

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 3/24/14
INITIAL/DATE

COMMENTS:

SDG XP0053

SAF-RC-232

Sample Location: 600-378

Date: 24 March 2014
 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 600-378
 Subject: Inorganics - Data Package No. XP0053-GEL

INTRODUCTION

This memo presents the results of data validation on Data Package No. XP0053 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
J1TDP6	2/25/14	Soil	C	See note 1
J1TDP7	2/25/14	Soil	C	See note 1
J1TDP8	2/25/14	Soil	C	See note 1
J1TDP9	2/25/14	Soil	C	See note 1
J1TDR0	2/25/14	Soil	C	See note 1
J1TDR1	2/25/14	Soil	C	See note 1

1 – Metals by 6010C & 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 zinc result in sample J1TDR1 was qualified as undetected and flagged "UJ".

All other preparation blank results were acceptable.

Field (Equipment) Blank

One field blank (J1TDR1) was submitted for analysis. Nine 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 barium (0%) and silicon (26.4%) results were qualified as estimates and flagged "J".

All other accuracy results were acceptable.

Precision

Laboratory Duplicate Samples

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

Due to an RPD outside QC limits, all barium (55.7%), results were qualified as estimates and flagged "J".

All other laboratory duplicate results were acceptable.

Field Duplicate

One set of field duplicates (J1TDP6/J1TDR0) were submitted for analysis. Field duplicate results are compared using the same criteria as for laboratory duplicates. The RPDs for barium (45.6%) and calcium (121.7%) were outside QC limits. Under the WCH statement of work, no qualification is required. All other field duplicate results were acceptable.

Analytical Detection Levels

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

Completeness

Data package No. XP0053 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 zinc result in sample J1TDR1 was qualified as undetected and flagged "UJ".
- Due to matrix spike recoveries outside QC limits, all barium (0%) and silicon (26.4%) results were qualified as estimates and flagged "J".
- Due to an RPD outside QC limits, all barium (55.7%), 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

INORGANICS DATA QUALIFICATION SUMMARY*

SDG: XP0053	REVIEWER: ELR	Project: 600-378	PAGE <u>1</u> OF <u>1</u>
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
Zinc	UJ	J1TDR1	Method blank contamination
Silicon Barium	J	All	MS recovery
Barium	J	All	RPD

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

Appendix 3
Annotated Laboratory Reports

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: March 5, 2014

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

Client SDG: XP0053

Client Sample ID: J1TDP7	Project: WCHN00213
Sample ID: 343751002	Client ID: WCHN001
Matrix: SOIL	
Collect Date: 25-FEB-14 13:15	
Receive Date: 27-FEB-14	
Collector: Client	
Moisture: 6.13%	

✓ 3/22/14

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	0.00424	0.00424	0.0127	mg/kg	1	BCD1	03/03/14	1449	1369634	1
Metals Analysis-ICP											
ICP METALS 6010TR Close-out List "Dry Weight Corrected"											
Aluminum		5370	7.03	20.7	mg/kg	1	HSC	03/04/14	1040	1369488	2
Arsenic	B	2.29	0.517	3.10	mg/kg	1					
Barium	*N S	75.5	0.103	0.517	mg/kg	1					
Beryllium	B	0.442	0.103	0.517	mg/kg	1					
Boron		5.52	1.03	5.17	mg/kg	1					
Cadmium		0.778	0.103	0.517	mg/kg	1					
Calcium		6890	8.27	25.9	mg/kg	1					
Chromium		6.33	0.155	0.517	mg/kg	1					
Copper		15.0	0.310	1.03	mg/kg	1					
Iron		25700	8.27	25.9	mg/kg	1					
Magnesium		4800	8.79	31.0	mg/kg	1					
Manganese		361	0.207	1.03	mg/kg	1					
Molybdenum	U	0.207	0.207	1.03	mg/kg	1					
Nickel		8.49	0.155	0.517	mg/kg	1					
Potassium		1180	6.62	25.9	mg/kg	1					
Silicon	N S	1090	1.55	10.3	mg/kg	1					
Silver		0.589	0.103	0.517	mg/kg	1					
Sodium		160	7.24	25.9	mg/kg	1					
Antimony	BD	3.18	1.71	5.17	mg/kg	5	HSC	03/04/14	1309	1369488	3
Cobalt	D	10.3	0.776	2.59	mg/kg	5					
Lead	D	6.71	1.71	5.17	mg/kg	5					
Vanadium	D	74.2	0.517	2.59	mg/kg	5					
Zinc	D	76.0	2.07	5.17	mg/kg	5					
Metals Analysis-ICP-MS											
SW846 3050B/6020A Selenium "Dry Weight Corrected"											
Selenium	DU	0.349	0.349	1.06	mg/kg	2	BAJ	03/05/14	0352	1369492	4

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	KXP3	02/28/14	1130	1369491
SW846 3050B	SW846 3050B Prep for 6010C	KXP3	02/28/14	1345	1369487
SW846 7471B Prep	SW846 7471B Mercury Prep Soil	AXS5	02/28/14	1448	1369633

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: March 5, 2014

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

Client SDG: XP0053

Client Sample ID: J1TDP8 Project: WCHN00213
 Sample ID: 343751003 Client ID: WCHN001
 Matrix: SOIL
 Collect Date: 25-FEB-14 13:20
 Receive Date: 27-FEB-14
 Collector: Client
 Moisture: 6.32%

✓ 3/22/14

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	0.0038	0.0038	0.0113	mg/kg	1	BCD1	03/03/14	1451	1369634	1
Metals Analysis-ICP											
ICP METALS 6010TR Close-out List "Dry Weight Corrected"											
Aluminum		5590	7.01	20.6	mg/kg	1	HSC	03/04/14	1042	1369488	2
Arsenic		3.22	0.515	3.09	mg/kg	1					
Barium	*N J	75.0	0.103	0.515	mg/kg	1					
Beryllium	B	0.451	0.103	0.515	mg/kg	1					
Boron	B	2.99	1.03	5.15	mg/kg	1					
Cadmium	B	0.447	0.103	0.515	mg/kg	1					
Calcium		8910	8.24	25.8	mg/kg	1					
Chromium		6.16	0.155	0.515	mg/kg	1					
Copper		14.1	0.309	1.03	mg/kg	1					
Iron		26200	8.24	25.8	mg/kg	1					
Magnesium		4900	8.76	30.9	mg/kg	1					
Manganese		355	0.206	1.03	mg/kg	1					
Molybdenum	U	0.206	0.206	1.03	mg/kg	1					
Nickel		7.62	0.155	0.515	mg/kg	1					
Potassium		1150	6.59	25.8	mg/kg	1					
Silicon	N J	1080	1.55	10.3	mg/kg	1					
Silver		0.608	0.103	0.515	mg/kg	1					
Sodium		177	7.21	25.8	mg/kg	1					
Antimony	DU	1.70	1.70	5.15	mg/kg	5	HSC	03/04/14	1313	1369488	3
Cobalt	D	9.79	0.773	2.58	mg/kg	5					
Lead	D	6.60	1.70	5.15	mg/kg	5					
Vanadium	D	72.2	0.515	2.58	mg/kg	5					
Zinc	D	54.6	2.06	5.15	mg/kg	5					
Metals Analysis-ICP-MS											
SW846 3050B/6020A Selenium "Dry Weight Corrected"											
Selenium	DU	0.333	0.333	1.01	mg/kg	2	BAJ	03/05/14	0359	1369492	4

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	KXP3	02/28/14	1130	1369491
SW846 3050B	SW846 3050B Prep for 6010C	KXP3	02/28/14	1345	1369487
SW846 7471B Prep	SW846 7471B Mercury Prep Soil	AXS5	02/28/14	1448	1369633

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: March 5, 2014

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

Client SDG: XP0053

Client Sample ID: J1TDP9
 Sample ID: 343751004
 Matrix: SOIL
 Collect Date: 25-FEB-14 13:25
 Receive Date: 27-FEB-14
 Collector: Client
 Moisture: 6.22%

Project: WCHN00213
 Client ID: WCHN001

W
3/22/14

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	0.00441	0.00399	0.0119	mg/kg	1	BCD1	03/03/14	1453	1369634	1
Metals Analysis-ICP											
ICP METALS 6010TR Close-out List "Dry Weight Corrected"											
Aluminum		5330	6.66	19.6	mg/kg	1	HSC	03/04/14	1044	1369488	2
Arsenic	B	2.21	0.490	2.94	mg/kg	1					
Barium	*N J	75.4	0.098	0.490	mg/kg	1					
Beryllium	B	0.417	0.098	0.490	mg/kg	1					
Boron	B	4.10	0.980	4.90	mg/kg	1					
Cadmium		0.676	0.098	0.490	mg/kg	1					
Calcium		6460	7.84	24.5	mg/kg	1					
Chromium		6.46	0.147	0.490	mg/kg	1					
Copper		15.2	0.294	0.980	mg/kg	1					
Iron		24200	7.84	24.5	mg/kg	1					
Magnesium		4460	8.33	29.4	mg/kg	1					
Manganese		359	0.196	0.980	mg/kg	1					
Molybdenum	U	0.196	0.196	0.980	mg/kg	1					
Nickel		8.23	0.147	0.490	mg/kg	1					
Potassium		1270	6.27	24.5	mg/kg	1					
Silicon	N J	795	1.47	9.80	mg/kg	1					
Silver		0.608	0.098	0.490	mg/kg	1					
Sodium		172	6.86	24.5	mg/kg	1					
Antimony	DU	1.62	1.62	4.90	mg/kg	5	HSC	03/04/14	1317	1369488	3
Cobalt	D	10.1	0.735	2.45	mg/kg	5					
Lead	D	11.9	1.62	4.90	mg/kg	5					
Vanadium	D	66.0	0.490	2.45	mg/kg	5					
Zinc	D	77.7	1.96	4.90	mg/kg	5					
Metals Analysis-ICP-MS											
SW846 3050B/6020A Selenium "Dry Weight Corrected"											
Selenium	DU	0.332	0.332	1.01	mg/kg	2	BAJ	03/05/14	0405	1369492	4

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	KXP3	02/28/14	1130	1369491
SW846 3050B	SW846 3050B Prep for 6010C	KXP3	02/28/14	1345	1369487
SW846 7471B Prep	SW846 7471B Mercury Prep Soil	AXS5	02/28/14	1448	1369633

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: March 5, 2014

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

Client SDG: XP0053

Client Sample ID: J1TDR0
 Sample ID: 343751005
 Matrix: SOIL
 Collect Date: 25-FEB-14 13:10
 Receive Date: 27-FEB-14
 Collector: Client
 Moisture: 6.07%

Project: WCHN00213
 Client ID: WCHN001

✓ 3/22/14

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	0.00423	0.00423	0.0126	mg/kg	1	BCD1	03/03/14	1458	1369634	1
Metals Analysis-ICP											
ICP METALS 6010TR Close-out List "Dry Weight Corrected"											
Aluminum		5350	6.67	19.6	mg/kg	1	HSC	03/04/14	1046	1369488	2
Arsenic		4.86	0.490	2.94	mg/kg	1					
Barium	*N J	75.4	0.098	0.490	mg/kg	1					
Beryllium	B	0.422	0.098	0.490	mg/kg	1					
Boron	B	2.90	0.980	4.90	mg/kg	1					
Cadmium		0.719	0.098	0.490	mg/kg	1					
Calcium		34600	7.84	24.5	mg/kg	1					
Chromium		6.08	0.147	0.490	mg/kg	1					
Copper		14.4	0.294	0.980	mg/kg	1					
Iron		25300	7.84	24.5	mg/kg	1					
Magnesium		5140	8.33	29.4	mg/kg	1					
Manganese		326	0.196	0.980	mg/kg	1					
Molybdenum	U	0.196	0.196	0.980	mg/kg	1					
Nickel		8.48	0.147	0.490	mg/kg	1					
Potassium		1060	6.27	24.5	mg/kg	1					
Silicon	N J	991	1.47	9.80	mg/kg	1					
Silver	B	0.334	0.098	0.490	mg/kg	1					
Sodium		192	6.86	24.5	mg/kg	1					
Antimony	BD	1.83	1.62	4.90	mg/kg	5	HSC	03/04/14	1321	1369488	3
Cobalt	D	9.85	0.735	2.45	mg/kg	5					
Lead	D	5.33	1.62	4.90	mg/kg	5					
Vanadium	D	74.9	0.490	2.45	mg/kg	5					
Zinc	D	53.0	1.96	4.90	mg/kg	5					
Metals Analysis-ICP-MS											
SW846 3050B/6020A Selenium "Dry Weight Corrected"											
Selenium	DU	0.325	0.325	1.00	mg/kg	2	BAJ	03/05/14	0412	1369492	4

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	KXP3	02/28/14	1130	1369491
SW846 3050B	SW846 3050B Prep for 6010C	KXP3	02/28/14	1345	1369487
SW846 7471B Prep	SW846 7471B Mercury Prep Soil	AXS5	02/28/14	1448	1369633

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: March 5, 2014

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

Client SDG: XP0053

Client Sample ID: J1TDR1
 Sample ID: 343751006
 Matrix: SOIL
 Collect Date: 25-FEB-14 13:05
 Receive Date: 27-FEB-14
 Collector: Client
 Moisture: <0.1%

Project: WCHN00213
 Client ID: WCHN001

✓
3/22/14

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	0.00363	0.00363	0.0108	mg/kg	1	BCD1	03/03/14	1459	1369634	1
Metals Analysis-ICP											
ICP METALS 6010TR Close-out List "Dry Weight Corrected"											
Aluminum		88.5	6.15	18.1	mg/kg	1	HSC	03/04/14	1048	1369488	2
Antimony	U	0.298	0.298	0.905	mg/kg	1					
Arsenic	U	0.452	0.452	2.71	mg/kg	1					
Barium	*N J	1.55	0.0905	0.452	mg/kg	1					
Beryllium	U	0.0905	0.0905	0.452	mg/kg	1					
Boron	U	0.905	0.905	4.52	mg/kg	1					
Cadmium	U	0.0905	0.0905	0.452	mg/kg	1					
Calcium		33.4	7.24	22.6	mg/kg	1					
Chromium	U	0.136	0.136	0.452	mg/kg	1					
Cobalt	U	0.136	0.136	0.452	mg/kg	1					
Copper	U	0.271	0.271	0.905	mg/kg	1					
Iron		190	7.24	22.6	mg/kg	1					
Lead	U	0.298	0.298	0.905	mg/kg	1					
Magnesium	B	15.1	7.69	27.1	mg/kg	1					
Manganese		3.75	0.181	0.905	mg/kg	1					
Molybdenum	U	0.181	0.181	0.905	mg/kg	1					
Nickel	U	0.136	0.136	0.452	mg/kg	1					
Potassium		30.4	5.79	22.6	mg/kg	1					
Silicon	N J	130	1.36	9.05	mg/kg	1					
Silver	U	0.0905	0.0905	0.452	mg/kg	1					
Sodium	U	6.33	6.33	22.6	mg/kg	1					
Vanadium	B	0.191	0.0905	0.452	mg/kg	1					
Zinc	C WJ	1.85	0.362	0.905	mg/kg	1					
Metals Analysis-ICP-MS											
SW846 3050B/6020A Selenium "Dry Weight Corrected"											
Selenium	DU	0.297	0.297	1.00	mg/kg	2	BAJ	03/05/14	0419	1369492	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	KXP3	02/28/14	1130	1369491
SW846 3050B	SW846 3050B Prep for 6010C	KXP3	02/28/14	1345	1369487
SW846 7471B Prep	SW846 7471B Mercury Prep Soil	AXS5	02/28/14	1448	1369633

Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

**Metals Fractional Narrative
WC-HANFORD, INC. (WCHN)
SDG XP0053**

Sample Analysis

Sample ID	Client ID
343751001	J1TDP6
343751002	J1TDP7
343751003	J1TDP8
343751004	J1TDP9
343751005	J1TDR0
343751006	J1TDR1
1203042739	Method Blank (MB) ICP
1203042740	Laboratory Control Sample (LCS)
1203042743	343751001(J1TDP6L) Serial Dilution (SD)
1203042741	343751001(J1TDP6D) Sample Duplicate (DUP)
1203042742	343751001(J1TDP6S) Matrix Spike (MS)
1203045044	343751001(J1TDP6PS) Post Spike (PS)
1203042751	Method Blank (MB) ICP-MS
1203042752	Laboratory Control Sample (LCS)
1203042755	343751001(J1TDP6L) Serial Dilution (SD)
1203042753	343751001(J1TDP6D) Sample Duplicate (DUP)
1203042754	343751001(J1TDP6S) Matrix Spike (MS)
1203043135	Method Blank (MB) CVAA
1203043136	Laboratory Control Sample (LCS)
1203043139	343751001(J1TDP6L) Serial Dilution (SD)
1203043140	343751001(J1TDP6D) Sample Duplicate (DUP)
1203043137	343751001(J1TDP6S) Matrix Spike (MS)

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

Method/Analysis Information

Analytical Batch:	1369488, 1369492 and 1369634
Prep Batch :	1369487, 1369491 and 1369633
Standard Operating Procedures:	GL-MA-E-013 REV# 22, GL-MA-E-009 REV# 22, GL-MA-E-014 REV# 25 and GL-MA-E-010 REV# 27

Analytical Method: SW846 3050B/6010C, SW846 3050B/6020A 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 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 - ICPMS was performed on a Perkin Elmer ELAN 9000 inductively coupled plasma mass spectrometer (ICP-MS). The instrument is equipped with a cross-flow nebulizer, *quadrupole mass spectrometer, and dual mode electron multiplier detector. Internal standards of scandium, germanium, indium, tantalum, and/or lutetium were utilized to cover the mass spectrum.* Operating conditions are set at 1400W power and combined argon pressures of 360+/- 7 kPa for the plasma and auxiliary gases, and 0.85 L/min carrier gas flow, and an initial lens voltage of 5.2.

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

The CRDL standard recoveries met the referenced advisory control limits.

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 samples were selected as the quality control (QC) samples for this SDG: 343751001 (J1TDP6)-ICP, CVAA and ICP-MS.

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 exceptions of Barium 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 reporting 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 Barium.

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 did not meet the recommended quality control acceptance criteria for percent recoveries for Barium and Silicon, and verifies the presence 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 established acceptance criteria.

Matrix Spike Duplicate (MSD) Recovery Statement

The percent recovery (%R) obtained from the MSD analyses are evaluated when the sample concentration is less than four times (4X) the spike concentration added. All applicable elements met the acceptance criteria.

MS/MSD Relative Percent Difference (RPD) Statement

The RPD(s) between the MS and MSD met the acceptance limits.

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. The samples in this SDG were diluted the standard two times for solids analyzed on the ICPMS. Samples 343751001, 343751002, 343751003, 343751004, 343751005 were diluted because Titanium was over the linear calibration range of the instrument and affects our ability to ensure the inter-element correction factors were valid for Antimony, Cobalt, Lead, Vanadium and Zinc.

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: 1272144. A copy is included in 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: Bryan Davis Date: 3-5-14

DATA EXCEPTION REPORT			
Mo. Day Yr. 05-MAR-14	Division: Industrial	Quality Criteria: Specifications	Type: Process
Instrument Type: ICP	Test / Method: SW846 3050B/6010C	Matrix Type: Solid	Client Code: WCHN
Batch ID: 1369488	Sample Numbers: See Below		
Potentially affected work order(s)(SDG): 343751(XP0053)			
Application Issues: Failed Recovery for MS/PS Failed RPD for DUP			
Specification and Requirements		DER Disposition:	
Exception Description:			
<p>1. Failed Recovery for MS/PS: QC 1203042742MS, 1203045044PS</p> <p>2. Failed RPD for DUP: QC 1203042741DUP</p>		<p>1. The matrix spike recovery failed outside of the control limits for barium and silicon. The post spike failed outside the required control limits for barium and silicon but passed for all other analytes. This verifies the presence of a matrix interference for barium and silicon and verifies the absence of a matrix interference for all the other analytes. Per GEL's accredited methods and SOPs, a corrective action is not required and the data is qualified and reported.</p> <p>2. The sample and sample duplicate % RPD failed outside the control limits for barium due to possible sample non-homogeneity and/or matrix interference. Per GEL's accredited methods and SOPs, a corrective action is not required and the data is qualified and reported.</p>	

Originator's Name:
Helen Camello 05-MAR-14

Data Validator/Group Leader:
Louise Smith 05-MAR-14

343751

Washington Closure Hanford				CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST				RC-232-078		Page 1 of 2		
Collector 2-25-14 JOHNSON, BRADY White, E				Company Contact Joan Kessner		Telephone No. 375-4688		Project Coordinator KESSNER, JH		Price Code 8B 7day		
Project Designation 100-IU-2 & 100-IU-6 Remaining Waste Sites				Sampling Location 600-378		SAF No. RC-232		Method of Shipment Commercial Carrier - fed ex		Data Turnaround		
Ice Chest No. RCC-07-014				Field Logbook No. EL-1666-01		COA 0603782000		Bill of Lading/Air Bill No. See OSPC				
Shipped To GEL Laboratories Charleston				Offsite Property No. A 131052								
Other Label Shipped To NA				Preservation		Cool 4C	Cool 4C	Cool 4C				
POSSIBLE SAMPLE HAZARDS/REMARKS None				Type of Container		GP	SG	SG				
				No. of Container(s)		1	1	1				
				Volume		125mL	125mL	125mL				
Special Handling and/or Storage Cool 4c				Sample Analysis		See item (1) in Special Instructions	PAHs - 8310	TPH-Diesel Range - WTPH-D +				
Sample No.		Matrix	Sample Date	Sample Time								
J1TDP6		SOIL	2-25-14	1310	X	X	X					
J1TDP7		SOIL	2-25-14	1315	X	X	X					
J1TDP8		SOIL	2-25-14	1320	X	X	X					
J1TDP9		SOIL	2-25-14	1325	X	X	X					
J1TDR0		SOIL	2-25-14	1310	X	X	X					
CHAIN OF POSSESSION				Sign/Print Names				SPECIAL INSTRUCTIONS				
Relinquished By/Removed From E. White on 2-25-14 1330				Received By/Stored In R. Fablberg R. Fell 2-25-14 1330				(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)				
Relinquished By/Removed From C. Bingham 2-25-14 1550				Received By/Stored In C. Bingham 2-25-14 1550								
Relinquished By/Removed From C. Bingham 2-25-14 1555				Received By/Stored In 1000 Battelle, fridge 2-25-14 1555								
Relinquished By/Removed From 1000 Battelle, fridge 2-26-14 1040				Received By/Stored In C. Bingham 2-26-14 1040								
Relinquished By/Removed From C. Bingham 2-26-14 1045				Received By/Stored In Fed EX								
Relinquished By/Removed From Fed EX				Received By/Stored In Off. Jean-Claude Pellegrini 2-27-14 0900								
Relinquished By/Removed From				Received By/Stored In								
FINAL SAMPLE DISPOSITION		Disposal Method		Disposed By		Date/Time		XP0053				



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WCH-EE-011

Washington Closure Hanford			CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST				RC-232-078		Page 2 of 2		
Collector <i>RF 2-25-14</i> JOHNSON, BRADY <i>White, E</i>			Company Contact Joan Kessner		Telephone No. 375-4688		Project Coordinator KESSNER, JH		Price Code <i>8B</i> Data Turnaround		
Project Designation 100-IU-2 & 100-IU-6 Remaining Waste Sites			Sampling Location 600-378		SAF No. RC-232		<i>7 D.3</i>				
Ice Chest No. <i>RCC-07-014</i>			Field Logbook No. EL-1666-01		COA 0603782000		Method of Shipment Commercial Carrier <i>- fed EX</i>				
Shipped To GEL Laboratories Charleston			Offsite Property No. <i>A131052</i>		Bill of Lading/Air Bill No. <i>See OSPC</i>						
Other Labs Shipped To <i>NA</i>			Preservation		Cool 4C	Cool 4C	Cool 4C				
POSSIBLE SAMPLE HAZARDS/REMARKS <i>None</i>			Type of Container		G/P	a/G	a/G				
			No. of Container(s)		1	1	1				
Special Handling and/or Storage <i>Cool 4c</i>			Volume		125mL	125mL	125mL				
			Sample Analysis		See item (1) in Special Instructions	PAHs - 8310	TPH-Diesel Range - WTPH-D +				
Sample No.	Matrix	Sample Date	Sample Time								
J1TDR1	SOIL	2-25-14	1305	X						<i>2-25-14 UNB</i>	
CHAIN OF POSSESSION				Sign/Print Names				SPECIAL INSTRUCTIONS			
Relinquished By/Removed From <i>E. White</i>		Date/Time <i>2-25-14 1330</i>		Received By/Stored In <i>R. Fahlen</i>		Date/Time <i>2-25-14 1330</i>		(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) <div style="border: 1px solid black; border-radius: 50%; padding: 10px; display: inline-block;"> REVIEWED BY <i>K. Wood</i> DATE <i>2-26-14</i> </div>			
Relinquished By/Removed From <i>R. Fahlen</i>		Date/Time <i>2-25-14 1550</i>		Received By/Stored In <i>C. Birmingham</i>		Date/Time <i>2-25-14 1550</i>					
Relinquished By/Removed From <i>C. Birmingham</i>		Date/Time <i>2-25-14 1555</i>		Received By/Stored In <i>1060 Battelle, Indge</i>		Date/Time <i>2-25-14 1555</i>					
Relinquished By/Removed From <i>1060 Battelle, Indge</i>		Date/Time <i>2-26-14 1040</i>		Received By/Stored In <i>C. Birmingham</i>		Date/Time <i>2-26-14 1040</i>					
Relinquished By/Removed From <i>C. Birmingham</i>		Date/Time <i>2-26-14 1045</i>		Received By/Stored In <i>fed EX</i>		Date/Time					
Relinquished By/Removed From <i>Fed Ex</i>		Date/Time		Received By/Stored In <i>Off Jennifer Pellegrini</i>		Date/Time <i>2-27-14 0900</i>					
Relinquished By/Removed From		Date/Time		Received By/Stored In		Date/Time					
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By		Date/Time		<i>X P 0053</i>					

WCH-EE-011

Appendix 5
Data Validation Supporting Documentation

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E
PROJECT:	600-378		DATA PACKAGE: XP0053		
VALIDATOR:	BLR	LAB:	Cel	DATE: 3/15/14	
			SDG:	XP0053	
ANALYSES PERFORMED					
SW-846/ICP	SW-846/GFAA	SW-846/Hg	SW-846 Cyanide		
SAMPLES/MATRIX					
JITDP6		JITDP7		JITDP8	
JITDP9		JITDR0		JITDR1	
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: Zinc - RI - UJ

FD - 9 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 - barium (0%) silica (26.4%) - J all

no PAJ

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

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

Duplicate RPD values acceptable?	Yes	<input checked="" type="radio"/> No	N/A
Duplicate results acceptable?	Yes	<input checked="" type="radio"/> No	N/A
MS/MSD standards NIST traceable? (Levels D, E)	Yes	<input type="radio"/> No	<input checked="" type="radio"/> N/A
MS/MSD standards expired? (Levels D, E)	Yes	<input type="radio"/> No	<input checked="" type="radio"/> N/A
Field duplicate RPD values acceptable?	Yes	<input checked="" type="radio"/> No	N/A
Field split RPD values acceptable?	Yes	<input type="radio"/> No	<input checked="" type="radio"/> N/A
Transcription/calculation errors? (Levels D, E)	Yes	<input type="radio"/> No	<input checked="" type="radio"/> N/A

Comments: RPD ~ 1 Precision - J

FD - 11 out

6. ICP QUALITY CONTROL (Levels D and E)

ICP serial dilution samples analyzed?	Yes	<input type="radio"/> No	<input checked="" type="radio"/> N/A
ICP serial dilution %D values acceptable?	Yes	<input type="radio"/> No	<input checked="" type="radio"/> N/A
ICP post digestion spike required?	Yes	<input type="radio"/> No	<input checked="" type="radio"/> N/A
ICP post digestion spike values acceptable?	Yes	<input type="radio"/> No	<input checked="" type="radio"/> N/A
Standards traceable?	Yes	<input type="radio"/> No	<input checked="" type="radio"/> N/A
Standards expired?	Yes	<input type="radio"/> No	<input checked="" type="radio"/> N/A
Transcription/calculation errors?	Yes	<input type="radio"/> No	<input checked="" type="radio"/> 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

GEL LABORATORIES LLC

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

QC Summary

Workorder: 343751

Client SDG: XP0053

Project Description: RC-232 Soil

Page 4 of 7

Parname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis-ICP											
Batch	1369488										
Chromium			U	0.145	mg/kg				HSC	03/04/14	10:16
Cobalt			U	0.145	mg/kg						
Copper			U	0.291	mg/kg						
Iron			U	7.75	mg/kg						
Lead			B	-0.372	mg/kg						
Magnesium			U	8.24	mg/kg						
Manganese			U	0.194	mg/kg						
Molybdenum			U	0.194	mg/kg						
Nickel			U	0.145	mg/kg						
Potassium			U	6.20	mg/kg						
Silicon			U	1.45	mg/kg						
Silver			U	0.0969	mg/kg						
Sodium			U	6.78	mg/kg						
Vanadium			U	0.0969	mg/kg						
Zinc			B	0.641	mg/kg						
QC1203042742 343751001 MS											
Aluminum	527			5540	6550	mg/kg		N/A (75%-125%)		03/04/14	10:27
Antimony	52.7	BD		2.09	D	50.7	mg/kg	92.3 (75%-125%)		03/04/14	12:59
Arsenic	52.7			4.32		57.8	mg/kg	101 (75%-125%)		03/04/14	10:27
Barium	52.7	*N		120	N	118	mg/kg	0* (75%-125%)			
Beryllium	52.7	B		0.497		54.3	mg/kg	102 (75%-125%)			
Boron	52.7			5.63		53.8	mg/kg	91.4 (75%-125%)			

GEL LABORATORIES LLC

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QC Summary

Workorder: 343751

Client SDG: XP0053

Project Description: RC-232 Soil

Page 5 of 7

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis-ICP											
Batch	1369488										
Cadmium	52.7		0.673		50.7	mg/kg	94.9	(75%-125%)	HSC	03/04/14	10:27
Calcium	527		8420		9730	mg/kg	N/A	(75%-125%)			
Chromium	52.7		6.34		56.7	mg/kg	95.7	(75%-125%)			
Cobalt	52.7		9.82		59.8	mg/kg	94.9	(75%-125%)			
Copper	52.7	D	15.0	D	69.6	mg/kg	104	(75%-125%)		03/04/14	12:59
Iron	527		27000		26800	mg/kg	N/A	(75%-125%)		03/04/14	10:27
Lead	52.7	D	5.92	D	58.6	mg/kg	100	(75%-125%)		03/04/14	12:59
Magnesium	527		4680		5300	mg/kg	N/A	(75%-125%)		03/04/14	10:27
Manganese	52.7		395		398	mg/kg	N/A	(75%-125%)			
Molybdenum	52.7	U	0.205		50.0	mg/kg	94.9	(75%-125%)			
Nickel	52.7		7.63		58.1	mg/kg	95.8	(75%-125%)			
Potassium	527		1070		1630	mg/kg	106	(75%-125%)			
Silicon	527	N	1080	N	1220	mg/kg	26.4 *	(75%-125%)			
Silver	52.7		0.638		52.8	mg/kg	99	(75%-125%)			
Sodium	527		200		801	mg/kg	114	(75%-125%)			
Vanadium	52.7	D	83.0	D	129	mg/kg	87.3	(75%-125%)		03/04/14	12:59
Zinc	52.7	D	59.2	D	109	mg/kg	93.7	(75%-125%)			
QC1203045044 343751001 PS											
Barium	500	*N	1180		1480	ug/L	61.2 *	(80%-120%)		03/04/14	12:50
Silicon	5000	N	10500		17700	ug/L	143 *	(80%-120%)			
QC1203042743 343751001 SDILT											
Aluminum			54200	D	10900	ug/L	.308	(0%-10%)		03/04/14	10:29
Antimony		BD	4.09	DU	8.20	ug/L	N/A	(0%-10%)		03/04/14	13:02

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QC Summary

Workorder: 343751 Client SDG: XP0053 Project Description: RC-232 Soil Page 6 of 7

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis-ICP											
Batch 1369488											
Arsenic		42.3	D	9.80	ug/L	15.9		(0%-10%)	HSC	03/04/14	10:29
Barium	*N	1180	D	241	ug/L	2.31		(0%-10%)			
Beryllium	B	4.86	DU	0.497	ug/L	N/A		(0%-10%)			
Boron		55.0	D	11.0	ug/L	.189		(0%-10%)			
Cadmium		6.58	DU	0.497	ug/L	N/A		(0%-10%)			
Calcium		82200	D	16700	ug/L	1.59		(0%-10%)			
Chromium		61.9	D	12.8	ug/L	3.4		(0%-10%)			
Cobalt	D	20.8	D	4.27	ug/L	2.49		(0%-10%)		03/04/14	13:02
Copper		157	D	29.6	ug/L	5.68		(0%-10%)		03/04/14	10:29
Iron		264000	D	55600	ug/L	5.46		(0%-10%)			
Lead	D	11.6	DU	8.20	ug/L	N/A		(0%-10%)		03/04/14	13:02
Magnesium		45700	D	9280	ug/L	1.49		(0%-10%)		03/04/14	10:29
Manganese		3860	D	805	ug/L	4.41		(0%-10%)			
Molybdenum	U	-4.67	DU	0.995	ug/L	N/A		(0%-10%)			
Nickel		74.6	D	15.6	ug/L	4.32		(0%-10%)			
Potassium		10400	D	2070	ug/L	.786		(0%-10%)			
Silicon	N	10500	D	2100	ug/L	.223		(0%-10%)			
Silver		6.23	D	1.44	ug/L	15.2		(0%-10%)			
Sodium		1960	D	394	ug/L	.757		(0%-10%)			
Vanadium	D	162	D	32.2	ug/L	.611		(0%-10%)		03/04/14	13:02
Zinc	D	116	D	23.6	ug/L	2.14		(0%-10%)			

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QC Summary

Workorder: 343751

Client SDG: XP0053

Project Description: RC-232 Soil

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Parname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis-Mercury											
Batch	1369634										
QC1203043140	343751001	DUP									
Mercury		U	0.00416	U	0.00416	mg/kg	N/A ^		BCD1	03/03/14	14:44
QC1203043136	LCS										
Mercury	0.117				0.119	mg/kg	101	(80%-120%)		03/03/14	14:17
QC1203043135	MB										
Mercury			U		0.00389	mg/kg				03/03/14	14:12
QC1203043137	343751001	MS									
Mercury	0.122	U	0.00416		0.129	mg/kg	103	(80%-120%)		03/03/14	14:41
QC1203043139	343751001	SDILT									
Mercury		U	0.038	DU	0.0213	ug/L	N/A	(0%-10%)		03/03/14	14:46

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.

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QC Summary

Report Date: March 5, 2014

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

Contact:

Workorder: 343751

Client SDG: XP0053

Project Description: RC-232 Soil

Parname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
Metals Analysis - ICPMS											
Batch 1369492											
QC1203042753	343751001	DUP									
Selenium		DU	0.348	DU	0.339	mg/kg	N/A ^		BAJ	03/05/14	03:06
QC1203042752	LCS										
Selenium	4.87		D	4.22	mg/kg		86.5	(80%-120%)		03/05/14	02:39
QC1203042751	MB										
Selenium			DU	0.329	mg/kg					03/05/14	02:32
QC1203042754	343751001	MS									
Selenium	5.07	DU	0.348	D	4.23	mg/kg		83.4	(75%-125%)	03/05/14	03:12
QC1203042755	343751001	SDILT									
Selenium		DU	-1.16	DU	1.74	ug/L	N/A	(0%-10%)		03/05/14	03:26
Metals Analysis-ICP											
Batch 1369488											
QC1203042741	343751001	DUP									
Aluminum			5540		5410	mg/kg	2.47	(0%-20%)	HSC	03/04/14	10:25
Antimony		BD	2.09	DU	1.69	mg/kg	36.0 ^	(+/-5.12)		03/04/14	12:56
Arsenic			4.32		3.61	mg/kg	17.9 ^	(+/-3.07)		03/04/14	10:25
Barium		*N	120	*	68.0	mg/kg	55.7*	(0%-20%)			
Beryllium		B	0.497	B	0.433	mg/kg	13.8 ^	(+/-0.512)			
Boron			5.63	B	4.37	mg/kg	25.2 ^	(+/-5.12)			
Cadmium			0.673		0.633	mg/kg	6.16 ^	(+/-0.512)			
Calcium			8420		8510	mg/kg	1.16	(0%-20%)			
Chromium			6.34		7.34	mg/kg	14.7	(0%-20%)			
Cobalt		D	10.7	D	11.2	mg/kg	5.13 ^	(+/-2.56)		03/04/14	12:56
Copper			16.0		14.7	mg/kg	9.06	(0%-20%)		03/04/14	10:25
Iron			27000		26300	mg/kg	2.64	(0%-20%)			

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QC Summary

Workorder: 343751

Client SDG: XP0053

Project Description: RC-232 Soil

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlat	Date	Time
Metals Analysis-ICP											
Batch	1369488										
Lead		D	5.92	D	5.76	mg/kg	2.72 ^	(+/-5.12)	HSC	03/04/14	12:56
Magnesium			4680		5070	mg/kg	8.08	(0%-20%)		03/04/14	10:25
Manganese			395		380	mg/kg	3.77	(0%-20%)			
Molybdenum		U	0.205	U	0.205	mg/kg	N/A ^				
Nickel			7.63		9.00	mg/kg	16.5	(0%-20%)			
Potassium			1070		1090	mg/kg	1.93	(0%-20%)			
Silicon		N	1080		1100	mg/kg	2.11	(0%-20%)			
Silver			0.638		0.589	mg/kg	7.96 ^	(+/-0.512)			
Sodium			200		190	mg/kg	4.97	(0%-20%)			
Vanadium		D	83.0	D	74.7	mg/kg	10.4	(0%-20%)		03/04/14	12:56
Zinc		D	59.2	D	58.0	mg/kg	1.97	(0%-20%)			
QC1203042740	LCS										
Aluminum			492		492	mg/kg	99.9	(80%-120%)		03/04/14	10:20
Antimony			49.2		48.8	mg/kg	99.1	(80%-120%)			
Arsenic			49.2		49.9	mg/kg	101	(80%-120%)			
Barium			49.2		49.1	mg/kg	99.7	(80%-120%)			
Beryllium			49.2		52.9	mg/kg	108	(80%-120%)			
Boron			49.2		47.7	mg/kg	96.9	(80%-120%)			
Cadmium			49.2		49.8	mg/kg	101	(80%-120%)			
Calcium			492		487	mg/kg	99	(80%-120%)			
Chromium			49.2		49.0	mg/kg	99.6	(80%-120%)			
Cobalt			49.2		48.9	mg/kg	99.4	(80%-120%)			

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QC Summary

Workorder: 343751 Client SDG: XP0053 Project Description: RC-232 Soil Page 3 of 7

Parmname	NOM	Sample Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis-ICP									
Batch	1369488								
Copper	49.2		50.9	mg/kg		103	(80%-120%)	HSC	03/04/14 10:20
Iron	492		500	mg/kg		102	(80%-120%)		
Lead	49.2		49.8	mg/kg		101	(80%-120%)		
Magnesium	492		500	mg/kg		102	(80%-120%)		
Manganese	49.2		49.5	mg/kg		101	(80%-120%)		
Molybdenum	49.2		48.5	mg/kg		98.5	(80%-120%)		
Nickel	49.2		49.6	mg/kg		101	(80%-120%)		
Potassium	492		505	mg/kg		103	(80%-120%)		
Silicon	492		446	mg/kg		90.6	(80%-120%)		
Silver	49.2		49.2	mg/kg		99.9	(80%-120%)		
Sodium	492		495	mg/kg		101	(80%-120%)		
Vanadium	49.2		49.5	mg/kg		101	(80%-120%)		
Zinc	49.2		50.7	mg/kg		103	(80%-120%)		
QC1203042739	MB								
Aluminum		U	6.59	mg/kg					03/04/14 10:16
Antimony		U	0.320	mg/kg					
Arsenic		U	0.484	mg/kg					
Barium		U	0.0969	mg/kg					
Beryllium		U	0.0969	mg/kg					
Boron		U	0.969	mg/kg					
Cadmium		U	0.0969	mg/kg					
Calcium		U	7.75	mg/kg					

Date: 24 March 2014
 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 600-378
 Subject: Diesel Range Organics - Data Package No. XP0053-GEL

INTRODUCTION

This memo presents the results of data validation on Data Package No. XP0053 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
J1TDP6	2/25/14	Soil	C	See note 1
J1TDP7	2/25/14	Soil	C	See note 1
J1TDP8	2/25/14	Soil	C	See note 1
J1TDP9	2/25/14	Soil	C	See note 1
J1TDR0	2/25/14	Soil	C	See note 1

1 – Diesel range organics by NWTPH-d.

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.

All accuracy results were acceptable.

Surrogate Recovery

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

All surrogate results were acceptable.

Precision

Matrix Spike/Matrix Spike Duplicate Samples

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

All duplicate results were acceptable.

Field Duplicate Samples

One set of field duplicates (J1TDP6/J1TDR0) were submitted for analysis. Field duplicate results 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 required quantitation limits (RQL's) to ensure that laboratory detection levels meet the required criteria. All analytes met the RQL.

Completeness

Data package No. XP0053 was submitted for validation and verified for completeness. Completeness is based on the percentage of data determined to be valid (i.e., not rejected). The completion percentage was 100%.

MAJOR DEFICIENCIES

None found.

MINOR DEFICIENCIES

None found.

REFERENCES

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

DOE/RL-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

DIESEL RANGE ORGANIC DATA QUALIFICATION SUMMARY*

SDG: XP0053	REVIEWER: ELR	Project: 600-378	PAGE <u>1</u> OF <u>1</u>
COMMENTS: No qualifiers assigned			

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

Appendix 3
Annotated Laboratory Reports

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Certificate of Analysis

Report Date: March 4, 2014

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

Client SDG: XP0053

Client Sample ID: J1TDP7
 Sample ID: 343751002
 Matrix: SOIL
 Collect Date: 25-FEB-14 13:15
 Receive Date: 27-FEB-14
 Collector: Client
 Moisture: 6.13%

Project: WCHN00213
 Client ID: WCHN001

✓
3/22/14

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Diesel Range Organics											
SW 3541/NWTPH-Dx in Soil "Dry Weight Corrected"											
Diesel Range Organics (C10-C20)	TU	2310	2310	7100	ug/kg	1	BYT1	03/04/14	0539	1369858	1
Motor Oil (C20-C36)	T	9650	2310	7100	ug/kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	3541 DRO IN SOIL PREP	SXW3	02/28/14	1900	1369856

The following Analytical Methods were performed:

Method	Description	Analyst Comments			
I	NWTPH-Dx in Soil				
Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
o-Terphenyl	SW 3541/NWTPH-Dx in Soil "Dry Weight Corrected"	473 ug/kg	710	66.7	(50%-150%)

Notes:

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Certificate of Analysis

Report Date: March 4, 2014

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

Client SDG: XP0053

Client Sample ID: J1TDP8
 Sample ID: 343751003
 Matrix: SOIL
 Collect Date: 25-FEB-14 13:20
 Receive Date: 27-FEB-14
 Collector: Client
 Moisture: 6.32%

Project: WCHN00213
 Client ID: WCHN001

✓
3/22/14

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Diesel Range Organics											
SW 3541/NWTPH-Dx in Soil "Dry Weight Corrected"											
Diesel Range Organics (C10-C20)	TU	2310	2310	7100	ug/kg	1	BYT1	03/04/14	0735	1369858	1
Motor Oil (C20-C36)	T	11000	2310	7100	ug/kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	3541 DRO IN SOIL PREP	SXW3	02/28/14	1900	1369856

The following Analytical Methods were performed:

Method	Description	Analyst Comments			
1	NWTPH-Dx in Soil				
Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
o-Terphenyl	SW 3541/NWTPH-Dx in Soil "Dry Weight Corrected"	537 ug/kg	710	75.6	(50%-150%)

Notes:

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: March 4, 2014

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

Client SDG: XP0053

Client Sample ID: J1TDP9
 Sample ID: 343751004
 Matrix: SOIL
 Collect Date: 25-FEB-14 13:25
 Receive Date: 27-FEB-14
 Collector: Client
 Moisture: 6.22%

Project: WCHN00213
 Client ID: WCHN001

✓
3/22/14

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Diesel Range Organics											
SW 3541/NWTPH-Dx in Soil "Dry Weight Corrected"											
Diesel Range Organics (C10-C20)	TU	2310	2310	7100	ug/kg	1	BYT1	03/04/14	0814	1369858	1
Motor Oil (C20-C36)	T	31200	2310	7100	ug/kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	3541 DRO IN SOIL PREP	SXW3	02/28/14	1900	1369856

The following Analytical Methods were performed:

Method	Description	Analyst Comments
I	NWTPH-Dx in Soil	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
o-Terphenyl	SW 3541/NWTPH-Dx in Soil "Dry Weight Corrected"	542 ug/kg	710	76.3	(50%-150%)

Notes:

Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

**FID Diesel Range Organics
WC-HANFORD, INC. (WCHN)
SDG XP0053**

Method/Analysis Information

Procedure: Analysis of Diesel Range Organics by Flame Ionization Detector
Analytical Method: NWTPH-Dx in Soil
Prep Method: SW846 3541
Analytical Batch Number: 1369858
Prep Batch Number: 1369856

Sample Analysis

The following samples were analyzed using the analytical protocol as established in NWTPH-Dx in Soil:

Sample ID	Client ID
343751001	J1TDP6
343751002	J1TDP7
343751003	J1TDP8
343751004	J1TDP9
343751005	J1TDR0
1203043734	Method Blank (MB)
1203043735	Laboratory Control Sample (LCS)
1203043736	343751002(J1TDP7) Matrix Spike (MS)
1203043737	343751002(J1TDP7) 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-003 REV# 24.

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

Calibration Information

Initial Calibration

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

Continuing Calibration Verification (CCV) Requirements

All associated calibration verification standard(s) (ICV or CCV) met the acceptance criteria. Analyte peaks eluted within the established retention time windows for this method.

Quality Control (QC) Information

Method Blank (MB) Statement

The MB analyzed with this SDG met the acceptance criteria.

Surrogate Recoveries

All surrogate recoveries were within the established acceptance criteria for this SDG.

Laboratory Control Sample (LCS) Recovery

The LCS spike recoveries met the acceptance limits.

QC Sample Designation

Sample 343751002 (J1TDP7) was selected for the matrix spike and matrix spike duplicate analysis.

Matrix Spike (MS) Recovery Statement

The MS recovered below the acceptance limits. This non-compliance is not likely to affect the result of the parent sample as all other samples in this batch met spike and surrogate recovery acceptance criteria.

Matrix Spike Duplicate (MSD) Recovery Statement

The MSD recovery was within the established acceptance limits.

MS/MSD Relative Percent Difference (RPD) Statement

The RPD between the MS and MSD did not meet the acceptance limits for Diesel Range Organics due to low spike recovery in the MS.

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. Analyte peaks eluted within the established retention time windows for this method.

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-extraction/Re-analysis

Re-extractions or re-analyses were not required in this SDG.

Miscellaneous Information

Electronic Package Comment

This 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. The data validator will always sign and date the case narrative.

Data Exception (DER) Documentation

Data exception report (DER) is generated to document procedural anomalies that may deviate from referenced SOP or contractual documents. DER #1271778 was generated for this SDG.

Manual Integrations

Certain standards and samples may have required manual integration to correctly position the baseline as set in the calibration standard injections. If manual integration was performed, copies of all manual integration peak profiles are included in the raw data section of this fraction.

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 additional comments were not required.

System Configuration

The Diesel Range Organics analysis was performed on the following instrument configuration:

Instrument ID	Instrument	System Configuration	Column ID	Column Description
FID7.1	Agilent Gas Chromatograph	Agilent 6890N GC/FID	DB-5MS	30m x 0.25mm, 0.25um(J&W)

Certification Statement

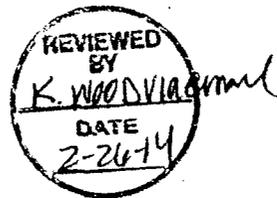
Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

DATA EXCEPTION REPORT			
Mo. Day Yr. 04-MAR-14	Division: Federal	Quality Criteria: Specifications	Type: Process
Instrument Type: GC/FID	Test / Method: NWTPH-Dx in Soil	Matrix Type: Solid	Client Code: WCHN
Batch ID: 1369858	Sample Numbers: See Below		
Potentially affected work order(s)(SDG): 343751(XP0053)			
Application Issues: Failed Recovery for MS/PS Failed RPD for MS/MSD, or PS/PSD			
Specification and Requirements Exception Description:		DER Disposition:	
<ol style="list-style-type: none"> The MS(1203043736) recovered diesel range organics at 62% and motor oil at 69%(SPC Limit: 70%-130%). The MS/MSD RPD value for diesel range organics is 24%(SPC Limit: 20%). 		<ol style="list-style-type: none"> The MSD exhibited similar(but passing) recoveries, the failures are attributed to matrix interference and the data were reported. The MS/MSD pair had a similar recovery for the analyte. The results are reported. 	

Originator's Name:
Benjamin Taft 04-MAR-14

Data Validator/Group Leader:
Jimin Cao 04-MAR-14

343751

Washington Closure Hanford			CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST				RC-232-078		Page 1 of 2		
Collector <i>2-25-14</i> JOHNSON, BRADY White, E			Company Contact Joan Kessner		Telephone No. 375-4688		Project Coordinator KESSNER, JH		Price Code 88		
Project Designation 100-IU-2 & 100-IU-6 Remaining Waste Sites			Sampling Location 600-378		SAF No. RC-232		Data Turnaround 7 day				
Ice Chest No. RCC-07-014			Field Logbook No. EL-1666-01		COA 0603782000		Method of Shipment Commerical Carrier - Fed Ex				
Shipped To GEL Laboratories Charleston			Offsite Property No. A131052		Bill of Lading/Air Bill No. See OSPC						
Other Labs Shipped To NA			Preservation		Cool 4C	Cool 4C	Cool 4C				
POSSIBLE SAMPLE HAZARDS/REMARKS None			Type of Container		GP	AG	AG				
Special Handling and/or Storage Cool 4c			No. of Container(s)		1	1	1				
			Volume		125mL	125mL	125mL				
			Sample Analysis		See item (1) in Special Instructions	PAHs - 8310	TPH-Diesel Range - WTPH-D +				
Sample No.	Matrix	Sample Date	Sample Time								
J1TDP6	SOIL	2-25-14	1310	X	X	X					
J1TDP7	SOIL	2-25-14	1315	X	X	X					
J1TDP8	SOIL	2-25-14	1320	X	X	X					
J1TDP9	SOIL	2-25-14	1325	X	X	X					
J1TDR0	SOIL	2-25-14	1310	X	X	X					
CHAIN OF POSSESSION				Sign/Print Names				SPECIAL INSTRUCTIONS			
Relinquished By/Removed From		Date/Time		Received By/Stored In		Date/Time		<p>(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)</p> <div style="text-align: center;">  </div>			
E. White <i>En Ho</i>		2-25-14 1330		R. Fahlberg <i>R. Fahl</i>		2-25-14					
R. Fahlberg <i>R. Fahl</i>		2-25-14 1530		C. Bingham <i>C. Bingham</i>		2-25-14 1550					
C. Bingham <i>C. Bingham</i>		2-25-14 1555		1060 Battelle, fridge <i>A</i>		2-25-14 1555					
1060 Battelle, fridge <i>IA</i>		2-26-14 1040		C. Bingham <i>C. Bingham</i>		2-26-14 1040					
C. Bingham <i>C. Bingham</i>		2-26-14 1045		Fed Ex							
Fed Ex		2-27-14 0900		Tom Cer Pellegriani <i>Tom Cer Pellegriani</i>		2-27-14 0900					
FINAL SAMPLE DISPOSITION		Disposal Method		Disposed By		Date/Time		XP0053			

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Washington Closure Hanford		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST					RC-232-078	Page 2 of 2
Collector <i>RF 2-25-14</i> JOHNSON, BRADY <i>White, E</i>		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 600-378		SAF No. RC-232		Price Code <i>8B</i> <i>7.D.3</i>		
Ice Chest No. <i>RCC-07-014</i>		Field Logbook No. EL-1686-01		COA 0603782000		Method of Shipment Commerical Carrier <i>- fed EX</i>		
Shipped To GEL Laboratories Charleston		Offsite Property No. <i>A131052</i>		Bill of Lading/Air Bill No. <i>See OSPC</i>				
Other Labs Shipped To <i>NA</i>		Preservation		Cool 4C	Cool 4C	Cool 4C		
POSSIBLE SAMPLE HAZARDS/REMARKS <i>None</i>		Type of Container		GP	aG	aG		
Special Handling and/or Storage <i>Cool 4c</i>		No. of Container(s)		1	1	1		
		Volume		125mL	125mL	125mL		
		Sample Analysis		See item (1) in Special Instructions	PAHs - 8310	TPH-Diesel Range - WTPH-D +		
Sample No.	Matrix	Sample Date	Sample Time					
J1TDR1	SOIL	<i>2-25-14</i>	<i>1305</i>	<i>X</i>			<i>2-25-14 CMB</i>	
CHAIN OF POSSESSION				Sign/Print Names				
Relinquished By/Removed From		Date/Time		Received By/Stored In		Date/Time		
<i>E. White</i>		<i>2-25-14 1330</i>		<i>R. Fabian</i>		<i>2-25-14 1330</i>		
<i>R. Fabian</i>		<i>2-25-14 1550</i>		<i>C. Birmingham</i>		<i>2-25-14 1550</i>		
<i>C. Birmingham</i>		<i>2-25-14 1555</i>		<i>1060 Battelle, Indge</i>		<i>2-25-14 1555</i>		
<i>1060 Battelle, Indge</i>		<i>2-26-14 1040</i>		<i>C. Birmingham</i>		<i>2-26-14 1040</i>		
<i>C. Birmingham</i>		<i>2-26-14 1045</i>		<i>fed EX</i>				
<i>Fed EX</i>				<i>C. Birmingham</i>		<i>2-27-14 0900</i>		
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)				
								
				<i>X P 0053</i>				

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WCH-EE-011

Appendix 5
Data Validation Supporting Documentation

GENERAL ORGANIC DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E
PROJECT:	600-378		DATA PACKAGE: XP0053		
VALIDATOR:	ELR	LAB: Gcl	DATE: 3/15/14		
		SDG: XP0053			
ANALYSES PERFORMED					
8015	8021	8141	8151	8315	
		WTPH-HCID	WTPH-G	WTPH-D	
SAMPLES/MATRIX:					
JITDP6 JITDP7 JITDP8 JITDP9					
JITDRO					
Soil					

1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE

Technical verification documentation present? Yes No N/A

Comments: _____

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

Initial calibrations acceptable? Yes No N/A
 Continuing calibrations acceptable? Yes No N/A
 Standards traceable? Yes No N/A
 Standards expired? Yes No N/A
 Calculation check acceptable? Yes No N/A

Comments: _____

GENERAL ORGANIC DATA VALIDATION CHECKLIST

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

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

Comments: _____

No FBS

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

- Surrogates/system monitoring compounds analyzed? Yes No N/A
- Surrogate/system monitoring compound recoveries acceptable? Yes No N/A
- Surrogates traceable? (Levels D, E) Yes No N/A
- Surrogates expired? (Levels D, E) Yes No N/A
- MS/MSD samples analyzed? Yes No N/A
- MS/MSD results acceptable? Yes No N/A
- MS/MSD standards NIST traceable? (Levels D, E) Yes No N/A
- MS/MSD standards expired? (Levels D, E) Yes No N/A
- LCS/BSS samples analyzed? Yes No N/A
- LCS/BSS results acceptable? Yes No N/A
- Standards traceable? (Levels D, E) Yes No N/A
- Standards expired? (Levels D, E) Yes No N/A
- Transcription/calculation errors? (Levels D, E) Yes No N/A
- Performance audit sample(s) analyzed? Yes No N/A
- Performance audit sample results acceptable? Yes No N/A

Comments: _____

No PAS

GENERAL ORGANIC DATA VALIDATION CHECKLIST

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

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

Comments: _____

6. HOLDING TIMES (all levels)

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

Comments: _____

GENERAL ORGANIC DATA VALIDATION CHECKLIST

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

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

Comments: _____

9. SAMPLE CLEANUP (Levels D and E)

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

Comments: _____

Appendix 6
Additional Documentation Requested by Client

GEL LABORATORIES LLC

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

QC Summary

Report Date: March 4, 2014

Page 1 of 2

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

Contact:

Workorder: 343751

Client SDG: XP0053

Project Description: RC-232 Soil

Paramname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Diesel Range Organics											
Batch	1369858										
QC1203043735	LCS			53400	ug/kg		80.1	(70%-130%)	BYT1	03/04/14	04:22
Diesel Range Organics (C10-C20)	66600										
Motor Oil (C20-C36)	66600			56300	ug/kg		84.4	(70%-130%)			
**o-Terphenyl	666			554	ug/kg		83.1	(50%-150%)			
QC1203043734	MB			2160	ug/kg					03/04/14	03:44
Diesel Range Organics (C10-C20)			U								
Motor Oil (C20-C36)			U	2160	ug/kg						
**o-Terphenyl	666			484	ug/kg		72.6	(50%-150%)			
QC1203043736	343751002 MS			44100	ug/kg		62.2*	(70%-130%)		03/04/14	06:18
Diesel Range Organics (C10-C20)	71000	TU	2310 T								
Motor Oil (C20-C36)	71000	T	9650 T	59200	ug/kg		69.9*	(70%-130%)			
**o-Terphenyl	710		473	451	ug/kg		63.5	(50%-150%)			
QC1203043737	343751002 MSD			56300	ug/kg	24.1*	79.3	(0%-20%)		03/04/14	06:57
Diesel Range Organics (C10-C20)	71000	TU	2310								
Motor Oil (C20-C36)	71000	T	9650	70700	ug/kg	17.6	86	(0%-20%)			
**o-Terphenyl	710		473	578	ug/kg		81.4	(50%-150%)			

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
- D Results are reported from a diluted aliquot of sample.
- E Concentration exceeds the calibration range of the instrument
- J 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). Value is estimated

Date: 24 March 2014
 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 600-378
 Subject: Polyaromatic Hydrocarbon - Data Package No. XP0053-GEL

INTRODUCTION

This memo presents the results of data validation on Data Package No. XP0053 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
J1TDP6	2/25/14	Soil	C	See note 1
J1TDP7	2/25/14	Soil	C	See note 1
J1TDP8	2/25/14	Soil	C	See note 1
J1TDP9	2/25/14	Soil	C	See note 1
J1TDR0	2/25/14	Soil	C	See note 1

1 – Polyaromatic Hydrocarbons by 3550B.

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.

All accuracy results were acceptable.

Surrogate Recovery

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

All surrogate results were acceptable.

Precision

Matrix Spike/Matrix Spike Duplicate Samples

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

All duplicate results were acceptable.

Field Duplicate Samples

One set of field duplicates (J1TDP6/J1TDR0) were submitted for analysis. Field duplicate results are compared using the same criteria as for laboratory duplicates. The RPDs for benzo(a)anthracene (34.4%), benzo(b)fluoranthene (42%), flouranthene (36.3%), phenanthrene (34.7%) and pyrene (35.1%) were outside QC limits. Under the WCH statement of work, no qualification is required. All other field duplicate results were acceptable.

Analytical Detection Levels

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

Completeness

Data package No. XP0053 was submitted for validation and verified for completeness. Completeness is based on the percentage of data determined to be valid (i.e., not rejected). The completion percentage was 100%.

MAJOR DEFICIENCIES

None found.

MINOR DEFICIENCIES

None found.

REFERENCES

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

DOE/RL-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

POLYAROMATIC HYDROCARBON DATA QUALIFICATION SUMMARY*

SDG: XP0053	REVIEWER: ELR	Project: 600-378	PAGE <u>1</u> OF <u>1</u>
COMMENTS: No qualifiers assigned			

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

Appendix 3
Annotated Laboratory Reports

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: March 5, 2014

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

Client SDG: XP0053

Client Sample ID: JITDP6
 Sample ID: 343751001
 Matrix: SOIL
 Collect Date: 25-FEB-14 13:10
 Receive Date: 27-FEB-14
 Collector: Client
 Moisture: 6.03%

Project: WCHN00213
 Client ID: WCHN001

W 3/22/14

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
HPLC-PAH											
8310/3550 PAH Std list Soil "Dry Weight Corrected"											
Acenaphthene	U	5.30	5.30	17.7	ug/kg	1	CWW	03/03/14	1313	1369797	1
Acenaphthylene	U	5.30	5.30	17.7	ug/kg	1					
Anthracene	J	15.7	1.77	17.7	ug/kg	1					
Benzo(a)anthracene		80.5	0.565	1.77	ug/kg	1					
Benzo(a)pyrene		64.3	0.565	1.77	ug/kg	1					
Benzo(b)fluoranthene		65.9	0.565	1.77	ug/kg	1					
Benzo(ghi)perylene		39.4	0.565	1.77	ug/kg	1					
Benzo(k)fluoranthene		39.3	0.283	0.883	ug/kg	1					
Chrysene		67.6	0.565	1.77	ug/kg	1					
Dibenzo(a,h)anthracene		1.78	0.565	1.77	ug/kg	1					
Fluoranthene		124	0.565	1.77	ug/kg	1					
Fluorene	U	5.30	5.30	17.7	ug/kg	1					
Indeno(1,2,3-cd)pyrene	U	0.565	0.565	1.77	ug/kg	1					
Naphthalene	U	5.30	5.30	17.7	ug/kg	1					
Phenanthrene		75.3	5.30	17.7	ug/kg	1					
Pyrene		129	0.565	1.77	ug/kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3550B	3550B PAH BY HPLC Prep in soil	AXVI	02/28/14	1750	1369796

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 8310	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Decafluorobiphenyl	8310/3550 PAH Std list Soil "Dry Weight Corrected"	5680 ug/kg	8830	64.4	(23%-104%)

Notes:

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: March 5, 2014

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

Client SDG: XP0053

Client Sample ID: J1TDP8
 Sample ID: 343751003
 Matrix: SOIL
 Collect Date: 25-FEB-14 13:20
 Receive Date: 27-FEB-14
 Collector: Client
 Moisture: 6.32%

Project: WCHN00213
 Client ID: WCHN001

✓
3/22/14

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
-----------	-----------	--------	----	----	-------	----	---------	------	------	-------	--------

HPLC-PAH

8310/3550 PAH Std list Soil "Dry Weight Corrected"

Acenaphthene	U	5.33	5.33	17.8	ug/kg	1	CWW	03/03/14	1726	1369797	1
Acenaphthylene	U	5.33	5.33	17.8	ug/kg	1					
Anthracene		37.8	1.78	17.8	ug/kg	1					
Benzo(a)anthracene		173	0.569	1.78	ug/kg	1					
Benzo(a)pyrene		168	0.569	1.78	ug/kg	1					
Benzo(b)fluoranthene		175	0.569	1.78	ug/kg	1					
Benzo(ghi)perylene		106	0.569	1.78	ug/kg	1					
Benzo(k)fluoranthene		89.9	0.284	0.888	ug/kg	1					
Chrysene		154	0.569	1.78	ug/kg	1					
Dibenzo(a,h)anthracene		4.90	0.569	1.78	ug/kg	1					
Fluoranthene		261	0.569	1.78	ug/kg	1					
Fluorene	U	5.33	5.33	17.8	ug/kg	1					
Indeno(1,2,3-cd)pyrene	U	0.569	0.569	1.78	ug/kg	1					
Naphthalene	U	5.33	5.33	17.8	ug/kg	1					
Phenanthrene		178	5.33	17.8	ug/kg	1					
Pyrene		255	0.569	1.78	ug/kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3550B	3550B PAH BY HPLC Prep in soil	AXV1	02/28/14	1750	1369796

The following Analytical Methods were performed:

Method	Description	Analyst Comments
I	SW846 8310	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Decafluorobiphenyl	8310/3550 PAH Std list Soil "Dry Weight Corrected"	6030 ug/kg	8880	67.8	(23%-104%)

Notes:

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: March 5, 2014

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

Client SDG: XP0053

Client Sample ID: J1TDP9
 Sample ID: 343751004
 Matrix: SOIL
 Collect Date: 25-FEB-14 13:25
 Receive Date: 27-FEB-14
 Collector: Client
 Moisture: 6.22%

✓
3/22/14

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
HPLC-PAH											
8310/3550 PAH Std list Soil "Dry Weight Corrected"											
Acenaphthene	U	5.31	5.31	17.7	ug/kg	1	CWW	03/03/14	2015	1369797	1
Acenaphthylene	U	5.31	5.31	17.7	ug/kg	1					
Anthracene	J	7.50	1.77	17.7	ug/kg	1					
Benzo(a)anthracene		54.0	0.566	1.77	ug/kg	1					
Benzo(a)pyrene		45.3	0.566	1.77	ug/kg	1					
Benzo(b)fluoranthene		52.4	0.566	1.77	ug/kg	1					
Benzo(ghi)perylene		29.0	0.566	1.77	ug/kg	1					
Benzo(k)fluoranthene		27.0	0.283	0.885	ug/kg	1					
Chrysene		47.8	0.566	1.77	ug/kg	1					
Dibenzo(a,h)anthracene	J	1.21	0.566	1.77	ug/kg	1					
Fluoranthene		83.4	0.566	1.77	ug/kg	1					
Fluorene	U	5.31	5.31	17.7	ug/kg	1					
Indeno(1,2,3-cd)pyrene	U	0.566	0.566	1.77	ug/kg	1					
Naphthalene	U	5.31	5.31	17.7	ug/kg	1					
Phenanthrene		39.9	5.31	17.7	ug/kg	1					
Pyrene		86.2	0.566	1.77	ug/kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3550B	3550B PAH BY HPLC Prep in soil	AXVI	02/28/14	1750	1369796

The following Analytical Methods were performed:

Method	Description	Analyst Comments
I	SW846 8310	

Surrogate/Tracer	Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Decafluorobiphenyl		8310/3550 PAH Std list Soil "Dry Weight Corrected"	5340 ug/kg	8850	60.4	(23%-104%)

Notes:

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: March 5, 2014

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

Client SDG: XP0053

Client Sample ID: J1TDR0
 Sample ID: 343751005
 Matrix: SOIL
 Collect Date: 25-FEB-14 13:10
 Receive Date: 27-FEB-14
 Collector: Client
 Moisture: 6.07%

Project: WCHN00213
 Client ID: WCHN001

✓
3/22/14

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
HPLC-PAH											
8310/3550 PAH Std list Soil "Dry Weight Corrected"											
Acenaphthene	U	5.32	5.32	17.7	ug/kg	1	CWW	03/03/14	2139	1369797	1
Acenaphthylene	U	5.32	5.32	17.7	ug/kg	1					
Anthracene		21.7	1.77	17.7	ug/kg	1					
Benzo(a)anthracene		114	0.568	1.77	ug/kg	1					
Benzo(a)pyrene		89.2	0.568	1.77	ug/kg	1					
Benzo(b)fluoranthene		101	0.568	1.77	ug/kg	1					
Benzo(ghi)perylene		53.2	0.568	1.77	ug/kg	1					
Benzo(k)fluoranthene		50.3	0.284	0.887	ug/kg	1					
Chrysene		95.1	0.568	1.77	ug/kg	1					
Dibenzo(a,h)anthracene		2.51	0.568	1.77	ug/kg	1					
Fluoranthene		179	0.568	1.77	ug/kg	1					
Fluorene	U	5.32	5.32	17.7	ug/kg	1					
Indeno(1,2,3-cd)pyrene	U	0.568	0.568	1.77	ug/kg	1					
Naphthalene	U	5.32	5.32	17.7	ug/kg	1					
Phenanthrene		107	5.32	17.7	ug/kg	1					
Pyrene		184	0.568	1.77	ug/kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3550B	3550B PAH BY HPLC Prep in soil	AXV1	02/28/14	1750	1369796

The following Analytical Methods were performed:

Method	Description	Analyst	Comments
I	SW846 8310		

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Decafluorobiphenyl	8310/3550 PAH Std list Soil "Dry Weight Corrected"	5990 ug/kg	8870	67.6	(23%-104%)

Notes:

Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

**HPLC-PAH
WC-HANFORD, INC. (WCHN)
SDG XP0053**

Method/Analysis Information

Procedure: Polynuclear Aromatic Hydrocarbons
Analytical Method: SW846 8310
Prep Method: SW846 3550B
Analytical Batch Number: 1369797
Prep Batch Number: 1369796

Sample Analysis

The following samples were analyzed using the analytical protocol as established in SW846 8310:

Sample ID	Client ID
343751001	J1TDP6
343751002	J1TDP7
343751003	J1TDP8
343751004	J1TDP9
343751005	J1TDR0
1203043588	Method Blank (MB)
1203043589	Laboratory Control Sample (LCS)
1203043590	343751001(J1TDP6) Matrix Spike (MS)
1203043591	343751001(J1TDP6) 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-030 REV# 15.

Raw data reports are processed and reviewed by the analyst using the Target software package. False positives have been removed from the Target quantitation reports per standard operating procedures (SOP) section 18.0.

Calibration Information

Due to software limitations, the files displayed at the beginning of the Form 6 are only the last files uploaded for each individual level. A complete listing of all files used in the current ICAL are shown on the Calibration History that is included with each Level 4 or higher package. The last file by date in each level is the one currently uploaded for that level.

The linear equation used in Target and indicated on the initial calibration summary form is not a conventional linear equation (slope intercept formula) and does not match the equation found in SW-846 method 8000B. The x and y axes are inverted in Target, so that the instrument response is treated as the independent variable (x) and the concentration ratio is treated as the dependent variable (y). The equation used in Target to calculate sample results is adjusted to account for the linear equation inversion and reciprocal slope. The adjusted calculation has been independently verified to produce valid results.

Initial Calibration

All initial calibration requirements have been met for this SDG.

CCV Requirements

All associated calibration verification standards (ICV or CCV) met the acceptance criteria.

Quality Control (QC) Information

Method Blank (MB) Statement

The MB analyzed with this SDG met the acceptance criteria.

Surrogate Recoveries

All the surrogate recoveries were within the established acceptance criteria for this SDG.

Laboratory Control Sample (LCS) Recovery

The LCS spike recoveries met the acceptance limits.

QC Sample Designation

Client sample 343751001 (J1TDP6) was chosen for matrix spike and matrix spike duplicate analysis.

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 RPDs between the MS and MSD met the acceptance limits.

Technical Information:

Holding Time Specifications

All samples in this SDG in this analytical batch met the specified holding time. GEL assigns holding times based on the associated methodology, which 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.

Sample Dilutions

The samples in this SDG did not require dilutions.

Sample Re-extraction/Re-analysis

Re-extractions or re-analyses were not required in this SDG.

Miscellaneous Information:

Data Exception (DER) Documentation

Data exception reports (DERs) are generated to document procedural anomalies that may deviate from referenced SOP or contractual documents.

A data exception report (DER) was not generated for this SDG.

Manual Integrations

Some initial calibration standards, continuing calibration standards, and/or samples may have required manual integrations due to software limitations.

Please see the raw data in the Miscellaneous Section.

Due to an unknown eluting between Benzo(b)fluoranthene and Benzo(k)fluoranthene, it was necessary to manually integrate one or both peaks for the DAD detector for samples 343751001 (J1TDP6), 343751002 (J1TDP7), 343751003 (J1TDP8) and 343751004 (J1TDP9). Analyst judgement was used to make the best integration.

Additional Comments

The Form 8 is used only as a sequence of the analysis.

One or more analytes were detected whose concentration greatly differed between the primary and confirmation analysis (greater than 40% difference or RPD) in sample 1203043591 (J1TDP6). Because both columns or detectors indicated an acceptable peak in the appropriate retention time window for these analytes, the analytes are reported as positive results. Due to the high percent difference or RPD between the two columns, it is indicated as such on the appropriate Form I/Certificate of Analysis (C of A) with a 'P' qualifier. Those analytes reported with a percent difference or RPD greater than 40% but less than 70% are qualified as presumptive evidence of the presence of the material.

Due to the nature of the sample extracts, instrument blanks were analyzed between samples to prevent possible matrix carryover.

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 analyst, reviewer, and report specialist names 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 laboratory utilizes a high performance liquid chromatography (HPLC) instrument configuration for Polynuclear Aromatic Hydrocarbons analyses.

The chromatographic hardware system consists of a HP Model 1100 HPLC with programmable gradient pumping and a 100uL loop injector.

The HPLC 1100 is coupled to a HP Model G1315A Diode Array UV detector which monitors absorbance at the following five wavelengths: 1) 224 nm; 2) 250 nm; 3) 270 nm; 4) 234 nm; 5) 300 nm.

The HPLC 1100 is also coupled to a HP Model G1321A Fluorescence Detector in series which monitors the following varying excitations and emissions 1) EX 230 nm EM 330 nm; 2) EX 210 nm EM 314 nm; 3) EX 250 nm EM 368 nm; 4) EX 237 nm EM 440 nm; 5) EX 277 nm EM 376 nm; 6) EX 255 nm EM 420 nm; 7) EX 230 nm EM 453 nm.

The Diode Array UV detector is used as the primary detector and the Fluorescence Detector is used as the confirmation detector. All results are reported from the primary Diode Array UV detector.

The HPLC system is identified with a designation of HPLC E in the raw data printouts.

Chromatographic Columns

Chromatographic separation of Polynuclear Aromatic Hydrocarbons is accomplished through analysis on the following reversed phase columns:

Phenomenex: Luna C18 (2), 100 A, 250 mm x 4.6 mm containing 5 um size particle.

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.

343751

Washington Closure Hanford				CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST				RC-232-078		Page 1 of 2		
Collector 2-25-14 JOHNSON, BRADY White, E				Company Contact Joan Kessner		Telephone No. 375-4688		Project Coordinator KESSNER, JH		Price Code 8B		
Project Designation 100-IU-2 & 100-IU-6 Remaining Waste Sites				Sampling Location 600-378		SAF No. RC-232		Data Turnaround 7day				
Ice Chest No. RCC-07-014				Field Logbook No. EL-1666-01		COA 0603782000		Method of Shipment Commercial Carrier - Fed Ex				
Shipped To GEL Laboratories Charleston				Offsite Property No. A131052				Bill of Lading/Air Bill No. See OSPC				
Other Labs Shipped To NA				Preservation		Cool 4C	Cool 4C	Cool 4C				
POSSIBLE SAMPLE HAZARDS/REMARKS None				Type of Container		GP	AG	AG				
				No. of Container(s)		1	1	1				
				Volume		125mL	125mL	125mL				
Special Handling and/or Storage Cool 4c				Sample Analysis		See item (1) in Special Instructions	PAHs - 6310	TPH-Diesel Range - WTPH-D +				
Sample No.	Matrix	Sample Date	Sample Time									
J1TDP6	SOIL	2-25-14	1310	X	X	X						
J1TDP7	SOIL	2-25-14	1315	X	X	X						
J1TDP8	SOIL	2-25-14	1320	X	X	X						
J1TDP9	SOIL	2-25-14	1325	X	X	X						
J1TDR0	SOIL	2-25-14	1310	X	X	X						
CHAIN OF POSSESSION				Sign/Print Names				SPECIAL INSTRUCTIONS				
Relinquished By/Removed From		Date/Time		Received By/Stored In		Date/Time		(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)				
E. White		2-25-14 1330		R. Fablberg		2-25-14 1330						
R. Fablberg		2-25-14 1550		C. Bingham		2-25-14 1550						
C. Bingham		2-25-14 1555		1060 Battelle, fridge		2-25-14 1555						
1060 Battelle, fridge		2-26-14 1040		C. Bingham		2-26-14 1040						
C. Bingham		2-26-14 1045		Fed Ex		2-27-14 0900						
Fed Ex		2-26-14		Off. Jennifer Pellegrini		2-27-14 0900						
Relinquished By/Removed From		Date/Time		Received By/Stored In		Date/Time						
FINAL SAMPLE DISPOSITION		Disposal Method		Disposed By		Date/Time		XP0053				



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WCH-EE-011

Washington Closure Hanford		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST				RC-232-078	Page 2 of 2
Collector <i>RF 2-25-14</i> <i>JOHNSON, BRADY White, E</i>		Company Contact Joan Kessner		Telephone No. 375-4688		Project Coordinator KESSNER, JH	Price Code <i>8B</i> Data Turnaround <i>7 Days</i>
Project Designation 100-IU-2 & 100-IU-6 Remaining Waste Sites		Sampling Location 600-378		SAF No. RC-232		Method of Shipment Commercial Carrier <i>- fed EX</i>	
Ice Chest No. <i>RCC-07-014</i>		Field Logbook No. EL-1666-01		COA 0603782000		Bill of Lading/Air Bill No. <i>See OSPC</i>	
Shipped To GEL Laboratories Charleston		Offsite Property No. <i>A131052</i>					
Other Labs Shipped To <i>NA</i>		Preservation		Cool 4C	Cool 4C	Cool 4C	
POSSIBLE SAMPLE HAZARDS/REMARKS <i>None</i>		Type of Container		G/P	g/G	g/G	
Special Handling and/or Storage <i>Cool 4c</i>		No. of Containers(s)		1	1	1	
		Volume		125mL	125mL	125mL	
		Sample Analysis		See item (1) in Special Instructions	PAHs - 8310	TPH-Diesel Range - WTPH-D +	
Sample No.	Matrix	Sample Date	Sample Time				
<i>J1TDR1</i>	<i>SOIL</i>	<i>2-25-14</i>	<i>1305</i>	<i>X</i>		<i>2-25-14 CMB</i>	
CHAIN OF POSSESSION				Sign/Print Names		SPECIAL INSTRUCTIONS	
Relinquished By/Removed From <i>E. White</i>		Date/Time <i>2-25-14 1330</i>		Received By/Stored In <i>R. Felder</i>		Date/Time <i>2-25-14 1330</i>	
Relinquished By/Removed From <i>R. Felder</i>		Date/Time <i>2-25-14 1550</i>		Received By/Stored In <i>C. Bingham</i>		Date/Time <i>2-25-14 1550</i>	
Relinquished By/Removed From <i>C. Bingham</i>		Date/Time <i>2-25-14 1555</i>		Received By/Stored In <i>1060 Battelle, Indge</i>		Date/Time <i>2-25-14 1555</i>	
Relinquished By/Removed From <i>1060 Battelle, Indge</i>		Date/Time <i>2-26-14 1040</i>		Received By/Stored In <i>C. Bingham</i>		Date/Time <i>2-26-14 1040</i>	
Relinquished By/Removed From <i>C. Bingham</i>		Date/Time <i>2-26-14 1045</i>		Received By/Stored In <i>fed EX</i>		Date/Time <i>2-26-14</i>	
Relinquished By/Removed From <i>Fed EX</i>		Date/Time <i>2-26-14</i>		Received By/Stored In <i>Dr. Jennifer Pellegrini</i>		Date/Time <i>2-27-14 0900</i>	
Relinquished By/Removed From		Date/Time		Received By/Stored In		Date/Time	
FINAL SAMPLE DISPOSITION		Disposal Method		Disposed By		Date/Time	

REVIEWED BY
K. Wood via email
DATE
2-26-14

X70053

WCH-EE-011

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Appendix 5
Data Validation Supporting Documentation

GENERAL ORGANIC DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E
PROJECT:	600-278		DATA PACKAGE: XP0053		
VALIDATOR:	ELR	LAB: Crel	DATE: 3/15/14		
			SDG: XP0053		
ANALYSES PERFORMED					
8015	8021	8141	8151	8315	8310
		WTPH-HCID	WTPH-G	WTPH-D	
SAMPLES/MATRIX:					
JITDPC JITD17 JITDP8 JITDP9					
JITDRO					
Soil					

1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE

Technical verification documentation present? Yes No N/A

Comments: _____

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

Initial calibrations acceptable? Yes No N/A
 Continuing calibrations acceptable? Yes No N/A
 Standards traceable? Yes No N/A
 Standards expired? Yes No N/A
 Calculation check acceptable? Yes No N/A

Comments: _____

GENERAL ORGANIC DATA VALIDATION CHECKLIST

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

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

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

Surrogates/system monitoring compounds analyzed?	Yes	No	N/A
Surrogate/system monitoring compound recoveries acceptable?	Yes	No	N/A
Surrogates traceable? (Levels D, E)	Yes	No	N/A
Surrogates expired? (Levels D, E)	Yes	No	N/A
MS/MSD samples analyzed?	Yes	No	N/A
MS/MSD results acceptable?	Yes	No	N/A
MS/MSD standards NIST traceable? (Levels D, E)	Yes	No	N/A
MS/MSD standards expired? (Levels D, E)	Yes	No	N/A
LCS/BSS samples analyzed?	Yes	No	N/A
LCS/BSS results acceptable?	Yes	No	N/A
Standards traceable? (Levels D, E)	Yes	No	N/A
Standards expired? (Levels D, E)	Yes	No	N/A
Transcription/calculation errors? (Levels D, E)	Yes	No	N/A
Performance audit sample(s) analyzed?	Yes	No	N/A
Performance audit sample results acceptable?	Yes	No	N/A
Comments: _____	no PAT		

GENERAL ORGANIC DATA VALIDATION CHECKLIST

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

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

Comments: _____

PC/RO - home ~~III~~ out

6. HOLDING TIMES (all levels)

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

Comments: _____

GENERAL ORGANIC DATA VALIDATION CHECKLIST

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

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

Comments: _____

9. SAMPLE CLEANUP (Levels D and E)

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

Comments: _____

Appendix 6
Additional Documentation Requested by Client

GEL LABORATORIES LLC

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

QC Summary

Report Date: March 5, 2014

Page 1 of 4

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

Contact:

Workorder: 343751

Client SDG: XP0053

Project Description: RC-232 Soil

Paramname	NOM	Sample Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
HPLC-PAH										
Batch	1369797									
QC1203043589	LCS									
Acenaphthene	1670		1260	ug/kg		75.9	(58%-99%)	CWW	03/03/14	12:31
Acenaphthylene	1670		1260	ug/kg		75.4	(58%-98%)			
Anthracene	1670		1470	ug/kg		88.1	(63%-94%)			
Benzo(a)anthracene	167		142	ug/kg		85.3	(73%-98%)			
Benzo(a)pyrene	167		133	ug/kg		79.6	(63%-99%)			
Benzo(b)fluoranthene	167		137	ug/kg		82.2	(70%-130%)			
Benzo(ghi)perylene	167		137	ug/kg		82.2	(70%-130%)			
Benzo(k)fluoranthene	83.3		64.5	ug/kg		77.4	(70%-130%)			
Chrysene	167		155	ug/kg		92.9	(70%-130%)			
Dibenzo(a,h)anthracene	167		161	ug/kg		96.5	(70%-130%)			
Fluoranthene	167		134	ug/kg		80.7	(70%-130%)			
Fluorene	1670		1310	ug/kg		78.6	(65%-130%)			
Indeno(1,2,3-cd)pyrene	167		147	ug/kg		88	(70%-130%)			
Naphthalene	1670		1220	ug/kg		73	(57%-130%)			
Phenanthrene	1670		1330	ug/kg		80	(70%-130%)			
Pyrene	167		144	ug/kg		86.6	(70%-130%)			
**Decafluorobiphenyl	8330		6140	ug/kg		73.8	(23%-104%)			
QC1203043588	MB									
Acenaphthene		U	4.99	ug/kg					03/03/14	11:49
Acenaphthylene		U	4.99	ug/kg						

QC Summary

Workorder: 343751 Client SDG: XP0053 Project Description: RC-232 Soil Page 2 of 4

Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
HPLC-PAH											
Batch	1369797										
Anthracene			U	1.66	ug/kg						
Benzo(a)anthracene			U	0.532	ug/kg				CWW	03/03/14	11:49
Benzo(a)pyrene			U	0.532	ug/kg						
Benzo(b)fluoranthene			U	0.532	ug/kg						
Benzo(ghi)perylene			U	0.532	ug/kg						
Benzo(k)fluoranthene			U	0.266	ug/kg						
Chrysene			U	0.532	ug/kg						
Dibenzo(a,h)anthracene			U	0.532	ug/kg						
Fluoranthene			U	0.532	ug/kg						
Fluorene			U	4.99	ug/kg						
Indeno(1,2,3-cd)pyrene			U	0.532	ug/kg						
Naphthalene			U	4.99	ug/kg						
Phenanthrene			U	4.99	ug/kg						
Pyrene			U	0.532	ug/kg						
**Decafluorobiphenyl	8320			5930	ug/kg		71.3	(23%-104%)			
QC1203043590	343751001	MS									
Acenaphthene	1770	U	5.30	1360	ug/kg		76.9	(49%-90%)		03/03/14	13:55
Acenaphthylene	1770	U	5.30	1300	ug/kg		73.7	(48%-97%)			
Anthracene	1770	J	15.7	1620	ug/kg		90.9	(49%-91%)			
Benzo(a)anthracene	177		80.5	231	ug/kg		85.2	(29%-126%)			
Benzo(a)pyrene	177		64.3	212	ug/kg		83.7	(26%-130%)			
Benzo(b)fluoranthene	177		65.9	226	ug/kg		90.8	(32%-135%)			
Benzo(ghi)perylene	177		39.4	176	ug/kg		77.2	(34%-125%)			

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QC Summary

Workorder: 343751

Client SDG: XP0053

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Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
HPLC-PAH											
Batch	1369797										
Benzo(k)fluoranthene	88.4	39.3		121	ug/kg		92.1	(48%-142%)	CWW	03/03/14	13:55
Chrysene	177	67.6		227	ug/kg		90.1	(39%-127%)			
Dibenzo(a,h)anthracene	177	1.78		178	ug/kg		99.5	(38%-130%)			
Fluoranthene	177	124		272	ug/kg		83.6	(20%-139%)			
Fluorene	1770	U	5.30	1450	ug/kg		82.1	(51%-90%)			
Indeno(1,2,3-cd)pyrene	177	U	0.565	184	ug/kg		104	(41%-145%)			
Naphthalene	1770	U	5.30	1130	ug/kg		64.2	(43%-87%)			
Phenanthrene	1770		75.3	1530	ug/kg		82.2	(50%-100%)			
Pyrene	177		129	290	ug/kg		90.8	(18%-149%)			
**Decafluorobiphenyl	8840		5680	5620	ug/kg		63.5	(23%-104%)			
QC1203043591	343751001	MSD									
Acenaphthene	1770	U	5.30	1210	ug/kg	12.0	68.2	(0%-30%)		03/03/14	14:37
Acenaphthylene	1770	U	5.30	1150	ug/kg	12.6	65	(0%-30%)			
Anthracene	1770	J	15.7	1440	ug/kg	12.1	80.4	(0%-30%)			
Benzo(a)anthracene	177		80.5	232	ug/kg	0.243	85.5	(0%-30%)			
Benzo(a)pyrene	177		64.3	204	ug/kg	4.12	78.9	(0%-30%)			
Benzo(b)fluoranthene	177		65.9	222	ug/kg	1.87	88.5	(0%-30%)			
Benzo(ghi)perylene	177		39.4	164	ug/kg	7.33	70.2	(0%-30%)			
Benzo(k)fluoranthene	88.4		39.3	120	ug/kg	0.532	91.4	(0%-30%)			
Chrysene	177		67.6	227	ug/kg	0.161	90.4	(0%-30%)			
Dibenzo(a,h)anthracene	177		1.78	159	ug/kg	11.2	88.9	(0%-30%)			
Fluoranthene	177		124	292	ug/kg	7.13	95	(0%-30%)			

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QC Summary

Workorder: 343751 Client SDG: XP0053 Project Description: RC-232 Soil Page 4 of 4

Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
HPLC-PAH											
Batch	1369797										
Fluorene	1770	U	5.30	1270	ug/kg	13.4	71.8	(0%-30%)	CWW	03/03/14	14:37
Indeno(1,2,3-cd)pyrene	177	U	0.565	P	168	ug/kg	9.23	95.1	(0%-30%)		
Naphthalene	1770	U	5.30	1050	ug/kg	7.49	59.6	(0%-30%)			
Phenanthrene	1770		75.3	1370	ug/kg	11.2	73	(0%-30%)			
Pyrene	177		129	307	ug/kg	5.86	101	(0%-30%)			
**Decafluorobiphenyl	8840		5680	5120	ug/kg		57.9	(23%-104%)			

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
- D Results are reported from a diluted aliquot of sample.
- E Concentration exceeds the calibration range of the instrument
- J 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). Value is estimated
- P Aroclor target analyte with greater than 25% difference between column analyses.
- T Spike and/or spike duplicate sample recovery is outside control limits.
- U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.
- 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
- o Analyte failed to recover within LCS limits (Organics only)

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.