SAF-RC-232
100-IU-2 & 100-IU-6 Remaining Waste Sites – Soil Full Protocol
FINAL VALIDATION PACKAGE

COMPLETE COPY OF VALIDATION PACKAGE TO:

Kathy Wendt	H4-21	KW 9/3/13 INITIAL/DATE

COMMENTS:

SDG XP0001 SAF-RC-232

Sample Location: 600-371

Date: 26 August 2013
To: Washington Closure Hanford Inc. (technical representative)
From: ELR Consulting
Project: 100-IU-2 & 100-IU-6 Remaining Waste Sites – Soil Full Protocol - Waste Site 600-371
Subject: Inorganic - Data Package No. XP0001-GEL

INTRODUCTION

This memo presents the results of data validation on Data Package No. XP0001 prepared by GEL Laboratories (GEL). 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
J1RVJ6	7/23/13	Soil	C	See note 1
J1RVJ7	7/23/13	Soil	C	See note 1
J1RVJ8	7/23/13	Soil	C	See note 1
J1RVJ9	7/23/13	Soil	C	See note 1
J1RVK0	7/23/13	Soil	C	See note 1
J1RVK1	7/23/13	Soil	C	See note 1

1 – Metals by 7471B & mercury by 7471B.

Data validation was conducted in accordance with the Washington Closure Hanford (WCH) validation statement of work and the 100 Area Remedial Action Sampling and Analysis Plan (DOE/RL-96-22, September 2009). 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.

Due to method blank contamination, the lead and zinc results in sample J1RVJ6 were qualified as undetected and flagged "UJ".

All other preparation blank results were acceptable.

Field (Equipment) Blank

One field blank (J1RVJ6) was submitted for analysis. Thirteen 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 75% to 125%. 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 74% and a sample result less than the IDL are qualified "UJ". Samples with a recovery of greater than 125% or less than 74% and a sample result greater than the IDL are qualified as estimates and flagged "J". Finally, for samples with a recovery greater than 125% and a sample result less than the IDL, no qualification is required.

Due to matrix spike recoveries outside QC limits, all aiuminum (172%), iron (184%) and silicon (139%) 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.

All laboratory duplicate results were acceptable.

Field Duplicate

One set of field duplicates (J1RVJ7/J1RVJ8) were submitted for analysis. Field duplicates are compared using the same criteria as 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. XP0001 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 method blank contamination, the lead and zinc results in sample J1RVJ6 were qualified as undetected and flagged "UJ".

- Due to matrix spike recoveries outside QC limits, all aluminum (172%), iron (184%) and silicon (139%) 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-96-22, Rev. 5, *100 Area Remedial Action Sampling and Analysis Plan*, U.S. Department of Energy, September 2009.

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: XP0001	REVIEWER: ELR	Project: 600-~~317~~ RLW 3719-3-13	PAGE 1 OF 1
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
Lead Zinc	UJ	J1RVJ6	Method blank Contamination
Aluminum Iron Silicon	J	All	MS recovery

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

Appendix 3

Annotated Laboratory Reports

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: August 2, 2013

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-232 Soil

Client SDG: XP0001

Client Sample ID: J1RVJ6
Sample ID: 330215001
Matrix: SOIL
Collect Date: 23-JUL-13 08:40
Receive Date: 25-JUL-13
Collector: Client
Moisture: <0.1%

Project: WCHN00213
Client ID: WCHN001

8/25/13

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Mercury Analysis-CVAA											
SW846 7471B Mercury in Solid "Dry Weight Corrected"											
Mercury	U	3.83	3.83	11.4	ug/kg	1	NOR1	07/29/13	1628	1317755	1
Metals Analysis-ICP											
ICP METALS 6010TR Close-out List "Dry Weight Corrected"											
Aluminum	N J	143000	6670	19600	ug/kg	1	HSC	08/01/13	1311	1317524	2
Arsenic	U	490	490	2940	ug/kg	1					
Barium		2040	98.0	490	ug/kg	1					
Beryllium	U	98.0	98.0	490	ug/kg	1					
Boron	U	980	980	4900	ug/kg	1					
Cadmium	U	98.0	98.0	490	ug/kg	1					
Calcium		40800	7840	24500	ug/kg	1					
Chromium	B	194	147	490	ug/kg	1					
Iron	N J	282000	7840	24500	ug/kg	1					
Magnesium	B	20500	8330	29400	ug/kg	1					
Manganese	*	7610	196	980	ug/kg	1					
Molybdenum	U	196	196	980	ug/kg	1					
Nickel	B	246	147	490	ug/kg	1					
Potassium		51600	6280	24500	ug/kg	1					
Selenium	U	490	490	2940	ug/kg	1					
Silicon	MN J	183000	1470	9800	ug/kg	1					
Silver	U	98.0	98.0	490	ug/kg	1					
Sodium	B	9020	6860	24500	ug/kg	1					
Copper	U	294	294	980	ug/kg	1	HSC	07/31/13	1449	1317524	3
Antimony	U	324	324	980	ug/kg	1	HSC	08/01/13	1322	1317524	4
Cobalt	B	149	147	490	ug/kg	1					
Lead	BC UJ	742	324	980	ug/kg	1					
Vanadium	B	327	98.0	490	ug/kg	1					
Zinc	C UJ	1330	392	980	ug/kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	SW846 3050B Prep for 6010C	AXG2	07/30/13	0750	1317523
SW846 7471B Prep	SW846 7471B Mercury Prep Soil	AXS5	07/26/13	1614	1317753

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Certificate of Analysis

Report Date: August 2, 2013

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-232 Soil

Client SDG: XP0001

Client Sample ID: J1RVJ7
Sample ID: 330215002
Matrix: SOIL
Collect Date: 23-JUL-13 09:00
Receive Date: 25-JUL-13
Collector: Client
Moisture: 2.93%

Project: WCHN00213
Client ID: WCHN001

8/25/13

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Mercury Analysis-CVAA											
SW846 7471B Mercury in Solid "Dry Weight Corrected"											
Mercury	U	4.13	4.13	12.3	ug/kg	1	NOR1	07/29/13	1635	1317755	1
Metals Analysis-ICP											
ICP METALS 6010TR Close-out List "Dry Weight Corrected"											
Aluminum	N J	5660000	6740	19800	ug/kg	1	HSC	07/31/13	1421	1317524	2
Arsenic		4170	495	2970	ug/kg	1					
Barium		56300	99.1	495	ug/kg	1					
Beryllium	B	263	99.1	495	ug/kg	1					
Boron	B	3800	991	4950	ug/kg	1					
Cadmium	B	217	99.1	495	ug/kg	1					
Calcium		4640000	7920	24800	ug/kg	1					
Chromium		10800	149	495	ug/kg	1					
Iron	N J	17300000	7920	24800	ug/kg	1					
Magnesium		3770000	8420	29700	ug/kg	1					
Manganese	*	245000	198	991	ug/kg	1					
Molybdenum	U	198	198	991	ug/kg	1					
Nickel		10300	149	495	ug/kg	1					
Potassium		1500000	6340	24800	ug/kg	1					
Selenium	U	495	495	2970	ug/kg	1					
Silicon	MN J	427000	1490	9910	ug/kg	1					
Silver	B	206	99.1	495	ug/kg	1					
Sodium		114000	6930	24800	ug/kg	1					
Copper		9850	297	991	ug/kg	1	HSC	07/31/13	1502	1317524	3
Antimony	DU	3270	3270	9910	ug/kg	10	HSC	08/01/13	1336	1317524	4
Cobalt	D	5810	1490	4950	ug/kg	10					
Lead	BD	7350	3270	9910	ug/kg	10					
Vanadium	D	42800	991	4950	ug/kg	10					
Zinc	D	35400	3960	9910	ug/kg	10					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	SW846 3050B Prep for 6010C	AXG2	07/30/13	0750	1317523
SW846 7471B Prep	SW846 7471B Mercury Prep Soil	AXS5	07/26/13	1614	1317753

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Certificate of Analysis

Report Date: August 2, 2013

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-232 Soil

Client SDG: XP0001

Client Sample ID: J1RVJ8
Sample ID: 330215003
Matrix: SOIL
Collect Date: 23-JUL-13 09:00
Receive Date: 25-JUL-13
Collector: Client
Moisture: 3.3%

Project: WCHN00213
Client ID: WCHN001

8/25/13

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Mercury Analysis-CVAA											
SW846 7471B Mercury in Solid "Dry Weight Corrected"											
Mercury	U	4.04	4.04	12.0	ug/kg	1	NOR1	07/29/13	1636	1317755	1
Metals Analysis-ICP											
ICP METALS 6010TR Close-out List "Dry Weight Corrected"											
Aluminum	N J	5610000	6160	18100	ug/kg	1	HSC	07/31/13	1423	1317524	2
Arsenic		3510	453	2720	ug/kg	1					
Barium		56900	90.5	453	ug/kg	1					
Beryllium	B	266	90.5	453	ug/kg	1					
Boron	B	2270	905	4530	ug/kg	1					
Cadmium	B	186	90.5	453	ug/kg	1					
Calcium		4760000	7240	22600	ug/kg	1					
Chromium		9560	136	453	ug/kg	1					
Iron	N J	16900000	7240	22600	ug/kg	1					
Magnesium		3520000	7700	27200	ug/kg	1					
Manganese	*	232000	181	905	ug/kg	1					
Molybdenum	U	181	181	905	ug/kg	1					
Nickel		9170	136	453	ug/kg	1					
Potassium		1410000	5800	22600	ug/kg	1					
Selenium	U	453	453	2720	ug/kg	1					
Silicon	MN J	314000	1360	9050	ug/kg	1					
Silver	B	214	90.5	453	ug/kg	1					
Sodium		135000	6340	22600	ug/kg	1					
Copper		10200	272	905	ug/kg	1	HSC	07/31/13	1504	1317524	3
Antimony	DU	2990	2990	9050	ug/kg	10	HSC	08/01/13	1350	1317524	4
Cobalt	D	5670	1360	4530	ug/kg	10					
Lead	BD	6800	2990	9050	ug/kg	10					
Vanadium	D	44500	905	4530	ug/kg	10					
Zinc	D	35000	3620	9050	ug/kg	10					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	SW846 3050B Prep for 6010C	AXG2	07/30/13	0750	1317523
SW846 7471B Prep	SW846 7471B Mercury Prep Soil	AXS5	07/26/13	1614	1317753

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Certificate of Analysis

Report Date: August 2, 2013

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-232 Soil

Client SDG: XP0001

Client Sample ID: J1RVJ9
Sample ID: 330215004
Matrix: SOIL
Collect Date: 23-JUL-13 09:10
Receive Date: 25-JUL-13
Collector: Client
Moisture: 2.78%

Project: WCHN00213
Client ID: WCHN001

8/25/13

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Mercury Analysis-CVAA											
SW846 7471B Mercury in Solid "Dry Weight Corrected"											
Mercury	B	4.11	4.05	12.1	ug/kg	1	NOR1	07/29/13	1641	1317755	1
Metals Analysis-ICP											
ICP METALS 6010TR Close-out List "Dry Weight Corrected"											
Aluminum	N J	5530000	6340	18600	ug/kg	1	HSC	07/31/13	1437	1317524	2
Arsenic		3840	466	2800	ug/kg	1					
Barium		65600	93.2	466	ug/kg	1					
Beryllium	B	273	93.2	466	ug/kg	1					
Boron		4660	932	4660	ug/kg	1					
Cadmium	B	314	93.2	466	ug/kg	1					
Calcium		11300000	7450	23300	ug/kg	1					
Chromium		10200	140	466	ug/kg	1					
Iron	N J	16900000	7450	23300	ug/kg	1					
Magnesium		3480000	7920	28000	ug/kg	1					
Manganese	*	242000	186	932	ug/kg	1					
Molybdenum	U	186	186	932	ug/kg	1					
Nickel		8320	140	466	ug/kg	1					
Potassium		1540000	5960	23300	ug/kg	1					
Selenium	U	466	466	2800	ug/kg	1					
Silicon	MN J	560000	1400	9320	ug/kg	1					
Silver	B	163	93.2	466	ug/kg	1					
Sodium		106000	6520	23300	ug/kg	1					
Copper		9690	280	932	ug/kg	1	HSC	07/31/13	1516	1317524	3
Antimony	DU	3070	3070	9320	ug/kg	10	HSC	08/01/13	1353	1317524	4
Cobalt	D	5360	1400	4660	ug/kg	10					
Lead	BD	8160	3070	9320	ug/kg	10					
Vanadium	D	46700	932	4660	ug/kg	10					
Zinc	D	36100	3730	9320	ug/kg	10					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	SW846 3050B Prep for 6010C	AXG2	07/30/13	0750	1317523
SW846 7471B Prep	SW846 7471B Mercury Prep Soil	AXS5	07/26/13	1614	1317753

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Certificate of Analysis

Report Date: August 2, 2013

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-232 Soil

Client SDG: XP0001

Client Sample ID: J1RVK0
Sample ID: 330215005
Matrix: SOIL
Collect Date: 23-JUL-13 09:20
Receive Date: 25-JUL-13
Collector: Client
Moisture: 2.39%

Project: WCHN00213
Client ID: WCHN001

8/25/13

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Mercury Analysis-CVAA											
SW846 7471B Mercury in Solid "Dry Weight Corrected"											
Mercury	U	3.96	3.96	11.8	ug/kg	1	NOR1	07/29/13	1643	1317755	1
Metals Analysis-ICP											
ICP METALS 6010TR Close-out List "Dry Weight Corrected"											
Aluminum	N J	5720000	6630	19500	ug/kg	1	HSC	07/31/13	1439	1317524	2
Arsenic		3790	488	2930	ug/kg	1					
Barium		58700	97.6	488	ug/kg	1					
Beryllium	B	279	97.6	488	ug/kg	1					
Boron	B	3250	976	4880	ug/kg	1					
Cadmium	B	238	97.6	488	ug/kg	1					
Calcium		5370000	7810	24400	ug/kg	1					
Chromium		10200	146	488	ug/kg	1					
Iron	N J	17400000	7810	24400	ug/kg	1					
Magnesium		3710000	8290	29300	ug/kg	1					
Manganese	*	248000	195	976	ug/kg	1					
Molybdenum	U	195	195	976	ug/kg	1					
Nickel		10000	146	488	ug/kg	1					
Potassium		1330000	6240	24400	ug/kg	1					
Selenium	U	488	488	2930	ug/kg	1					
Silicon	MN J	279000	1460	9760	ug/kg	1					
Silver	B	144	97.6	488	ug/kg	1					
Sodium		128000	6830	24400	ug/kg	1					
Copper		9940	293	976	ug/kg	1	HSC	07/31/13	1519	1317524	3
Antimony	DU	3220	3220	9760	ug/kg	10	HSC	08/01/13	1356	1317524	4
Cobalt	D	5820	1460	4880	ug/kg	10					
Lead	BD	5790	3220	9760	ug/kg	10					
Vanadium	D	45200	976	4880	ug/kg	10					
Zinc	D	34200	3900	9760	ug/kg	10					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	SW846 3050B Prep for 6010C	AXG2	07/30/13	0750	1317523
SW846 7471B Prep	SW846 7471B Mercury Prep Soil	AXS5	07/26/13	1614	1317753

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Certificate of Analysis

Report Date: August 2, 2013

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-232 Soil

Client SDG: XP0001

Client Sample ID: J1RVK1
Sample ID: 330215006
Matrix: SOIL
Collect Date: 23-JUL-13 09:25
Receive Date: 25-JUL-13
Collector: Client
Moisture: 1.16%

Project: WCHN00213
Client ID: WCHN001

8/25/13

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Mercury Analysis-CVAA											
SW846 7471B Mercury in Solid "Dry Weight Corrected"											
Mercury	U	3.98	3.98	11.9	ug/kg	1	NOR1	07/29/13	1645	1317755	1
Metals Analysis-ICP											
ICP METALS 6010TR Close-out List "Dry Weight Corrected"											
Aluminum	N J	5950000	6630	19500	ug/kg	1	HSC	07/31/13	1441	1317524	2
Arsenic		3620	487	2920	ug/kg	1					
Barium		59000	97.5	487	ug/kg	1					
Beryllium	B	282	97.5	487	ug/kg	1					
Boron	B	2990	975	4870	ug/kg	1					
Cadmium	B	264	97.5	487	ug/kg	1					
Calcium		2910000	7800	24400	ug/kg	1					
Chromium		10400	146	487	ug/kg	1					
Iron	N J	17600000	7800	24400	ug/kg	1					
Magnesium		3410000	8280	29200	ug/kg	1					
Manganese	*	250000	195	975	ug/kg	1					
Molybdenum	U	195	195	975	ug/kg	1					
Nickel		8860	146	487	ug/kg	1					
Potassium		1370000	6240	24400	ug/kg	1					
Selenium	U	487	487	2920	ug/kg	1					
Silicon	MN J	345000	1460	9750	ug/kg	1					
Silver	B	285	97.5	487	ug/kg	1					
Sodium		116000	6820	24400	ug/kg	1					
Copper		9670	292	975	ug/kg	1	HSC	07/31/13	1522	1317524	3
Antimony	DU	3220	3220	9750	ug/kg	10	HSC	08/01/13	1359	1317524	4
Cobalt	D	5730	1460	4870	ug/kg	10					
Lead	BD	6640	3220	9750	ug/kg	10					
Vanadium	D	45700	975	4870	ug/kg	10					
Zinc	D	33800	3900	9750	ug/kg	10					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	SW846 3050B Prep for 6010C	AXG2	07/30/13	0750	1317523
SW846 7471B Prep	SW846 7471B Mercury Prep Soil	AXS5	07/26/13	1614	1317753

Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

Metals Fractional Narrative
WC-HANFORD, INC. (WCHN)
SDG XP0001

Sample Analysis

Sample ID	Client ID
330215001	J1RVJ6
330215002	J1RVJ7
330215003	J1RVJ8
330215004	J1RVJ9
330215005	J1RVK0
330215006	J1RVK1
1202915432	Method Blank (MB) **ICP**
1202915433	Laboratory Control Sample (LCS)
1202915436	330215001(J1RVJ6L) Serial Dilution (SD)
1202915434	330215001(J1RVJ6D) Sample Duplicate (DUP)
1202915435	330215001(J1RVJ6S) Matrix Spike (MS)
1202920306	330215001(J1RVJ6PS) Post Spike (PS)
1202915936	Method Blank (MB) **CVAA**
1202915937	Laboratory Control Sample (LCS)
1202915940	330215001(J1RVJ6L) Serial Dilution (SD)
1202915938	330215001(J1RVJ6D) Sample Duplicate (DUP)
1202915939	330215001(J1RVJ6S) Matrix Spike (MS)

The samples in this SDG were analyzed on a "dry weight" basis.

Method/Analysis Information

Analytical Batch:	1317524 and 1317755
Prep Batch :	1317523 and 1317753
Standard Operating Procedures:	GL-MA-E-013 REV# 22, GL-MA-E-009 REV# 22 and GL-MA-E-010 REV# 26
Analytical Method:	SW846 3050B/6010C and SW846 7471B
Prep Method :	SW846 3050B and SW846 7471B Prep

Preparation/Analytical Method Verification

The SOP stated above has been prepared based on technical research and testing conducted by GEL Laboratories, LLC. and with guidance from the regulatory documents listed in this "Method/Analysis Information" section.

System Configuration

The Metals analysis-ICP was performed on a P E 5300 Optima radial/axial-viewing inductively coupled plasma atomic emission spectrometer. The instrument is equipped with a Burgener nebulizer, cyclonic spray chamber, and yttrium or scandium internal standard. Operating conditions for the ICP are set at a power level of 1500 watts. The instrument has a peristaltic pump flow rate of 1.4L/min, argon gas flows of 15 L/min and 0.2 L/min for the torch and auxiliary gases, and a flow setting of 0.65L/min for the nebulizer.

The Metals analysis-ICP was performed on a PE 7300 Optima radial/axial-viewing inductively coupled plasma atomic emission spectrometer. The instrument is equipped with a Burgener nebulizer, cyclonic spray chamber, and yttrium or scandium internal standard. Operating conditions for the ICP are set at a power level of 1500 watts. The instrument has a peristaltic pump flow rate of 1.4L/min, argon gas flows of 15 L/min and 0.2 L/min for the torch and auxiliary gases, and a flow setting of 0.65L/min for the nebulizer.

The Metals analysis-Mercury was performed on a Perkin-Elmer Flow Injection Mercury System (FIMS-100) automated mercury analyzer. The instrument consists of a cold vapor atomic absorption spectrometer set to detect mercury at a wavelength of 253.7 nm. Sample introduction through the flow injection system is performed via a peristaltic pump at 9 mL/min and nitrogen carrier gas rate of 80 mL/min.

Calibration Information

Instrument Calibration
All initial calibration requirements have been met for this sample delivery group (SDG).

CRDL Requirements
All CRDL standards met the advisory control limits with the exception of potassium, antimony, and lead. PQL01 (analyzed at 12:43 on 08/01/13) recovered high for potassium; however, the sample result was 2x greater than the PQL, therefore the data is reported. PQL02 (analyzed at 13:43 on 08/01/13) and PQL03 (analyzed at 14:20 on 08/01/13) recovered high for antimony; however, the sample results were less than the MDL, therefore the data is reported. PQL02 (analyzed at 13:43 on 08/01/13) recovered high for lead and the samples in this SDG were not less than the MDL or 2x greater than the PQL. The samples were analyzed on 3 separate passing calibrations. A bracketing PQL recovered high for lead in all 3 analyses due to possible matrix interactions. The lead results could be biased slightly high. The data is being reported.

ICSA/ICSAB Statement
All interference check samples (ICSA and ICSAB) associated with this SDG met the established acceptance criteria.

Continuing Calibration Blank (CCB) Requirements
All continuing calibration blanks (CCB) bracketing this batch met the established acceptance criteria.

Continuing Calibration Verification (CCV) Requirements
All continuing calibration verifications (CCV) bracketing this SDG met the acceptance criteria.

Quality Control (QC) Information

Method Blank (MB) Statement
The MBs analyzed with this SDG met the acceptance criteria.

Laboratory Control Sample (LCS) Recovery
The LCS spike recoveries met the acceptance limits.

Quality Control (QC) Sample Statement
The following sample was selected as the quality control (QC) sample for this SDG: 330215001 (J1RVJ6).

Matrix Spike (MS) Recovery Statement
The percent recoveries (%R) obtained from the MS analyses are evaluated when the sample concentration is less than four times (4X) the spike concentration added. The MS met the recommended quality control acceptance criteria for percent recoveries for all applicable analytes with the exception of aluminum, iron, and silicon.

Duplicate Relative Percent Difference (RPD) Statement
The relative percent difference (RPD) obtained from the designated sample duplicate (DUP) is evaluated based on acceptance criteria of 20% when the sample is >5X the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the contract required detection limit (RL), a control of +/-RL is used to evaluate the DUP results. All applicable analytes met these requirements with the exception of manganese.

Post Spike (PS) Recovery Statement
The percent recoveries (%R) obtained from the PS analyses are evaluated when the sample concentration is less than four times (4X) the spike concentration added. The PS met the recommended quality control acceptance criteria for percent recoveries for all applicable analytes and verifies the absence of matrix interferences.

Serial Dilution % Difference Statement
The serial dilution is used to assess matrix suppression or enhancement. Raw element concentrations that are 25X the IDL/MDL for CVAA, 50X the IDL/MDL for ICP, and 100X the IDL/MDL for ICP-MS analyses are applicable for serial dilution assessment. All applicable analytes met the acceptance criteria of less than 10% difference (%D) with the exception of silicon.

Technical Information

Holding Time Specifications
GEL assigns holding times based on the associated methodology, which assigns the date and time from sample collection of sample receipt. Those holding times expressed in hours are calculated in the AlphaLIMS system. Those holding times expressed as days expire at midnight on the day of expiration. All samples in this SDG met the specified holding time.

Preparation/Analytical Method Verification
All procedures were performed as stated in the SOP. Method SW-846 3050B is not a total digestion technique for most samples. It is a very strong acid digestion that will dissolve almost all elements that could become environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

Sample Dilutions
Dilutions are performed to minimize matrix interferences resulting from elevated mineral element concentrations present in solid samples and/or to bring over range target analyte concentrations into the linear calibration range of the instrument. Samples 330215002, 330215003, 330215004, 330215005, and 330215006 required dilutions in order to bring raw values of titanium within the linear range of the instrument, and for the analytes antimony, cobalt, lead, vanadium, and zinc that titanium interferes with, in order to ensure that the inter-element correction factors were valid on the ICP.

Preparation Information
The samples in this SDG were prepared exactly according to the cited SOP.

Miscellaneous Information

Electronic Packaging Comment
This data package was generated using an electronic data processing program referred to as virtual packaging. In an effort to increase quality and efficiency, the laboratory has developed systems to generate all data packages electronically. The following change from traditional packages should be noted:

Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and dates are present on the original raw data. These hard copies are temporarily stored in the laboratory. An electronic signature page inserted after the case

narrative will include the data validator's signature and title. The signature page also includes the data qualifiers used in the fractional package. Data that are not generated electronically, such as hand written pages, will be scanned and inserted into the electronic package.

Data Exception (DER) Documentation
Data exception reports are generated to document any procedural anomalies that may deviate from referenced SOP or contractual documents. The following DER was generated for this SDG: 1207485. A copy is included in the Miscellaneous Data section of this package.

Additional Comments
Additional comments were not required for this SDG.

Certification Statement

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

Review Validation:

GEL requires all analytical data to be verified by a qualified data validator. In addition, all data designated for CLP or CLP-like packaging will receive a third level validation upon completion of the data package.

The following data validator verified the information presented in this case narrative:

Reviewer: _____ **Date:** 08/05/13

DATA EXCEPTION REPORT

Mo.Day Yr.	Division:	Quality Criteria:	Type:
01-AUG-13	Industrial	Specifications	Process
Instrument Type:	**Test / Method:**	**Matrix Type:**	**Client Code:**
ICP	SW846 3050B/6010C	Solid	WCHN
Batch ID:	**Sample Numbers:**		
1317524	See Below		

Potentially affected work order(s)(SDG): 330215(XP0001),330221(XP0002),330227(XP0003)

Application Issues:

Failed Recovery for MS/PS

Failed RPD for DUP

Other

Specification and Requirements Exception Description:	DER Disposition:
1. Failed Recovery for MS/PS: QC 1202915435MS,1202915438MS, 1202915441MS 2. Failed RPD for DUP: QC 1202915434DUP, 1202915440DUP 3. Low level PQL recovered high for lead:	1. The matrix spike recovery failed outside of the control limits for aluminum and silicon for 330221 and aluminum, iron, and silicon for 330215 and 330227. The post spike passed the required control limits for all analytes. This verifies the absence of a matrix interference. Per GEL's accredited methods and SOPs, a corrective action is not required and the data is qualified and reported. 2. The sample and sample duplicate % RPD failed outside the control limits for iron and manganese for 330227 and manganese for 330215 due to possible sample non-homogeneity. Per GEL's accredited methods and SOPs, a corrective action is not required and the data is qualified and reported. 3. The samples were analyzed on 3 separate passing calibrations. A bracketing PQL recovered high for lead in all 3 analyses due to possible matrix interactions. Samples 330215001, 002, 003, 004, 005, 006 and 330221001 were not less than the MDL or 2x greater than the PQL. The lead results could be biased slightly high. The data is being reported.

Originator's Name:
Helen Camello 01-AUG-13

Data Validator/Group Leader:
Jamie Johnson 01-AUG-13

330215

Washington Closure Hanford — CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

RC-232-040 | Page 1 of 2

Collector: A. Dunnum	Company Contact: Joan Kessner	Telephone No.: 375-4688	Project Coordinator: KESSNER, JH
Price Code: 8C	Data Turnaround: 15 Days		
Project Designation: 100-IU-2 & 100-IU-6 Remaining Waste Sites	Sampling Location: 600-371		SAF No.: RC-232
Ice Chest No.: WCH-11-009	Field Logbook No.: EL 1666	COA: 06037120000	Method of Shipment: fed Ex
Shipped To: Eberline - GEL	Offsite Property No.: A120893		Bill of Lading/Air Bill No.: See OSPC

7 MAO 7-23-13

POSSIBLE SAMPLE HAZARDS/REMARKS
None

Special Handling and/or Storage
Cool 4 C

Preservation	Cool 4C	Cool 4C
Type of Container	G/P	aG
No. of Container(s)	1	1
Volume	125mL	125mL

SAMPLE ANALYSIS

Sample No.	Matrix	Sample Date	Sample Time	See item (1) in Special Instructions	Semi-VOA - 8270A (TCL)
J1RVJ6	SOIL	7-23-13	0840	X	X
J1RVJ7	SOIL	7-23-13	0900	X	X
J1RVJ8	SOIL	7-23-13	0900	X	X
J1RVJ9	SOIL	7-23-13	0910	X	X
J1RVK0	SOIL	7-23-13	0920	X	X

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
A. Dunnum	7-23-13 1045	R. Fahlberg R. Fahlberg	7-23-13 1045
R. Fahlberg R. Fahlberg	7-23-13 1515	John Harris	7-23-13 1515
John Harris	7-23-13 1650	Fed Ex #3A 1060 Battelle	7-23-13 1650
Fed Ex #3A 1060 Battelle	7-24-13 1014	John Harris	7-24-13 1014
John Harris	7-24-13 1015	Fed Ex	
		Jennifer Pellegrini	7-25-13 0955

FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	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) (Mercury)

REVIEWED BY CMB DATE 7-24-13

XP0001

WCH-EE-011

Generated Date/Time: 07/22/2013 16:16, PDT

Washington Closure Hanford — CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

RC-232-040 | Page 2 of 2

Collector	A. Dunnum
Company Contact	Joan Kessner
Telephone No.	375-4688
Project Coordinator	KESSNER, JH
Price Code	8C
Data Turnaround	~~15 Days~~ 7 wkd 7-23-13
Project Designation	100-IU-2 & 100-IU-6 Remaining Waste Sites
Sampling Location	600-371
SAF No.	RC-232
Ice Chest No.	WCH-11-009
Field Logbook No.	EL1666
COA	0603712000
Method of Shipment	fed EX
Shipped To	Eberline - GEL
Offsite Property No.	A120893
Bill of Lading/Air Bill No.	See OSPC

POSSIBLE SAMPLE HAZARDS/REMARKS
None

Special Handling and/or Storage
Cool 4 C

Preservation	Cool 4C	Cool 4C									
Type of Container	G/P	aG									
No. of Container(s)	1	1									
Volume	125mL	125mL									
SAMPLE ANALYSIS	See item (1) in Special Instructions	Semi-VOA - 8270A (TCL)									

Sample No.	Matrix	Sample Date	Sample Time										
J1RVK1	SOIL	7-23-13	0925	X	X								

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
A. Dunnum	7-23-13 1046	R. Fehlberg R. Fehlberg	7-23-13 1045
R. Fehlberg R. Fehlberg	7-23-13 1515	Joyce Harris	7-23-13 1515
Joyce Harris	7-23-13 1658	Friz #3A 1060 Battelle	7-23-13 1660
Friz #3A 1060 Battelle	7-24-13 1014	Joyce Harris	7-24-13 1014
Joyce Harris	WCH 7-24-13 1015	FedEx	
		Jennifer Pellegrini	7-25-13 0845

FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	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) (Mercury)

REVIEWED BY CMB DATE 7-24-13

XP0001

WCH-EE-011

Generated Date/Time: 07/22/2013 16:16, PDT

Appendix 5

Data Validation Supporting Documentation

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E
PROJECT: 600-371			DATA PACKAGE: XP0001		
VALIDATOR: ELR		LAB: Gel		DATE: 8/23/13	
			SDG: XP0001		

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

SAMPLES/MATRIX
J1RUJ6 J1RUJ7 J1RUJ8 J1RUJ9
J1RUK0 J1RUK1
Soil

1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE

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

Comments:

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

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

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

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

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

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

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

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

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

Comments:

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

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

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

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

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

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

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

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

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

Comments: J6 - lead + zinc - UJ

FB - 13 detects

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

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

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

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

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

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

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

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

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

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

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

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

Comments: MS - al (177%) iron (184%) silicon (135%) - J all

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: _____

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

QC Summary

Report Date: August 2, 2013

WC-Hanford, Inc.
2620 Fermi Avenue
MSIN H4-21
Richland, Washington

Contact: Joan Kessner

Workorder: 330215 Client SDG: XP0001 Project Description: RC-232 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis-ICP										
Batch 1317524										
QC1202915434 330215001 DUP										
Aluminum	N	143000		140000	ug/kg	1.92		(0%-20%)	HSC	07/31/13 14:10
Antimony	U	324	U	329	ug/kg	N/A ^				08/01/13 13:26
Arsenic	U	490	B	655	ug/kg	177 ^		(+/-2990)		07/31/13 14:10
Barium		2040		1840	ug/kg	10.1 ^		(+/-499)		
Beryllium	U	98.0	U	99.8	ug/kg	N/A ^				
Boron	U	980	U	998	ug/kg	N/A ^				
Cadmium	U	98.0	U	99.8	ug/kg	N/A ^				
Calcium		40800		36300	ug/kg	11.7 ^		(+/-25000)		
Chromium	B	194	U	150	ug/kg	40.8 ^		(+/-499)		
Cobalt	B	149	U	150	ug/kg	23.9 ^		(+/-499)		08/01/13 13:26
Copper	U	294	U	299	ug/kg	N/A ^				07/31/13 14:52
Iron	N	282000		298000	ug/kg	5.46		(0%-20%)		07/31/13 14:10
Lead	BC	742	BC	549	ug/kg	30.0 ^		(+/-998)		08/01/13 13:26
Magnesium	B	20500	B	19700	ug/kg	3.66 ^		(+/-29900)		07/31/13 14:10
Manganese	*	7610	*	5810	ug/kg	26.8*		(0%-20%)		
Molybdenum	U	196	U	200	ug/kg	N/A ^				
Nickel	B	246	U	150	ug/kg	69.1 ^		(+/-499)		
Potassium		51600		40100	ug/kg	25.1 ^		(+/-25000)		
Selenium	U	490	U	499	ug/kg	N/A ^				
Silicon	MN	183000		160000	ug/kg	13.3		(0%-20%)		

QC Summary

Workorder: 330215 **Client SDG:** XP0001 **Project Description:** RC-232 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD/D%		REC%	Range	Anlst	Date Time
Metals Analysis-ICP												
Batch 1317524												
Silver		U	98.0	U	99.8	ug/kg	N/A	^			HSC	07/31/13 14:10
Sodium		B	9020	U	6990	ug/kg	52.6	^		(+/-25000)		
Vanadium		B	327	B	259	ug/kg	23.2	^		(+/-499)		08/01/13 13:26
Zinc		C	1330	C	1410	ug/kg	6.09	^		(+/-998)		
QC1202915433 LCS												
Aluminum	500000				465000	ug/kg			93	(80%-120%)		07/31/13 14:02
Antimony	50000				49000	ug/kg			98	(80%-120%)		08/01/13 13:18
Arsenic	50000				50400	ug/kg			101	(80%-120%)		07/31/13 14:02
Barium	50000				48300	ug/kg			96.6	(80%-120%)		
Beryllium	50000				50200	ug/kg			100	(80%-120%)		
Boron	50000				46400	ug/kg			92.7	(80%-120%)		
Cadmium	50000				50500	ug/kg			101	(80%-120%)		
Calcium	500000				489000	ug/kg			97.8	(80%-120%)		
Chromium	50000				48300	ug/kg			96.5	(80%-120%)		
Cobalt	50000				48600	ug/kg			97.1	(80%-120%)		08/01/13 13:18
Copper	50000				48200	ug/kg			96.5	(80%-120%)		07/31/13 14:46
Iron	500000				490000	ug/kg			97.9	(80%-120%)		07/31/13 14:02
Lead	50000				49300	ug/kg			98.6	(80%-120%)		08/01/13 13:18
Magnesium	500000				499000	ug/kg			99.8	(80%-120%)		07/31/13 14:02
Manganese	50000				49200	ug/kg			98.3	(80%-120%)		
Molybdenum	50000				48000	ug/kg			96.1	(80%-120%)		
Nickel	50000				49400	ug/kg			98.7	(80%-120%)		

QC Summary

Workorder: 330215 **Client SDG:** XP0001 **Project Description:** RC-232 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis-ICP										
Batch 1317524										
Potassium	500000			492000	ug/kg		98.4	(80%-120%)	HSC	07/31/13 14:02
Selenium	50000			53500	ug/kg		107	(80%-120%)		
Silicon	500000			438000	ug/kg		87.6	(80%-120%)		
Silver	50000			48300	ug/kg		96.6	(80%-120%)		
Sodium	500000			466000	ug/kg		93.2	(80%-120%)		
Vanadium	50000			50100	ug/kg		100	(80%-120%)		08/01/13 13:18
Zinc	50000			51300	ug/kg		103	(80%-120%)		
QC1202915432 MB										
Aluminum			U	6720	ug/kg					07/31/13 13:58
Antimony			U	326	ug/kg					08/01/13 13:14
Arsenic			U	494	ug/kg					07/31/13 13:58
Barium			U	98.8	ug/kg					
Beryllium			U	98.8	ug/kg					
Boron			U	988	ug/kg					
Cadmium			U	98.8	ug/kg					
Calcium			U	7910	ug/kg					
Chromium			U	148	ug/kg					
Cobalt			U	148	ug/kg					08/01/13 13:14
Copper			U	296	ug/kg					07/31/13 14:43
Iron			U	7910	ug/kg					07/31/13 13:58
Lead			B	456	ug/kg					08/01/13 13:14
Magnesium			U	8400	ug/kg					07/31/13 13:58

QC Summary

Workorder: 330215 **Client SDG:** XP0001 **Project Description:** RC-232 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis-ICP											
Batch 1317524											
Manganese				U	198	ug/kg				HSC	07/31/13 13:58
Molybdenum				U	198	ug/kg					
Nickel				U	148	ug/kg					
Potassium				U	6320	ug/kg					
Selenium				U	494	ug/kg					
Silicon				U	1480	ug/kg					
Silver				U	98.8	ug/kg					
Sodium				U	6920	ug/kg					
Vanadium				U	98.8	ug/kg					08/01/13 13:14
Zinc				B	472	ug/kg					
QC1202915435 330215001 MS											
Aluminum	495000	N	143000	N	997000	ug/kg		172*	(75%-125%)		07/31/13 14:14
Antimony	49500	U	324		51900	ug/kg		105	(75%-125%)		08/01/13 13:29
Arsenic	49500	U	490		53900	ug/kg		109	(75%-125%)		07/31/13 14:14
Barium	49500		2040		54300	ug/kg		106	(75%-125%)		
Beryllium	49500	U	98.0		54100	ug/kg		109	(75%-125%)		
Boron	49500	U	980		49900	ug/kg		100	(75%-125%)		
Cadmium	49500	U	98.0		53600	ug/kg		108	(75%-125%)		
Calcium	495000		40800		570000	ug/kg		107	(75%-125%)		
Chromium	49500	B	194		51900	ug/kg		104	(75%-125%)		
Cobalt	49500	B	149		52000	ug/kg		105	(75%-125%)		08/01/13 13:29
Copper	49500	U	294		51500	ug/kg		104	(75%-125%)		07/31/13 14:55

QC Summary

Workorder: 330215 **Client SDG:** XP0001 **Project Description:** RC-232 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis-ICP											
Batch 1317524											
Iron	495000	N	282000	N	1190000	ug/kg		184*	(75%-125%)	HSC	07/31/13 14:14
Lead	49500	BC	742		53000	ug/kg		106	(75%-125%)		08/01/13 13:29
Magnesium	495000	B	20500		572000	ug/kg		111	(75%-125%)		07/31/13 14:14
Manganese	49500	*	7610		61600	ug/kg		109	(75%-125%)		
Molybdenum	49500	U	196		50800	ug/kg		102	(75%-125%)		
Nickel	49500	B	246		53100	ug/kg		107	(75%-125%)		
Potassium	495000		51600		578000	ug/kg		106	(75%-125%)		
Selenium	49500	U	490		57200	ug/kg		115	(75%-125%)		
Silicon	495000	MN	183000	N	871000	ug/kg		139*	(75%-125%)		
Silver	49500	U	98.0		51800	ug/kg		104	(75%-125%)		
Sodium	495000	B	9020		502000	ug/kg		99.5	(75%-125%)		
Vanadium	49500	B	327		53500	ug/kg		107	(75%-125%)		08/01/13 13:29
Zinc	49500	C	1330		55700	ug/kg		110	(75%-125%)		
QC1202920306 330215001 PS											
Aluminum	5000	N	1460		6540	ug/L		102	(80%-120%)		08/01/13 16:50
Iron	5000	N	2880		7980	ug/L		102	(80%-120%)		
Silicon	5000	MN	1860		7150	ug/L		106	(80%-120%)		
QC1202915436 330215001 SDILT											
Aluminum		N	1460	D	278	ug/L	4.41		(0%-10%)		07/31/13 14:17
Antimony		U	0.118	DU	1620	ug/L	N/A		(0%-10%)		08/01/13 13:32
Arsenic		U	0.406	DU	2450	ug/L	N/A		(0%-10%)		07/31/13 14:17
Barium			20.8	D	3.89	ug/L	6.34		(0%-10%)		
Beryllium		U	0.244	DU	490	ug/L	N/A		(0%-10%)		

QC Summary

Workorder: 330215 **Client SDG:** XP0001 **Project Description:** RC-232 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis-ICP										
Batch 1317524										
Boron	U	3.40	DU	4900	ug/L	N/A		(0%-10%)	HSC	07/31/13 14:17
Cadmium	U	0.696	DU	490	ug/L	N/A		(0%-10%)		
Calcium		417	D	107	ug/L	28.2		(0%-10%)		
Chromium	B	1.98	DU	735	ug/L	N/A		(0%-10%)		
Cobalt	B	1.51	DU	735	ug/L	N/A		(0%-10%)		08/01/13 13:32
Copper	U	-2.05	DU	1470	ug/L	N/A		(0%-10%)		07/31/13 14:59
Iron	N	2880	D	581	ug/L	.903		(0%-10%)		07/31/13 14:17
Lead	BC	7.57	DU	1620	ug/L	N/A		(0%-10%)		08/01/13 13:32
Magnesium	B	209	DU	41700	ug/L	N/A		(0%-10%)		07/31/13 14:17
Manganese	*	77.6	D	14.8	ug/L	4.74		(0%-10%)		
Molybdenum	U	1.20	DU	980	ug/L	N/A		(0%-10%)		
Nickel	B	2.51	DU	735	ug/L	N/A		(0%-10%)		
Potassium		526	D	87.1	ug/L	17.3		(0%-10%)		
Selenium	U	1.08	DU	2450	ug/L	N/A		(0%-10%)		
Silicon	MN	1860	DM	289	ug/L	22.5*		(0%-10%)		
Silver	U	0.168	DU	490	ug/L	N/A		(0%-10%)		
Sodium	B	92.0	DU	34300	ug/L	N/A		(0%-10%)		
Vanadium	B	3.34	DU	490	ug/L	N/A		(0%-10%)		08/01/13 13:32
Zinc	C	13.5	CD	4.10	ug/L	51.3		(0%-10%)		
Metals Analysis-Mercury										
Batch 1317755										
QC1202915938 330215001 DUP										
Mercury	U	3.83	U	4.02	ug/kg	N/A ^			NOR1	07/29/13 16:30

QC Summary

Workorder: 330215 **Client SDG:** XP0001 **Project Description:** RC-232 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis-Mercury											
Batch 1317755											
QC1202915937 LCS											
Mercury	117				120	ug/kg		103	(80%-120%)	NOR1	07/29/13 16:26
QC1202915936 MB											
Mercury				U	3.96	ug/kg					07/29/13 16:25
QC1202915939 330215001 MS											
Mercury	119	U	3.83		121	ug/kg		102	(80%-120%)		07/29/13 16:31
QC1202915940 330215001 SDILT											
Mercury		U	-0.031	DU	19.1	ug/L	N/A		(0%-10%)		07/29/13 16:33

Notes:

The Qualifiers in this report are defined as follows:

- * Duplicate analysis not within control limits
- + Correlation coefficient for Method of Standard Additions (MSA) is < 0.995
- B The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate).
- C Target analyte was detected in the sample and the associated blank, and the sample concentration was <= 5 times the blank concentration.
- D Results are reported from a diluted aliquot of sample.
- E Reported value is estimated due to interferences. See comment in narrative.
- M Duplicate precision not met.
- N Spike Sample recovery is outside control limits.
- S Reported value determined by the Method of Standard Additions (MSA)
- U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.
- W Post-digestion spike recovery for GFAA out of control limit. Sample absorbency < 50% of spike absorbency.
- X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Y Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- Z Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.
^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.
* Indicates that a Quality Control parameter was not within specifications.
For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

Date: 26 August 2013
To: Washington Closure Hanford Inc. (technical representative)
From: ELR Consulting
Project: 100-IU-2 & 100-IU-6 Remaining Waste Sites – Soil Full Protocol - Waste Site 600-371
Subject: Semivolatile Organic - Data Package No. XP0001-GEL

INTRODUCTION

This memo presents the results of data validation on Data Package No. XP0001 prepared by GEL Laboratories (GEL). 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
J1RVJ7	7/23/13	Soil	C	See note 1
J1RVJ8	7/23/13	Soil	C	See note 1
J1RVJ9	7/23/13	Soil	C	See note 1
J1RVK0	7/23/13	Soil	C	See note 1
J1RVK1	7/23/13	Soil	C	See note 1

1 – Semivolatile organics by 8270C.

Data validation was conducted in accordance with the Washington Closure Hanford (WCH) validation statement of work and the 100 Area Remedial Action Sampling and Analysis Plan (DOE/RL-96-22, September 2009). 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: Analytes 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 an LCS recovery outside QC limits, all 2,4-dinitrophenol (21.3%) and hexachlorocyclopentadiene (48.4%), results were qualified as estimates and flagged "J".

Due to a matrix spike duplicate recovery outside QC limits, all hexachlorocyclopentadiene (49.2%) 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.

All duplicate results were acceptable.

Field Duplicate Samples

One set field duplicates (J1RVJ7/J1RVJ8) 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 (RQL's) to ensure that laboratory detection levels meet the required criteria. All analytes met the RQL.

Completeness

Data package No. XP0001 was submitted for validation and verified for completeness. Completeness is based on the percentage of data determined to be valid (i.e., not rejected). The completion percentage was 100%.

MAJOR DEFICIENCIES

None found.

MINOR DEFICIENCIES

The following minor deficiencies were noted:

- Due to an LCS recovery outside QC limits, all 2,4-dinitrophenol (21.3%) and hexachlorocyclopentadiene (48.4%), results were qualified as estimates and flagged "J".

- Due to a matrix spike duplicate recovery outside QC limits, all hexachlorocyclopentadiene (49.2%) 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-96-22, Rev. 5, *100 Area Remedial Action Sampling and Analysis Plan*, U.S. Department of Energy, September 2009.

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

SEMIVOLATILE ORGANIC DATA QUALIFICATION SUMMARY*

SDG: XP0001	REVIEWER: ELR	Project: 600-~~317~~ 371 RLW 9-3-13	PAGE 1 OF 1
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
Hexachlorocyclopentadiene	J	All	MSD recovery
2,4-dinitrophenol hexachlorocyclopentadiene	J	All	LCS recovery

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

Appendix 3

Annotated Laboratory Reports

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: **RC-232 Soil**

Report Date: August 1, 2013

Client Sample ID:	J1RVJ7	Project:	WCHN00213
Sample ID:	330215002	Client ID:	WCHN001
Matrix:	SOIL		
Collect Date:	23-JUL-13 09:00		
Receive Date:	25-JUL-13		
Collector:	Client		
Moisture:	2.93%		

✓ 8/25/13

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Semi-Volatile-GC/MS										
8270D/3541 BNA Soil Automated Soxhlet "Dry Weight Corrected"										
1,2,4-Trichlorobenzene	U	103	103	343	UG/KG	1	JMB3 07/27/13	1223	1317730	1
1,2-Dichlorobenzene	U	103	103	343	UG/KG	1				
1,3-Dichlorobenzene	U	103	103	343	UG/KG	1				
1,4-Dichlorobenzene	U	103	103	343	UG/KG	1				
2,4,5-Trichlorophenol	U	103	103	343	UG/KG	1				
2,4,6-Trichlorophenol	U	103	103	343	UG/KG	1				
2,4-Dichlorophenol	U	103	103	343	UG/KG	1				
2,4-Dimethylphenol	U	103	103	343	UG/KG	1				
2,4-Dinitrophenol	U J	103	103	685	UG/KG	1				
2,4-Dinitrotoluene	U	103	103	343	UG/KG	1				
2,6-Dinitrotoluene	U	103	103	343	UG/KG	1				
2-Chloronaphthalene	U	10.3	10.3	34.3	UG/KG	1				
2-Chlorophenol	U	103	103	343	UG/KG	1				
2-Methyl-4,6-dinitrophenol	U	103	103	343	UG/KG	1				
2-Methylnaphthalene	U	10.3	10.3	34.3	UG/KG	1				
2-Nitrophenol	U	103	103	343	UG/KG	1				
3,3'-Dichlorobenzidine	U	103	103	343	UG/KG	1				
4-Bromophenylphenylether	U	103	103	343	UG/KG	1				
4-Chloro-3-methylphenol	U	137	137	343	UG/KG	1				
4-Chloroaniline	U	103	103	343	UG/KG	1				
4-Chlorophenylphenylether	U	103	103	343	UG/KG	1				
4-Nitrophenol	U	103	103	343	UG/KG	1				
Acenaphthene	U	10.3	10.3	34.3	UG/KG	1				
Acenaphthylene	U	10.3	10.3	34.3	UG/KG	1				
Anthracene	U	10.3	10.3	34.3	UG/KG	1				
Benzo(a)anthracene	U	10.3	10.3	34.3	UG/KG	1				
Benzo(a)pyrene	U	10.3	10.3	34.3	UG/KG	1				
Benzo(b)fluoranthene	U	10.3	10.3	34.3	UG/KG	1				
Benzo(ghi)perylene	U	10.3	10.3	34.3	UG/KG	1				
Benzo(k)fluoranthene	U	10.3	10.3	34.3	UG/KG	1				
Butylbenzylphthalate	U	103	103	343	UG/KG	1				
Carbazole	U	10.3	10.3	34.3	UG/KG	1				
Chrysene	U	10.3	10.3	34.3	UG/KG	1				

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: **RC-232 Soil**

Report Date: August 1, 2013

Client Sample ID: J1RVJ7
Sample ID: 330215002

Project: WCHN00213
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Semi-Volatile-GC/MS										
8270D/3541 BNA Soil Automated Soxhlet "Dry Weight Corrected"										
Di-n-butylphthalate	U	103	103	343	UG/KG	1				
Di-n-octylphthalate	U	103	103	343	UG/KG	1				
Dibenzo(a,h)anthracene	U	10.3	10.3	34.3	UG/KG	1				
Dibenzofuran	U	103	103	343	UG/KG	1				
Diethylphthalate	U	103	103	343	UG/KG	1				
Dimethylphthalate	U	103	103	343	UG/KG	1				
Diphenylamine	U	103	103	343	UG/KG	1				
Fluoranthene	U	10.3	10.3	34.3	UG/KG	1				
Fluorene	U	10.3	10.3	34.3	UG/KG	1				
Hexachlorobenzene	U	103	103	343	UG/KG	1				
Hexachlorobutadiene	U	103	103	343	UG/KG	1				
Hexachlorocyclopentadiene	U J	103	103	343	UG/KG	1				
Hexachloroethane	U	103	103	343	UG/KG	1				
Indeno(1,2,3-cd)pyrene	U	10.3	10.3	34.3	UG/KG	1				
Isophorone	U	103	103	343	UG/KG	1				
N-Nitrosodipropylamine	U	103	103	343	UG/KG	1				
Naphthalene	U	10.3	10.3	34.3	UG/KG	1				
Nitrobenzene	U	103	103	343	UG/KG	1				
Pentachlorophenol	U	103	103	343	UG/KG	1				
Phenanthrene	U	10.3	10.3	34.3	UG/KG	1				
Phenol	U	103	103	343	UG/KG	1				
Pyrene	U	10.3	10.3	34.3	UG/KG	1				
bis(2-Chloroethoxy)methane	U	103	103	343	UG/KG	1				
bis(2-Chloroethyl) ether	U	103	103	343	UG/KG	1				
bis(2-Chloroisopropyl)ether	U	103	103	343	UG/KG	1				
bis(2-Ethylhexyl)phthalate	U	103	103	343	UG/KG	1				
3- and/or 4-Methylphenol	U	103	103	343	UG/KG	1				
m-Nitroaniline	U	103	103	343	UG/KG	1				
o-Cresol	U	103	103	343	UG/KG	1				
o-Nitroaniline	U	113	113	343	UG/KG	1				

8/25/13

Surrogate/Tracer recovery	*Result*	*Nominal*	*Recovery%*	*Acceptable Limits*	*Date Time:*	*07/27/13 12 23*
Nitrobenzene-d5	1130 UG/KG	1710	65.9	(21%-103%)		
2-Fluorobiphenyl	1150 UG/KG	1710	67.0	(25%-100%)		
p-Terphenyl-d14	1330 UG/KG	1710	77.8	(31%-124%)		
2-Fluorophenol	2460 UG/KG	3430	71.9	(23%-107%)		
Phenol-d5	2480 UG/KG	3430	72.4	(25%-108%)		
2,4,6-Tribromophenol	2950 UG/KG	3430	86.2	(20%-122%)		

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: **RC-232 Soil**

Report Date: August 1, 2013

Client Sample ID: J1RVJ7
Sample ID: 330215002

Project: WCHN00213
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method

Semi-Volatile-GC/MS

8270D/3541 BNA Soil Automated Soxhlet "Dry Weight Corrected"

Tentatively Identified Compound (TIC)	*CAS No.*	*RT*	*Est. Concentration*	*Fit*	*Qual*	*Date Time:*	*07/27/13 12 23*
unknown		1.84	161 UG/KG	0	J		
Unknown Aldol Condensate		3.552	2420 UG/KG		AJ		
1,2-Benzenedicarboxylic acid, bis(	000084-69-5	11.858	150 UG/KG	90	NJ		
n-Hexadecanoic acid	000057-10-3	12.318	395 UG/KG	99	NJ		
unknown		13.03	168 UG/KG	0	J		
Octadecanoic acid	000057-11-4	13.303	150 UG/KG	99	NJ		
Nonacosane	000630-03-5	18.255	251 UG/KG	93	NJ		
Eicosane	000112-95-8	20.689	956 UG/KG	96	NJ		

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	Prep Method 3541 8270D BNA for Soil	MXS4	07/26/13	1745	1317728

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	SW846 3541/8270D	

8/25/13

Certificate of Analysis

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: **RC-232 Soil**

Report Date: August 1, 2013

Client Sample ID:	J1RVJ8	Project:	WCHN00213
Sample ID:	330215003	Client ID:	WCHN001
Matrix:	SOIL		
Collect Date:	23-JUL-13 09:00		
Receive Date:	25-JUL-13		
Collector:	Client		
Moisture:	3.3%		

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Semi-Volatile-GC/MS										
8270D/3541 BNA Soil Automated Soxhlet "Dry Weight Corrected"										
1,2,4-Trichlorobenzene	U	103	103	343	UG/KG	1	JMB3 07/27/13	1354	1317730	1
1,2-Dichlorobenzene	U	103	103	343	UG/KG	1				
1,3-Dichlorobenzene	U	103	103	343	UG/KG	1				
1,4-Dichlorobenzene	U	103	103	343	UG/KG	1				
2,4,5-Trichlorophenol	U	103	103	343	UG/KG	1				
2,4,6-Trichlorophenol	U	103	103	343	UG/KG	1				
2,4-Dichlorophenol	U	103	103	343	UG/KG	1				
2,4-Dimethylphenol	U	103	103	343	UG/KG	1				
2,4-Dinitrophenol	U J	103	103	687	UG/KG	1				
2,4-Dinitrotoluene	U	103	103	343	UG/KG	1				
2,6-Dinitrotoluene	U	103	103	343	UG/KG	1				
2-Chloronaphthalene	U	10.3	10.3	34.3	UG/KG	1				
2-Chlorophenol	U	103	103	343	UG/KG	1				
2-Methyl-4,6-dinitrophenol	U	103	103	343	UG/KG	1				
2-Methylnaphthalene	U	10.3	10.3	34.3	UG/KG	1				
2-Nitrophenol	U	103	103	343	UG/KG	1				
3,3'-Dichlorobenzidine	U	103	103	343	UG/KG	1				
4-Bromophenylphenylether	U	103	103	343	UG/KG	1				
4-Chloro-3-methylphenol	U	137	137	343	UG/KG	1				
4-Chloroaniline	U	103	103	343	UG/KG	1				
4-Chlorophenylphenylether	U	103	103	343	UG/KG	1				
4-Nitrophenol	U	103	103	343	UG/KG	1				
Acenaphthene	U	10.3	10.3	34.3	UG/KG	1				
Acenaphthylene	U	10.3	10.3	34.3	UG/KG	1				
Anthracene	U	10.3	10.3	34.3	UG/KG	1				
Benzo(a)anthracene	U	10.3	10.3	34.3	UG/KG	1				
Benzo(a)pyrene	U	10.3	10.3	34.3	UG/KG	1				
Benzo(b)fluoranthene	U	10.3	10.3	34.3	UG/KG	1				
Benzo(ghi)perylene	U	10.3	10.3	34.3	UG/KG	1				
Benzo(k)fluoranthene	U	10.3	10.3	34.3	UG/KG	1				
Butylbenzylphthalate	U	103	103	343	UG/KG	1				
Carbazole	U	10.3	10.3	34.3	UG/KG	1				
Chrysene	U	10.3	10.3	34.3	UG/KG	1				

8/25/13

Certificate of Analysis

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: **RC-232 Soil**

Report Date: August 1, 2013

Client Sample ID: J1RVJ8
Sample ID: 330215003

Project: WCHN00213
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Semi-Volatile-GC/MS										
8270D/3541 BNA Soil Automated Soxhlet "Dry Weight Corrected"										
Di-n-butylphthalate	U	103	103	343	UG/KG	1				
Di-n-octylphthalate	U	103	103	343	UG/KG	1				
Dibenzo(a,h)anthracene	U	10.3	10.3	34.3	UG/KG	1				
Dibenzofuran	U	103	103	343	UG/KG	1				
Diethylphthalate	U	103	103	343	UG/KG	1				
Dimethylphthalate	U	103	103	343	UG/KG	1				
Diphenylamine	U	103	103	343	UG/KG	1				
Fluoranthene	U	10.3	10.3	34.3	UG/KG	1				
Fluorene	U	10.3	10.3	34.3	UG/KG	1				
Hexachlorobenzene	U	103	103	343	UG/KG	1				
Hexachlorobutadiene	U	103	103	343	UG/KG	1				
Hexachlorocyclopentadiene	U J	103	103	343	UG/KG	1	8/25/17			
Hexachloroethane	U	103	103	343	UG/KG	1				
Indeno(1,2,3-cd)pyrene	U	10.3	10.3	34.3	UG/KG	1				
Isophorone	U	103	103	343	UG/KG	1				
N-Nitrosodipropylamine	U	103	103	343	UG/KG	1				
Naphthalene	U	10.3	10.3	34.3	UG/KG	1				
Nitrobenzene	U	103	103	343	UG/KG	1				
Pentachlorophenol	U	103	103	343	UG/KG	1				
Phenanthrene	U	10.3	10.3	34.3	UG/KG	1				
Phenol	U	103	103	343	UG/KG	1				
Pyrene	U	10.3	10.3	34.3	UG/KG	1				
bis(2-Chloroethoxy)methane	U	103	103	343	UG/KG	1				
bis(2-Chloroethyl) ether	U	103	103	343	UG/KG	1				
bis(2-Chloroisopropyl)ether	U	103	103	343	UG/KG	1				
bis(2-Ethylhexyl)phthalate	U	103	103	343	UG/KG	1				
3- and/or 4-Methylphenol	U	103	103	343	UG/KG	1				
m-Nitroaniline	U	103	103	343	UG/KG	1				
o-Cresol	U	103	103	343	UG/KG	1				
o-Nitroaniline	U	113	113	343	UG/KG	1				

Surrogate/Tracer recovery	*Result*	*Nominal*	*Recovery%*	*Acceptable Limits*	*Date Time:*	*07/27/13 13 54*
p-Terphenyl-d14	1250 UG/KG	1720	73.1	(31%-124%)		
2-Fluorophenol	2140 UG/KG	3430	62.4	(23%-107%)		
Phenol-d5	2210 UG/KG	3430	64.4	(25%-108%)		
2,4,6-Tribromophenol	2710 UG/KG	3430	78.8	(20%-122%)		
Nitrobenzene-d5	975 UG/KG	1720	56.8	(21%-103%)		
2-Fluorobiphenyl	985 UG/KG	1720	57.4	(25%-100%)		

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: **RC-232 Soil**

Report Date: August 1, 2013

Client Sample ID: J1RVJ8
Sample ID: 330215003

Project: WCHN00213
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method

Semi-Volatile-GC/MS

8270D/3541 BNA Soil Automated Soxhlet "Dry Weight Corrected"

Tentatively Identified Compound (TIC)	*CAS No.*	*RT*	*Est. Concentration*	*Fit*	*Qual*	*Date Time:*	*07/27/13 13 54*
Unknown Aldol Condensate		3.552	2170 UG/KG		AJ		
n-Hexadecanoic acid	000057-10-3	12.318	372 UG/KG	99	NJ		
3-Eicosene, (E)-	074685-33-9	15.1	274 UG/KG	96	NJ		
13-Docosenamide, (Z)-	000112-84-5	17.127	195 UG/KG	94	NJ		
Nonacosane	000630-03-5	18.255	332 UG/KG	96	NJ		
Heneicosane	000629-94-7	20.694	1360 UG/KG	91	NJ		

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	Prep Method 3541 8270D BNA for Soil	MXS4	07/26/13	1745	1317728

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	SW846 3541/8270D	

8/25/13

Certificate of Analysis

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: **RC-232 Soil**

Report Date: August 1, 2013

Client Sample ID:	J1RVJ9	Project:	WCHN00213
Sample ID:	330215004	Client ID:	WCHN001
Matrix:	SOIL		
Collect Date:	23-JUL-13 09:10		
Receive Date:	25-JUL-13		
Collector:	Client		
Moisture:	2.78%		

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Semi-Volatile-GC/MS										
8270D/3541 BNA Soil Automated Soxhlet "Dry Weight Corrected"										
1,2,4-Trichlorobenzene	U	102	102	342	UG/KG	1	JMB3 07/27/13	1453	1317730	1
1,2-Dichlorobenzene	U	102	102	342	UG/KG	1				
1,3-Dichlorobenzene	U	102	102	342	UG/KG	1				
1,4-Dichlorobenzene	U	102	102	342	UG/KG	1				
2,4,5-Trichlorophenol	U	102	102	342	UG/KG	1				
2,4,6-Trichlorophenol	U	102	102	342	UG/KG	1				
2,4-Dichlorophenol	U	102	102	342	UG/KG	1				
2,4-Dimethylphenol	U	102	102	342	UG/KG	1				
2,4-Dinitrophenol	U S	102	102	683	UG/KG	1				
2,4-Dinitrotoluene	U	102	102	342	UG/KG	1				
2,6-Dinitrotoluene	U	102	102	342	UG/KG	1				
2-Chloronaphthalene	U	10.2	10.2	34.2	UG/KG	1				
2-Chlorophenol	U	102	102	342	UG/KG	1				
2-Methyl-4,6-dinitrophenol	U	102	102	342	UG/KG	1				
2-Methylnaphthalene	U	10.2	10.2	34.2	UG/KG	1				
2-Nitrophenol	U	102	102	342	UG/KG	1				
3,3'-Dichlorobenzidine	U	102	102	342	UG/KG	1				
4-Bromophenylphenylether	U	102	102	342	UG/KG	1				
4-Chloro-3-methylphenol	U	137	137	342	UG/KG	1				
4-Chloroaniline	U	102	102	342	UG/KG	1				
4-Chlorophenylphenylether	U	102	102	342	UG/KG	1				
4-Nitrophenol	U	102	102	342	UG/KG	1				
Acenaphthene	U	10.2	10.2	34.2	UG/KG	1				
Acenaphthylene	U	10.2	10.2	34.2	UG/KG	1				
Anthracene	U	10.2	10.2	34.2	UG/KG	1				
Benzo(a)anthracene	U	10.2	10.2	34.2	UG/KG	1				
Benzo(a)pyrene	U	10.2	10.2	34.2	UG/KG	1				
Benzo(b)fluoranthene	U	10.2	10.2	34.2	UG/KG	1				
Benzo(ghi)perylene	U	10.2	10.2	34.2	UG/KG	1				
Benzo(k)fluoranthene	U	10.2	10.2	34.2	UG/KG	1				
Butylbenzylphthalate	U	102	102	342	UG/KG	1				
Carbazole	U	10.2	10.2	34.2	UG/KG	1				
Chrysene	U	10.2	10.2	34.2	UG/KG	1				

8/23/13

Certificate of Analysis

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: **RC-232 Soil**

Report Date: August 1, 2013

Client Sample ID: J1RVJ9
Sample ID: 330215004

Project: WCHN00213
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Semi-Volatile-GC/MS										
8270D/3541 BNA Soil Automated Soxhlet "Dry Weight Corrected"										
Di-n-butylphthalate	U	102	102	342	UG/KG	1				
Di-n-octylphthalate	U	102	102	342	UG/KG	1				
Dibenzo(a,h)anthracene	U	10.2	10.2	34.2	UG/KG	1				
Dibenzofuran	U	102	102	342	UG/KG	1				
Diethylphthalate	U	102	102	342	UG/KG	1				
Dimethylphthalate	U	102	102	342	UG/KG	1				
Diphenylamine	U	102	102	342	UG/KG	1				
Fluoranthene	U	10.2	10.2	34.2	UG/KG	1				
Fluorene	U	10.2	10.2	34.2	UG/KG	1				
Hexachlorobenzene	U	102	102	342	UG/KG	1				
Hexachlorobutadiene	U	102	102	342	UG/KG	1				
Hexachlorocyclopentadiene	U J	102	102	342	UG/KG	1				
Hexachloroethane	U	102	102	342	UG/KG	1				
Indeno(1,2,3-cd)pyrene	U	10.2	10.2	34.2	UG/KG	1				
Isophorone	U	102	102	342	UG/KG	1				
N-Nitrosodipropylamine	U	102	102	342	UG/KG	1				
Naphthalene	U	10.2	10.2	34.2	UG/KG	1				
Nitrobenzene	U	102	102	342	UG/KG	1				
Pentachlorophenol	U	102	102	342	UG/KG	1				
Phenanthrene	U	10.2	10.2	34.2	UG/KG	1				
Phenol	U	102	102	342	UG/KG	1				
Pyrene	U	10.2	10.2	34.2	UG/KG	1				
bis(2-Chloroethoxy)methane	U	102	102	342	UG/KG	1				
bis(2-Chloroethyl) ether	U	102	102	342	UG/KG	1				
bis(2-Chloroisopropyl)ether	U	102	102	342	UG/KG	1				
bis(2-Ethylhexyl)phthalate	U	102	102	342	UG/KG	1				
3- and/or 4-Methylphenol	U	102	102	342	UG/KG	1				
m-Nitroaniline	U	102	102	342	UG/KG	1				
o-Cresol	U	102	102	342	UG/KG	1				
o-Nitroaniline	U	113	113	342	UG/KG	1				

8/23/13

Surrogate/Tracer recovery	*Result*	*Nominal*	*Recovery%*	*Acceptable Limits*	*Date Time:*	*07/27/13 14 53*
2-Fluorobiphenyl	1220 UG/KG	1710	71.6	(25%-100%)		
Nitrobenzene-d5	1240 UG/KG	1710	72.4	(21%-103%)		
p-Terphenyl-d14	1450 UG/KG	1710	85.0	(31%-124%)		
2-Fluorophenol	2650 UG/KG	3420	77.5	(23%-107%)		
Phenol-d5	2750 UG/KG	3420	80.7	(25%-108%)		
2,4,6-Tribromophenol	3270 UG/KG	3420	95.8	(20%-122%)		

Certificate of Analysis

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: **RC-232 Soil**

Report Date: August 1, 2013

Client Sample ID: J1RVJ9
Sample ID: 330215004

Project: WCHN00213
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method

Semi-Volatile-GC/MS

8270D/3541 BNA Soil Automated Soxhlet "Dry Weight Corrected"

Tentatively Identified Compound (TIC)	*CAS No.*	*RT*	*Est. Concentration*	*Fit*	*Qual*	*Date Time:*	*07/27/13 14 53*
unknown		1.835	152 UG/KG	0	J		
Unknown Aldol Condensate		3.552	2770 UG/KG		AJ		
n-Hexadecanoic acid	000057-10-3	12.324	543 UG/KG	99	NJ		
unknown		13.212	303 UG/KG	0	J		
Octadecanoic acid	000057-11-4	13.308	290 UG/KG	99	NJ		
3-Octadecene, (E)-	007206-19-1	13.998	142 UG/KG	97	NJ		
5-Eicosene, (E)-	074685-30-6	15.057	846 UG/KG	99	NJ		
Docosanoic acid	000112-85-6	15.426	189 UG/KG	99	NJ		
Tricosane	000638-67-5	16.4	453 UG/KG	97	NJ		
Trifluoroacetic acid, n-octadecyl	079392-43-1	16.533	338 UG/KG	91	NJ		
13-Docosenamide, (Z)-	000112-84-5	17.132	390 UG/KG	95	NJ		
Eicosane	000112-95-8	17.261	198 UG/KG	97	NJ		
Squalene	007683-64-9	17.437	229 UG/KG	91	NJ		
Nonacosane	000630-03-5	18.266	3250 UG/KG	98	NJ		
unknown		18.464	433 UG/KG	0	J		
Heneicosane	000629-94-7	20.7	1280 UG/KG	97	NJ		
Cyclooctacosane	000297-24-5	20.882	3320 UG/KG	96	NJ		
Ergosterol	000057-87-4	22.24	3090 UG/KG	90	NJ		

✓ 8/25/13

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	Prep Method 3541 8270D BNA for Soil	MXS4	07/26/13	1745	1317728

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	SW846 3541/8270D	

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: **RC-232 Soil**

Report Date: August 1, 2013

Client Sample ID: J1RVK0
Sample ID: 330215005
Matrix: SOIL
Collect Date: 23-JUL-13 09:20
Receive Date: 25-JUL-13
Collector: Client
Moisture: 2.39%

Proiect: WCHN00213
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Semi-Volatile-GC/MS										
8270D/3541 BNA Soil Automated Soxhlet "Dry Weight Corrected"										
1,2,4-Trichlorobenzene	U	102	102	340	UG/KG	1	JMB3 07/27/13	1552	1317730	1
1,2-Dichlorobenzene	U	102	102	340	UG/KG	1				
1,3-Dichlorobenzene	U	102	102	340	UG/KG	1				
1,4-Dichlorobenzene	U	102	102	340	UG/KG	1				
2,4,5-Trichlorophenol	U	102	102	340	UG/KG	1				
2,4,6-Trichlorophenol	U	102	102	340	UG/KG	1				
2,4-Dichlorophenol	U	102	102	340	UG/KG	1				
2,4-Dimethylphenol	U	102	102	340	UG/KG	1				
2,4-Dinitrophenol	U J	102	102	681	UG/KG	1				
2,4-Dinitrotoluene	U	102	102	340	UG/KG	1				
2,6-Dinitrotoluene	U	102	102	340	UG/KG	1				
2-Chloronaphthalene	U	10.2	10.2	34.0	UG/KG	1				
2-Chlorophenol	U	102	102	340	UG/KG	1				
2-Methyl-4,6-dinitrophenol	U	102	102	340	UG/KG	1				
2-Methylnaphthalene	U	10.2	10.2	34.0	UG/KG	1				
2-Nitrophenol	U	102	102	340	UG/KG	1				
3,3'-Dichlorobenzidine	U	102	102	340	UG/KG	1				
4-Bromophenylphenylether	U	102	102	340	UG/KG	1				
4-Chloro-3-methylphenol	U	136	136	340	UG/KG	1				
4-Chloroaniline	U	102	102	340	UG/KG	1				
4-Chlorophenylphenylether	U	102	102	340	UG/KG	1				
4-Nitrophenol	U	102	102	340	UG/KG	1				
Acenaphthene	U	10.2	10.2	34.0	UG/KG	1				
Acenaphthylene	U	10.2	10.2	34.0	UG/KG	1				
Anthracene	U	10.2	10.2	34.0	UG/KG	1				
Benzo(a)anthracene	U	10.2	10.2	34.0	UG/KG	1				
Benzo(a)pyrene	U	10.2	10.2	34.0	UG/KG	1				
Benzo(b)fluoranthene	U	10.2	10.2	34.0	UG/KG	1				
Benzo(ghi)perylene	U	10.2	10.2	34.0	UG/KG	1				
Benzo(k)fluoranthene	U	10.2	10.2	34.0	UG/KG	1				
Butylbenzylphthalate	U	102	102	340	UG/KG	1				
Carbazole	U	10.2	10.2	34.0	UG/KG	1				
Chrysene	U	10.2	10.2	34.0	UG/KG	1				

8/25/13

Certificate of Analysis

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: **RC-232 Soil**

Report Date: August 1, 2013

Client Sample ID: J1RVK0
Sample ID: 330215005

Project: WCHN00213
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Semi-Volatile-GC/MS										
8270D/3541 BNA Soil Automated Soxhlet "Dry Weight Corrected"										
Di-n-butylphthalate	U	102	102	340	UG/KG	1				
Di-n-octylphthalate	U	102	102	340	UG/KG	1				
Dibenzo(a,h)anthracene	U	10.2	10.2	34.0	UG/KG	1				
Dibenzofuran	U	102	102	340	UG/KG	1				
Diethylphthalate	U	102	102	340	UG/KG	1				
Dimethylphthalate	U	102	102	340	UG/KG	1				
Diphenylamine	U	102	102	340	UG/KG	1				
Fluoranthene	U	10.2	10.2	34.0	UG/KG	1				
Fluorene	U	10.2	10.2	34.0	UG/KG	1				
Hexachlorobenzene	U	102	102	340	UG/KG	1				
Hexachlorobutadiene	U	102	102	340	UG/KG	1				
Hexachlorocyclopentadiene	U J	102	102	340	UG/KG	1				
Hexachloroethane	U	102	102	340	UG/KG	1				
Indeno(1,2,3-cd)pyrene	U	10.2	10.2	34.0	UG/KG	1				
Isophorone	U	102	102	340	UG/KG	1				
N-Nitrosodipropylamine	U	102	102	340	UG/KG	1				
Naphthalene	U	10.2	10.2	34.0	UG/KG	1				
Nitrobenzene	U	102	102	340	UG/KG	1				
Pentachlorophenol	U	102	102	340	UG/KG	1				
Phenanthrene	U	10.2	10.2	34.0	UG/KG	1				
Phenol	U	102	102	340	UG/KG	1				
Pyrene	U	10.2	10.2	34.0	UG/KG	1				
bis(2-Chloroethoxy)methane	U	102	102	340	UG/KG	1				
bis(2-Chloroethyl) ether	U	102	102	340	UG/KG	1				
bis(2-Chloroisopropyl)ether	U	102	102	340	UG/KG	1				
bis(2-Ethylhexyl)phthalate	U	102	102	340	UG/KG	1				
3- and/or 4-Methylphenol	U	102	102	340	UG/KG	1				
m-Nitroaniline	U	102	102	340	UG/KG	1				
o-Cresol	U	102	102	340	UG/KG	1				
o-Nitroaniline	U	112	112	340	UG/KG	1				

√ 8/25/13

Surrogate/Tracer recovery	*Result*	*Nominal*	*Recovery%*	*Acceptable Limits*	*Date Time:*	*07/27/13 15 52*
Nitrobenzene-d5	1080 UG/KG	1700	63.3	(21%-103%)		
2-Fluorobiphenyl	1090 UG/KG	1700	64.3	(25%-100%)		
p-Terphenyl-d14	1280 UG/KG	1700	75.2	(31%-124%)		
2-Fluorophenol	2350 UG/KG	3400	69.0	(23%-107%)		
Phenol-d5	2400 UG/KG	3400	70.4	(25%-108%)		
2,4,6-Tribromophenol	2710 UG/KG	3400	79.7	(20%-122%)		

Certificate of Analysis

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: **RC-232 Soil**

Report Date: August 1, 2013

Client Sample ID: J1RVK0
Sample ID: 330215005

Project: WCHN00213
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method

Semi-Volatile-GC/MS

8270D/3541 BNA Soil Automated Soxhlet "Dry Weight Corrected"

Tentatively Identified Compound (TIC)	*CAS No.*	*RT*	*Est. Concentration*	*Fit*	*Qual*	*Date Time:*	*07/27/13 15 52*
unknown		1.851	251 UG/KG	0	J		
Unknown Aldol Condensate		3.552	2420 UG/KG		AJ		
unknown		13.035	149 UG/KG	0	J		
5-Eicosene, (E)-	074685-30-6	15.067	324 UG/KG	99	NJ		
13-Docosenamide, (Z)-	000112-84-5	17.127	210 UG/KG	94	NJ		
Heneicosane	000629-94-7	18.261	169 UG/KG	91	NJ		
unknown		22.871	701 UG/KG	0	J		

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	Prep Method 3541 8270D BNA for Soil	MXS4	07/26/13	1745	1317728

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	SW846 3541/8270D	

✓ 8/25/13

Certificate of Analysis

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: **RC-232 Soil**

Report Date: August 1, 2013

Client Sample ID: J1RVK1
Sample ID: 330215006
Matrix: SOIL
Collect Date: 23-JUL-13 09:25
Receive Date: 25-JUL-13
Collector: Client
Moisture: 1.16%

Project: WCHN00213
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Semi-Volatile-GC/MS										
8270D/3541 BNA Soil Automated Soxhlet "Dry Weight Corrected"										
1,2,4-Trichlorobenzene	U	101	101	336	UG/KG	1	JMB3 07/27/13	1622	1317730	1
1,2-Dichlorobenzene	U	101	101	336	UG/KG	1				
1,3-Dichlorobenzene	U	101	101	336	UG/KG	1				
1,4-Dichlorobenzene	U	101	101	336	UG/KG	1				
2,4,5-Trichlorophenol	U	101	101	336	UG/KG	1				
2,4,6-Trichlorophenol	U	101	101	336	UG/KG	1				
2,4-Dichlorophenol	U	101	101	336	UG/KG	1				
2,4-Dimethylphenol	U	101	101	336	UG/KG	1				
2,4-Dinitrophenol	U J	101	101	673	UG/KG	1				
2,4-Dinitrotoluene	U	101	101	336	UG/KG	1				
2,6-Dinitrotoluene	U	101	101	336	UG/KG	1				
2-Chloronaphthalene	U	10.1	10.1	33.6	UG/KG	1				
2-Chlorophenol	U	101	101	336	UG/KG	1				
2-Methyl-4,6-dinitrophenol	U	101	101	336	UG/KG	1				
2-Methylnaphthalene	U	10.1	10.1	33.6	UG/KG	1				
2-Nitrophenol	U	101	101	336	UG/KG	1				
3,3'-Dichlorobenzidine	U	101	101	336	UG/KG	1				
4-Bromophenylphenylether	U	101	101	336	UG/KG	1				
4-Chloro-3-methylphenol	U	135	135	336	UG/KG	1				
4-Chloroaniline	U	101	101	336	UG/KG	1				
4-Chlorophenylphenylether	U	101	101	336	UG/KG	1				
4-Nitrophenol	U	101	101	336	UG/KG	1				
Acenaphthene	U	10.1	10.1	33.6	UG/KG	1				
Acenaphthylene	U	10.1	10.1	33.6	UG/KG	1				
Anthracene	U	10.1	10.1	33.6	UG/KG	1				
Benzo(a)anthracene	U	10.1	10.1	33.6	UG/KG	1				
Benzo(a)pyrene	U	10.1	10.1	33.6	UG/KG	1				
Benzo(b)fluoranthene	U	10.1	10.1	33.6	UG/KG	1				
Benzo(ghi)perylene	U	10.1	10.1	33.6	UG/KG	1				
Benzo(k)fluoranthene	U	10.1	10.1	33.6	UG/KG	1				
Butylbenzylphthalate	U	101	101	336	UG/KG	1				
Carbazole	U	10.1	10.1	33.6	UG/KG	1				
Chrysene	U	10.1	10.1	33.6	UG/KG	1				

8/25/13

Certificate of Analysis

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: **RC-232 Soil**

Report Date: August 1, 2013

Client Sample ID: J1RVK1
Sample ID: 330215006

Project: WCHN00213
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Semi-Volatile-GC/MS										
8270D/3541 BNA Soil Automated Soxhlet "Dry Weight Corrected"										
Di-n-butylphthalate	U	101	101	336	UG/KG	1				
Di-n-octylphthalate	U	101	101	336	UG/KG	1				
Dibenzo(a,h)anthracene	U	10.1	10.1	33.6	UG/KG	1				
Dibenzofuran	U	101	101	336	UG/KG	1				
Diethylphthalate	U	101	101	336	UG/KG	1				
Dimethylphthalate	U	101	101	336	UG/KG	1				
Diphenylamine	U	101	101	336	UG/KG	1				
Fluoranthene	U	10.1	10.1	33.6	UG/KG	1				
Fluorene	U	10.1	10.1	33.6	UG/KG	1				
Hexachlorobenzene	U	101	101	336	UG/KG	1				
Hexachlorobutadiene	U	101	101	336	UG/KG	1				
Hexachlorocyclopentadiene	U J	101	101	336	UG/KG	1				
Hexachloroethane	U	101	101	336	UG/KG	1				
Indeno(1,2,3-cd)pyrene	U	10.1	10.1	33.6	UG/KG	1				
Isophorone	U	101	101	336	UG/KG	1				
N-Nitrosodipropylamine	U	101	101	336	UG/KG	1				
Naphthalene	U	10.1	10.1	33.6	UG/KG	1				
Nitrobenzene	U	101	101	336	UG/KG	1				
Pentachlorophenol	U	101	101	336	UG/KG	1				
Phenanthrene	U	10.1	10.1	33.6	UG/KG	1				
Phenol	U	101	101	336	UG/KG	1				
Pyrene	U	10.1	10.1	33.6	UG/KG	1				
bis(2-Chloroethoxy)methane	U	101	101	336	UG/KG	1				
bis(2-Chloroethyl) ether	U	101	101	336	UG/KG	1				
bis(2-Chloroisopropyl)ether	U	101	101	336	UG/KG	1				
bis(2-Ethylhexyl)phthalate	U	101	101	336	UG/KG	1				
3- and/or 4-Methylphenol	U	101	101	336	UG/KG	1				
m-Nitroaniline	U	101	101	336	UG/KG	1				
o-Cresol	U	101	101	336	UG/KG	1				
o-Nitroaniline	U	111	111	336	UG/KG	1				

8/25/13

Surrogate/Tracer recovery	*Result*	*Nominal*	*Recovery%*	*Acceptable Limits*	*Date Time:*	*07/27/13 16 22*
p-Terphenyl-d14	1190 UG/KG	1680	70.6	(31%-124%)		
2-Fluorophenol	1660 UG/KG	3360	49.2	(23%-107%)		
Phenol-d5	1680 UG/KG	3360	49.8	(25%-108%)		
2,4,6-Tribromophenol	2410 UG/KG	3360	71.7	(20%-122%)		
Nitrobenzene-d5	761 UG/KG	1680	45.3	(21%-103%)		
2-Fluorobiphenyl	776 UG/KG	1680	46.1	(25%-100%)		

GEL LABORATORIES LLC
2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: **RC-232 Soil**

Report Date: August 1, 2013

Client Sample ID: J1RVK1
Sample ID: 330215006

Project: WCHN00213
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method

Semi-Volatile-GC/MS

8270D/3541 BNA Soil Automated Soxhlet "Dry Weight Corrected"

Tentatively Identified Compound (TIC)	*CAS No.*	*RT*	*Est. Concentration*	*Fit*	*Qual*	*Date Time:*	*07/27/13 16 22*
unknown		1.851	663 UG/KG	0	J		
Unknown Aldol Condensate		3.547	1790 UG/KG		AJ		
Bromoacetic acid, octadecyl ester	018992-03-5	15.089	213 UG/KG	91	NJ		
13-Docosenamide, (Z)-	000112-84-5	17.127	317 UG/KG	95	NJ		
Nonacosane	000630-03-5	18.261	351 UG/KG	98	NJ		
Tetratriacontane	014167-59-0	20.694	1580 UG/KG	91	NJ		

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	Prep Method 3541 8270D BNA for Soil	MXS4	07/26/13	1745	1317728

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	SW846 3541/8270D	

8/25/13

Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

Method/Analysis Information

Procedure:	**Analysis of Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry**
Analytical Method:	SW846 3541/8270D
Prep Method:	SW846 3541
Analytical Batch Number:	1317730
Prep Batch Number:	1317728

Sample Analysis

The following samples were analyzed using the analytical protocol as established in SW846 3541/8270D:

Sample ID	Client ID
330215002	J1RVJ7
330215003	J1RVJ8
330215004	J1RVJ9
330215005	J1RVK0
330215006	J1RVK1
1202915867	Method Blank (MB)
1202915868	Laboratory Control Sample (LCS)
1202915871	330215002(J1RVJ7) Matrix Spike (MS)
1202915872	330215002(J1RVJ7) Matrix Spike Duplicate (MSD)

The samples in this SDG were analyzed on a "dry weight" basis.

Preparation/Analytical Method Verification

SOP Reference
Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-OA-E-009 REV# 30.

Raw data reports are processed and reviewed by the analyst using the data analysis software package. False positives have been removed from the quantitation reports per standard operating procedures (SOP).

Calibration Information

A complete list of the initial calibration data files are shown in the Calibration History report located in the Standard Data section of the data package. The various calibration mixes may not be calibrated using all of the calibration levels. In addition, not all of the mixes are calibrated using the same levels.

Diphenylamine has now superseded N-Nitroso-diphenylamine on Quantitation Reports, Initial Calibration Reports, Calibration Check Standard Reports, etc. Previous versions of EPA Methodologies referenced N-Nitroso-diphenylamine. However, as stated in EPA Methodology, "N-Nitroso-diphenylamine decomposes in the gas chromatographic inlet and cannot be separated from Diphenylamine." Studies of these two compounds at GEL, both independent of each other and together, showed that they not only co-elute, but also have similar mass spectra. N-Nitroso-diphenylamine and Diphenylamine will be reported as Diphenylamine on all reports and forms.

Initial Calibration
All initial calibration requirements have been met for this sample delivery group (SDG) in this batch. A second source initial calibration verification (ICV) was included in the standard section directly behind the initial calibration.

CCV Requirements
All Calibration Verification Standards (CCV) did not meet the acceptance criteria as outlined in Method 8270D. However, the method allows for a designated number of outliers dependent on the requested analyte list. This SDG satisfied the 8270D outlier acceptance criteria. Detected concentrations of these analytes should be considered as estimated.

Quality Control (QC) Information

Method Blank (MB) Statement
The MB analyzed with this SDG in this batch met the acceptance criteria.

Surrogate Recoveries
All the surrogate recoveries were within the established acceptance criteria for this SDG in this batch.

Laboratory Control Sample (LCS) Recovery
The LCS(1202915868) did not meet spike recovery limits for 2,4-Dinitrophenol at 21.3% (SPC limits: 22.0%-83.0%). 2,4-Dinitrophenol accounts for less than 5% of the total number of requested spiking analytes. 2,4-Dinitrophenol is known to be a poor responding analyte that is subject to erratic chromatography as stated in the Method. This may account for the low recovery of the analyte in the LCS. The data results have been reported.

QC Sample Designation
Sample 330215002 (J1RVJ7) was selected for analysis as the matrix spike and matrix spike duplicate.

Matrix Spike (MS) Recovery Statement
The MS recoveries were within the established acceptance limits.

Matrix Spike Duplicate (MSD) Recovery Statement
The MSD recoveries were within the established acceptance limits.

MS/MSD Relative Percent Difference (RPD) Statement
The RPD values between the MS and MSD met the acceptance limits.

Internal Standard (ISTD) Acceptance
The internal standard responses used to quantitate the requested target analytes were within the required acceptance criteria for the SDG associated samples in this batch.

Technical Information:

Holding Time Specifications
All samples in this SDG met the specified holding time. GEL assigns holding times based on the associated methodology that assigns the date and time from sample collection or sample receipt. Those holding times expressed in hours are calculated in the ALPHALIMS system. Those holding times expressed as days expire at

midnight on the day of expiration.

Preparation/Analytical Method Verification
All procedures were performed as stated in the SOP. All reported compound mass spectra met the detection specifications in the method.

Sample Dilutions
The samples in this SDG in this batch did not require dilutions.

Sample Re-extraction/Re-analysis
Re-extractions or re-analyses were not required in this SDG in this analytical batch unless confirmations or dilutions were required.

Miscellaneous Information:

Data Exception (DER) Documentation
Data exception report 1206748 was generated for the samples in this batch for this SDG.

Manual Integrations
Some initial calibration standards, continuing calibration standards, and/or samples may require manual integrations due to software limitations. Manual integrations, if any, are included with the raw data.

TIC Comment
Tentatively identified compounds (TIC) may be requested for samples 1202915867 (MB), 330215002 (J1RVJ7), 330215003 (J1RVJ8), 330215004 (J1RVJ9), 330215005 (J1RVK0) and 330215006 (J1RVK1) in this delivery group/work order. Please note that non-requested calibrated analytes detected in a client sample may be reported on the Form 1/Certificate of Analysis as TICs. TIC data, if requested, are included on the Sample Data Summary (Form 1) and are also included with the sample raw data.

Additional Comments
The additional comments field is used to address special issues associated with each analysis, clarify method/contractual issues pertaining to the analysis, and to list any report documents generated as a result of sample analysis or review. The following additional comments were required:

Due to rounding differences in the calculation, the data reported in the Surrogate Recovery Report may differ slightly from the raw data. Due to software issue, the raw data may not correctly display the updated SPC limits. Please see Sample Data Summary Report and Surrogate Recovery Report for the correct surrogate acceptance limits.

Electronic Package Comment

The following package was generated using an electronic data processing program referred to as "virtual packaging". In an effort to increase quality and efficiency, the laboratory is developing systems to eventually generate all data packages electronically. The following change from "traditional" packages should be noted:

Analyst/peer reviewer initials and dates are not present on the electronic data files. Presently, all initials and dates are present on the original raw data. These hard copies are temporarily stored in the laboratory. An electronic signature page inserted after the case narrative of each electronic package will indicate the reviewer name associated with the generation of the data and package. The data validator will always sign and date the case narrative. Data that are not generated electronically, such as hand written pages, will be scanned and inserted into the electronic package.

System Configuration

The Semi-Volatile-GC/MS analysis was performed on the following instrument configuration:

Instrument ID	Instrument	System Configuration	Column ID	Column Description
MSD4.I	Agilent 7890A/5975C GC/MS w/ 7683 Autosampler	HP6890/HP5973	DB-5MS	25m x 0.2mm, 0.33um (5% Phenylmethylpolysiloxane)

Certification Statement

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

DATA EXCEPTION REPORT

Mo.Day Yr.	Division:	Quality Criteria:	Type:
31-JUL-13	Industrial	Specifications	Process
Instrument Type: SEMIVOA GC/MS	**Test / Method:** SW846 3541/8270D	**Matrix Type:** Solid	**Client Code:** WCHN
Batch ID: 1317730	**Sample Numbers:** See Below		

Potentially affected work order(s)(SDG): 330215(XP0001),330229(X0010)

Application Issues:

Failed Recovery for MS/PS

Failed Recovery for LCS/LCSD

Failed Recovery for MSD/PSD

Specification and Requirements Exception Description:	DER Disposition:
1. LCS(1202915868) did not meet spike recovery limits for 2,4-Dinitrophenol at 21.3% (SPC limits: 22.0%-83.0%).	1. 2,4-Dinitrophenol accounts for less than 5% of the total number of requested spiking analytes. 2,4-Dinitrophenol is known to be a poor responding analyte that is subject to erratic chromatography as stated in the Method. This may account for the low recovery of the analyte in the LCS (as well as in the zero percent recovery in the MS(1202915869) and MSD(1202915870)). The data results have been reported.
2. MS(1202915869) recovered 2,4-Dimethylphenol at 26.5% (limits are 30-109%), 2,4-Dinitrophenol at 0% (limits are 19-101%) and 3,3'Dichlorobenzidine at 0% (limits are 28-105%). 3. MSD(1202915870) recovered 2,4-Dimethylphenol at 26.4% (limits are 30-109%), 2,4-Dinitrophenol at 0% (limits are 19-101%) and 3,3'Dichlorobenzidine at 0% (limits are 28-105%).	2., 3. As MS(1202915869) and MSD(1202915870) displayed similar recoveries, the failures were attributed to sample matrix interference. 2,4-Dinitrophenol is known to be a poor responding analyte that is subject to erratic chromatography as stated in the Method. This may account for the zero percent recovery of the analyte in the MS and MSD (as well as in the low recovery in the LCS). The data results have been reported.

Originator's Name:

Josh Brooks 31-JUL-13

Data Validator/Group Leader:

Barbara Bailey 06-AUG-13

330215

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-232-040	Page 1 of 2

Collector: A. Dunnum	Company Contact: Joan Kessner	Telephone No.: 375-4688	Project Coordinator: KESSNER, JH
Price Code: 8C	Data Turnaround: ~~15 Days~~ 7 MAO 7-23-13		
Project Designation: 100-IU-2 & 100-IU-6 Remaining Waste Sites	Sampling Location: 600-371		SAF No.: RC-232
Ice Chest No.: WCH-11-009	Field Logbook No.: EL 1666	COA: 06037120000	Method of Shipment: fed Ex
Shipped To: Eberline - GEL	Offsite Property No.: A120893		Bill of Lading/Air Bill No.: See OSPC

POSSIBLE SAMPLE HAZARDS/REMARKS
None

Special Handling and/or Storage
Cool 4 C

Preservation	Cool 4C	Cool 4C									
Type of Container	G/P	aG									
No. of Container(s)	1	1									
Volume	125mL	125mL									
SAMPLE ANALYSIS	See item (1) in Special Instructions	Semi-VOA - 8270A (TCL)									

Sample No.	Matrix	Sample Date	Sample Time		
J1RVJ6	SOIL	7-23-13	0840	X	X
J1RVJ7	SOIL	7-23-13	0900	X	X
J1RVJ8	SOIL	7-23-13	0900	X	X
J1RVJ9	SOIL	7-23-13	0910	X	X
J1RVK0	SOIL	7-23-13	0920	X	X

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

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
A. Dunnum	7-23-13 1045	R. Fahlberg R. Fahlberg	1045 7-23-13
R. Fahlberg R. Fahlberg	7-23-13 1515	John Harris	1515 7-23-13
John Harris	1650 7-23-13	Fed Ex #3A 1060 BATTELLE	1650 7-23-13
Fed Ex #3A 1060 BATTELLE	1014 7-24-13	John Harris	1014 7-24-13
John Harris	1015 7-24-13	Fed Ex	
		Jennifer Pellegrini	7-25-13 0855

FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	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) {Mercury}

REVIEWED BY CMR DATE 7-24-13

XP0001

WCH-EE-011

Generated Date/Time: 07/22/2013 16:16, PDT

Washington Closure Hanford — CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

RC-232-040 | Page 2 of 2

Collector: A. Dunnum	Company Contact: Joan Kessner	Telephone No.: 375-4688	Project Coordinator: KESSNER, JH
Project Designation: 100-IU-2 & 100-IU-6 Remaining Waste Sites	Sampling Location: 600-371		SAF No.: RC-232
Ice Chest No.: WCH-11-009	Field Logbook No.: EL1666	COA: 0603712000	Method of Shipment: fed EX
Shipped To: Eberline - GEL	Offsite Property No.: A120893		Bill of Lading/Air Bill No.: See OSPC

Price Code: 8C — Data Turnaround: ~~15~~ Days 7 MAB 7-23-13

POSSIBLE SAMPLE HAZARDS/REMARKS
None

Special Handling and/or Storage
Cool 4 C

Preservation	Cool 4C	Cool 4C
Type of Container	G/P	aG
No. of Container(s)	1	1
Volume	125mL	125mL

SAMPLE ANALYSIS

Sample No.	Matrix	Sample Date	Sample Time	See item (1) in Special Instructions	Semi-VOA - 8270A (TCL)
J1RVK1	SOIL	7-23-13	0925	X	X

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

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
A. Dunnum [signature]	7-23-13 1045	R. Fehlberg R. Fehlberg	1045 7-23-13
R. Fehlberg R. Fehlberg	1515 7-23-13	Joho Harrie	1515 7-23-13
Joho Harrie	1650 ~~1517~~ 7-23-13 7-23-13	Frig #3A 1060 Battelle	1650 7-23-13
Frig #3A 1060 Battelle	1014 7-24-13	Joho Harrie	1014 7-24-13
Joho Harrie	1015 wcit 7-24-13	FedEx	
		Jennifer Pellegrini	7-25-13 0845

FINAL SAMPLE DISPOSITION — Disposal Method — Disposed By — 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) {Mercury}

REVIEWED BY CMB DATE 7-24-13

XP0001

WCH-EE-011

Generated Date/Time: 07/22/2013 16:16, PDT

Appendix 5

Data Validation Supporting Documentation

GC/MS ORGANIC DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E
PROJECT: 600-371			DATA PACKAGE: XP0001		
VALIDATOR: ELR		LAB: GeL		DATE: 8/23/13	
			SDG: XP0001		
ANALYSES PERFORMED					
SW-846 8260		SW-846 8260 (TCLP)	SW-846 8270		SW-846 8270 (TCLP)
SAMPLES/MATRIX					
J1RUJ7	J1RUJ8	J1RUJ9	J1RUK0	J1RUK1	
					SOIL

1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE

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

Comments:

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

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

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

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

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

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

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

Comments:

GC/MS ORGANIC DATA VALIDATION CHECKLIST

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

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

Comments: 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? (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 - 11 - J
MSD - 1 - J

no BAT

GC/MS ORGANIC DATA VALIDATION CHECKLIST

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

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

MS/MSD RPD values acceptable? ..... Yes No N/A

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

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

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

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

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

Comments: _____

6. SYSTEM PERFORMANCE (Levels D and E)

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

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

Internal standard retention times acceptable? ..... Yes No N/A

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

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

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

Comments: _____

7. HOLDING TIMES (all levels)

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

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

Comments: _____

GC/MS ORGANIC DATA VALIDATION CHECKLIST

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

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

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

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

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

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

Laboratory properly identified and coded all TIC? (Levels D, E) ..... Yes No N/A

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

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

Comments:

9. SAMPLE CLEANUP (Levels D and E)

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

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

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

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

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

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

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

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

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

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

Comments:

Appendix 6

Additional Documentation Requested by Client

QC Summary

Report Date: August 6, 2013

WC-Hanford, Inc.
2620 Fermi Avenue
MSIN H4-21
Richland, Washington

Contact: Joan Kessner

Workorder: 330215 Client SDG: XP0001 Project Description: RC-232 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatile-GC/MS											
Batch 1317730											
QC1202915868 LCS											
1,2,4-Trichlorobenzene	1660			1070	UG/KG		64.6	(37%-98%)	JMB3	07/27/13	11:53
1,2-Dichlorobenzene	1660			1090	UG/KG		65.5	(39%-93%)			
1,3-Dichlorobenzene	1660			1050	UG/KG		63.2	(39%-110%)			
1,4-Dichlorobenzene	1660			1080	UG/KG		64.7	(40%-110%)			
2,4,5-Trichlorophenol	1660			1210	UG/KG		73	(41%-103%)			
2,4,6-Trichlorophenol	1660			925	UG/KG		55.6	(36%-98%)			
2,4-Dichlorophenol	1660			1090	UG/KG		65.2	(35%-110%)			
2,4-Dimethylphenol	1660			1070	UG/KG		64.2	(35%-102%)			
2,4-Dinitrophenol	1660		J	354	UG/KG		21.3 *	(22%-83%)			
2,4-Dinitrotoluene	1660			1440	UG/KG		86.7	(43%-109%)			
2,6-Dinitrotoluene	1660			1310	UG/KG		79	(41%-103%)			
2-Chloronaphthalene	1660			1090	UG/KG		65.6	(39%-101%)			
2-Chlorophenol	1660			1090	UG/KG		65.3	(38%-100%)			
2-Methyl-4,6-dinitrophenol	1660			940	UG/KG		56.5	(33%-103%)			
2-Methylnaphthalene	1660			1130	UG/KG		68.1	(36%-107%)			
2-Nitrophenol	1660			1050	UG/KG		63.3	(35%-106%)			
3,3'-Dichlorobenzidine	1660			1130	UG/KG		67.8	(32%-111%)			
3- and/or 4-Methylphenol	1660			1220	UG/KG		73.3	(39%-115%)			
4-Bromophenylphenylether	1660			1260	UG/KG		76	(42%-110%)			
4-Chloro-3-methylphenol	1660			1100	UG/KG		65.8	(35%-104%)			

QC Summary

Workorder: 330215 **Client SDG:** XP0001 **Project Description:** RC-232 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatile-GC/MS											
Batch 1317730											
4-Chloroaniline	1660			891	UG/KG		53.5	(32%-106%)	JMB3	07/27/13	11:53
4-Chlorophenylphenylether	1660			1170	UG/KG		70.6	(41%-104%)			
4-Nitrophenol	1660			929	UG/KG		55.8	(23%-114%)			
Acenaphthene	1660			1080	UG/KG		65.2	(36%-105%)			
Acenaphthylene	1660			1110	UG/KG		66.8	(38%-103%)			
Anthracene	1660			1200	UG/KG		72.2	(43%-104%)			
Benzo(a)anthracene	1660			1270	UG/KG		76.3	(46%-108%)			
Benzo(a)pyrene	1660			1270	UG/KG		76.6	(45%-109%)			
Benzo(b)fluoranthene	1660			1140	UG/KG		68.7	(42%-111%)			
Benzo(ghi)perylene	1660			1660	UG/KG		99.6	(43%-115%)			
Benzo(k)fluoranthene	1660			1150	UG/KG		69.3	(43%-103%)			
Butylbenzylphthalate	1660			1200	UG/KG		72	(37%-107%)			
Carbazole	1660			1650	UG/KG		99.1	(53%-118%)			
Chrysene	1660			1230	UG/KG		74.1	(47%-107%)			
Di-n-butylphthalate	1660			1370	UG/KG		82.5	(46%-112%)			
Di-n-octylphthalate	1660			1400	UG/KG		84.1	(41%-110%)			
Dibenzo(a,h)anthracene	1660			1750	UG/KG		105	(39%-128%)			
Dibenzofuran	1660			1220	UG/KG		73.6	(38%-104%)			
Diethylphthalate	1660			1220	UG/KG		73.6	(42%-109%)			
Dimethylphthalate	1660			1150	UG/KG		68.9	(41%-105%)			
Diphenylamine	1660			1230	UG/KG		74	(40%-101%)			

QC Summary

Workorder: 330215 **Client SDG:** XP0001 **Project Description:** RC-232 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Semi-Volatile-GC/MS										
Batch 1317730										
Fluoranthene	1660			1410	UG/KG		84.8	(44%-106%)		
Fluorene	1660			1120	UG/KG		67.4	(39%-102%)	JMB3	07/27/13 11:53
Hexachlorobenzene	1660			1280	UG/KG		76.8	(41%-108%)		
Hexachlorobutadiene	1660			1140	UG/KG		68.4	(32%-104%)		
Hexachlorocyclopentadiene	1660			805	UG/KG		48.4	(24%-84%)		
Hexachloroethane	1660			1020	UG/KG		61.5	(34%-98%)		
Indeno(1,2,3-cd)pyrene	1660			1700	UG/KG		102	(45%-115%)		
Isophorone	1660			1310	UG/KG		78.6	(36%-98%)		
N-Nitrosodipropylamine	1660			1220	UG/KG		73.5	(34%-106%)		
Naphthalene	1660			1110	UG/KG		66.8	(38%-106%)		
Nitrobenzene	1660			1180	UG/KG		70.9	(35%-99%)		
Pentachlorophenol	1660			1090	UG/KG		65.5	(31%-93%)		
Phenanthrene	1660			1200	UG/KG		72	(43%-105%)		
Phenol	1660			1080	UG/KG		65.1	(38%-98%)		
Pyrene	1660			1120	UG/KG		67.1	(33%-99%)		
bis(2-Chloroethoxy)methane	1660			1110	UG/KG		66.6	(37%-98%)		
bis(2-Chloroethyl) ether	1660			1140	UG/KG		68.3	(35%-96%)		
bis(2-Chloroisopropyl)ether	1660			1110	UG/KG		66.7	(27%-109%)		
bis(2-Ethylhexyl)phthalate	1660			1180	UG/KG		70.9	(41%-104%)		
m-Nitroaniline	1660			1050	UG/KG		62.9	(32%-113%)		
o-Cresol	1660			1080	UG/KG		64.7	(37%-97%)		
o-Nitroaniline	1660			1110	UG/KG		66.5	(34%-116%)		

QC Summary

Workorder: 330215 **Client SDG:** XP0001 **Project Description:** RC-232 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Semi-Volatile-GC/MS										
Batch 1317730										
**2,4,6-Tribromophenol	3330			2730	UG/KG		81.9	(20%-122%)		
**2-Fluorobiphenyl	1660			1040	UG/KG		62.4	(25%-100%)	JMB3	07/27/13 11:53
**2-Fluorophenol	3330			2220	UG/KG		66.8	(23%-107%)		
**Nitrobenzene-d5	1660			1050	UG/KG		63	(21%-103%)		
**Phenol-d5	3330			2300	UG/KG		69.1	(25%-108%)		
**p-Terphenyl-d14	1660			1200	UG/KG		72	(31%-124%)		
QC1202915867 MB										
1,2,4-Trichlorobenzene			U	99.9	UG/KG					07/27/13 11:24
1,2-Dichlorobenzene			U	99.9	UG/KG					
1,3-Dichlorobenzene			U	99.9	UG/KG					
1,4-Dichlorobenzene			U	99.9	UG/KG					
2,4,5-Trichlorophenol			U	99.9	UG/KG					
2,4,6-Trichlorophenol			U	99.9	UG/KG					
2,4-Dichlorophenol			U	99.9	UG/KG					
2,4-Dimethylphenol			U	99.9	UG/KG					
2,4-Dinitrophenol			U	99.9	UG/KG					
2,4-Dinitrotoluene			U	99.9	UG/KG					
2,6-Dinitrotoluene			U	99.9	UG/KG					
2-Chloronaphthalene			U	9.99	UG/KG					
2-Chlorophenol			U	99.9	UG/KG					
2-Methyl-4,6-dinitrophenol			U	99.9	UG/KG					
2-Methylnaphthalene			U	9.99	UG/KG					
2-Nitrophenol			U	99.9	UG/KG					

QC Summary

Workorder: 330215 **Client SDG:** XP0001 **Project Description:** RC-232 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatile-GC/MS											
Batch 1317730											
3,3'-Dichlorobenzidine			U	99.9	UG/KG				JMB3	07/27/13	11:24
3- and/or 4-Methylphenol			U	99.9	UG/KG						
4-Bromophenylphenylether			U	99.9	UG/KG						
4-Chloro-3-methylphenol			U	133	UG/KG						
4-Chloroaniline			U	99.9	UG/KG						
4-Chlorophenylphenylether			U	99.9	UG/KG						
4-Nitrophenol			U	99.9	UG/KG						
Acenaphthene			U	9.99	UG/KG						
Acenaphthylene			U	9.99	UG/KG						
Anthracene			U	9.99	UG/KG						
Benzo(a)anthracene			U	9.99	UG/KG						
Benzo(a)pyrene			U	9.99	UG/KG						
Benzo(b)fluoranthene			U	9.99	UG/KG						
Benzo(ghi)perylene			U	9.99	UG/KG						
Benzo(k)fluoranthene			U	9.99	UG/KG						
Butylbenzylphthalate			U	99.9	UG/KG						
Carbazole			U	9.99	UG/KG						
Chrysene			U	9.99	UG/KG						
Di-n-butylphthalate			U	99.9	UG/KG						
Di-n-octylphthalate			U	99.9	UG/KG						
Dibenzo(a,h)anthracene			U	9.99	UG/KG						

QC Summary

Workorder: 330215 **Client SDG:** XP0001 **Project Description:** RC-232 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatile-GC/MS											
Batch 1317730											
Dibenzofuran			U	99.9	UG/KG						
Diethylphthalate			U	99.9	UG/KG				JMB3	07/27/13	11:24
Dimethylphthalate			U	99.9	UG/KG						
Diphenylamine			U	99.9	UG/KG						
Fluoranthene			U	9.99	UG/KG						
Fluorene			U	9.99	UG/KG						
Hexachlorobenzene			U	99.9	UG/KG						
Hexachlorobutadiene			U	99.9	UG/KG						
Hexachlorocyclopentadiene			U	99.9	UG/KG						
Hexachloroethane			U	99.9	UG/KG						
Indeno(1,2,3-cd)pyrene			U	9.99	UG/KG						
Isophorone			U	99.9	UG/KG						
N-Nitrosodipropylamine			U	99.9	UG/KG						
Naphthalene			U	9.99	UG/KG						
Nitrobenzene			U	99.9	UG/KG						
Pentachlorophenol			U	99.9	UG/KG						
Phenanthrene			U	9.99	UG/KG						
Phenol			U	99.9	UG/KG						
Pyrene			U	9.99	UG/KG						
bis(2-Chloroethoxy)methane			U	99.9	UG/KG						
bis(2-Chloroethyl) ether			U	99.9	UG/KG						
bis(2-Chloroisopropyl)ether			U	99.9	UG/KG						

QC Summary

Workorder: 330215 **Client SDG:** XP0001 **Project Description:** RC-232 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Semi-Volatile-GC/MS										
Batch 1317730										
bis(2-Ethylhexyl)phthalate			U	99.9	UG/KG					
m-Nitroaniline			U	99.9	UG/KG				JMB3	07/27/13 11:24
o-Cresol			U	99.9	UG/KG					
o-Nitroaniline			U	110	UG/KG					
**2,4,6-Tribromophenol	3330			2430	UG/KG		72.9	(20%-122%)		
**2-Fluorobiphenyl	1670			1160	UG/KG		69.9	(25%-100%)		
**2-Fluorophenol	3330			2460	UG/KG		73.8	(23%-107%)		
**Nitrobenzene-d5	1670			1200	UG/KG		72.2	(21%-103%)		
**Phenol-d5	3330			2480	UG/KG		74.5	(25%-108%)		
**p-Terphenyl-d14	1670			1170	UG/KG		70	(31%-124%)		
QC1202915871 330215002 MS										
1,2,4-Trichlorobenzene	1710	U	103	1250	UG/KG		72.9	(25%-102%)		07/27/13 12:52
1,2-Dichlorobenzene	1710	U	103	1210	UG/KG		70.7	(25%-99%)		
1,3-Dichlorobenzene	1710	U	103	1190	UG/KG		69.3	(24%-96%)		
1,4-Dichlorobenzene	1710	U	103	1200	UG/KG		70.2	(24%-97%)		
2,4,5-Trichlorophenol	1710	U	103	1390	UG/KG		81.3	(38%-109%)		
2,4,6-Trichlorophenol	1710	U	103	1260	UG/KG		73.4	(32%-103%)		
2,4-Dichlorophenol	1710	U	103	1300	UG/KG		76	(31%-103%)		
2,4-Dimethylphenol	1710	U	103	1270	UG/KG		74.2	(30%-109%)		
2,4-Dinitrophenol	1710	U	103	944	UG/KG		55.1	(19%-101%)		
2,4-Dinitrotoluene	1710	U	103	1640	UG/KG		95.4	(36%-115%)		
2,6-Dinitrotoluene	1710	U	103	1530	UG/KG		89	(36%-107%)		
2-Chloronaphthalene	1710	U	10.3	1300	UG/KG		75.6	(27%-109%)		

QC Summary

Workorder: 330215 **Client SDG:** XP0001 **Project Description:** RC-232 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Semi-Volatile-GC/MS										
Batch 1317730										
2-Chlorophenol	1710	U	103	1260	UG/KG		73.4	(28%-108%)	JMB3	07/27/13 12:52
2-Methyl-4,6-dinitrophenol	1710	U	103	1360	UG/KG		79.5	(14%-116%)		
2-Methylnaphthalene	1710	U	10.3	1330	UG/KG		77.7	(23%-107%)		
2-Nitrophenol	1710	U	103	1260	UG/KG		73.2	(24%-106%)		
3,3'-Dichlorobenzidine	1710	U	103	1300	UG/KG		76	(28%-105%)		
3- and/or 4-Methylphenol	1710	U	103	1430	UG/KG		83.7	(32%-123%)		
4-Bromophenylphenylether	1710	U	103	1470	UG/KG		85.6	(37%-112%)		
4-Chloro-3-methylphenol	1710	U	137	1380	UG/KG		80.3	(32%-112%)		
4-Chloroaniline	1710	U	103	1050	UG/KG		61.2	(27%-100%)		
4-Chlorophenylphenylether	1710	U	103	1390	UG/KG		81.3	(37%-110%)		
4-Nitrophenol	1710	U	103	1400	UG/KG		81.5	(12%-128%)		
Acenaphthene	1710	U	10.3	1300	UG/KG		75.9	(28%-102%)		
Acenaphthylene	1710	U	10.3	1330	UG/KG		77.3	(32%-103%)		
Anthracene	1710	U	10.3	1360	UG/KG		79.4	(36%-104%)		
Benzo(a)anthracene	1710	U	10.3	1380	UG/KG		80.6	(27%-120%)		
Benzo(a)pyrene	1710	U	10.3	1430	UG/KG		83.6	(31%-116%)		
Benzo(b)fluoranthene	1710	U	10.3	1300	UG/KG		76	(30%-119%)		
Benzo(ghi)perylene	1710	U	10.3	1580	UG/KG		91.9	(30%-109%)		
Benzo(k)fluoranthene	1710	U	10.3	1290	UG/KG		75.3	(31%-125%)		
Butylbenzylphthalate	1710	U	103	1300	UG/KG		76.1	(33%-121%)		
Carbazole	1710	U	10.3	1850	UG/KG		108	(40%-133%)		

QC Summary

Workorder: 330215 **Client SDG:** XP0001 **Project Description:** RC-232 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatile-GC/MS											
Batch 1317730											
Chrysene	1710	U	10.3	1330	UG/KG		77.6	(33%-114%)			
Di-n-butylphthalate	1710	U	103	1450	UG/KG		84.8	(42%-119%)	JMB3	07/27/13	12:52
Di-n-octylphthalate	1710	U	103	1550	UG/KG		90.3	(36%-115%)			
Dibenzo(a,h)anthracene	1710	U	10.3	1700	UG/KG		99.2	(26%-128%)			
Dibenzofuran	1710	U	103	1460	UG/KG		85.3	(28%-117%)			
Diethylphthalate	1710	U	103	1390	UG/KG		80.8	(40%-113%)			
Dimethylphthalate	1710	U	103	1340	UG/KG		77.9	(38%-110%)			
Diphenylamine	1710	U	103	1410	UG/KG		82.5	(34%-111%)			
Fluoranthene	1710	U	10.3	1490	UG/KG		86.8	(32%-115%)			
Fluorene	1710	U	10.3	1320	UG/KG		77.2	(30%-115%)			
Hexachlorobenzene	1710	U	103	1440	UG/KG		84	(34%-111%)			
Hexachlorobutadiene	1710	U	103	1300	UG/KG		75.9	(24%-105%)			
Hexachlorocyclopentadiene	1710	U	103	987	UG/KG		57.6	(12%-106%)			
Hexachloroethane	1710	U	103	1150	UG/KG		66.9	(24%-102%)			
Indeno(1,2,3-cd)pyrene	1710	U	10.3	1670	UG/KG		97.5	(29%-117%)			
Isophorone	1710	U	103	1550	UG/KG		90.2	(24%-108%)			
N-Nitrosodipropylamine	1710	U	103	1400	UG/KG		81.9	(23%-117%)			
Naphthalene	1710	U	10.3	1270	UG/KG		74.3	(21%-107%)			
Nitrobenzene	1710	U	103	1400	UG/KG		81.4	(25%-104%)			
Pentachlorophenol	1710	U	103	1470	UG/KG		85.6	(22%-108%)			
Phenanthrene	1710	U	10.3	1330	UG/KG		77.7	(28%-119%)			
Phenol	1710	U	103	1280	UG/KG		74.7	(28%-108%)			

QC Summary

Workorder: 330215 **Client SDG:** XP0001 **Project Description:** RC-232 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Semi-Volatile-GC/MS										
Batch 1317730										
Pyrene	1710	U	10.3	1200	UG/KG		69.9	(25%-119%)		
bis(2-Chloroethoxy)methane	1710	U	103	1300	UG/KG		75.6	(27%-104%)	JMB3	07/27/13 12:52
bis(2-Chloroethyl) ether	1710	U	103	1290	UG/KG		75.4	(25%-102%)		
bis(2-Chloroisopropyl)ether	1710	U	103	1250	UG/KG		72.8	(25%-105%)		
bis(2-Ethylhexyl)phthalate	1710	U	103	1310	UG/KG		76.4	(33%-124%)		
m-Nitroaniline	1710	U	103	1260	UG/KG		73.4	(31%-110%)		
o-Cresol	1710	U	103	1250	UG/KG		73.1	(27%-105%)		
o-Nitroaniline	1710	U	113	1370	UG/KG		79.8	(37%-114%)		
**2,4,6-Tribromophenol	3430		2950	3290	UG/KG		96.1	(20%-122%)		
**2-Fluorobiphenyl	1710		1150	1210	UG/KG		70.8	(25%-100%)		
**2-Fluorophenol	3430		2460	2490	UG/KG		72.7	(23%-107%)		
**Nitrobenzene-d5	1710		1130	1200	UG/KG		70.2	(21%-103%)		
**Phenol-d5	3430		2480	2660	UG/KG		77.5	(25%-108%)		
**p-Terphenyl-d14	1710		1330	1280	UG/KG		74.6	(31%-124%)		
QC1202915872 330215002 MSD										
1,2,4-Trichlorobenzene	1720	U	103	1180	UG/KG	6.21	68.5	(0%-30%)		07/27/13 13:22
1,2-Dichlorobenzene	1720	U	103	1160	UG/KG	4.39	67.6	(0%-30%)		
1,3-Dichlorobenzene	1720	U	103	1130	UG/KG	4.60	66.1	(0%-30%)		
1,4-Dichlorobenzene	1720	U	103	1150	UG/KG	4.21	67.2	(0%-30%)		
2,4,5-Trichlorophenol	1720	U	103	1350	UG/KG	2.95	78.8	(0%-30%)		
2,4,6-Trichlorophenol	1720	U	103	1210	UG/KG	4.19	70.3	(0%-30%)		
2,4-Dichlorophenol	1720	U	103	1230	UG/KG	5.84	71.6	(0%-30%)		
2,4-Dimethylphenol	1720	U	103	1190	UG/KG	6.58	69.4	(0%-30%)		

QC Summary

Workorder: 330215 **Client SDG:** XP0001 **Project Description:** RC-232 Soil

Semi-Volatile-GC/MS
Batch 1317730

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
2,4-Dinitrophenol	1720	U	103	882	UG/KG	6.81	51.4	(0%-30%)	JMB3	07/27/13 13:22
2,4-Dinitrotoluene	1720	U	103	1600	UG/KG	2.00	93.4	(0%-30%)		
2,6-Dinitrotoluene	1720	U	103	1460	UG/KG	4.59	84.9	(0%-30%)		
2-Chloronaphthalene	1720	U	10.3	1210	UG/KG	7.11	70.4	(0%-30%)		
2-Chlorophenol	1720	U	103	1190	UG/KG	5.56	69.4	(0%-30%)		
2-Methyl-4,6-dinitrophenol	1720	U	103	1310	UG/KG	3.82	76.4	(0%-30%)		
2-Methylnaphthalene	1720	U	10.3	1250	UG/KG	6.39	72.8	(0%-30%)		
2-Nitrophenol	1720	U	103	1170	UG/KG	6.71	68.4	(0%-30%)		
3,3'-Dichlorobenzidine	1720	U	103	1330	UG/KG	2.21	77.6	(0%-30%)		
3- and/or 4-Methylphenol	1720	U	103	1370	UG/KG	4.37	80	(0%-30%)		
4-Bromophenylphenylether	1720	U	103	1440	UG/KG	2.15	83.7	(0%-30%)		
4-Chloro-3-methylphenol	1720	U	137	1320	UG/KG	4.41	76.8	(0%-30%)		
4-Chloroaniline	1720	U	103	990	UG/KG	5.92	57.7	(0%-30%)		
4-Chlorophenylphenylether	1720	U	103	1330	UG/KG	5.02	77.3	(0%-30%)		
4-Nitrophenol	1720	U	103	1380	UG/KG	0.936	80.7	(0%-30%)		
Acenaphthene	1720	U	10.3	1210	UG/KG	6.86	70.8	(0%-30%)		
Acenaphthylene	1720	U	10.3	1240	UG/KG	6.31	72.5	(0%-30%)		
Anthracene	1720	U	10.3	1350	UG/KG	0.735	78.7	(0%-30%)		
Benzo(a)anthracene	1720	U	10.3	1400	UG/KG	1.43	81.7	(0%-30%)		
Benzo(a)pyrene	1720	U	10.3	1440	UG/KG	0.291	83.8	(0%-30%)		
Benzo(b)fluoranthene	1720	U	10.3	1360	UG/KG	4.25	79.2	(0%-30%)		

QC Summary

Workorder: 330215 **Client SDG:** XP0001 **Project Description:** RC-232 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Semi-Volatile-GC/MS										
Batch 1317730										
Benzo(ghi)perylene	1720	U	10.3	1580	UG/KG	0.578	92.3	(0%-30%)		
Benzo(k)fluoranthene	1720	U	10.3	1330	UG/KG	3.03	77.6	(0%-30%)	JMB3	07/27/13 13:22
Butylbenzylphthalate	1720	U	103	1350	UG/KG	3.31	78.6	(0%-30%)		
Carbazole	1720	U	10.3	1840	UG/KG	0.421	107	(0%-30%)		
Chrysene	1720	U	10.3	1370	UG/KG	2.57	79.5	(0%-30%)		
Di-n-butylphthalate	1720	U	103	1460	UG/KG	0.0528	84.8	(0%-30%)		
Di-n-octylphthalate	1720	U	103	1560	UG/KG	0.454	90.7	(0%-30%)		
Dibenzo(a,h)anthracene	1720	U	10.3	1740	UG/KG	2.31	101	(0%-30%)		
Dibenzofuran	1720	U	103	1380	UG/KG	6.19	80.1	(0%-30%)		
Diethylphthalate	1720	U	103	1350	UG/KG	2.48	78.7	(0%-30%)		
Dimethylphthalate	1720	U	103	1280	UG/KG	4.41	74.5	(0%-30%)		
Diphenylamine	1720	U	103	1390	UG/KG	1.61	81.1	(0%-30%)		
Fluoranthene	1720	U	10.3	1500	UG/KG	0.995	87.6	(0%-30%)		
Fluorene	1720	U	10.3	1260	UG/KG	4.62	73.7	(0%-30%)		
Hexachlorobenzene	1720	U	103	1410	UG/KG	2.04	82.3	(0%-30%)		
Hexachlorobutadiene	1720	U	103	1230	UG/KG	5.87	71.5	(0%-30%)		
Hexachlorocyclopentadiene	1720	U	103	845	UG/KG	15.6	49.2	(0%-30%)		
Hexachloroethane	1720	U	103	1100	UG/KG	4.17	64.1	(0%-30%)		
Indeno(1,2,3-cd)pyrene	1720	U	10.3	1710	UG/KG	2.09	99.4	(0%-30%)		
Isophorone	1720	U	103	1440	UG/KG	7.16	83.9	(0%-30%)		
N-Nitrosodipropylamine	1720	U	103	1350	UG/KG	4.27	78.4	(0%-30%)		
Naphthalene	1720	U	10.3	1190	UG/KG	6.55	69.5	(0%-30%)		

QC Summary

Workorder: 330215 **Client SDG:** XP0001 **Project Description:** RC-232 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Semi-Volatile-GC/MS										
Batch 1317730										
Nitrobenzene	1720	U	103	1300	UG/KG	6.81	76	(0%-30%)		
Pentachlorophenol	1720	U	103	1440	UG/KG	2.12	83.8	(0%-30%)	JMB3	07/27/13 13:22
Phenanthrene	1720	U	10.3	1340	UG/KG	0.485	78	(0%-30%)		
Phenol	1720	U	103	1220	UG/KG	5.01	71	(0%-30%)		
Pyrene	1720	U	10.3	1270	UG/KG	5.53	73.8	(0%-30%)		
bis(2-Chloroethoxy)methane	1720	U	103	1220	UG/KG	6.34	70.9	(0%-30%)		
bis(2-Chloroethyl) ether	1720	U	103	1240	UG/KG	4.43	72	(0%-30%)		
bis(2-Chloroisopropyl)ether	1720	U	103	1200	UG/KG	4.33	69.7	(0%-30%)		
bis(2-Ethylhexyl)phthalate	1720	U	103	1330	UG/KG	1.40	77.4	(0%-30%)		
m-Nitroaniline	1720	U	103	1230	UG/KG	2.16	71.8	(0%-30%)		
o-Cresol	1720	U	103	1200	UG/KG	4.46	69.9	(0%-30%)		
o-Nitroaniline	1720	U	113	1310	UG/KG	4.54	76.2	(0%-30%)		
**2,4,6-Tribromophenol	3430		2950	3290	UG/KG		96	(20%-122%)		
**2-Fluorobiphenyl	1720		1150	1130	UG/KG		66	(25%-100%)		
**2-Fluorophenol	3430		2460	2410	UG/KG		70.1	(23%-107%)		
**Nitrobenzene-d5	1720		1130	1140	UG/KG		66.3	(21%-103%)		
**Phenol-d5	3430		2480	2550	UG/KG		74.2	(25%-108%)		
**p-Terphenyl-d14	1720		1330	1360	UG/KG		79	(31%-124%)		

Notes:

The Qualifiers in this report are defined as follows:

A The TIC is a suspected aldol-condensation product

B The analyte was detected in both the associated QC blank and in the sample.

C Analyte has been confirmed by GC/MS analysis