

**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 10/7/14  
INITIAL/DATE

**COMMENTS:**

**SDG X0074**

**SAF-RC-232**

**Sample Location: 600-332**

Date: 6 October 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 600-332  
 Subject: Diesel Range Organics - Data Package No. X0074-GEL

**INTRODUCTION**

This memo presents the results of data validation on Data Package No. X0074 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
J1TXF8	8/12/14	Soil	C	See note 1

1 – Diesel range organics by NWTPH-Dx.

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 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

No field duplicates were submitted for analysis.

#### · **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. X0074 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\*

<b>SDG: X0074</b>	<b>REVIEWER: ELR</b>	<b>Project: 600-332</b>	<b>PAGE <u>1</u> OF <u>1</u></b>
<b>COMMENTS: No qualifiers assigned</b>			

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

**Appendix 3**  
**Annotated Laboratory Reports**

# GEL LABORATORIES LLC

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

## Certificate of Analysis

Report Date: August 25, 2014

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

Client SDG: X0074

Client Sample ID: J1TXF8  
 Sample ID: 354864001  
 Matrix: SOIL  
 Collect Date: 12-AUG-14 13:14  
 Receive Date: 15-AUG-14  
 Collector: Client  
 Moisture: .541%

Project: WCHN00213  
 Client ID: WCHN001

10/5/14

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)	U	2170	2170	6690	ug/kg	1	BYT1	08/21/14	1328	1412997	1
Motor Oil (C20-C36)		16600	2170	6690	ug/kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	3541 DRO IN SOIL PREP	SXW3	08/20/14	1746	1412996

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"	513 ug/kg	669	76.7	(50%-150%)

**Notes:**

**Appendix 4**

**Laboratory Narrative and Chain-of-Custody Documentation**

**FID Diesel Range Organics  
WC-HANFORD, INC. (WCHN)  
SDG X0074**

**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:** 1412997  
**Prep Batch Number:** 1412996

**Sample Analysis**

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

<b>Sample ID</b>	<b>Client ID</b>
354864001	J1TXF8
1203151940	MB for batch 1412996
1203151941	Laboratory Control Sample (LCS)
1203151942	354864001(J1TXF8) Matrix Spike (MS)
1203151943	354864001(J1TXF8) 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 354864001 (JITXF8) was selected for the matrix spike and matrix spike duplicate analysis.

**Matrix Spike (MS) Recovery Statement**

The MS recovery was within the established acceptance limits.

**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 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. 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. A data exception report (DER) was not 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:

<b>Instrument ID</b>	<b>Instrument</b>	<b>System Configuration</b>	<b>Column ID</b>	<b>Column Description</b>
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.

**GEL LABORATORIES LLC**

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

**Qualifier Definition Report  
for**

**WCHN001 WC-HANFORD, INC.**

**Client SDG: X0074 GEL Work Order: 354864 Project: RC-232 Soil**

**The Qualifiers in this report are defined as follows:**

U Analyzed for but not detected above limiting criteria. Includes MDL, MDA, PQL, zero, counting error, and total analytical error.

DL Indicates that sample is diluted.

RA Indicates that sample is re-analyzed without re-extraction.

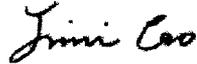
RE Indicates that sample is re-extracted.

**Review/Validation**

GEL requires all analytical data to be verified by a qualified data reviewer. In addition, all CLP-like deliverables receive a third level review of the fractional data package.

The following data validator verified the information presented in this data report:

Signature:



Name: Jimin Cao

Date: 25 AUG 2014

Title: Data Validator

<b>Washington Closure Hanford</b>		<b>CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST</b>				RC-232-087	Page 1 of 1
Project Designation Q Storage 100-IU-2 & 100-IU-6 Remaining Waste Sites	Company Contact Joan Kessner	Telephone No. 375-4888	Project Coordinator KESSNER, JH	Price Code 8C	Data Turnaround <b>15 Days</b>		
Field No. RCL-07-012	Sampling Location 600-332, Gable Mt. firing range septic system	Field Logbook No. EL-1667-02	SAF No. RC-232	Method of Shipment Commercial Carrier / Fed Ex			
Shipped To GEL Laboratories Charleston	Offsite Property No. A131218	COA 0603322000	Bill of Lading/Air Bill No. See OSAC				

Possible Sample Hazards/Remarks	Preservation	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	None
	Type of Container	G/P	G/P	aG	Gs*	aG	aG	aG	aG	G/P
	No. of Container(s)	1	1	1	3	1	1	1	1	1
	Volume	250mL	250mL	125mL	40mL	250mL	250mL	250mL	250mL	500mL
	Sample Analysis	See item (1) in Special Instructions	NO2/NO3 - 353.1 (Nitrogen in Nitrite and Nitrate)	TPH-Diesel Range - WTPH-D.*	TPH-Gasoline Range - WTPH-G	Semi-VOA - 8270 (TCL)	PAHs - 8310	PCBs - 8062	Pesticides - 8081; Chloro-Herbicides - EPA8151	ICP Metals (TCLP) - 1311, 8010, Mercury (TCLP) - 1311/7470

Sample No.	Matrix	Sample Date	Sample Time							
TXF8	SOIL	8/12/14	1314	✓	✓	✓	✓	✓	✓	✓

CHAIN OF POSSESSION		Sign/Print Names	
Relinquished By/Removed From Joan Kessner	Date/Time 8-12-14 1400	Received By/Stored In Dorothy Duster	Date/Time 8/12/14 1400
Relinquished By/Removed From Dorothy Duster	Date/Time 8-12-14 1637	Received By/Stored In Fridge BA Battelle	Date/Time 8/12/14 1637
Relinquished By/Removed From BA Battelle	Date/Time 8/13/14 0755	Received By/Stored In 8th Sector	Date/Time 8/13/14
Relinquished By/Removed From 8th Sector	Date/Time 8/13/14 0800	Received By/Stored In FED EX	Date/Time 8/13/14
Relinquished By/Removed From FED EX	Date/Time 8/13/14	Received By/Stored In Chris Duster	Date/Time 8/13/14 0900
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time

**SPECIAL INSTRUCTIONS**

Perform extraction of TCLP analysis and await direction from J. Kessner before proceeding to analysis.

(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, Zino); Mercury - 7471- (CV) (Mercury)

\* Custodian unavailable to remove samples from controlled storage. Shipper removed samples, taking custody for shipment to lab.

REVIEWED BY  
K. Wood (via email)

DATE  
8/13/14

FINAL SAMPLE DISPOSITION WCH-EE-011	Disposal Method	Disposed By	Date/Time
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**Appendix 5**  
**Data Validation Supporting Documentation**

**GENERAL ORGANIC DATA VALIDATION CHECKLIST**

VALIDATION LEVEL:	A	B	<b>C</b>	D	E
PROJECT:	600-332		DATA PACKAGE: 70074		
VALIDATOR:	ELR	LAB: Ciel	DATE: 10/5/14		
			SDG: 70074		
ANALYSES PERFORMED					
8015	8021	8141	8151	8315	
		WTPH-HCID	WTPH-G	<b>WTPH-D</b>	
SAMPLES/MATRIX:					
JHXF8					
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 FR  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**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 PA

**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 absorbant) 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: August 25, 2014

Page 1

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

Workorder: 354864

Client SDG: X0074

Project Description: RC-232 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Tim
<b>Diesel Range Organics</b>											
Batch	1412997										
QC1203151941 LCS											
Diesel Range Organics (C10-C20)	66600			53400	ug/kg		80.1	(70%-130%)	BYT1	08/21/14	12
Motor Oil (C20-C36)	66600			58100	ug/kg		87.2	(70%-130%)			
**o-Terphenyl	666			559	ug/kg		83.9	(50%-150%)			
QC1203151940 MB											
Diesel Range Organics (C10-C20)			U	2160	ug/kg					08/21/14	12
Motor Oil (C20-C36)			U	2160	ug/kg						
**o-Terphenyl	666			469	ug/kg		70.4	(50%-150%)			
QC1203151942 354864001 MS											
Diesel Range Organics (C10-C20)	67000	U	2170	55700	ug/kg		83.2	(70%-130%)		08/21/14	14
Motor Oil (C20-C36)	67000		16600	79000	ug/kg		93.1	(70%-130%)			
**o-Terphenyl	670		513	568	ug/kg		84.8	(50%-150%)			
QC1203151943 354864001 MSD											
Diesel Range Organics (C10-C20)	66900	U	2170	56800	ug/kg	1.91	84.8	(0%-20%)		08/21/14	14
Motor Oil (C20-C36)	66900		16600	78000	ug/kg	1.24	91.7	(0%-20%)			
**o-Terphenyl	669		513	582	ug/kg		87	(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: 6 October 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 600-332  
 Subject: Gasoline Range Organics - Data Package No. X0074-GEL

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**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 analyzed within 14 days of the date of sample collection.

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

No field duplicates were submitted for analysis.

## **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. X0074 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**

GASOLINE RANGE ORGANIC DATA QUALIFICATION SUMMARY\*

<b>SDG: X0074</b>	<b>REVIEWER: ELR</b>	<b>Project: 600-332</b>	<b>PAGE <u>1</u> OF <u>1</u></b>
<b>COMMENTS: No qualifiers assigned</b>			

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

**Appendix 3**  
**Annotated Laboratory Reports**

# GEL LABORATORIES LLC

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

## Certificate of Analysis

Report Date: August 29, 2014

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

Client SDG: X0074

Client Sample ID: J1TXF8  
 Sample ID: 354864001  
 Matrix: SOIL  
 Collect Date: 12-AUG-14 13:14  
 Receive Date: 15-AUG-14  
 Collector: Client  
 Moisture: .541%

Project: WCHN00213  
 Client ID: WCHN001

10/5/14

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Volatiles GRO Organics											
NWTPH-Gx GRO in Soil "Dry Weight Corrected"											
Gasoline Range Organics (C6 - C10)	U	16.8	16.8	50.3	UG/KG	1	RXY1	08/22/14	1234	1413825	1

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
NWTPH-Gx in Soil	NWTPH-Gx Prep in Soil	RXY1	08/22/14	1220	1413824

The following Analytical Methods were performed:

Method	Description	Analyst Comments			
1	NWTPH-Gx in Soil				

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Bromofluorobenzene	NWTPH-Gx GRO in Soil "Dry Weight Corrected"	41.9 UG/KG	50.0	83.4	(50%-150%)

Notes:

**Appendix 4**

**Laboratory Narrative and Chain-of-Custody Documentation**

**GC Volatile Organics  
WC-HANFORD, INC. (WCHN)  
SDG X0074**

**Method/Analysis Information**

**Procedure:** Volatile Total Petroleum Hydrocarbons by Flame Ionization Detector  
**Analytical Method:** NWTPH-Gx in Soil  
**Prep Method:** NWTPH-Gx in Soil  
**Analytical Batch Number:** 1413825  
**Prep Batch Number:** 1413824

**Sample Analysis**

The following client and quality control samples were analyzed to complete this sample delivery group/work order using the methods referenced in the Analysis Information section:

<b>Sample ID</b>	<b>Client ID</b>
354864001	JITXF8
1203154018	MB for batch 1413824
1203154021	Laboratory Control Sample (LCS)
1203154019	354868001(J1TXH0) Post Spike (PS)
1203154020	354868001(J1TXH0) Post Spike Duplicate (PSD)

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

NOTE: For volatile organic analyses the matrix spike designations may be indicated as "PS" or "PSD". The "PS" designation (post spike) indicates that the matrix was fortified prior to analysis but after applying any prep factors, such as a dilution. The laboratory considers the MS/MSD and PS/PSD designations interchangeable.

**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-004 REV# 25.

**Calibration Information**

**Initial Calibration**

All initial calibration requirements have been met for this sample delivery group (SDG). See the calibration history report for a list of data files that were used to generate the initial calibration curve in the Standard Data Section of this data package.

**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(s) analyzed with this SDG met the acceptance criteria.

#### **Surrogate Recoveries**

Surrogate recoveries, in all samples and quality control samples, were within the acceptance limits.

#### **Laboratory Control Sample (LCS) Recovery**

The LCS spike recoveries met the acceptance limits.

#### **QC Sample Designation**

Sample 354868001 (JITXH0) was selected for analysis as the matrix spike.

#### **Matrix Spike (PS) Recovery Statement**

The GRO recovery was within the acceptance limits.

#### **Matrix Spike Duplicate (PSD) Recovery Statement**

The GRO recovery was within the acceptance limits.

#### **Relative Percent Difference (RPD) Statement**

The RPD between the matrix spike pair 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.

#### **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 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 (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**

Data files associated with the initial calibration, continuing calibration check(s), and samples may have been manually integrated to correct misidentification of peaks by the integration software.

**Additional Comments**

Additional comments were not required for this SDG.

**System Configuration**

The GRO Organics analysis was performed on the following instrument configuration:

<b>Instrument ID</b>	<b>Instrument</b>	<b>System Configuration</b>	<b>Column ID</b>	<b>Column Description</b>	<b>P &amp; T Trap</b>
VOC4A.I	Agilent 6890N GC/FID w/ OI 4560/Archon Autosampler	HP6890N GC/FID	DB-624	0.53mm x 3.0u x 15m	OI #10

<b>Washington Closure Hanford</b>		<b>CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST</b>				RC-232-087	Page 1 of 1
Location <i>W Stove</i>		Company Contact Joan Kessner		Telephone No. 375-4688		Project Coordinator KESSNER, JH	
Object Designation 100-IU-2 & 100-IU-6 Remaining Waste Sites		Sampling Location 600-332, Gable Mt. firing range septic system		SAF No. RC-232		Price Code 8C Data Turnaround <b>15 Days</b>	
Chest No. <i>RCL-07-012</i>		Field Logbook No. EL-1667-02		COA 0603322000		Method of Shipment Commerical Carrier / <i>Fed Ex</i>	
Shipped To GEL Laboratories Charleston		Offsite Property No. <i>A131 218</i>		Bill of Lading/Air Bill No. <i>See OSPL</i>			

Other Labels Shipped To  <i>N/A 354864</i>	Preservation	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	None
	Type of Container	GP	GP	aG	Gr*	aG	aG	aG	aG	GP
	No. of Container(s)	1	1	1	3	1	1	1	1	1
	Volume	250mL	250mL	125mL	40mL	250mL	250mL	250mL	250mL	500mL
	Sample Analysis	See item (1) in Special Instructions	NO2/NO3 - 353.1 (Nitrogen in Nitrite and Nitrate)	TPH-Diesel Range - WTPH-D+	TPH-Gasoline Range - WTPH-G	Semi-VOA - 8270 (TCL)	PAHs - 8310	PCBs - 3082	Pesticides - 9081; Chloro-Herbicides - EP8151	ICP Metals (TCLP) - 1311/8010; Mercury (TCLP) - 1311/7470

Sample No.	Matrix	Sample Date	Sample Time								
ITXFB	SOIL	8/12/14	1314	✓	✓	✓	✓	✓	✓	✓	✓

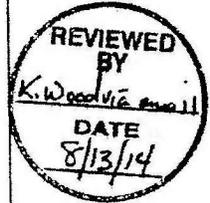
CHAIN OF POSSESSION		Sign/Print Names	
Relinquished By/Removed From <i>Rainey Stowe</i>	Date/Time <i>8-12-14 1400</i>	Received By/Stored In <i>Joan Kessner</i>	Date/Time <i>8/12/14 1400</i>
Relinquished By/Removed From <i>W. Stowe</i>	Date/Time <i>8-12-14 1637</i>	Received By/Stored In <i>Fridge 3A</i>	Date/Time <i>8/12/14 1637</i>
Relinquished By/Removed From <i>100 Battselle</i>	Date/Time <i>8/13/14 0755</i>	Received By/Stored In <i>STH Sexton</i>	Date/Time <i>8/13/14 0755</i>
Relinquished By/Removed From <i>STH Sexton</i>	Date/Time <i>8/13/14 0800</i>	Received By/Stored In <i>FED EX</i>	Date/Time <i>8/13/14</i>
Relinquished By/Removed From <i>Fed Ex</i>	Date/Time <i>8/13/14 0900</i>	Received By/Stored In <i>Chris Zuercher</i>	Date/Time <i>8/13/14 0900</i>
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time

**SPECIAL INSTRUCTIONS**

Perform extraction of TCLP analysis and await direction from J. Kessner before proceeding to analysis.

(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)

\* Custodian unavailable to remove samples from controlled storage. Shipper removed samples, taking custody for shipment to lab.



FINAL SAMPLE DISPOSITION  
WCH-EE-011

**Appendix 5**  
**Data Validation Supporting Documentation**

**GENERAL ORGANIC DATA VALIDATION CHECKLIST**

VALIDATION LEVEL:	A	B	<b>C</b>	D	E
PROJECT:	600-332		DATA PACKAGE: X0074		
VALIDATOR:	ELR	LAB:	Chel	DATE: 10/5/14	
			SDG:	X0074	
ANALYSES PERFORMED					
8015	8021	8141	8151	8315	
		WTPH-HCID	<b>WTPH-G</b>	WTPH-D	
SAMPLES/MATRIX:					
JITFX8					
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 PB  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**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 PB  
\_\_\_\_\_

**GENERAL ORGANIC DATA VALIDATION CHECKLIST**

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

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

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**6. HOLDING TIMES (all levels)**

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

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**GENERAL ORGANIC DATA VALIDATION CHECKLIST**

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

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

**9. SAMPLE CLEANUP (Levels D and E)**

Fluoricil ® (or other aborbant) cleanup performed? .....  Yes  No  N/A  
Lot check performed? .....  Yes  No  N/A  
Check recoveries 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: August 29, 2014

Page 1 of 2

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

**Workorder: 354864**

**Client SDG: X0074**

**Project Description: RC-232 Soil**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Volatiles GRO Organics</b>											
Batch	1413825										
QC1203154021	LCS										
Gasoline Range Organics (C6 - C10)	500			386	UG/KG		77.1	(70%-130%)	RXY1	08/22/14	09:38
<b>**Bromofluorobenzene</b>				41.3	UG/KG		82.5	(50%-150%)			
QC1203154018	MB										
Gasoline Range Organics (C6 - C10)			U	16.7	UG/KG					08/22/14	10:33
<b>**Bromofluorobenzene</b>				51.4	UG/KG		103	(50%-150%)			
QC1203154019	354868001	PS									
Gasoline Range Organics (C6 - C10)	500	U	0.00	372	ug/L		74.4	(70%-130%)		08/22/14	14:35
<b>**Bromofluorobenzene</b>	50.0		37.5	37.2	ug/L		74.5	(50%-150%)			
QC1203154020	354868001	PSD									
Gasoline Range Organics (C6 - C10)	500	U	0.00	370	ug/L	0.469	74	(0%-20%)		08/22/14	15:04
<b>**Bromofluorobenzene</b>	50.0		37.5	34.6	ug/L		69.1	(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
- 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)

Date: 6 October 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 600-332  
 Subject: Herbicides - Data Package No. X0074-GEL

**INTRODUCTION**

This memo presents the results of data validation on Data Package No. X0074 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
J1TXF8	8/12/14	Soil	C	See note 1

1 – Herbicides by 8151A.

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".

Due to the extraction holding time being exceeded by less than twice the limit, all herbicide results in sample batch 1415555 were qualified as estimates and flagged "J".

All other holding times were acceptable.

### **Method Blanks**

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

All method blank results were acceptable.

### Field (equipment) Blanks

No field blanks were submitted for analysis.

### **Accuracy**

#### Matrix Spike/Matrix Spike Duplicate & Blank Spike Recoveries

Matrix spike/matrix spike duplicate analyses are used to assess the analytical accuracy of the reported data and the effect of the matrix on the ability to accurately quantify sample concentrations. Matrix spike/matrix spike duplicate analyses are performed in duplicate using five compounds for which percent recoveries must be within a range of 50-150% or within laboratory control limits. If spike recoveries are outside control limits, detected sample results less than five times the spike concentration are qualified as estimates and flagged "J". Undetected sample results with spike recoveries below control limits are qualified as estimates and flagged "UJ". Undetected sample results are not qualified if the spike recovery is above control limits. Sample results greater than five times the spike concentration require no qualification.

Due to an LCS recovery outside QC limits (32.8% & 46.3%), all dinoseb results were qualified as estimates and flagged "J".

Due to matrix spike recoveries outside QC limits, the dalapon (0%) and dinoseb (0%) results in sample batch 1415555 were qualified as estimates and flagged "J".

Due to matrix spike duplicate recoveries outside QC limits, the dalapon (0%) and dinoseb (23.9%) results in sample batch 1415555 were qualified as estimates and flagged "J".

All other accuracy results were acceptable.

#### Surrogate Recovery

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

All surrogate results were acceptable.

#### **Precision**

##### Matrix Spike/Matrix Spike Duplicate Samples

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

Due to an RPD outside QC limits (200%), the dinoseb results in sample batch 1415555 were qualified as estimates and flagged "J".

All other duplicate results were acceptable.

### Field Duplicate Samples

No field duplicates were submitted for analysis.

### **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. X0074 was submitted for validation and verified for completeness. Completeness is based on the percentage of data determined to be valid (i.e., not rejected). The completion percentage was 100%.

### **MAJOR DEFICIENCIES**

None found.

### **MINOR DEFICIENCIES**

The following minor deficiencies were noted:

- Due to the extraction holding time being exceeded by less than twice the limit, all herbicide results in sample batch 1415555 were qualified as estimates and flagged "J".
- Due to an LCS recovery outside QC limits (32.8% & 46.3%), all dinoseb results were qualified as estimates and flagged "J".
- Due to matrix spike recoveries outside QC limits, the dalapon (0%) and dinoseb (0%) results in sample batch 1415555 were qualified as estimates and flagged "J".
- Due to matrix spike duplicate recoveries outside QC limits, the dalapon (0%) and dinoseb (23.9%) results in sample batch 1415555 were qualified as estimates and flagged "J".
- Due to an RPD outside QC limits (200%), the dinoseb results in sample batch 1415555 were qualified as estimates and flagged "J".

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

## REFERENCES

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

DOE/RL-96-22, Rev. 5, *100 Area Remedial Action Sampling and Analysis Plan*, U.S. Department of Energy, September 2009.

**Appendix 1**  
**Glossary of Data Reporting Qualifiers**

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

- U - Indicates the compound or analyte was analyzed for and not detected in the sample. The value reported is the same quantitation limit corrected for sample dilution and moisture content by the laboratory.
- UJ - Indicates the compound or analyte was analyzed for and not detected in the sample. Due to a minor QC deficiency identified during the data validation, the associated quantitation limit is an estimate.
- J - Indicates the compound or analyte was analyzed for and detected. Due to a minor QC deficiency identified during the data validation, the associated quantitation limit is an estimate.
- R - Indicates the compound or analyte was analyzed for, detected, and due to an identified major QC deficiency, the data are unusable.
- UR - Indicates the compound or analyte was analyzed for and not detected in the sample. Additionally, the data is unusable due to an identified major QC deficiency.
- NJ - Indicates presumptive evidence of a compound at an estimated value. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).
- N - Indicates presumptive evidence of a compound. The data may not be valid for some specific applications usable for decision-making purposes).

**Appendix 2**  
**Summary of Data Qualification**

HERBICIDE DATA QUALIFICATION SUMMARY\*

<b>SDG: X0074</b>	<b>REVIEWER: ELR</b>	<b>Project: 600-332</b>	<b>PAGE <u>1</u> OF <u>1</u></b>
<b>COMPOUND</b>	<b>QUALIFIER</b>	<b>SAMPLES AFFECTED</b>	<b>REASON</b>
Dinoseb	J	All	LCS recovery
Dalapon Dinoseb	J	All in analytical batch 1415555	MS & MSD recovery
Dinoseb	J	All in analytical batch 1415555	RPD
All	J	All in analytical batch 1415555	Hold time

\* - 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: September 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: X0074

Client Sample ID: J1TXF8  
 Sample ID: 354864001  
 Matrix: SOIL  
 Collect Date: 12-AUG-14 13:14  
 Receive Date: 15-AUG-14  
 Collector: Client  
 Moisture: .541%

Project: WCHN00213  
 Client ID: WCHN001

10/5/14

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
<b>Semi-Volatiles-HERB</b>											
<b>8151A Herbicides Soil "Dry Weight Corrected"</b>											
2,4,5-T	DU	3.33	3.33	10.0	ug/kg	2	LXA1	08/28/14	1652	1414273	1
2,4,5-TP	DU	3.33	3.33	10.0	ug/kg	2					
2,4-D	DJ	5.58	3.33	10.0	ug/kg	2					
2,4-DB	DTU	3.33	3.33	10.0	ug/kg	2					
Dalapon	DU	70.3	70.3	201	ug/kg	2					
Dicamba	DU	4.02	4.02	10.0	ug/kg	2					
Dichlorprop	DU	4.54	4.54	10.0	ug/kg	2					
Dinoseb	DU	3.33	3.33	10.0	ug/kg	2					
MCPA	DU	462	462	2010	ug/kg	2					
MCPP	DU	402	402	2010	ug/kg	2					
2,4,5-T	UX	1.67	1.67	5.03	ug/kg	1	LXA1	09/04/14	1918	1415555	2
2,4,5-TP	UX	1.67	1.67	5.03	ug/kg	1					
2,4-D	TUX	1.67	1.67	5.03	ug/kg	1					
2,4-DB	TUX	1.67	1.67	5.03	ug/kg	1					
Dalapon	TUX	35.2	35.2	101	ug/kg	1					
Dicamba	UX	2.01	2.01	5.03	ug/kg	1					
Dichlorprop	UX	2.27	2.27	5.03	ug/kg	1					
Dinoseb	TUX	1.67	1.67	5.03	ug/kg	1					
MCPA	UX	231	231	1010	ug/kg	1					
MCPP	TUX	201	201	1010	ug/kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 8151A	8151A Herbicides Prep in Soil	AXVI	08/26/14	1835	1414271
SW846 8151A	8151A Herbicides Prep in Soil	SJW1	09/02/14	1120	1415552

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 8151A	
2	SW846 8151A	
3	SW846 8151A	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
2,4-Dichlorophenylacetic acid	8151A Herbicides Soil "Dry Weight Corrected"	106 ug/kg	100	106	(38%-142%)
2,4-Dichlorophenylacetic acid	8151A Herbicides Soil "Dry Weight Corrected"	89.8 ug/kg	101	89.3	(38%-142%)

**Appendix 4**

**Laboratory Narrative and Chain-of-Custody Documentation**

**Herbicide Case Narrative  
WC-HANFORD, INC. (WCHN)  
SDG X0074**

**Method/Analysis Information**

**Procedure:** Analysis of Chlorophenoxy Acid Herbicides by ECD  
**Analytical Method:** SW846 8151A  
**Prep Method:** SW846 8151A  
**Analytical Batch Number:** 1414273  
**Prep Batch Number:** 1414271

**Sample Analysis**

The following samples were analyzed using the analytical protocol as established in SW846 8151A:

<b>Sample ID</b>	<b>Client ID</b>
354864001	J1TXF8
1203155210	MB for batch 1414271
1203155213	Laboratory Control Sample (LCS)
1203155211	354864001(J1TXF8) Matrix Spike (MS)
1203155212	354864001(J1TXF8) 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-011 REV# 21.

Raw data reports are processed and reviewed by the analyst using 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 Initial Calibration Verification (ICV) requirements have been met for this SDG. However, not all Calibration Verification Standards (CCV) requirements were met. Several target analytes failed acceptance criteria with a negative bias on one analytical column in the standards bracketing the samples in this SDG. The negative bias for the analytical data is a result of instrument response decreasing after the initial calibration. The instrument response never decreased to a point where the target analytes would not be detected. Since these target analytes were not detected in the samples, the non-compliance had no adverse impact on the data. All analytes were

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**

The MS and MSD, 1203155211 (J1TXF8) and 1203155212 (J1TXF8), did not meet surrogate recovery acceptance criteria. Since there were target analytes detected above the reporting limits in the associated parent sample, the biased high surrogate recoveries had no adverse impact on the data and the results have been reported.

#### **Laboratory Control Sample (LCS) Recovery**

The LCS (1203155213) did not meet spike recovery acceptance criteria for Dinoseb. The batch was re-extracted out of holding in batch 1415555. Since the re-extraction batch met the LCS acceptance criteria, both sets of data results have been reported.

#### **QC Sample Designation**

Sample 354864001 (J1TXF8) was selected for analysis as the matrix spike and matrix spike duplicate.

#### **Matrix Spike (MS) Recovery Statement**

The MS, 1203155211 (J1TXF8), did not meet spike recovery acceptance criteria for 2,4-DB. Since 2,4-DB was not detected above the reporting limits in the associated parent sample, the biased high spike recoveries had no adverse impact on the data and the results have been reported.

#### **Matrix Spike Duplicate (MSD) Recovery Statement**

The MSD, 1203155212 (J1TXF8), did not meet spike recovery acceptance criteria for 2,4-DB. Since 2,4-DB was not detected above the reporting limits in the associated parent sample, the biased high spike recoveries had no adverse impact on the data and the results have been reported.

#### **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. All reported analyte detections in client and quality control samples were within the established retention time windows. Reported target analyte concentrations were confirmed on a dissimilar column.

#### **Sample Dilutions**

Samples 1203155211 (J1TXF8), 1203155212 (J1TXF8) and 354864001 (J1TXF8) were diluted due to high concentrations of non-target analytes within the retention time window of interest.

#### **Sample Re-extraction/Re-analysis**

Sample 354864001 (J1TXF8) was re-extracted out of holding in batch 1415555 due to LCS failure.

## Miscellaneous Information

### **Electronic Package 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 of each electronic package will indicate the reviewer name associated with the generation of the data and package. The data validator will always sign and date the case narrative. Data that are not generated electronically, such as hand written pages, will be scanned and inserted into the electronic package.

### **Data Exception (DER) Documentation**

The following DER was generated for this SDG: 1331280.

### **Manual Integrations**

Some initial calibration standards, continuing calibration standards, and/or 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 Herbicide 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 following additional comments were required:

The higher results from either column have been chosen and reported in the data package for the client samples, MB and LCS. The data reported for the MS and MSD are from the same analytical column as the parent sample.

Due to rounding differences in the calculation between the forms, the data reported in the Sample Summary (form 1) and Spike Recovery Report (form 3) may differ slightly from the data reported in Identification Summary (form 10).

Due to software issue, the raw data may not correctly display the updated SPC limits. Please see Sample Data Summary Report and Surrogate Recovery Report for the correct surrogate acceptance limits.

### **System Configuration**

The Semi-Volatiles-HERB analysis was performed on the following instrument configuration:

<b>Instrument ID</b>	<b>Instrument</b>	<b>System Configuration</b>	<b>Column ID</b>	<b>Column Description</b>
ECD6A.I_1	Agilent 6890 Gas Chromatograph/Dual ECD w/ 7683 Autosampler	HP6890 Series GC/ECD	Rtx-CLP I	30m x 0.32mm, 0.50um (Rtx-CLPesticide)
ECD6A.I_2	Agilent 6890 Gas Chromatograph/Dual ECD w/ 7683 Autosampler	HP6890 Series GC/ECD	Rtx-CLP II	30m x 0.32mm, 0.50um (Rtx-CLPesticide II)

**Method/Analysis Information**

**Procedure:** Analysis of Chlorophenoxy Acid Herbicides by ECD  
Analytical Method: SW846 8151A  
Prep Method: SW846 8151A  
Analytical Batch Number: 1415555  
Prep Batch Number: 1415552

**Sample Analysis**

The following samples were analyzed using the analytical protocol as established in SW846 8151A:

<b>Sample ID</b>	<b>Client ID</b>
354864001	J1TXF8
1203158366	MB for batch 1415552
1203158367	Laboratory Control Sample (LCS)
1203158368	354864001(J1TXF8) Matrix Spike (MS)
1203158369	354864001(J1TXF8) 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-011 REV# 21.

Raw data reports are processed and reviewed by the analyst using 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 standards (ICV, CVS, or CCV) met the acceptance criteria. All analytes were 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 354864001 (J1TXF8) was selected for analysis as the matrix spike and matrix spike duplicate.

#### **Matrix Spike (MS) Recovery Statement**

The MS, 1203158368 (J1TXF8), did not meet spike recovery acceptance criteria. Since the MSD displayed spike similar recoveries to the MS, the failures were attributed to sample matrix interference and the data results have been reported.

#### **Matrix Spike Duplicate (MSD) Recovery Statement**

The MSD, 1203158369 (J1TXF8), did not meet spike recovery acceptance criteria. Since the MSD displayed spike similar recoveries to the MS, the failures were attributed to sample matrix interference and the data results have been reported.

#### **MS/MSD Relative Percent Difference (RPD) Statement**

The MS/MSD pair, 1203158368 (J1TXF8) and 1203158369 (J1TXF8), did not meet RPD acceptance criteria. The RPD failure was attributed to sample matrix interference and the data results have been reported.

#### **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. Sample 354864001 (J1TXF8) was re-extracted out of holding from batch 1414273 due to batch QC failure. Since the LCS met the acceptance criteria in the re-extraction, both sets of data results have been reported.

##### **Preparation/Analytical Method Verification**

All procedures were performed as stated in the SOP. All reported analyte detections in client and quality control samples were within the established retention time windows. Reported target analyte concentrations were confirmed on a dissimilar column.

##### **Sample Dilutions**

The samples in this SDG did not require dilutions.

##### **Sample Re-extraction/Re-analysis**

Sample 354864001 (J1TXF8) was re-extracted out of holding from batch 1414273 due to batch QC failure. Since the LCS met the acceptance criteria in the re-extraction, both sets of data results have been reported.

#### **Miscellaneous Information**

##### **Electronic Package 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 of each electronic package will indicate the reviewer name associated with the generation of the data and package. The data validator will always sign and date the case narrative. Data that are not generated electronically, such as hand written pages, will be scanned and inserted into the electronic package.

##### **Data Exception (DER) Documentation**

The following DER was generated for this SDG: 1331116.

### **Manual Integrations**

Some initial calibration standards, continuing calibration standards, and/or 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 Herbicide 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 following additional comments were required:

The higher results from either column have been chosen and reported in the data package for the client samples, MB and LCS. The data reported for the MS and MSD are from the same analytical column as the parent sample.

Due to rounding differences in the calculation between the forms, the data reported in the Sample Summary (form 1) and Spike Recovery Report (form 3) may differ slightly from the data reported in Identification Summary (form 10).

Due to software issue, the raw data may not correctly display the updated SPC limits. Please see Sample Data Summary Report and Surrogate Recovery Report for the correct surrogate acceptance limits.

### **System Configuration**

The Semi-Volatiles-HERB analysis was performed on the following instrument configuration:

<b>Instrument ID</b>	<b>Instrument</b>	<b>System Configuration</b>	<b>Column ID</b>	<b>Column Description</b>
ECD6A.I_1	Agilent 6890 Gas Chromatograph/Dual ECD w/ 7683 Autosampler	HP6890 Series GC/ECD	Rtx-CLP I	30m x 0.32mm, 0.50um (Rtx-CLPesticide)
ECD6A.I_2	Agilent 6890 Gas Chromatograph/Dual ECD w/ 7683 Autosampler	HP6890 Series GC/ECD	Rtx-CLP II	30m x 0.32mm, 0.50um (Rtx-CLPesticide II)

### **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.

<b>DATA EXCEPTION REPORT</b>			
<b>Mo. Day Yr.</b> 05-SEP-14	<b>Division:</b> Industrial	<b>Quality Criteria:</b> Specifications	<b>Type:</b> Process
<b>Instrument Type:</b> GC/ECD	<b>Test / Method:</b> SW846 8151A	<b>Matrix Type:</b> Solid	<b>Client Code:</b> WCHN
<b>Batch ID:</b> 1415555	<b>Sample Numbers:</b> See Below		
<p><b>Potentially affected work order(s)(SDG): 354864(X0074),354866(X0075),354868(X0076)</b></p> <p><b>Application Issues:</b>                      Failed Recovery for MS/PS                      Failed RPD for MS/MSD, or PS/PSD                      Sample Prepped out of Holding                      Sample Logged out of Holding                      Failed Recovery for MSD/PSD</p>			
<b>Specification and Requirements Exception Description:</b>		<b>DER Disposition:</b>	
<ol style="list-style-type: none"> <li>1. The MS(1203158368) and MSD(1203158369) did not meet spike recovery acceptance criteria.</li> <li>2. The MS(1203158370) and MSD(1203158371) did not meet spike recovery acceptance criteria.</li> <li>3. The MS(1203158372) and MSD(1203158373) did not meet spike recovery acceptance criteria.</li> <li>4. The MS(1203158368)/MSD(1203158369) pair did not meet RPD acceptance criteria.</li> <li>5. Samples 354864001, 354866001, and 354868001 were re-extracted out of holding from batch 1414273 due to batch QC failure.</li> </ol>		<ol style="list-style-type: none"> <li>1., 2., 3. Since the MSD displayed spike similar recoveries to the MS, the failures were attributed to sample matrix interference and the data results have been reported.</li> <li>4. The RPD failure was attributed to sample matrix interference and the data results have been reported.</li> <li>5. Since the LCS met the acceptance criteria in the re-extraction, both sets of data results have been reported.</li> </ol>	

**Originator's Name:**  
Lindsey Jensen      05-SEP-14

**Data Validator/Group Leader:**  
Barbara Bailey      05-SEP-14

DATA EXCEPTION REPORT			
<b>Mo. Day Yr.</b> 05-SEP-14	<b>Division:</b> Industrial	<b>Quality Criteria:</b> Specifications	<b>Type:</b> Process
<b>Instrument Type:</b> GC/ECD	<b>Test / Method:</b> SW846 8151A	<b>Matrix Type:</b> Solid	<b>Client Code:</b> WCHN
<b>Batch ID:</b> 1414273	<b>Sample Numbers:</b> See Below		
<b>Potentially affected work order(s)(SDG): 354864(X0074),354866(X0075),354868(X0076)</b>			
<b>Application Issues:</b> Failed Recovery for MS/PS Failed Recovery for LCS/LCSD Failed Yield for Surrogates Failed Recovery for MSD/PSD			
<b>Specification and Requirements Exception Description:</b>		<b>DER Disposition:</b>	
<p>1. The LCS(1203155213) did not meet spike recovery acceptance criteria for Dinoseb.</p> <p>2. The MS(1203155211) and MSD(1203155212) did not meet surrogate recovery acceptance criteria.</p> <p>3. The MS(1203155211) and MSD(1203155212) did not meet spike recovery acceptance criteria for 2,4-DB.</p>		<p>1. The batch was re-extracted out of holding in batch 1415555. Since the re-extraction batch met the LCS acceptance criteria, both sets of data results have been reported.</p> <p>2. Since there were target analytes detected above the reporting limits in the associated parent sample, the biased high surrogate recoveries had no adverse impact on the data and the results have been reported.</p> <p>3. Since 2,4-DB was not detected above the reporting limits in the associated parent sample, the biased high spike recoveries had no adverse impact on the data and the results have been reported.</p>	

**Originator's Name:**  
Barbara Bailey      05-SEP-14

**Data Validator/Group Leader:**  
Jimin Cao              05-SEP-14

**Washington Closure Hanford**

**CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST**

RC-232-087

Page 1 of 1

Collector <i>Stowe</i>	Company Contact Joan Kessner	Telephone No. 375-4888	Project Coordinator KESSNER, JH	Price Code 8C	Data Turnaround <b>15 Days</b>
Project Designation 100-IU-2 & 100-IU-6 Remaining Waste Sites	Sampling Location 600-332, Gable Mt. firing range septic system	SAF No. RC-232			
Chest No. <i>RCL-07-012</i>	Field Logbook No. EL-1667-02	COA 0603322000	Method of Shipment Commercial Carrier / <i>Fed Ex</i>		
Shipped To GEL Laboratories Charleston	Offsite Property No. <i>A131218</i>	Bill of Lading/Air Bill No. <i>See OSPL</i>			

Possible Sample Hazards/Remarks	Preservation	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	None
	Type of Container	GP	GP	aG	Ge*	aG	aG	aG	aG	GP
	No. of Container(s)	1	1	1	3	1	1	1	1	1
	Volume	250mL	250mL	125mL	40mL	250mL	250mL	250mL	250mL	500mL
Special Handling and/or Storage	Sample Analysis	See Item (1) in Special Instructions	NO2/NO3 - 353.1 (Nitrogen in Nitrite and Nitrate)	TPH-Diesel Range - WTPH-D +	TPH-Gasoline Range - WTPH-G	Semi-VOA - 8270 (TCL)	PAHs - 8310	PCBs - 9062	Pesticides - 8081; Chloro-Herbicides - EPAB151	ICP Metals (TCLP) - 1311/8010; Mercury (TCLP) - 1311/7470

Sample No.	Matrix	Sample Date	Sample Time								
<i>ITXF8</i>	SOIL	<i>8/12/14</i>	<i>1314</i>	✓	✓	✓	✓	✓	✓	✓	✓

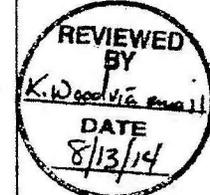
CHAIN OF POSSESSION		Sign/Print Names	
Relinquished By/Removed From <i>Pinky Stowe</i>	Date/Time <i>8-12-14 1400</i>	Received By/Stored In <i>DWSHEA</i>	Date/Time <i>8/12/14 1400</i>
Relinquished By/Removed From <i>DWSHEA</i>	Date/Time <i>8-12-14 1637</i>	Received By/Stored In <i>Fridge 3A Battelle</i>	Date/Time <i>8/12/14 1637</i>
Relinquished By/Removed From <i>Battelle Fridge 3A</i>	Date/Time <i>8/13/14 0755</i>	Received By/Stored In <i>SM Sexton</i>	Date/Time <i>8/13/14 0755</i>
Relinquished By/Removed From <i>SM Sexton</i>	Date/Time <i>8/13/14 0800</i>	Received By/Stored In <i>FED EX</i>	Date/Time <i>8/13/14</i>
Relinquished By/Removed From <i>Fed Ex</i>	Date/Time <i>8-15-14 0900</i>	Received By/Stored In <i>Chris Zuchner</i>	Date/Time <i>8-15-14 0900</i>
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time

**SPECIAL INSTRUCTIONS**

Perform extraction of TCLP analysis and await direction from J. Kessner before proceeding to analysis.

(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)

Custodian unavailable to remove samples from controlled storage. Shipper removed samples, taking custody for shipment to lab.



FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time
WCH-EE-011			

**Appendix 5**  
**Data Validation Supporting Documentation**

**GENERAL ORGANIC DATA VALIDATION CHECKLIST**

VALIDATION LEVEL:	A	B	<b>C</b>	D	E
PROJECT:	600-332		DATA PACKAGE: X0074		
VALIDATOR:	BLR	LAB: Cre	DATE 10/5/14		
			SDG: X0074		
ANALYSES PERFORMED					
8015	8021	8141	<b>8151A</b>	8315	
		WTPH-HCID	WTPH-G	WTPH-D	
SAMPLES/MATRIX:					
JITXF8					
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 FR

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

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

Comments: LCS - 273 - dinoseb 2.5% 52.5% - J  
LCS - dinoseb - 46.3% -  
MS - 55 dalepen + dinoseb (0.0%) - J EU  
MSD - 55 dalyan + dinoseb (0 + 23.7%) - J EU

No PR

**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: \_\_\_\_\_  
\_\_\_\_\_ *SS - d.m.o.r.e.t (2009)* \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**6. HOLDING TIMES (all levels)**

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

Comments: \_\_\_\_\_ *batch SS - L2X - J cell* \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**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: September 5, 2014

Page 1 of 5

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

Contact:

Workorder: 354864

Client SDG: X0074

Project Description: RC-232 Soil

Parname	NOM	Sample Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Semi-Volatiles-HERB</b>										
Batch	1414273									
QC1203155213	LCS									
2,4,5-T	40.0		39.2	ug/kg		98.2	(52%-137%)	LXA1	08/28/14	16:29
2,4,5-TP	40.0		36.8	ug/kg		92	(58%-133%)			
2,4-D	40.0		40.2	ug/kg		101	(53%-139%)			
2,4-DB	40.0		40.1	ug/kg		100	(61%-139%)			
Dalapon	400		445	ug/kg		111	(39%-113%)			
Dicamba	40.0		35.4	ug/kg		88.6	(54%-118%)			
Dichlorprop	40.0		35.4	ug/kg		88.6	(59%-126%)			
Dinoseb	40.0		13.1	ug/kg		32.8 *	(39%-94%)			
MCPA	4000		3440	ug/kg		86.2	(60%-120%)			
MCPP	4000		3400	ug/kg		85	(50%-123%)			
**2,4-Dichlorophenylacetic acid	99.9		95.3	ug/kg		95.4	(38%-142%)			
QC1203155210	MB									
2,4,5-T		U	1.66	ug/kg					08/28/14	16:07
2,4,5-TP		U	1.66	ug/kg						
2,4-D		U	1.66	ug/kg						
2,4-DB		U	1.66	ug/kg						
Dalapon		U	35.0	ug/kg						
Dicamba		U	2.00	ug/kg						
Dichlorprop		U	2.26	ug/kg						
Dinoseb		U	1.66	ug/kg						

# GEL LABORATORIES LLC

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

## QC Summary

Workorder: 354864

Client SDG: X0074

Project Description: RC-232 Soil

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Semi-Volatiles-HERB</b>											
Batch	1414273										
MCPA			U	230	ug/kg						
MCPP			U	200	ug/kg				LXA1	08/28/14	16:07
**2,4-Dichlorophenylacetic acid	99.9			89.6	ug/kg		89.7	(38%-142%)			
QC1203155211 354864001 MS											
2,4,5-T	40.2	DU	3.33 D	38.9	ug/kg		96.9	(45%-131%)		08/28/14	17:13
2,4,5-TP	40.2	DU	3.33 D	39.3	ug/kg		97.9	(49%-135%)			
2,4-D	40.2	DJ	5.58 D	44.1	ug/kg		95.8	(53%-135%)			
2,4-DB	40.2	DTU	3.33 DPT	66.9	ug/kg		167*	(61%-139%)			
Dalapon	402	DU	70.3 D	302	ug/kg		75.2	(30%-113%)			
Dicamba	40.2	DU	4.02 D	34.3	ug/kg		85.4	(48%-124%)			
Dichlorprop	40.2	DU	4.54 D	37.1	ug/kg		92.5	(46%-138%)			
Dinoseb	40.2	DU	3.33 D	27.1	ug/kg		67.5	(25%-130%)			
MCPA	4020	DU	462 D	3440	ug/kg		85.7	(50%-133%)			
MCPP	4020	DU	402 D	3290	ug/kg		81.8	(47%-123%)			
**2,4-Dichlorophenylacetic acid	100		106	144	ug/kg		144*	(38%-142%)			
QC1203155212 354864001 MSD											
2,4,5-T	40.2	DU	3.33 D	40.7	ug/kg	4.58	101	(0%-32%)		08/28/14	17:36
2,4,5-TP	40.2	DU	3.33 D	41.2	ug/kg	4.72	103	(0%-31%)			
2,4-D	40.2	DJ	5.58 D	45.3	ug/kg	2.85	98.9	(0%-70%)			
2,4-DB	40.2	DTU	3.33 DT	70.2	ug/kg	4.84	175*	(0%-27%)			
Dalapon	402	DU	70.3 D	310	ug/kg	2.57	77.1	(0%-18%)			
Dicamba	40.2	DU	4.02 D	36.7	ug/kg	6.75	91.3	(0%-41%)			
Dichlorprop	40.2	DU	4.54 D	37.9	ug/kg	1.93	94.2	(0%-40%)			
Dinoseb	40.2	DU	3.33 D	28.9	ug/kg	6.20	71.8	(0%-169%)			

# GEL LABORATORIES LLC

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

## QC Summary

Workorder: 354864

Client SDG: X0074

Project Description: RC-232 Soil

Page 3 of 5

Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Semi-Volatiles-HERB</b>											
Batch	1414273										
MCPA	4020	DU	462	D	3680	ug/kg	6.63	91.5	(0%-38%)	LXA1	08/28/14 17:36
MCPP	4020	DU	402	D	3550	ug/kg	7.64	88.2	(0%-30%)		
**2,4-Dichlorophenylacetic acid	100		106		146	ug/kg		146*	(38%-142%)		
<hr/>											
Batch	1415555										
QC1203158367	LCS										
2,4,5-T	40.0				44.7	ug/kg		112	(52%-137%)	LXA1	09/04/14 18:56
2,4,5-TP	40.0				39.6	ug/kg		98.9	(58%-133%)		
2,4-D	40.0				42.6	ug/kg		107	(53%-139%)		
2,4-DB	40.0				50.2	ug/kg		125	(61%-139%)		
Dalapon	400				329	ug/kg		82.3	(39%-113%)		
Dicamba	40.0				38.0	ug/kg		95	(54%-118%)		
Dichlorprop	40.0				37.2	ug/kg		93.1	(59%-126%)		
Dinoseb	40.0				18.5	ug/kg		46.3	(39%-94%)		
MCPA	4000				3920	ug/kg		98.1	(60%-120%)		
MCPP	4000				3740	ug/kg		93.5	(50%-123%)		
**2,4-Dichlorophenylacetic acid	100				101	ug/kg		101	(38%-142%)		
<hr/>											
QC1203158366	MB										
2,4,5-T				U	1.66	ug/kg					09/04/14 18:33
2,4,5-TP				U	1.66	ug/kg					
2,4-D				U	1.66	ug/kg					
2,4-DB				U	1.66	ug/kg					
Dalapon				U	35.0	ug/kg					
Dicamba				U	2.00	ug/kg					

# GEL LABORATORIES LLC

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

## QC Summary

Workorder: 354864

Client SDG: X0074

Project Description: RC-232 Soil

Page 4 of 5

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Semi-Volatiles-HERB</b>											
Batch	1415555										
Dichlorprop				U	2.26	ug/kg			LXA1	09/04/14	18:33
Dinoseb				U	1.66	ug/kg					
MCPA				U	230	ug/kg					
MCPP				U	200	ug/kg					
**2,4-Dichlorophenylacetic acid	99.9				94.7	ug/kg	94.8	(38%-142%)			
QC1203158368 354864001 MS											
2,4,5-T	40.2	UX	1.67	X	45.4	ug/kg	113	(45%-131%)		09/04/14	19:40
2,4,5-TP	40.2	UX	1.67	X	39.3	ug/kg	97.9	(49%-135%)			
2,4-D	40.2	TUX	1.67	X	47.2	ug/kg	117	(53%-135%)			
2,4-DB	40.2	TUX	1.67	TX	56.6	ug/kg	141 *	(61%-139%)			
Dalapon	402	TUX	35.2	TUX	35.2	ug/kg	0 *	(30%-113%)			
Dicamba	40.2	UX	2.01	X	40.3	ug/kg	100	(48%-124%)			
Dichlorprop	40.2	UX	2.27	X	46.7	ug/kg	116	(46%-138%)			
Dinoseb	40.2	TUX	1.67	TUX	1.67	ug/kg	0 *	(25%-130%)			
MCPA	4020	UX	231	X	4330	ug/kg	108	(50%-133%)			
MCPP	4020	TUX	201	ETX	9010	ug/kg	224 *	(47%-123%)			
**2,4-Dichlorophenylacetic acid	100		89.8		91.6	ug/kg	91.2	(38%-142%)			
QC1203158369 354864001 MSD											
2,4,5-T	40.1	UX	1.67	X	46.7	ug/kg	2.86	116	(0%-32%)	09/04/14	20:08
2,4,5-TP	40.1	UX	1.67	X	41.1	ug/kg	4.28	102	(0%-31%)		
2,4-D	40.1	TUX	1.67	X	48.5	ug/kg	2.71	121	(0%-70%)		
2,4-DB	40.1	TUX	1.67	TX	60.7	ug/kg	6.97	151 *	(0%-27%)		
Dalapon	401	TUX	35.2	TUX	35.1	ug/kg	N/A	0 *	(0%-18%)		

**QC Summary**

Workorder: 354864      Client SDG: X0074      Project Description: RC-232 Soil      Page 5 of 5

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-HERB											
Batch 1415555											
Dicamba	40.1	UX	2.01	X	40.3	ug/kg	0.0696	100	(0%-41%)	LXA1	09/04/14 20:08
Dichlorprop	40.1	UX	2.27	X	54.0	ug/kg	14.6	135	(0%-40%)		
Dinoseb	40.1	TUX	1.67	PTX	9.59	ug/kg	200*	23.9*	(0%-169%)		
MCPA	4010	UX	231	X	4280	ug/kg	1.26	107	(0%-38%)		
MCPP	4010	TUX	201	ETX	9010	ug/kg	0.00806	225*	(0%-30%)		
**2,4-Dichlorophenylacetic acid	100		89.8		98.8	ug/kg		98.5	(38%-142%)		

**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 or %RPD not applicable.  
 ^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

\* Indicates that a Quality Control parameter was not within specifications.  
 For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

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

Date: 6 October 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  
 600-332  
 Subject: Inorganic - Data Package No. X0074-GEL

**INTRODUCTION**

This memo presents the results of data validation on Data Package No. X0074 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
J1TXF8	8/12/14	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 boron result was qualified as undetected and flagged "UJ".

All other preparation blank results were acceptable.

#### Field (Equipment) Blank

No field blanks were submitted for analysis.

#### · **Accuracy**

##### Matrix Spike and Laboratory Control Sample

Matrix spike (MS) and laboratory control sample (LCS) analyses are used to assess the analytical accuracy of the reported data. The matrix spike is used to assess the effect of the matrix on the ability to accurately quantify sample concentrations. Recoveries must fall within the range of 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 silicon (10.9%) results were qualified as estimates and flagged "J".

All other accuracy results were acceptable.

## **Precision**

### Laboratory Duplicate Samples

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

All laboratory duplicate results were acceptable.

### Field Duplicate

No field duplicates were submitted for analysis.

## **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. X0074 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 boron result was qualified as undetected and flagged "UJ".
- Due to matrix spike recoveries outside QC limits, all silicon (10.9%) results were qualified as estimates and flagged "J".

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

## **REFERENCES**

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

DOE/RL-96-22, Rev. 5, *100 Area Remedial Action Sampling and Analysis Plan*, U.S. Department of Energy, September 2009.

**Appendix 1**  
**Glossary of Data Reporting Qualifiers**

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

- U - Indicates the compound or analyte was analyzed for and not detected in the sample. The value reported is the sample quantitation limit corrected for sample dilution and moisture content by the laboratory.
- UJ - Indicates the compound or analyte was analyzed for and not detected in the sample. Due to a minor QC deficiency identified during the data validation, the associated quantitation limit is an estimate.
- J - Indicates the compound or analyte was analyzed for and detected. Due to a minor QC deficiency identified during the data validation, the associated concentration is an estimate, but the data are usable for decision-making purposes.
- BJ - Applied to inorganic analyses only. Indicates the analyte concentration was greater than the IDL but less than the CRDL and is considered an estimated value.
- R - Indicates the compound or analyte was analyzed for, detected, and due to an identified major QC deficiency, the data are unusable.
- UR - Indicates the compound or analyte was analyzed for and not detected in the sample. Additionally, the data is unusable due to an identified major QC deficiency.
- NJ - Indicates presumptive evidence of a compound at an estimated value. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).
- N - Indicates presumptive evidence of a compound. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).

**Appendix 2**  
**Summary of Data Qualification**

INORGANIC DATA QUALIFICATION SUMMARY\*

<b>SDG: X0074</b>	<b>REVIEWER: ELR</b>	<b>Project: 600-332</b>	<b>PAGE <u>1</u> OF <u>1</u></b>
<b>COMPOUND</b>	<b>QUALIFIER</b>	<b>SAMPLES AFFECTED</b>	<b>REASON</b>
Silicon	J	All	MS recovery
Boron	UJ	All	Method blank contamination

\* - 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: September 15, 2014

Company : WC-Hanford, Inc.  
 Address : 2620 Fermi Avenue  
 MSIN H4-21  
 Richland, Washington 99354

Client SDG: X0074

Client Sample ID: J1TXF8  
 Sample ID: 354864001  
 Matrix: SOIL  
 Collect Date: 12-AUG-14 13:14  
 Receive Date: 15-AUG-14  
 Collector: Client  
 Moisture: .541%

Project: WCHN00213  
 Client ID: WCHN001

K  
10/5/14

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time Batch	Method
<b>Mercury Analysis-CVAA</b>										
SW846 7471B Mercury in Solid "Dry Weight Corrected"										
Mercury	B	0.0075	0.00402	0.012	mg/kg	1	MTM1	08/19/14	1123 1412249	1
<b>Metals Analysis-ICP</b>										
ICP METALS 6010TR Close-out List "Dry Weight Corrected"										
Aluminum		6630	6.68	19.6	mg/kg	1	HSC	08/19/14	0935 1412088	2
Arsenic		3.47	0.491	2.95	mg/kg	1				
Barium		80.8	0.0982	0.491	mg/kg	1				
Beryllium		1.12	0.0982	0.491	mg/kg	1				
Boron	B	1.34	0.982	4.91	mg/kg	1				
Cadmium	B	0.357	0.0982	0.491	mg/kg	1				
Calcium		5490	7.85	24.5	mg/kg	1				
Chromium		10.2	0.147	0.491	mg/kg	1				
Cobalt		11.6	0.147	0.491	mg/kg	1				
Copper		13.7	0.295	0.982	mg/kg	1				
Iron		22600	7.85	24.5	mg/kg	1				
Lead		5.48	0.324	0.982	mg/kg	1				
Magnesium		4810	8.35	29.5	mg/kg	1				
Manganese		370	0.196	0.982	mg/kg	1				
Molybdenum	B	0.213	0.196	0.982	mg/kg	1				
Nickel		11.2	0.147	0.491	mg/kg	1				
Potassium		1490	6.28	24.5	mg/kg	1				
Silicon	N	782	1.47	9.82	mg/kg	1				
Sodium		144	6.87	24.5	mg/kg	1				
Vanadium		58.5	0.0982	0.491	mg/kg	1				
Zinc	C	42.7	0.393	0.982	mg/kg	1				
Antimony	DU	1.62	1.62	4.91	mg/kg	5	HSC	08/21/14	0855 1412088	3
Silver	BD	1.16	0.491	2.45	mg/kg	5				
<b>Metals Analysis-ICP-MS</b>										
SW846 3050B/6020A Selenium "Dry Weight Corrected"										
Selenium	DU	0.323	0.323	1.00	mg/kg	2	BAJ	08/28/14	0442 1412079	4

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	JXM5	08/18/14	1000	1412078
SW846 3050B	SW846 3050B Prep for 6010C	JXM5	08/18/14	1000	1412087
SW846 7471B Prep	SW846 7471B Mercury Prep Soil	AXS5	08/18/14	1624	1412248

**Appendix 4**

**Laboratory Narrative and Chain-of-Custody Documentation**

**Metals Fractional Narrative  
WC-HANFORD, INC. (WCHN)  
SDG X0074**

**Sample Analysis**

<b>Sample ID</b>	<b>Client ID</b>
354864001	JITXF8
1203149606	Method Blank (MB) ICP
1203149607	Laboratory Control Sample (LCS)
1203149610	354864001(JITXF8L) Serial Dilution (SD)
1203149608	354864001(JITXF8D) Sample Duplicate (DUP)
1203149609	354864001(JITXF8S) Matrix Spike (MS)
1203155163	354864001(JITXF8PS) Post Spike (PS)
1203149585	Method Blank (MB) ICP-MS
1203149586	Laboratory Control Sample (LCS)
1203149589	354864001(JITXF8L) Serial Dilution (SD)
1203149587	354864001(JITXF8D) Sample Duplicate (DUP)
1203149588	354864001(JITXF8S) Matrix Spike (MS)
1203150020	Method Blank (MB) CVAA
1203150021	Laboratory Control Sample (LCS)
1203150025	354864001(JITXF8L) Serial Dilution (SD)
1203150022	354864001(JITXF8D) Sample Duplicate (DUP)
1203150023	354864001(JITXF8S) Matrix Spike (MS)

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

**Method/Analysis Information**

<b>Analytical Batch:</b>	1412088, 1412079 and 1412249
<b>Prep Batch :</b>	1412087, 1412078 and 1412248
<b>Standard Operating Procedures:</b>	GL-MA-E-013 REV# 22, GL-MA-E-009 REV# 24, GL-MA-E-014 REV# 25 and GL-MA-E-010 REV# 28
<b>Analytical Method:</b>	SW846 3050B/6010C, SW846 3050B/6020A and SW846 7471B
<b>Prep Method :</b>	SW846 3050B and SW846 7471B Prep

### **Preparation/Analytical Method Verification**

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

### **System Configuration**

The Metals analysis-ICP was performed on a P E 5300 Optima radial/axial-viewing inductively coupled plasma atomic emission spectrometer. The instrument is equipped with an ESI SC-FAST introduction, 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 0.4L/min, argon gas flows of 13 L/min and 0.2 L/min for the torch and auxiliary gases, and a flow setting of 0.65L/min for the nebulizer.

The Metals analysis-ICP was performed on a PE 7300 Optima radial/axial-viewing inductively coupled plasma atomic emission spectrometer. The instrument is equipped with an ESI SC-FAST introduction, 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 0.4L/min, argon gas flows of 13 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/PQL Requirements**

The CRDL/PQL 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 Blanks (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 method blank analyzed with this SDG did not contain analytes of interest above the CRDL, with the exception of zinc: The samples in this SDG contained the above noted analytes at concentrations more than ten times the amount present in the method blank (MB), therefore the data was not adversely affected. 1203149606 (MB)-ICP.

**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: 354864001 (J1TXF8)-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 did not meet the recommended quality control acceptance criteria for percent recoveries for barium, potassium and silicon. 1203149609 (J1TXF8)-ICP.

**Duplicate Relative Percent Difference (RPD) Statement**

The 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 RL, a control of +/-RL is used to evaluate the DUP results. All applicable analytes met these requirements.

**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 silicon and verifies the presence of matrix interferences. See DER report #1327750. 1203155163 (J1TXF8)-ICP.

**Serial Dilution % Difference Statement**

The serial dilution is used to assess matrix suppression or enhancement. Raw element concentrations 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 percent difference criteria.

**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. Sample was diluted for titanium in order to bring raw values within the linear range of the instrument, and for the analytes interfered with, in order to ensure that the inter-element correction factors were valid for antimony. Sample required dilution for silver in order to minimize suppression due to matrix interferences. 354864001 (J1TXF8)-ICP. The ICPMS solid samples in this SDG were diluted the standard two times. ICP-MS.

#### **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. Data exception reports were included behind the Case Narrative or in the Miscellaneous Data section of this data package. The following DER was generated for this SDG: 1327750. 1203149609 (J1TXF8) and 1203155163 (J1TXF8)-ICP.

##### **Additional Comments**

Additional comments were not required for this SDG.

**Certification Statement**

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

**Review Validation:**

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

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

**Reviewer:** \_\_\_\_\_ **Date:** \_\_\_\_\_

<b>DATA EXCEPTION REPORT</b>			
<b>Mo. Day Yr.</b> 26-AUG-14	<b>Division:</b> Industrial	<b>Quality Criteria:</b> Specifications	<b>Type:</b> Process
<b>Instrument Type:</b> ICP	<b>Test / Method:</b> SW846 3050B/6010C	<b>Matrix Type:</b> Solid	<b>Client Code:</b> WCHN
<b>Batch ID:</b> 1412088	<b>Sample Numbers:</b> See Below		
<b>Potentially affected work order(s)(SDG): 354864(X0074), 354866(X0075), 354868(X0076)</b>			
<b>Application Issues:</b> Failed Recovery for MS/PS Method Blank contamination Failed RPD for DUP Other			
<b>Specification and Requirements Exception Description:</b>		<b>DER Disposition:</b>	
<p>1. Failed Recovery for MS/PS:</p> <p style="margin-left: 20px;">QC 1203149609MS, 1203149612MS, 1203149615MS, 1203155163PS, 1203155164PS, 1203155165PS</p> <p>2. Failed RPD for DUP:</p> <p style="margin-left: 20px;">QC 1203149611DUP</p> <p>3. Method Blank contamination:</p> <p style="margin-left: 20px;">QC 1203149606MB</p> <p>4. High range standard recovered less than 90% for silicon.</p>		<p>1. The matrix spike recovery failed outside of the control limits for barium, potassium and silicon. The post spike failed outside the required control limits for silicon but passed for all other analytes. This verifies the presence of a matrix interference for silicon and verifies the absence of a matrix interference for all the other analytes.</p> <p>2. The sample and sample duplicate % RPD failed outside the control limits for lead due to possible sample non-homogeneity and/or matrix interference.</p> <p>3. The method blank was slightly contaminated for zinc the samples in this SDG contained the above noted analytes at concentrations more than ten times the amount present in the method blank (MB), therefore the data was not adversely affected.</p> <p>4. The post spike that was analyzed recovered high for silicon, there was no data that was affected and therefore data is being reported per Group Leader.</p>	

**Originator's Name:**  
Helen Camello 02-SEP-14

**Data Validator/Group Leader:**  
Louise Smith 02-SEP-14

<b>Washington Closure Hanford</b>		<b>CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST</b>				RC-232-087	Page 1 of 1
Collector <i>C. Stowe</i>	Company Contact Joan Kessner	Telephone No. 375-4688	Project Coordinator KESSNER, JH	Price Code 8C	Data Turnaround <b>15 Days</b>		
Project Designation 100-IU-2 & 100-IU-6 Remaining Waste Sites	Sampling Location 600-332, Gable Mt. firing range septic system	Field Logbook No. EL-1667-02	COA 0603322000	Method of Shipment Commerical Carrier / <i>Fed Ex</i>	Bill of Lading/Air Bill No. <i>See OSPL</i>		
Case Chest No. <i>RCC-07-012</i>	Offsite Property No. <i>A131218</i>						
Shipped To GEL Laboratories Charleston							

Other Labs Shipped To	Preservation	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	None
<i>N/A</i>											
<i>354864</i>	Type of Container	G/P	G/P	aG	Ga*	aG	aG	aG	aG	aG	G/P
POSSIBLE SAMPLE HAZARDS/REMARKS <i>None</i>	No. of Container(s)	1	1	1	3	1	1	1	1	1	1
	Volume	250mL	250mL	125mL	40mL	250mL	250mL	250mL	250mL	500mL	
	Sample Analysis	See item (1) in Special Instructions	NO2/NO3 - 353.1 (Nitrogen in Nitrite and Nitrate)	TPH-Diesel Range - WTPH-D +	TPH-Gasoline Range - WTPH-G	Semi-VOA - 8270 (TCL)	PAHs - 8310	PCBs - 8082	Pesticides - 8081; Chloro-Herbiocides - EPA8151	ICP Metals (TCLP) - 1311; 8010; Mercury (TCLP) - 1311/7470	

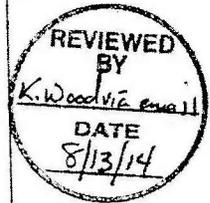
Sample No.	Matrix	Sample Date	Sample Time								
<i>J1188</i>	SOIL	<i>8/12/14</i>	<i>1314</i>	✓	✓	✓	✓	✓	✓	✓	✓

CHAIN OF POSSESSION		Sign/Print Names	
Relinquished By/Removed From <i>Painy Stowe</i>	Date/Time <i>8-12-14 1400</i>	Received By/Stored In <i>DWSHEA</i>	Date/Time <i>8/12/14 1400</i>
Relinquished By/Removed From <i>DWSHEA</i>	Date/Time <i>8-12-14 1637</i>	Received By/Stored In <i>Fridge 3A Battelle</i>	Date/Time <i>8/12/14 1637</i>
Relinquished By/Removed From <i>Battelle Fridge 3A</i>	Date/Time <i>8/13/14 0755</i>	Received By/Stored In <i>SM Sexton</i>	Date/Time <i>8/13/14 0755</i>
Relinquished By/Removed From <i>SM Sexton</i>	Date/Time <i>8/13/14 0800</i>	Received By/Stored In <i>Fed Ex</i>	Date/Time <i>8/13/14 0800</i>
Relinquished By/Removed From <i>Fed Ex</i>	Date/Time <i>8/13/14 0900</i>	Received By/Stored In <i>Chris Sanchez</i>	Date/Time <i>8/13/14 0900</i>

**SPECIAL INSTRUCTIONS**  
Perform extraction of TCLP analysis and await direction from J. Kessner before proceeding to analysis.

(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)

\* Custodian unavailable to remove samples from controlled storage. Shipper removed samples, taking custody for shipment to lab.



FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time
WCH-EE-011			

**Appendix 5**  
**Data Validation Supporting Documentation**

**INORGANIC ANALYSIS DATA VALIDATION CHECKLIST**

VALIDATION LEVEL:	A	B	<b>C</b>	D	E
PROJECT:	600-332		DATA PACKAGE: X0074		
VALIDATOR:	ELR	LAB: Ge	DATE: 10/5/14		
		SDG: X0074			
ANALYSES PERFORMED					
<b>SW-846/ICP</b>	SW-846/GFAA	<b>SW-846/Hg</b>	SW-846 Cyanide		
SAMPLES/MATRIX					
JITXF8					
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: None (UT)

no FB

**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 - Silicon (10.9%) - Jael

no PA

### INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

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

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

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**6. ICP QUALITY CONTROL (Levels D and E)**

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

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**INORGANIC ANALYSIS DATA VALIDATION CHECKLIST**

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

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

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**8. HOLDING TIMES (all levels)**

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

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**INORGANIC ANALYSIS DATA VALIDATION CHECKLIST**

**9. RESULT QUANTITATION AND DETECTION LIMITS (all levels)**

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

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Appendix 6**  
**Additional Documentation Requested by Client**

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

**QC Summary**

Report Date: September 15, 2014

Page 1 of 7

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

Contact:

Workorder: 354864

Client SDG: X0074

Project Description: RC-232 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis - ICPMS</b>											
Batch 1412079											
QC1203149587	354864001	DUP									
Selenium		DU	0.323	DU	0.311	mg/kg	N/A		BAJ	08/28/14	04:49
QC1203149586	LCS										
Selenium	4.97		D		4.54	mg/kg	91.4	(80%-120%)		08/28/14	04:22
QC1203149585	MB										
Selenium			DU		0.308	mg/kg				08/28/14	04:15
QC1203149588	354864001	MS									
Selenium	4.94	DU	0.323	D	4.22	mg/kg	85.4	(75%-125%)		08/28/14	04:55
QC1203149589	354864001	SDILT									
Selenium		DU	-0.931	DU	1.61	ug/L	N/A	(0%-10%)		08/28/14	05:09
<b>Metals Analysis-ICP</b>											
Batch 1412088											
QC1203149608	354864001	DUP									
Aluminum			6630		6600	mg/kg	0.473	(0%-20%)	HSC	08/19/14	09:38
Antimony		DU	1.62	DU	1.65	mg/kg	N/A			08/21/14	08:59
Arsenic			3.47		3.69	mg/kg	6.02 ^	(+/-3.00)		08/19/14	09:38
Barium			80.8		78.8	mg/kg	2.51	(0%-20%)			
Beryllium			1.12		1.14	mg/kg	1.27 ^	(+/-0.501)			
Boron		B	1.34	B	2.82	mg/kg	71.0 ^	(+/-5.01)			
Cadmium		B	0.357	B	0.354	mg/kg	0.862 ^	(+/-0.501)			
Calcium			5490		5460	mg/kg	0.459	(0%-20%)			
Chromium			10.2		10.2	mg/kg	0.192	(0%-20%)			
Cobalt			11.6		11.5	mg/kg	0.458	(0%-20%)			
Copper			13.7		13.2	mg/kg	4.10	(0%-20%)			
Iron			22600		22700	mg/kg	0.461	(0%-20%)			

# GEL LABORATORIES LLC

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

## QC Summary

Workorder: 354864

Client SDG: X0074

Project Description: RC-232 Soil

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Paramname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis-ICP</b>											
Batch	1412088										
Lead		5.48		5.71	mg/kg	4.18		(0%-20%)	HSC	08/19/14	09:38
Magnesium		4810		4720	mg/kg	1.84		(0%-20%)			
Manganese		370		340	mg/kg	8.23		(0%-20%)			
Molybdenum	B	0.213	B	0.245	mg/kg	14.1	^	(+/-1.00)			
Nickel		11.2		10.3	mg/kg	8.72		(0%-20%)			
Potassium		1490		1530	mg/kg	2.12		(0%-20%)			
Silicon	N	782		770	mg/kg	1.58		(0%-20%)			
Silver	BD	1.16	BD	1.23	mg/kg	6.16	^	(+/-2.50)		08/21/14	08:59
Sodium		144		137	mg/kg	5.04		(0%-20%)		08/19/14	09:38
Vanadium		58.5		57.8	mg/kg	1.20		(0%-20%)			
Zinc	C	42.7		41.2	mg/kg	3.50		(0%-20%)			
QC1203149607	LCS										
Aluminum		483		488	mg/kg			101 (80%-120%)		08/19/14	09:32
Antimony		48.3		48.2	mg/kg			99.9 (80%-120%)		08/21/14	08:52
Arsenic		48.3		47.5	mg/kg			98.4 (80%-120%)		08/19/14	09:32
Barium		48.3		47.5	mg/kg			98.5 (80%-120%)			
Beryllium		48.3		48.8	mg/kg			101 (80%-120%)			
Boron		48.3		48.0	mg/kg			99.5 (80%-120%)			
Cadmium		48.3		47.9	mg/kg			99.2 (80%-120%)			
Calcium		483		487	mg/kg			101 (80%-120%)			
Chromium		48.3		46.7	mg/kg			96.8 (80%-120%)			
Cobalt		48.3		47.5	mg/kg			98.5 (80%-120%)			

# GEL LABORATORIES LLC

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## QC Summary

Workorder: 354864

Client SDG: X0074

Project Description: RC-232 Soil

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Parmname	NOM	Sample Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
<b>Metals Analysis-ICP</b>									
Batch	1412088								
Copper	48.3		47.0	mg/kg		97.5	(80%-120%)	HSC	08/19/14 09:32
Iron	483		491	mg/kg		102	(80%-120%)		
Lead	48.3		47.2	mg/kg		97.7	(80%-120%)		
Magnesium	483		511	mg/kg		106	(80%-120%)		
Manganese	48.3		47.8	mg/kg		99	(80%-120%)		
Molybdenum	48.3		46.0	mg/kg		95.4	(80%-120%)		
Nickel	48.3		46.7	mg/kg		96.8	(80%-120%)		
Potassium	483		466	mg/kg		96.5	(80%-120%)		
Silicon	483		414	mg/kg		85.7	(80%-120%)		
Silver	48.3		47.9	mg/kg		99.3	(80%-120%)		08/21/14 08:52
Sodium	483		491	mg/kg		102	(80%-120%)		08/19/14 09:32
Vanadium	48.3		47.6	mg/kg		98.6	(80%-120%)		
Zinc	48.3		49.6	mg/kg		103	(80%-120%)		
QC1203149606	MB								
Aluminum		U	6.58	mg/kg					08/19/14 09:30
Antimony		U	0.319	mg/kg					08/21/14 08:47
Arsenic		U	0.484	mg/kg					08/19/14 09:30
Barium		U	0.0967	mg/kg					
Beryllium		U	0.0967	mg/kg					
Boron		B	1.01	mg/kg					
Cadmium		U	0.0967	mg/kg					
Calcium		U	7.74	mg/kg					

# GEL LABORATORIES LLC

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

## QC Summary

Workorder: 354864

Client SDG: X0074

Project Description: RC-232 Soil

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Paramname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis-ICP</b>											
Batch	1412088										
Chromium			B	0.190	mg/kg				HSC	08/19/14	09:30
Cobalt			U	0.145	mg/kg						
Copper			U	0.290	mg/kg						
Iron			B	14.8	mg/kg						
Lead			U	0.319	mg/kg						
Magnesium			U	8.22	mg/kg						
Manganese			B	0.830	mg/kg						
Molybdenum			U	0.193	mg/kg						
Nickel			U	0.145	mg/kg						
Potassium			B	14.2	mg/kg						
Silicon			U	1.45	mg/kg						
Silver			U	0.0967	mg/kg					08/21/14	08:47
Sodium			U	6.77	mg/kg					08/19/14	09:30
Vanadium			U	0.0967	mg/kg						
Zinc				1.16	mg/kg						
QC1203149609	354864001 MS										
Aluminum	472			6630	8120	mg/kg	N/A	(75%-125%)		08/19/14	09:41
Antimony	47.2	DU		1.62	47.0	mg/kg	99.6	(75%-125%)		08/21/14	09:03
Arsenic	47.2			3.47	48.4	mg/kg	95	(75%-125%)		08/19/14	09:41
Barium	47.2			80.8	126	mg/kg	95.3	(75%-125%)			
Beryllium	47.2			1.12	46.3	mg/kg	95.6	(75%-125%)			
Boron	47.2	B		1.34	46.1	mg/kg	94.6	(75%-125%)			

# GEL LABORATORIES LLC

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## QC Summary

Workorder: 354864

Client SDG: X0074

Project Description: RC-232 Soil

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis-ICP</b>											
Batch	1412088										
Cadmium	47.2	B	0.357	43.3	mg/kg		91	(75%-125%)	HSC	08/19/14	09:41
Calcium	472		5490	5970	mg/kg		N/A	(75%-125%)			
Chromium	47.2		10.2	53.3	mg/kg		91.3	(75%-125%)			
Cobalt	47.2		11.6	54.8	mg/kg		91.4	(75%-125%)			
Copper	47.2		13.7	59.1	mg/kg		95.9	(75%-125%)			
Iron	472		22600	23500	mg/kg		N/A	(75%-125%)			
Lead	47.2		5.48	48.4	mg/kg		90.9	(75%-125%)			
Magnesium	472		4810	5270	mg/kg		N/A	(75%-125%)			
Manganese	47.2		370	375	mg/kg		N/A	(75%-125%)			
Molybdenum	47.2	B	0.213	42.9	mg/kg		90.4	(75%-125%)			
Nickel	47.2		11.2	52.7	mg/kg		87.8	(75%-125%)			
Potassium	472		1490	2030	mg/kg		114	(75%-125%)			
Silicon	472	N	782 N	834	mg/kg		10.9 *	(75%-125%)			
Silver	47.2	BD	1.16 D	49.4	mg/kg		102	(75%-125%)		08/21/14	09:03
Sodium	472		144	638	mg/kg		105	(75%-125%)		08/19/14	09:41
Vanadium	47.2		58.5	103	mg/kg		93.5	(75%-125%)			
Zinc	47.2	C	42.7	84.6	mg/kg		88.8	(75%-125%)			
QC1203155163	354864001	PS									
Silicon	5000	N	7970	22300	ug/L		286 *	(80%-120%)	JWJ	08/25/14	14:26
QC1203149610	354864001	SDILT									
Aluminum			67500 D	13600	ug/L		.9	(0%-10%)	HSC	08/19/14	09:44
Antimony		DU	-2.12 DU	8.10	ug/L		N/A	(0%-10%)		08/21/14	09:06
Arsenic			35.4 DU	2.45	ug/L		N/A	(0%-10%)		08/19/14	09:44

# GEL LABORATORIES LLC

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

## QC Summary

Workorder: 354864

Client SDG: X0074

Project Description: RC-232 Soil

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Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis-ICP</b>											
Batch	1412088										
Barium		823	D	162	ug/L	1.57		(0%-10%)	HSC	08/19/14	09:44
Beryllium		11.4	D	2.39	ug/L	4.74		(0%-10%)			
Boron	B	13.6	DU	4.91	ug/L	N/A		(0%-10%)			
Cadmium	B	3.63	DU	0.491	ug/L	N/A		(0%-10%)			
Calcium		55900	D	11200	ug/L	.182		(0%-10%)			
Chromium		104	D	19.8	ug/L	4.46		(0%-10%)			
Cobalt		118	D	22.6	ug/L	4.05		(0%-10%)			
Copper		140	D	26.6	ug/L	5.14		(0%-10%)			
Iron		230000	D	46300	ug/L	.6		(0%-10%)			
Lead		55.8	D	8.94	ug/L	19.9		(0%-10%)			
Magnesium		49000	D	9830	ug/L	.373		(0%-10%)			
Manganese		3760	D	762	ug/L	1.2		(0%-10%)			
Molybdenum	B	2.17	DU	0.982	ug/L	N/A		(0%-10%)			
Nickel		114	D	22.4	ug/L	2.15		(0%-10%)			
Potassium		15200	D	3010	ug/L	1.18		(0%-10%)			
Silicon	N	7970	D	1500	ug/L	5.7		(0%-10%)			
Silver	BD	2.37	DU	2.45	ug/L	N/A		(0%-10%)		08/21/14	09:06
Sodium		1460	D	271	ug/L	7.59		(0%-10%)		08/19/14	09:44
Vanadium		596	D	114	ug/L	4.51		(0%-10%)			
Zinc	C	434	D	86.1	ug/L	.914		(0%-10%)			
<b>Metals Analysis-Mercury</b>											
Batch	1412249										

# GEL LABORATORIES LLC

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

## QC Summary

Workorder: 354864      Client SDG: X0074      Project Description: RC-232 Soil      Page 7 of 7

Parname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date	Time
<b>Metals Analysis-Mercury</b>											
Batch	1412249										
QC1203150022	354864001	DUP									
Mercury		B	0.0075	B	0.00833	mg/kg	10.5	^	(+/-0.0121) MTM1	08/19/14	11:25
QC1203150021	LCS										
Mercury	0.117				0.114	mg/kg	97.4		(80%-120%)	08/19/14	11:21
QC1203150020	MB										
Mercury				U	0.00369	mg/kg				08/19/14	11:20
QC1203150023	354864001	MS									
Mercury	0.113	B	0.0075		0.123	mg/kg			103 (80%-120%)	08/19/14	11:26
QC1203150025	354864001	SDILT									
Mercury		B	0.125	DU	0.0201	ug/L	N/A		(0%-10%)	08/19/14	11:28

**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. The associated blank concentration is >= EQL or is > 5% of the measured concentration and/or decision level for associated samples.
- 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 or %RPD not applicable.  
 ^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

\* Indicates that a Quality Control parameter was not within specifications.  
 For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

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

Date: 6 October 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 600-332  
 Subject: Polyaromatic Hydrocarbon - Data Package No. X0074-GEL

## **INTRODUCTION**

This memo presents the results of data validation on Data Package No. X0074 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.

<b>Sample ID</b>	<b>Sample Date</b>	<b>Media</b>	<b>Validation</b>	<b>Analyte</b>
J1TXF8	8/12/14	Soil	C	See note 1

1 – Polyaromatic Hydrocarbons by 8310.

Data validation was conducted in accordance with the Washington Closure Hanford (WCH) validation statement of work and the 100 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

No field duplicates were submitted for analysis.

#### **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. X0074 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\*

<b>SDG: X0074</b>	<b>REVIEWER: ELR</b>	<b>Project: 600-332</b>	<b>PAGE <u>1</u> OF <u>1</u></b>
<b>COMMENTS: No qualifiers assigned</b>			

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

**Appendix 3**  
**Annotated Laboratory Reports**

# GEL LABORATORIES LLC

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

## Certificate of Analysis

Report Date: August 29, 2014

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

Client SDG: X0074

Client Sample ID: JITXF8  
 Sample ID: 354864001  
 Matrix: SOIL  
 Collect Date: 12-AUG-14 13:14  
 Receive Date: 15-AUG-14  
 Collector: Client  
 Moisture: .541%

*W 10/9/14*

Project: WCHN00213  
 Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
<b>HPLC-PAH</b>											
<b>8310/3550 PAH Std list Soil "Dry Weight Corrected"</b>											
Acenaphthene	U	5.03	5.03	16.8	ug/kg	1	CWW	08/22/14	1118	1413006	1
Acenaphthylene	U	5.03	5.03	16.8	ug/kg	1					
Anthracene	U	1.68	1.68	16.8	ug/kg	1					
Benzo(a)anthracene	J	1.41	0.536	1.68	ug/kg	1					
Benzo(a)pyrene	P	1.81	0.536	1.68	ug/kg	1					
Benzo(b)fluoranthene	U	0.536	0.536	1.68	ug/kg	1					
Benzo(ghi)perylene	J	1.02	0.536	1.68	ug/kg	1					
Benzo(k)fluoranthene	U	0.268	0.268	0.838	ug/kg	1					
Chrysene	J	0.807	0.536	1.68	ug/kg	1					
Dibenzo(a,h)anthracene	U	0.536	0.536	1.68	ug/kg	1					
Fluoranthene	J	1.25	0.536	1.68	ug/kg	1					
Fluorene	U	5.03	5.03	16.8	ug/kg	1					
Indeno(1,2,3-cd)pyrene	U	0.536	0.536	1.68	ug/kg	1					
Naphthalene	U	5.03	5.03	16.8	ug/kg	1					
Phenanthrene	U	5.03	5.03	16.8	ug/kg	1					
Pyrene	J	1.33	0.536	1.68	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	08/20/14	1648	1413005

**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"	5840 ug/kg	8380	69.7	(23%-104%)

**Notes:**

**Appendix 4**

**Laboratory Narrative and Chain-of-Custody Documentation**

**HPLC-PAH  
WC-HANFORD, INC. (WCHN)  
SDG X0074**

**Method/Analysis Information**

**Procedure:** Polynuclear Aromatic Hydrocarbons  
Analytical Method: SW846 8310  
Prep Method: SW846 3550B  
Analytical Batch Number: 1413006  
Prep Batch Number: 1413005

**Sample Analysis**

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

<b>Sample ID</b>	<b>Client ID</b>
354864001	J1TXF8
1203151970	MB for batch 1413005
1203151971	Laboratory Control Sample (LCS)
1203151972	354864001(J1TXF8) Matrix Spike (MS)
1203151973	354864001(J1TXF8) 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 354864001 (J1TXF8) 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, and sample 354864001 (JITXF8) required manual integrations due to software limitations.

Please see the raw data in the Miscellaneous Section.

#### **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 354864001 (JITXF8). Because both 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.

#### **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.

**Washington Closure Hanford**      **CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST**      RC-232-087      Page 1 of 1

Director <i>Stowe</i>	Company Contact Joan Kessner	Telephone No. 375-4888	Project Coordinator KESSNER, JH	Price Code 8C	Data Turnaround <b>15 Days</b>
Project Designation 100-IU-2 & 100-IU-6 Remaining Waste Sites	Sampling Location 600-332, Gable Mt. firing range septic system	SAF No. RC-232			
Chest No. <i>RCL-07-012</i>	Field Logbook No. EL-1667-02	COA 0603322000	Method of Shipment Commerical Carrier	<i>/ Fed Ex</i>	
Shipped To GEL Laboratories Charleston	Offsite Property No. <i>A131218</i>	Bill of Lading/Air Bill No. <i>See OSPL</i>			

Possible Sample Hazards/Remarks	Preservation	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	None
	Type of Container	GP	GP	aG	Ge*	aG	aG	aG	aG	GP
	No. of Container(s)	1	1	1	3	1	1	1	1	1
	Volume	250mL	250mL	125mL	40mL	250mL	250mL	250mL	250mL	500mL
	Sample Analysis	See item (1) in Special Instructions	NO2/NO3 - 353.1 (Nitrogen in Nitrite and Nitrate)	TPH-Diesel Range - WTPH-D +	TPH-Gasoline Range - WTPH-G	Semi-VOA - 8270 (TCL)	PAHs - 8310	PCBs - 3062	Pesticides - 8061; Chloro-Herbicides - EPAB151	ICP Metals (TCLP) - 1311/8010; Mercury (TCLP) - 1311/7470

Sample No.	Matrix	Sample Date	Sample Time							
TXFB	SOIL	8/12/14	1314	✓	✓	✓	✓	✓	✓	✓

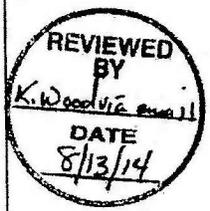
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
<i>Rincy Stowe</i>	8-12-14 1400	<i>Joan Kessner</i>	8/12/14 1400
<i>W Shea</i>	8-12-14 1637	<i>BA Buhelle</i>	8/12/14 1637
<i>BA Buhelle</i>	8/13/14 0755	<i>EM Sextal</i>	8/13/14 0755
<i>EM Sextal</i>	8/13/14 0800	<i>FED EX</i>	
<i>FED EX</i>	8-15-14 0900	<i>Chris Deachen</i>	8-15-14 0900

**SPECIAL INSTRUCTIONS**

Perform extraction of TCLP analysis and await direction from J.Kessner before proceeding to analysis.

(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)

\*Custodian unavailable to remove samples from controlled storage. Shipper removed samples, taking custody for shipment to lab.



FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time
WCH-EE-011			

**Appendix 5**  
**Data Validation Supporting Documentation**

**GENERAL ORGANIC DATA VALIDATION CHECKLIST**

VALIDATION LEVEL:	A	B	<b>C</b>	D	E
PROJECT:	600-332		DATA PACKAGE: X0074		
VALIDATOR:	ELR	LAB: Ge	DATE: 10/5/14		
			SDG: X0074		
ANALYSES PERFORMED					
8015	8021	8141	8151	8315	<b>8310</b>
		WTPH-HCID	WTPH-G	WTPH-D	
SAMPLES/MATRIX:					
JITXPS					
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 FR \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**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 PA \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**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)**

Fluorocil ® (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: August 29, 2014

Page 1 of 4

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

Contact: Joan Kessner

Workorder: 354864

Client SDG: X0074

Project Description: RC-232 Soil

Parmname	NOM	Sample Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
<b>HPLC-PAH</b>									
Batch	1413006								
QC1203151971	LCS								
Acenaphthene	1660		1520	ug/kg	91.2	(58%-99%)	CWW	08/22/14	10:36
Acenaphthylene	1660		1390	ug/kg	83.5	(58%-98%)			
Anthracene	1660		1540	ug/kg	92.3	(63%-94%)			
Benzo(a)anthracene	166		151	ug/kg	90.5	(73%-98%)			
Benzo(a)pyrene	166		142	ug/kg	85.4	(63%-99%)			
Benzo(b)fluoranthene	166		150	ug/kg	90.4	(70%-130%)			
Benzo(ghi)perylene	166		140	ug/kg	84.3	(70%-130%)			
Benzo(k)fluoranthene	83.2		81.0	ug/kg	97.4	(70%-130%)			
Chrysene	166		163	ug/kg	98.1	(70%-130%)			
Dibenzo(a,h)anthracene	166		175	ug/kg	105	(70%-130%)			
Fluoranthene	166		145	ug/kg	86.9	(70%-130%)			
Fluorene	1660		1480	ug/kg	88.7	(65%-130%)			
Indeno(1,2,3-cd)pyrene	166		159	ug/kg	95.6	(70%-130%)			
Naphthalene	1660		1340	ug/kg	80.6	(57%-130%)			
Phenanthrene	1660		1470	ug/kg	88.2	(70%-130%)			
Pyrene	166		151	ug/kg	90.9	(70%-130%)			
**Decafluorobiphenyl	8320		6930	ug/kg	83.3	(23%-104%)			
QC1203151970	MB								
Acenaphthene		U	5.00	ug/kg				08/22/14	09:54
Acenaphthylene		U	5.00	ug/kg					

# GEL LABORATORIES LLC

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

## QC Summary

Workorder: 354864

Client SDG: X0074

Project Description: RC-232 Soil

Page 2 of 4

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>HPLC-PAH</b>											
Batch	1413006										
Anthracene			U	1.67	ug/kg						
Benzo(a)anthracene			U	0.533	ug/kg				CWW	08/22/14	09:54
Benzo(a)pyrene			U	0.533	ug/kg						
Benzo(b)fluoranthene			U	0.533	ug/kg						
Benzo(ghi)perylene			U	0.533	ug/kg						
Benzo(k)fluoranthene			U	0.266	ug/kg						
Chrysene			U	0.533	ug/kg						
Dibenzo(a,h)anthracene			U	0.533	ug/kg						
Fluoranthene			U	0.533	ug/kg						
Fluorene			U	5.00	ug/kg						
Indeno(1,2,3-cd)pyrene			U	0.533	ug/kg						
Naphthalene			U	5.00	ug/kg						
Phenanthrene			U	5.00	ug/kg						
Pyrene			U	0.533	ug/kg						
<b>**Decafluorobiphenyl</b>	<b>8330</b>			<b>6970</b>	<b>ug/kg</b>		<b>83.7</b>	<b>(23%-104%)</b>			
QC1203151972 354864001 MS											
Acenaphthene	1670	U	5.03	1350	ug/kg		80.7	(49%-90%)		08/22/14	12:01
Acenaphthylene	1670	U	5.03	1230	ug/kg		73.6	(48%-97%)			
Anthracene	1670	U	1.68	1370	ug/kg		81.6	(49%-91%)			
Benzo(a)anthracene	167	J	1.41	132	ug/kg		78.2	(29%-126%)			
Benzo(a)pyrene	167	P	1.81	128	ug/kg		75.2	(26%-130%)			
Benzo(b)fluoranthene	167	U	0.536	133	ug/kg		79.7	(32%-135%)			
Benzo(ghi)perylene	167	J	1.02	121	ug/kg		71.7	(34%-125%)			

# GEL LABORATORIES LLC

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## QC Summary

Workorder: 354864

Client SDG: X0074

Project Description: RC-232 Soil

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Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>HPLC-PAH</b>											
Batch	1413006										
Benzo(k)fluoranthene	83.6	U	0.268	71.1	ug/kg		85	(48%-142%)	CWW	08/22/14	12:01
Chrysene	167	J	0.807	141	ug/kg		84	(39%-127%)			
Dibenzo(a,h)anthracene	167	U	0.536	151	ug/kg		90	(38%-130%)			
Fluoranthene	167	J	1.25	126	ug/kg		74.3	(20%-139%)			
Fluorene	1670	U	5.03	1290	ug/kg		76.9	(51%-90%)			
Indeno(1,2,3-cd)pyrene	167	U	0.536	137	ug/kg		81.9	(41%-145%)			
Naphthalene	1670	U	5.03	1220	ug/kg		72.6	(43%-87%)			
Phenanthrene	1670	U	5.03	1280	ug/kg		76.7	(50%-100%)			
Pyrene	167	J	1.33	132	ug/kg		78.3	(18%-149%)			
**Decafluorobiphenyl	8360		5840	5990	ug/kg		71.6	(23%-104%)			
QC1203151973 354864001 MSD											
Acenaphthene	1670	U	5.03	1260	ug/kg	7.22	75	(0%-30%)		08/22/14	12:43
Acenaphthylene	1670	U	5.03	1150	ug/kg	7.12	68.4	(0%-30%)			
Anthracene	1670	U	1.68	1300	ug/kg	4.79	77.7	(0%-30%)			
Benzo(a)anthracene	167	J	1.41	127	ug/kg	4.20	74.8	(0%-30%)			
Benzo(a)pyrene	167	P	1.81	123	ug/kg	3.82	72.3	(0%-30%)			
Benzo(b)fluoranthene	167	U	0.536	129	ug/kg	2.89	77.3	(0%-30%)			
Benzo(ghi)perylene	167	J	1.02	116	ug/kg	3.91	68.9	(0%-30%)			
Benzo(k)fluoranthene	83.7	U	0.268	68.4	ug/kg	3.78	81.7	(0%-30%)			
Chrysene	167	J	0.807	135	ug/kg	4.72	80	(0%-30%)			
Dibenzo(a,h)anthracene	167	U	0.536	143	ug/kg	5.06	85.5	(0%-30%)			
Fluoranthene	167	J	1.25	124	ug/kg	0.825	73.6	(0%-30%)			

# GEL LABORATORIES LLC

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

## QC Summary

Workorder: 354864

Client SDG: X0074

Project Description: RC-232 Soil

Page 4 of 4

Paramname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>HPLC-PAH</b>											
Batch	1413006										
Fluorene	1670	U	5.03	1200	ug/kg	6.73	71.8	(0%-30%)	CWW	08/22/14	12:43
Indeno(1,2,3-cd)pyrene	167	U	0.536	131	ug/kg	4.46	78.2	(0%-30%)			
Naphthalene	1670	U	5.03	1150	ug/kg	5.29	68.8	(0%-30%)			
Phenanthrene	1670	U	5.03	1220	ug/kg	5.09	72.8	(0%-30%)			
Pyrene	167	J	1.33	129	ug/kg	2.82	76	(0%-30%)			
**Decafluorobiphenyl	8370		5840	5580	ug/kg		66.7	(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 or %RPD not applicable.  
 ^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

\* Indicates that a Quality Control parameter was not within specifications.  
 For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

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

Date: 6 October 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 600-332  
Subject: Pesticide/PCB - Data Package No. X0074-GEL

## **INTRODUCTION**

This memo presents the results of data validation on Data Package No. X0074 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.

<b>Sample ID</b>	<b>Sample Date</b>	<b>Media</b>	<b>Validation</b>	<b>Analyte</b>
J1TXF8	8/12/14	Soil	C	See note 1

1 – PCBs by 8082A and pesticides by 8081B.

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 of extraction. Holding times are not applicable for PCB analysis.

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

All holding times were acceptable.

### **Method Blanks**

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

All method blank results were acceptable.

### Field (equipment) Blanks

No field blanks were submitted for analysis.

### **Accuracy**

#### Matrix Spike/Matrix Spike Duplicate & Blank Spike Recoveries

Matrix spike/matrix spike duplicate analyses are used to assess the analytical accuracy of the reported data and the effect of the matrix on the ability to accurately quantify sample concentrations. Matrix spike/matrix spike duplicate analyses are performed in duplicate using five compounds for which percent recoveries must be within a range of 50-150% or within laboratory control limits. If spike recoveries are outside control limits, detected sample results less than five times the spike concentration are qualified as estimates and flagged "J". Undetected sample results with spike recoveries below control limits are qualified as estimates and flagged "UJ". Undetected sample results are not qualified if the spike recovery is above control limits. Sample results greater than five times the spike concentration require no qualification.

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

All other accuracy results were acceptable.

### Surrogate Recovery

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

All surrogate results were acceptable.

### **Precision**

#### Matrix Spike/Matrix Spike Duplicate Samples

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

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

All other duplicate results were acceptable.

#### Field Duplicate Samples

No field duplicates were submitted for analysis.

### **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. X0074 was submitted for validation and verified for completeness. Completeness is based on the percentage of data determined to be valid (i.e., not rejected). The completion percentage was 100%.

## **MAJOR DEFICIENCIES**

None found.

## **MINOR DEFICIENCIES**

The following minor deficiencies were noted:

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

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

## **REFERENCES**

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

DOE/RL-96-22, Rev. 5, *100 Area Remedial Action Sampling and Analysis Plan*, U.S. Department of Energy, September 2009.

**Appendix 1**  
**Glossary of Data Reporting Qualifiers**

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

- U - Indicates the compound or analyte was analyzed for and not detected in the sample. The value reported is the same quantitation limit corrected for sample dilution and moisture content by the laboratory.
- UJ - Indicates the compound or analyte was analyzed for and not detected in the sample. Due to a minor QC deficiency identified during the data validation, the associated quantitation limit is an estimate.
- J - Indicates the compound or analyte was analyzed for and detected. Due to a minor QC deficiency identified during the data validation, the associated quantitation limit is an estimate.
- R - Indicates the compound or analyte was analyzed for, detected, and due to an identified major QC deficiency, the data are unusable.
- UR - Indicates the compound or analyte was analyzed for and not detected in the sample. Additionally, the data is unusable due to an identified major QC deficiency.
- NJ - Indicates presumptive evidence of a compound at an estimated value. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).
- N - Indicates presumptive evidence of a compound. The data may not be valid for some specific applications usable for decision-making purposes).

**Appendix 2**  
**Summary of Data Qualification**

PESTICIDE/PCB DATA QUALIFICATION SUMMARY\*

<b>SDG: X0074</b>	<b>REVIEWER: ELR</b>	<b>Project: 600-332</b>	<b>PAGE <u>1</u> OF <u>1</u></b>
<b>COMPOUND</b>	<b>QUALIFIER</b>	<b>SAMPLES AFFECTED</b>	<b>REASON</b>
Toxaphene	J	All	No MS, MSD or LCS analysis

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

**Appendix 3**  
**Annotated Laboratory Reports**

# GEL LABORATORIES LLC

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

## Certificate of Analysis

Report Date: August 27, 2014

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

Client SDG: X0074

Client Sample ID: J1TXF8  
 Sample ID: 354864001  
 Matrix: SOIL  
 Collect Date: 12-AUG-14 13:14  
 Receive Date: 15-AUG-14  
 Collector: Client  
 Moisture: .541%

Project: WCHN00213  
 Client ID: WCHN001

*✓*  
10/5/14

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
<b>Semi-Volatiles-Pesticide</b>											
<b>8081B/3541 Pesticide Soil Automated Soxhlet "Dry Weight Corrected"</b>											
4,4'-DDD	DU	1.67	1.67	6.68	ug/kg	5	LOF	08/22/14	1835	1412526	1
4,4'-DDE	D	186	1.67	6.68	ug/kg	5					
Aldrin	DU	0.835	0.835	3.34	ug/kg	5					
Dieldrin	DU	1.67	1.67	6.68	ug/kg	5					
Endosulfan I	DTU	0.835	0.835	3.34	ug/kg	5					
Endosulfan II	DU	1.67	1.67	6.68	ug/kg	5					
Endosulfan sulfate	DU	1.67	1.67	6.68	ug/kg	5					
Endrin	DU	1.67	1.67	6.68	ug/kg	5					
Endrin aldehyde	DU	1.67	1.67	6.68	ug/kg	5					
Endrin ketone	DU	1.67	1.67	6.68	ug/kg	5					
Heptachlor epoxide	DTU	0.835	0.835	3.34	ug/kg	5					
Methoxychlor	DU	8.35	8.35	33.4	ug/kg	5					
Toxaphene	DU	27.8	27.8	83.5	ug/kg	5					
alpha-BHC	DU	0.835	0.835	3.34	ug/kg	5					
beta-BHC	DU	0.835	0.835	3.34	ug/kg	5					
delta-BHC	DU	0.835	0.835	3.34	ug/kg	5					
gamma-BHC (Lindane)	DU	0.835	0.835	3.34	ug/kg	5					
4,4'-DDT	D	44.5	1.67	6.68	ug/kg	5	LOF	08/22/14	1835	1412526	2
Heptachlor	D	3.97	0.835	3.34	ug/kg	5					
alpha-Chlordane	D	12.8	0.835	3.34	ug/kg	5					
gamma-Chlordane	D	18.9	0.835	3.34	ug/kg	5					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	Prep Method 3541 8081B Prep Soil	MXD2	08/20/14	0950	1412525

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 3541/8081B	
2	SW846 3541/8081B	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
4cmx	8081B/3541 Pesticide Soil Automated Soxhlet "Dry Weight Corrected"	30.3 ug/kg	33.4	90.8	(32%-120%)
Decachlorobiphenyl	8081B/3541 Pesticide Soil Automated Soxhlet "Dry Weight Corrected"	35.3 ug/kg	33.4	106	(37%-129%)

# GEL LABORATORIES LLC

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

## Certificate of Analysis

Report Date: August 20, 2014

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

Client SDG: X0074

Client Sample ID: J1TXF8  
 Sample ID: 354864001  
 Matrix: SOIL  
 Collect Date: 12-AUG-14 13:14  
 Receive Date: 15-AUG-14  
 Collector: Client  
 Moisture: .541%

Project: WCHN00213  
 Client ID: WCHN001

✓  
1d slip

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
<b>Semi-Volatiles-PCB</b>											
<b>SW846 3541/8082A PCB Solid Automated Soxhlet "Dry Weight Corrected"</b>											
Aroclor-1016	DU	11.1	11.1	33.4	ug/kg	10	JXM	08/20/14	0733	1412528	1
Aroclor-1221	DU	11.1	11.1	33.4	ug/kg	10					
Aroclor-1232	DU	11.1	11.1	33.4	ug/kg	10					
Aroclor-1242	DU	11.1	11.1	33.4	ug/kg	10					
Aroclor-1248	DU	11.1	11.1	33.4	ug/kg	10					
Aroclor-1254	DU	11.1	11.1	33.4	ug/kg	10					
Aroclor-1260	DU	11.1	11.1	33.4	ug/kg	10					
Aroclor-1262	DU	11.1	11.1	33.4	ug/kg	10					
Aroclor-1268	DU	11.1	11.1	33.4	ug/kg	10					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	Prep Method 3541 PCB Prep Soil	MXD2	08/19/14	1030	1412527

The following Analytical Methods were performed:

Method	Description	Analyst Comments			
1	SW846 3541/8082A				
Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
4cmx	SW846 3541/8082A PCB Solid Automated Soxhlet "Dry Weight Corrected"	4.95 ug/kg	6.69	73.9	(44%-106%)
Decachlorobiphenyl	SW846 3541/8082A PCB Solid Automated Soxhlet "Dry Weight Corrected"	6.84 ug/kg	6.69	102	(35%-119%)

Notes:

**Appendix 4**

**Laboratory Narrative and Chain-of-Custody Documentation**

**PCB Case Narrative  
WC-HANFORD, INC. (WCHN)  
SDG X0074**

**Method/Analysis Information**

**Procedure:** Analysis of Polychlorinated Biphenyls by ECD  
**Analytical Method:** SW846 3541/8082A  
**Prep Method:** SW846 3541  
**Analytical Batch Number:** 1412528  
**Prep Batch Number:** 1412527

**Sample Analysis**

The following samples were analyzed using the analytical protocol as established in SW846 3541/8082A:

<b>Sample ID</b>	<b>Client ID</b>
354864001	J1TXF8
1203150629	MB for batch 1412527
1203150630	Laboratory Control Sample (LCS)
1203150631	354864001(J1TXF8) Matrix Spike (MS)
1203150632	354864001(J1TXF8) 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-040 REV# 20.

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**

A complete list of the initial calibration data files are shown in the Calibration History report located in the Standard Data section of the data package.

**Initial Calibration**

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

**Continuing Calibration Verification (CCV) Requirements**

All associated calibration verification standards (ICV or CCV) met the acceptance criteria. All analytes were 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 the samples in this SDG in this batch.

#### **Laboratory Control Sample (LCS) Recovery**

The LCS spike recoveries met the acceptance limits.

#### **QC Sample Designation**

Sample 354864001 (J1TXF8) was selected for the matrix spike and matrix spike duplicate analysis.

#### **Matrix Spike (MS) Recovery Statement**

The MS recoveries for this SDG were within the established acceptance limits.

#### **Matrix Spike Duplicate (MSD) Recovery Statement**

The MSD recoveries for this SDG were within the established acceptance limits.

#### **MS/MSD Relative Percent Difference (RPD) Statement**

The RPD 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. All reported analyte detections in client and quality control samples were within the established retention time windows. Reported analyte concentrations were confirmed on dissimilar columns. All sample extracts were cleaned using alumina. Additionally, copper was added to all sample extracts to remove sulfur.

#### **Sample Dilutions**

Samples 1203150631 (J1TXF8MS), 1203150632 (J1TXF8MSD) and 354864001 (J1TXF8) were diluted at 1:10 due to high level of non-target analytes within the retention time window of interest.

#### **Sample Re-extraction/Re-analysis**

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

### **Miscellaneous Information**

#### **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. 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.

#### **Data Exception (DER) Documentation**

Data exception report (DER) is generated to document procedural anomalies that may deviate from referenced SOP or contractual documents. A DER was not required for the samples in this SDG in this batch.

#### **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 PCB 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 following additional comments were required:

The higher results from either column have been chosen and reported in the data package for the client samples, MB and LCS. The data reported for the MS and MSD are from the same analytical column as the parent sample.

Due to software issue, the surrogate recovery range was not indicated or possibly indicated incorrectly in Quantitation Report. Please see Surrogate Recovery Report for correct surrogate acceptance limits.

Due to rounding differences in the calculation between the forms, the data reported in Sample Summary (form 1) and Spike Recovery Report (form 3) may differ slightly from the data reported in Identification Summary (form 10).

Aroclors quantitated on the raw data report by ChemStation data system do not necessarily represent positive Aroclor identification. In order for positive identification to be made, the Aroclor must match in pattern and retention time; as well as quantitate relatively close between the primary and confirmation columns, as specified in SW846 method 8000. When these conditions are not met, the Aroclor is reported as a non-detect on the data report.

#### **System Configuration**

The Semi-Volatiles-PCB analysis was performed on the following instrument configuration:

<b>Instrument ID</b>	<b>Instrument</b>	<b>System Configuration</b>	<b>Column ID</b>	<b>Column Description</b>
ECD8A.I_1	Agilent 6890 Gas Chromatograph/Dual ECD w/ 7683 Autosampler	HP6890 Series ECD	Rtx-CLP I	30m x 0.25mm, 0.25um (Rtx-CLPesticide I)
ECD8A.I_2	Agilent 6890 Gas Chromatograph/Dual ECD w/ 7683 Autosampler	HP6890 Series ECD	Rtx-CLP II	30m x 0.25mm, 0.20um (Rtx-CLPesticide II)

#### **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.

**Pesticide Case Narrative  
WC-HANFORD, INC. (WCHN)  
SDG X0074**

**Method/Analysis Information**

**Procedure:** Organochlorine Pesticides and Chlorinated Hydrocarbons  
**Analytical Method:** SW846 3541/8081B  
**Prep Method:** SW846 3541  
**Analytical Batch Number:** 1412526  
**Prep Batch Number:** 1412525

**Sample Analysis**

<b>Sample ID</b>	<b>Client ID</b>
354864001	J1TXF8
1203150621	MB for batch 1412525
1203150622	Laboratory Control Sample (LCS)
1203150623	354864001(J1TXF8) Matrix Spike (MS)
1203150624	354864001(J1TXF8) 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-041 REV# 13.

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

**Calibration Information**

A complete list of the initial calibration data files are shown in the Calibration History report located in the Standard Data section of the data package.

**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. All analytes were 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 analytical batch for this SDG.

#### **Laboratory Control Sample (LCS) Recovery**

The laboratory control sample (LCS) spike recoveries met the acceptance limits.

#### **QC Sample Designation**

Sample 354864001 (J1TXF8) was selected for the matrix spike and matrix spike duplicate analysis.

#### **Matrix Spike (MS) Recovery Statement**

The MS, 1203150623 (J1TXF8), recovered below the acceptance limits for 4,4'-DDE due to dilution, sample matrix interference and high level of 4,4-DDE in the parent sample.

#### **Matrix Spike Duplicate (MSD) Recovery Statement**

The MSD, 1203150624 (J1TXF8), recovered above the acceptance limits for Heptachlor epoxide and Endosulfan I due to dilution and sample matrix interference.

#### **MS/MSD Relative Percent Difference (RPD) Statement**

The RPD values between the MS and MSD were within 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 in this analytical batch met the specified holding time.

#### **Preparation/Analytical Method Verification**

All procedures were performed as stated in the SOP. All reported analyte detections in client and quality control samples were within the established retention time windows. Sulfur cleanup with copper was performed on the samples in this batch.

#### **Sample Dilutions**

Samples 1203150623 (J1TXF8MS), 1203150624 (J1TXF8MSD) and 354864001 (J1TXF8) were diluted at 1:5 prior to analysis due to the viscous nature of the matrix.

#### **Sample Re-extraction/Re-analysis**

Re-extractions were not required in this SDG in this analytical batch.

#### **Florisil**

Florisil clean-up was not performed on client and quality control samples in this batch.

### **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 for documentation of any procedural anomalies that may deviate from referenced SOP or contractual documents. DER #1327286 was generated for the MS and MSD of sample 354864001 (JITXF8) in this batch.

**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 pesticide 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 following additional comments were required:

Detected target analytes were reported from the analytical column with the higher concentration. Results below the method detection limit (non-detects) were reported from column one.

Due to software issue, the surrogate recovery range was not indicated or possibly indicated incorrectly in Quantitation Report. Please see Surrogate Recovery Report for correct surrogate recovery acceptance limits.

Due to rounding differences in the calculation between the forms, the data reported in Sample Summary (form 1) and Spike Recovery Report (form 3) may differ slightly from the data reported in Identification Summary (form 10).

**System Configuration**

The Semi-Volatiles-Pesticide analysis was performed on the following instrument configuration:

<b>Instrument ID</b>	<b>Instrument</b>	<b>System Configuration</b>	<b>Column ID</b>	<b>Column Description</b>
ECD7A.I_1	Agilent 6890 Gas Chromatograph/Dual ECD w/ 7673 Autosampler	HP6890 Series ECD	Rtx-CLP I	30m x 0.25mm, 0.25um (Rtx-CLPesticide I)
ECD7A.I_2	Agilent 6890 Gas Chromatograph/Dual ECD w/ 7673 Autosampler	HP6890 Series ECD	Rtx-CLP II	30m x 0.25mm, 0.20um (Rtx-CLPesticide II)

**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.

<b>DATA EXCEPTION REPORT</b>			
<b>Mo. Day Yr.</b> 23-AUG-14	<b>Division:</b> Industrial	<b>Quality Criteria:</b> Specifications	<b>Type:</b> Process
<b>Instrument Type:</b> GC/ECD	<b>Test / Method:</b> SW846 3541/8081B	<b>Matrix Type:</b> Solid	<b>Client Code:</b> WCHN
<b>Batch ID:</b> 1412528	<b>Sample Numbers:</b> See Below		
<b>Potentially affected work order(s)(SDG): 354864(X0074),354868(X0076)</b>			
<b>Application Issues:</b> Failed Recovery for MS/PS Failed RPD for MS/MSD, or PS/PSD Failed Recovery for MSD/PSD			
<b>Specification and Requirements Exception Description:</b>		<b>DER Disposition:</b>	
<p>1. The 1203150623MS(354864) recovered Endrin at 158% on one column. The limits are 45-142%.</p> <p>2. The 1203150624MSD(354864) recovered Endrin at 187% on one column (limits are 45-142%), Heptachlor epoxide at 141% on one column (limits are 36-130%) and Endosulfan I at 131% on one column (limits are 36-125%).</p> <p>3. The RPD value between the 1203150627MS(354868) and 1203150628MSD(354868) were not within the 0-30% limits for Endrin aldehyde at 55.1% on one column and at 49.7% on the other column.</p>		<p>1. &amp; 2. The MS and MSD recovered the spiked analytes in a similar manner. The analytes passed recovery on the other column. The LCS passed recovery for all analytes on both columns. The data are reported.</p> <p>3. Endrin aldehyde passed recovery on both columns. The RPD failure is attributed to the large difference in the recovery values between analyte pairs in the MS and MSD. The MS and MSD passed recoveries for the analyte. The LCS passed recoveries for all the analytes. The data are reported.</p>	

**Originator's Name:**  
Lloyd O Fox      23-AUG-14

**Data Validator/Group Leader:**  
Herbert Maier      25-AUG-14

**Washington Closure Hanford**      **CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST**      RC-232-087      Page 1 of 1

Project Designation 100-IJ-2 & 100-IU-6 Remaining Waste Sites	Company Contact Jcan Kessner	Telephone No. 375-4888	Project Coordinator KESSNER, JH	Price Code 8C	Data Turnaround <b>15 Days</b>
Chest No. RCL-07-012	Sampling Location 600-332, Gable Mt. firing range septic system	Field Logbook No. EL-1667-02	SAF No. RC-232	Method of Shipment Commerical Carrier / Fed Ex	
Shipped To GEL Laboratories Charleston	Offsite Property No. A131218	COA 0603322000	Method of Shipment Commerical Carrier / Fed Ex	Bill of Lading/Air Bill No. See OSPL	

Possible Sample Hazards/Remarks	Preservation	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	None
	Type of Container	GP	GP	aG	GS*	aG	aG	aG	aG	GP
	No. of Container(s)	1	1	1	3	1	1	1	1	1
	Volume	250mL	250mL	125mL	40mL	250mL	250mL	250mL	250mL	500mL
Special Handling and/or Storage	Sample Analysis	See item (1) in Special Instructions	NO2/NO3 - 353.1 (Nitrogen in Nitrite and Nitrate)	TPH-Diesel Range - WTPH-D +	TPH-Gasoline Range - WTPH-G	Semi-VOA - 8270 (TCL)	PAHs - 8310	PCBs - 3082	Pesticides - 8081; Chloro-Herbicides - EPA8151	ICP Metals (TCLP) - 1311/8010; Mercury (TCLP) - 1311/7470

Sample No.	Matrix	Sample Date	Sample Time								
TXFB	SOIL	8/12/14	1314	✓	✓	✓	✓	✓	✓	✓	✓

CHAIN OF POSSESSION		Sign/Print Names	
Relinquished By/Removed From Randy Stowe	Date/Time 8-12-14 1400	Received By/Stored In Dorothy DUSHEA	Date/Time 8/12/14 1400
Relinquished By/Removed From WShea DUSHEA	Date/Time 8-12-14 1637	Received By/Stored In Fridge BA Battelle	Date/Time 8/12/14 1637
Relinquished By/Removed From 1600 Battelle Fridge 3A	Date/Time 8/13/14 0755	Received By/Stored In EM Sexton	Date/Time 8/13/14 0755
Relinquished By/Removed From EM Sexton	Date/Time 8/13/14 0800	Received By/Stored In FED EX	Date/Time 8/13/14 0800
Relinquished By/Removed From Fed Ex	Date/Time 8/13/14 0900	Received By/Stored In Chris Dauchen	Date/Time 8/13/14 0900
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time

**SPECIAL INSTRUCTIONS**

Perform extraction of TCLP analysis and await direction from J. Kessner before proceeding to analysis.

(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)

\* Custodian unavailable to remove samples from controlled storage. Shipper removed samples, taking custody for shipment to lab.



**Appendix 5**  
**Data Validation Supporting Documentation**

**PCB DATA VALIDATION CHECKLIST**

VALIDATION LEVEL:	A	B	<b>C</b>	D	E
PROJECT:	600-332		DATA PACKAGE: X6074		
VALIDATOR:	ELR	LAB: Cre	DATE: 10/5/14		
			SDG: X0074		
ANALYSES PERFORMED					
<b>SW-846 8081</b>	SW-846 8081 (TCLP)	<b>SW-846 8082</b>	SW-846 8081 (TCLP)		
SAMPLES/MATRIX					
JITXP8					
soil					

**1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE**

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

Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

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

Initial calibrations acceptable? ..... Yes No **N/A**  
 Continuing calibrations acceptable? ..... Yes No **N/A**  
 Standards traceable? ..... Yes No **N/A**  
 Standards expired? ..... Yes No **N/A**  
 Calculation check acceptable? ..... Yes No **N/A**  
 DDT and endrin breakdowns acceptable? ..... Yes No **N/A**

Comments: \_\_\_\_\_  
 \_\_\_\_\_

**PCB 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 analyzed? ..... Yes No N/A  
 Surrogate 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: \_\_\_\_\_

fox - no ms/msd/lcs - J ell

no PAT

**PCB 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: \_\_\_\_\_

fox - no MS/MSD - J all

**6. SYSTEM PERFORMANCE (Levels D and E)**

- Chromatographic performance acceptable? ..... Yes No  N/A
- Positive results resolved acceptably? ..... Yes No  N/A

Comments: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**7. HOLDING TIMES (all levels)**

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

Comments: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**PCB DATA VALIDATION CHECKLIST**

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

- Compound identification acceptable? (Levels D, E) ..... Yes No N/A
- Compound quantitation acceptable? (Levels D, E) ..... Yes No N/A
- Results reported for all requested analyses? ..... Yes No N/A
- Results supported in the raw data? (Levels D, E) ..... Yes No N/A
- Samples properly prepared? (Levels D, E) ..... Yes No N/A
- 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)**

- Fluorocil ® (or other absorbent) cleanup performed? ..... Yes No N/A
- Lot check performed? ..... Yes No N/A
- Check recoveries acceptable? ..... Yes No N/A
- GPC cleanup performed? ..... Yes No N/A
- GPC check performed? ..... Yes No N/A
- GPC check recoveries acceptable? ..... Yes No N/A
- GPC calibration performed? ..... Yes No N/A
- GPC calibration check performed? ..... Yes No N/A
- GPC calibration check retention times acceptable? ..... Yes No N/A
- Check/calibration materials traceable? ..... Yes No N/A
- Check/calibration materials Expired? ..... Yes No N/A
- Analytical batch QC given similar cleanup? ..... Yes No N/A
- Transcription/Calculation Errors? ..... Yes No N/A

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Appendix 6**

**Additional Documentation Requested by Client**

# GEL LABORATORIES LLC

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

## QC Summary

Report Date: August 20, 2014

Page 1 of 2

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

Workorder: 354864

Client SDG: X0074

Project Description: RC-232 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Semi-Volatiles-PCB</b>											
Batch	1412528										
QC1203150630	LCS										
Aroclor-1016	33.3			22.8	ug/kg		68.7	(39%-120%)	JXM	08/20/14	07:21
Aroclor-1260	33.3			22.9	ug/kg		68.7	(50%-116%)			
**4cmx	6.65			5.13	ug/kg		77.1	(44%-106%)			
**Decachlorobiphenyl	6.65			6.49	ug/kg		97.5	(35%-119%)			
QC1203150629	MB										
Aroclor-1016			U	1.11	ug/kg					08/20/14	07:08
Aroclor-1221			U	1.11	ug/kg						
Aroclor-1232			U	1.11	ug/kg						
Aroclor-1242			U	1.11	ug/kg						
Aroclor-1248			U	1.11	ug/kg						
Aroclor-1254			U	1.11	ug/kg						
Aroclor-1260			U	1.11	ug/kg						
Aroclor-1262			U	1.11	ug/kg						
Aroclor-1268			U	1.11	ug/kg						
**4cmx	6.65			6.55	ug/kg		98.5	(44%-106%)			
**Decachlorobiphenyl	6.65			7.58	ug/kg		114	(35%-119%)			
QC1203150631	354864001	MS									
Aroclor-1016	33.5	DU	11.1	DJ	28.3	ug/kg	84.6	(25%-125%)		08/20/14	07:45
Aroclor-1260	33.5	DU	11.1	DJ	28.5	ug/kg	85.2	(28%-127%)			
**4cmx	6.69		4.95		4.45	ug/kg	66.5	(44%-106%)			
**Decachlorobiphenyl	6.69		6.84		7.45	ug/kg	111	(35%-119%)			

# GEL LABORATORIES LLC

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

## QC Summary

Workorder: 354864

Client SDG: X0074

Project Description: RC-232 Soil

Page 2 of 2

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Semi-Volatiles-PCB</b>											
Batch	1412528										
QC1203150632	354864001	MSD									
Aroclor-1016	33.5	DU	11.1	DJ	31.8	ug/kg	11.6	95	(0%-30%)	JXM	08/20/14 07:58
Aroclor-1260	33.5	DU	11.1	DJ	31.4	ug/kg	9.76	94	(0%-30%)		
**4cmx	6.69		4.95		5.32	ug/kg		79.5	(44%-106%)		
**Decachlorobiphenyl	6.69		6.84		7.49	ug/kg		112	(35%-119%)		

**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 or %RPD not applicable.  
 ^ 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.

# GEL LABORATORIES LLC

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

## QC Summary

Report Date: August 27, 2014

Page 1 of 5

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

Contact:

Workorder: 354864

Client SDG: X0074

Project Description: RC-232 Soil

Parmname	NOM	Sample Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Semi-Volatiles-Pesticide</b>										
Batch	1412526									
QC1203150622	LCS									
4,4'-DDD	41.6		40.4	ug/kg		97.1	(51%-124%)	LOF	08/20/14	21:00
4,4'-DDE	41.6		40.0	ug/kg		96.2	(51%-119%)			
4,4'-DDT	41.6		39.5	ug/kg		95	(50%-128%)			
Aldrin	16.6		14.5	ug/kg		87.3	(48%-113%)			
Dieldrin	41.6		35.8	ug/kg		86.2	(51%-112%)			
Endosulfan I	16.6		11.0	ug/kg		65.9	(43%-110%)			
Endosulfan II	41.6		29.8	ug/kg		71.7	(49%-111%)			
Endosulfan sulfate	41.6		37.2	ug/kg		89.4	(54%-121%)			
Endrin	41.6		46.8	ug/kg		113	(54%-134%)			
Endrin aldehyde	41.6		33.5	ug/kg		80.6	(49%-117%)			
Endrin ketone	41.6		33.7	ug/kg		81.1	(48%-110%)			
Heptachlor	16.6		15.1	ug/kg		90.6	(52%-117%)			
Heptachlor epoxide	16.6		14.4	ug/kg		86.7	(53%-115%)			
Methoxychlor	166		155	ug/kg		93.5	(48%-117%)			
alpha-BHC	16.6		14.4	ug/kg		86.4	(50%-122%)			
alpha-Chlordane	16.6		14.6	ug/kg		88	(52%-113%)			
beta-BHC	16.6		14.0	ug/kg		84	(54%-110%)			
delta-BHC	16.6		13.7	ug/kg		82.2	(53%-117%)			
gamma-BHC (Lindane)	16.6		14.8	ug/kg		89	(53%-120%)			
gamma-Chlordane	16.6		15.4	ug/kg		92.4	(52%-117%)			

# GEL LABORATORIES LLC

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

## QC Summary

Workorder: 354864

Client SDG: X0074

Project Description: RC-232 Soil

Page 2 of 5

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatiles-Pesticide											
Batch 1412526											
**4cmx	33.3			29.9	ug/kg		90	(32%-120%)	LOF	08/20/14	21:00
**Decachlorobiphenyl	33.3			28.6	ug/kg		85.9	(37%-129%)			
QC1203150621	MB										
4,4'-DDD			U	0.333	ug/kg					08/20/14	20:44
4,4'-DDE			U	0.333	ug/kg						
4,4'-DDT			U	0.333	ug/kg						
Aldrin			U	0.166	ug/kg						
Dieldrin			U	0.333	ug/kg						
Endosulfan I			U	0.166	ug/kg						
Endosulfan II			U	0.333	ug/kg						
Endosulfan sulfate			U	0.333	ug/kg						
Endrin			U	0.333	ug/kg						
Endrin aldehyde			U	0.333	ug/kg						
Endrin ketone			U	0.333	ug/kg						
Heptachlor			U	0.166	ug/kg						
Heptachlor epoxide			U	0.166	ug/kg						
Methoxychlor			U	1.66	ug/kg						
Toxaphene			U	5.54	ug/kg						
alpha-BHC			U	0.166	ug/kg						
alpha-Chlordane			U	0.166	ug/kg						
beta-BHC			U	0.166	ug/kg						
delta-BHC			U	0.166	ug/kg						

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## QC Summary

Workorder: 354864

Client SDG: X0074

Project Description: RC-232 Soil

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Semi-Volatiles-Pesticide</b>											
Batch	1412526										
gamma-BHC (Lindane)				U	0.166	ug/kg			LOF	08/20/14	20:44
gamma-Chlordane				U	0.166	ug/kg					
**4cmx	33.3				27.9	ug/kg	83.9	(32%-120%)			
**Decachlorobiphenyl	33.3				27.9	ug/kg	83.8	(37%-129%)			
QC1203150623 354864001 MS											
4,4'-DDD	41.8	DU	1.67	D	43.0	ug/kg	103	(37%-134%)		08/22/14	18:52
4,4'-DDE	41.8	D	186	D	188	ug/kg	N/A	(33%-133%)			
4,4'-DDT	41.8	D	44.5	D	72.1	ug/kg	66	(21%-149%)			
Aldrin	16.7	DU	0.835	D	15.0	ug/kg	89.5	(34%-134%)			
Dieldrin	41.8	DU	1.67	D	37.3	ug/kg	89.2	(36%-132%)			
Endosulfan I	16.7	DTU	0.835	DP	18.7	ug/kg	112	(36%-125%)			
Endosulfan II	41.8	DU	1.67	D	32.5	ug/kg	77.8	(37%-129%)			
Endosulfan sulfate	41.8	DU	1.67	D	39.1	ug/kg	93.5	(31%-140%)			
Endrin	41.8	DU	1.67	D	47.2	ug/kg	113	(45%-142%)			
Endrin aldehyde	41.8	DU	1.67	D	35.3	ug/kg	84.3	(31%-133%)			
Endrin ketone	41.8	DU	1.67	D	37.7	ug/kg	90.1	(30%-139%)			
Heptachlor	16.7	D	3.97	D	17.1	ug/kg	78.7	(32%-137%)			
Heptachlor epoxide	16.7	DTU	0.835	D	21.2	ug/kg	127	(36%-130%)			
Methoxychlor	167	DU	8.35	D	179	ug/kg	107	(28%-143%)			
alpha-BHC	16.7	DU	0.835	D	13.9	ug/kg	83.3	(37%-129%)			
alpha-Chlordane	16.7	D	12.8	D	24.0	ug/kg	67.3	(29%-141%)			
beta-BHC	16.7	DU	0.835	D	15.8	ug/kg	94.7	(33%-136%)			

# GEL LABORATORIES LLC

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

## QC Summary

Workorder: 354864

Client SDG: X0074

Project Description: RC-232 Soil

Page 4 of 5

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Semi-Volatiles-Pesticide</b>											
Batch	1412526										
delta-BHC	16.7	DU	0.835	D	13.7	ug/kg	81.8	(37%-136%)	LOF	08/22/14	18:52
gamma-BHC (Lindane)	16.7	DU	0.835	D	14.6	ug/kg	87.3	(35%-130%)			
gamma-Chlordane	16.7	D	18.9	D	30.8	ug/kg	71.4	(30%-139%)			
**4cmx	33.4		30.3		32.1	ug/kg	96	(32%-120%)			
**Decachlorobiphenyl	33.4		35.3		37.9	ug/kg	113	(37%-129%)			
QC1203150624	354864001 MSD										
4,4'-DDD	41.7	DU	1.67	D	46.2	ug/kg	6.97	111	(0%-30%)	08/22/14	19:08
4,4'-DDE	41.7	D	186	D	231	ug/kg	20.5	N/A	(0%-30%)		
4,4'-DDT	41.7	D	44.5	D	90.0	ug/kg	22.2	109	(0%-30%)		
Aldrin	16.7	DU	0.835	D	16.4	ug/kg	8.90	98	(0%-30%)		
Dieldrin	41.7	DU	1.67	D	40.8	ug/kg	8.95	97.8	(0%-30%)		
Endosulfan I	16.7	DTU	0.835	DPT	21.8	ug/kg	15.4	131 *	(0%-30%)		
Endosulfan II	41.7	DU	1.67	D	35.5	ug/kg	8.68	85	(0%-30%)		
Endosulfan sulfate	41.7	DU	1.67	D	41.0	ug/kg	4.86	98.3	(0%-30%)		
Endrin	41.7	DU	1.67	DP	51.3	ug/kg	8.29	123	(0%-30%)		
Endrin aldehyde	41.7	DU	1.67	D	36.3	ug/kg	2.94	87	(0%-30%)		
Endrin ketone	41.7	DU	1.67	D	39.6	ug/kg	5.11	95	(0%-30%)		
Heptachlor	16.7	D	3.97	D	18.6	ug/kg	8.12	87.5	(0%-30%)		
Heptachlor epoxide	16.7	DTU	0.835	DT	23.5	ug/kg	10.3	141 *	(0%-30%)		
Methoxychlor	167	DU	8.35	D	186	ug/kg	3.98	111	(0%-30%)		
alpha-BHC	16.7	DU	0.835	D	15.5	ug/kg	10.5	92.6	(0%-30%)		
alpha-Chlordane	16.7	D	12.8	D	22.6	ug/kg	6.01	59	(0%-30%)		

# GEL LABORATORIES LLC

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## QC Summary

Workorder: 354864

Client SDG: X0074

Project Description: RC-232 Soil

Page 5 of 5

Paramname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Semi-Volatiles-Pesticide</b>											
Batch	1412526										
beta-BHC	16.7	DU	0.835	D	17.3	ug/kg	8.81	104	(0%-30%)	LOF	08/22/14 19:08
delta-BHC	16.7	DU	0.835	D	14.8	ug/kg	7.82	88.6	(0%-30%)		
gamma-BHC (Lindane)	16.7	DU	0.835	D	16.4	ug/kg	11.7	98.3	(0%-30%)		
gamma-Chlordane	16.7	D	18.9	D	31.0	ug/kg	0.617	72.6	(0%-30%)		
**4cmx	33.4		30.3		32.5	ug/kg		97.4	(32%-120%)		
**Decachlorobiphenyl	33.4		35.3		37.9	ug/kg		114	(37%-129%)		

**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 or %RPD not applicable.  
 ^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

\* Indicates that a Quality Control parameter was not within specifications.  
 For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

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

Date: 6 October 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 600-332  
Subject: Semivolatile Organic - Data Package No. X0074-GEL

## **INTRODUCTION**

This memo presents the results of data validation on Data Package No. X0074 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.

<b>Sample ID</b>	<b>Sample Date</b>	<b>Media</b>	<b>Validation</b>	<b>Analyte</b>
J1TXF8	8/12/14	Soil	C	See note 1

1 – Semivolatile organics by 8270C.

Data validation was conducted in accordance with the Washington Closure Hanford (WCH) validation statement of work and the 100 Area Remedial Action Sampling and Analysis Plan (DOE/RL-96-22, September 2009). Appendices 1 through 6 provide the following information as indicated below:

- Appendix 1. Glossary of Data Reporting Qualifiers
- Appendix 2. Summary of Data Qualification
- Appendix 3. Annotated Laboratory Reports
- Appendix 4. Laboratory Narrative and Chain-of-Custody Documentation
- Appendix 5. Data Validation Supporting Documentation
- Appendix 6. Additional Data Requested by Client

## **DATA QUALITY OBJECTIVES**

### **Holding Times**

Analytical holding times were assessed to ascertain whether the holding time requirements were met by the laboratory. The holding time requirements are as follows: Analytes must be extracted within 14 days of the date of sample collection and analyzed within 40 days from the date of extraction.

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

All holding times were acceptable.

#### **Method Blanks**

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

All method blank results were acceptable.

#### Field (equipment) Blanks

No field blanks were submitted for analysis.

#### **Accuracy**

##### Matrix Spike/Matrix Spike Duplicate & Blank Spike Recoveries

Matrix spike/matrix spike duplicate analyses are used to assess the analytical accuracy of the reported data and the effect of the matrix on the ability to accurately quantify sample concentrations. Matrix spike/matrix spike duplicate analyses are performed in duplicate using five compounds for which percent recoveries must be within a range of 50-150% or within laboratory control limits. If spike recoveries are outside control limits, detected sample results less than five times the spike concentration are qualified as estimates and flagged "J". Undetected sample results with spike recoveries below control limits are qualified as estimates and flagged "UJ". Undetected sample results are not qualified if the spike recovery is above control limits. Sample results greater than five times the spike concentration require no qualification.

Due to an LCS recovery outside QC limits, all 2,4-dinitrophenol (25.1%) and hexachlorocyclopentadiene (42.9%) results were qualified as estimates and flagged "J".

Due to a matrix spike recovery outside QC limits, all 2,4-dinitrophenol (30.6%) and, hexachlorocyclopentadiene (34.8%) results were qualified as estimates and flagged "J".

Due to a matrix spike duplicate recovery outside QC limits, all 2,4-dinitrophenol (26%), and hexachlorocyclopentadiene (32.3%) results were qualified as estimates and flagged "J".

All other accuracy results were acceptable.

#### Surrogate Recovery

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

All surrogate results were acceptable.

#### **Precision**

##### Matrix Spike/Matrix Spike Duplicate Samples

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

All duplicate results were acceptable.

##### Field Duplicate Samples

No field duplicates were submitted for analysis.

### **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. X0074 was submitted for validation and verified for completeness. Completeness is based on the percentage of data determined to be valid (i.e., not rejected). The completion percentage was 100%.

### **MAJOR DEFICIENCIES**

None found.

### **MINOR DEFICIENCIES**

The following minor deficiencies were noted:

- Due to an LCS recovery outside QC limits, all 2,4-dinitrophenol (25.1%) and hexachlorocyclopentadiene (42.9%) results were qualified as estimates and flagged "J".
- Due to a matrix spike recovery outside QC limits, all 2,4-dinitrophenol (30.6%) and, hexachlorocyclopentadiene (34.8%) results were qualified as estimates and flagged "J".
- Due to a matrix spike duplicate recovery outside QC limits, all 2,4-dinitrophenol (26%), and hexachlorocyclopentadiene (32.3%) results were qualified as estimates and flagged "J".

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

## REFERENCES

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

DOE/RL-96-22, Rev. 5, *100 Area Remedial Action Sampling and Analysis Plan*, U.S. Department of Energy, September 2009.

**Appendix 1**  
**Glossary of Data Reporting Qualifiers**

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

- U - Indicates the compound or analyte was analyzed for and not detected in the sample. The value reported is the same quantitation limit corrected for sample dilution and moisture content by the laboratory.
- UJ - Indicates the compound or analyte was analyzed for and not detected in the sample. Due to a minor QC deficiency identified during the data validation, the associated quantitation limit is an estimate.
- J - Indicates the compound or analyte was analyzed for and detected. Due to a minor QC deficiency identified during the data validation, the associated quantitation limit is an estimate.
- R - Indicates the compound or analyte was analyzed for, detected, and due to an identified major QC deficiency, the data are unusable.
- UR - Indicates the compound or analyte was analyzed for and not detected in the sample. Additionally, the data is unusable due to an identified major QC deficiency.
- NJ - Indicates presumptive evidence of a compound at an estimated value. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).
- N - Indicates presumptive evidence of a compound. The data may not be valid for some specific applications usable for decision-making purposes).

**Appendix 2**  
**Summary of Data Qualification**

**SEMIVOLATILE ORGANIC DATA QUALIFICATION SUMMARY\***

<b>SDG: X0074</b>	<b>REVIEWER: ELR</b>	<b>Project: 600-332</b>	<b>PAGE <u>1</u> OF <u>1</u></b>
<b>COMPOUND</b>	<b>QUALIFIER</b>	<b>SAMPLES AFFECTED</b>	<b>REASON</b>
2,4-dinitrophenol hexachlorocyclopentadiene	J	All	MS, MSD and LCS recovery

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

**Appendix 3**  
**Annotated Laboratory Reports**

# GEL LABORATORIES LLC

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## Certificate of Analysis

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

Report Date: September 16, 2014

Client SDG: X0074

Client Sample ID:	J1TXF8	Project:	WCHN00213
Sample ID:	354864001	Client ID:	WCHN001
Matrix:	SOIL		
Collect Date:	12-AUG-14 13:14		
Receive Date:	15-AUG-14		
Collector:	Client		
Moisture:	.541%		

✓  
10/5/14

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
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**Semi-Volatile-GC/MS**

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

1,2,4-Trichlorobenzene	U	101	101	335	ug/kg	1	RMB	08/20/14	1112	1412740	1
1,2-Dichlorobenzene	U	101	101	335	ug/kg	1					
1,3-Dichlorobenzene	U	101	101	335	ug/kg	1					
1,4-Dichlorobenzene	U	101	101	335	ug/kg	1					
2,4,5-Trichlorophenol	U	101	101	335	ug/kg	1					
2,4,6-Trichlorophenol	U	101	101	335	ug/kg	1					
2,4-Dichlorophenol	U	101	101	335	ug/kg	1					
2,4-Dimethylphenol	U	101	101	335	ug/kg	1					
2,4-Dinitrophenol	U	101	101	670	ug/kg	1					
2,4-Dinitrotoluene	U	101	101	335	ug/kg	1					
2,6-Dinitrotoluene	U	101	101	335	ug/kg	1					
2-Chloronaphthalene	U	10.1	10.1	33.5	ug/kg	1					
2-Chlorophenol	U	101	101	335	ug/kg	1					
2-Methyl-4,6-dinitrophenol	U	101	101	335	ug/kg	1					
2-Methylnaphthalene	U	10.1	10.1	33.5	ug/kg	1					
2-Nitrophenol	U	101	101	335	ug/kg	1					
3,3'-Dichlorobenzidine	U	101	101	335	ug/kg	1					
4-Bromophenylphenylether	U	101	101	335	ug/kg	1					
4-Chloro-3-methylphenol	U	134	134	335	ug/kg	1					
4-Chloroaniline	U	101	101	335	ug/kg	1					
4-Chlorophenylphenylether	U	101	101	335	ug/kg	1					
4-Nitrophenol	U	101	101	335	ug/kg	1					
Acenaphthene	U	10.1	10.1	33.5	ug/kg	1					
Acenaphthylene	U	10.1	10.1	33.5	ug/kg	1					
Anthracene	U	10.1	10.1	33.5	ug/kg	1					
Benzo(a)anthracene	U	10.1	10.1	33.5	ug/kg	1					
Benzo(a)pyrene	U	10.1	10.1	33.5	ug/kg	1					
Benzo(b)fluoranthene	U	10.1	10.1	33.5	ug/kg	1					
Benzo(ghi)perylene	U	10.1	10.1	33.5	ug/kg	1					
Benzo(k)fluoranthene	U	10.1	10.1	33.5	ug/kg	1					
Butylbenzylphthalate	U	101	101	335	ug/kg	1					
Carbazole	U	10.1	10.1	33.5	ug/kg	1					
Chrysene	U	10.1	10.1	33.5	ug/kg	1					

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## Certificate of Analysis

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

10/5/14

Report Date: September 16, 2014

Client SDG: X0074

Client Sample ID: J1TXF8  
 Sample ID: 354864001

Project: WCHN00213  
 Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
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**Semi-Volatile-GC/MS**

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

Di-n-butylphthalate	U	101	101	335	ug/kg	1				
Di-n-octylphthalate	U	101	101	335	ug/kg	1				
Dibenzo(a,h)anthracene	U	10.1	10.1	33.5	ug/kg	1				
Dibenzofuran	U	101	101	335	ug/kg	1				
Diethylphthalate	U	101	101	335	ug/kg	1				
Dimethylphthalate	U	101	101	335	ug/kg	1				
Diphenylamine	U	101	101	335	ug/kg	1				
Fluoranthene	U	10.1	10.1	33.5	ug/kg	1				
Fluorene	U	10.1	10.1	33.5	ug/kg	1				
Hexachlorobenzene	U	101	101	335	ug/kg	1				
Hexachlorobutadiene	U	101	101	335	ug/kg	1				
Hexachlorocyclopentadiene	U	101	101	335	ug/kg	1				
Hexachloroethane	U	101	101	335	ug/kg	1				
Indeno(1,2,3-cd)pyrene	U	10.1	10.1	33.5	ug/kg	1				
Isophorone	U	101	101	335	ug/kg	1				
N-Nitrosodipropylamine	U	101	101	335	ug/kg	1				
Naphthalene	U	10.1	10.1	33.5	ug/kg	1				
Nitrobenzene	U	101	101	335	ug/kg	1				
Pentachlorophenol	U	101	101	335	ug/kg	1				
Phenanthrene	U	10.1	10.1	33.5	ug/kg	1				
Phenol	U	101	101	335	ug/kg	1				
Pyrene	U	10.1	10.1	33.5	ug/kg	1				
bis(2-Chloro-1-methylethyl)ether	U	101	101	335	ug/kg	1				
bis(2-Chloroethoxy)methane	U	101	101	335	ug/kg	1				
bis(2-Chloroethyl) ether	U	101	101	335	ug/kg	1				
bis(2-Ethylhexyl)phthalate	U	101	101	335	ug/kg	1				
3- and/or 4-Methylphenol	U	101	101	335	ug/kg	1				
m-Nitroaniline	U	101	101	335	ug/kg	1				
o-Cresol	U	101	101	335	ug/kg	1				
o-Nitroaniline	U	111	111	335	ug/kg	1				
p-Nitroaniline	U	101	101	335	ug/kg	1				

**Surrogate/Tracer recovery**

Surrogate/Tracer recovery	Result	Nominal	Recovery%	Acceptable Limits
2-Fluorobiphenyl	1060 ug/kg	1680	63.1	(25%-100%)
Nitrobenzene-d5	1080 ug/kg	1680	64.6	(21%-103%)
p-Terphenyl-d14	1290 ug/kg	1680	76.8	(31%-124%)
2-Fluorophenol	2260 ug/kg	3350	67.6	(23%-107%)
Phenol-d5	2330 ug/kg	3350	69.4	(25%-108%)

Date Time: 08/20/14 11 12

# GEL LABORATORIES LLC

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

## Certificate of Analysis

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

M 10/5/14

Report Date: September 16, 2014

Client SDG: X0074

Client Sample ID: J1TXF8  
 Sample ID: 354864001

Project: WCHN00213  
 Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
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**Semi-Volatile-GC/MS**

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

2,4,6-Tribromophenol		2980 ug/kg	3350	89.0	(20%-122%)					
<i>Tentatively Identified Compound (TIC)</i>	<i>CAS No.</i>		<i>RT</i>	<i>Est. Concentration</i>	<i>Fit</i>	<i>Qual</i>	<i>Date Time:</i>	<b>08/20/14 11 12</b>		
Trichloromethane	000067-66-3		2.272	225 ug/kg	96	NJ				
unknown			2.422	209 ug/kg	0	J				
Unknown Aldol Condensate			4.165	3910 ug/kg		AJ				
Benzene, 1,1'-(dichloroethenyliden	000072-55-9		14.007	210 ug/kg	99	NJ				
1-Docosene	001599-67-3		15.67	1110 ug/kg	94	NJ				
Nonadecane	000629-92-5		17.125	157 ug/kg	95	NJ				
Pentacosane	000629-99-2		19.184	480 ug/kg	97	NJ				
Hentriacontane	000630-04-6		21.736	346 ug/kg	98	NJ				

**The following Prep Methods were performed**

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	Prep Method 3541 8270D BNA for Soil	SXW3	08/19/14	1734	1412739

**The following Analytical Methods were performed**

Method	Description	Analyst Comments
1	SW846 3541/8270D	

**Appendix 4**

**Laboratory Narrative and Chain-of-Custody Documentation**

**Semi-Volatile Case Narrative  
WC-HANFORD, INC. (WCHN)  
SDG X0074**

**Method/Analysis Information**

**Procedure:** Analysis of Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry

Analytical Method: SW846 3541/8270D

Prep Method: SW846 3541

Analytical Batch Number: 1412740

Prep Batch Number: 1412739

**Sample Analysis**

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

<b>Sample ID</b>	<b>Client ID</b>
354864001	J1TXF8
1203151245	MB for batch 1412739
1203151246	Laboratory Control Sample (LCS)
1203151247	354864001(J1TXF8) Matrix Spike (MS)
1203151248	354864001(J1TXF8) Matrix Spike Duplicate (MSD)

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

**Preparation/Analytical Method Verification**

**SOP Reference**

Procedure for preparation, analysis and reporting of analytical data are controlled by GEL Laboratories LLC as Standard Operating Procedure (SOP). The data discussed in this narrative has been analyzed in accordance with GL-OA-E-009 REV# 32.

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

**Calibration Information**

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

*Diphenylamine has now superseded N-Nitroso-diphenylamine on Quantitation Reports, Initial Calibration Reports, Calibration Check Standard Reports, etc. Previous versions of EPA Methodologies referenced N-Nitroso-diphenylamine. However, as stated in EPA Methodology, "N-Nitroso-diphenylamine decomposes in the gas chromatographic inlet and cannot be separated from Diphenylamine." Studies of these two compounds at*

GEL, both independent of each other and together, showed that they not only co-elute, but also have similar mass spectra. N-Nitroso-diphenylamine and Diphenylamine will be reported as Diphenylamine on all reports and forms.

**Initial Calibration**

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

**CCV Requirements**

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

**Quality Control (QC) Information**

**Method Blank (MB) Statement**

The MB analyzed with this SDG in this batch met the acceptance criteria.

**Surrogate Recoveries**

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

**Laboratory Control Sample (LCS) Recovery**

The LCS spike recoveries met the acceptance limits.

**QC Sample Designation**

Sample 354864001 (J1TXF8) was selected for analysis as the matrix spike and matrix spike duplicate.

**Matrix Spike (MS) Recovery Statement**

The MS recoveries were within the established acceptance limits.

**Matrix Spike Duplicate (MSD) Recovery Statement**

The MSD recoveries were within the established acceptance limits.

**MS/MSD Relative Percent Difference (RPD) Statement**

The RPD values between the MS and MSD met the acceptance limits.

**Internal Standard (ISTD) Acceptance**

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

**Technical Information:**

**Holding Time Specifications**

All samples in this SDG in this batch met the specified holding time.

**Preparation/Analytical Method Verification**

All procedures were performed as stated in the SOP. All reported compound mass spectra met the detection specifications in the method.

**Sample Dilutions**

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

**Sample Re-extraction/Re-analysis**

Re-extractions or re-analyses were not required in this SDG in this analytical batch unless confirmations or

dilutions were required.

**Miscellaneous Information:**

**Data Exception (DER) Documentation**

Data exception reports (DERs) are generated to document procedural anomalies that may deviate from referenced SOP or contractual documents. A DER was not required for sample 354864001 (J1TXF8) or associated QC in this batch.

**Manual Integrations**

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

**TIC Comment**

Tentatively identified compounds (TIC) may be requested for samples 1203151245 (MB) and 354864001 (J1TXF8) in this delivery group/work order. Please note that non-requested calibrated analytes detected in a client sample may be reported on the Form 1/Certificate of Analysis as TICs. TIC data, if requested, are included on the Sample Data Summary (Form 1) and are also included with the sample raw data.

**Additional Comments**

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

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

**Electronic Package Comment**

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

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

**System Configuration**

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

<b>Instrument ID</b>	<b>Instrument</b>	<b>System Configuration</b>	<b>Column ID</b>	<b>Column Description</b>
MSD8.I	Agilent 6890/5973 GC/MS w/ 7683 Autosampler	HP6890/HP5973	DB-5MS	25m x 0.2mm, 0.33um (5% Phenylmethylpolysiloxane)

**Certification Statement**

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

<b>Washington Closure Hanford</b>		<b>CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST</b>				RC-232-087	Page 1 of 1
Project Designation 100-IJ-2 & 100-IU-6 Remaining Waste Sites		Company Contact Joan Kessner		Telephone No. 375-4888		Project Coordinator KESSNER, JH	Price Code 8C
Chest No. RCL-07-012		Sampling Location 800-332, Gable Mt. firing range septic system		SAF No. RC-232		Data Turnaround <b>15 Days</b>	
Shipped To GEL Laboratories Charleston		Field Logbook No. EL-1667-02		COA 0603322000		Method of Shipment Commerical Carrier / Fed Ex	
Carrier Label Shipped To N/A 354864		Offsite Property No. A131 218		Bill of Lading/Air Bill No. See OSAC			

Possible Sample Hazards/Remarks	Special Handling and/or Storage	Preservation	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	None
		Type of Container	GP	GP	aG	Gs*	aG	aG	aG	aG	GP
		No. of Container(s)	1	1	1	3	1	1	1	1	1
		Volume	250mL	250mL	125mL	40mL	250mL	250mL	250mL	250mL	500mL
		Sample Analysis	See item (1) in Special Instructions	NO2/NO3 - 353.1 (Nitrogen in Nitrite and Nitrate)	TPH-Diesel Range - WTPH-D+	TPH-Gasoline Range - WTPH-G	Semi-VGA - 8270 (TCL)	PAHs - 8310	PCBs - 3082	Pesticides - 8081; Chloro-Herbicides - EPAB151	ICP Metals (TCLP) - 1311/8010; Mercury (TCLP) - 1311/7470

Sample No.	Matrix	Sample Date	Sample Time								
TXFB	SOIL	8/12/14	1314	✓	✓	✓	✓	✓	✓	✓	✓

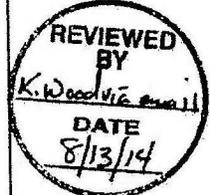
CHAIN OF POSSESSION		Sign/Print Names	
Relinquished By/Removed From Randy Stowe	Date/Time 8-12-14 1400	Received By/Stored In Dorothy DUSHEA	Date/Time 8/12/14 1400
Relinquished By/Removed From WShea DUSHEA	Date/Time 8-12-14 1637	Received By/Stored In Fridge 3A Battelle	Date/Time 8/12/14 1637
Relinquished By/Removed From WED Battelle Fridge 3A	Date/Time 8/13/14 0755	Received By/Stored In STH Sexton	Date/Time 8/13/14 0755
Relinquished By/Removed From STH Sexton	Date/Time 8/13/14 0800	Received By/Stored In FED EX	Date/Time 8/13/14 0800
Relinquished By/Removed From FED EX	Date/Time 8/13/14 0900	Received By/Stored In Chris Sanchez	Date/Time 8/13/14 0900

**SPECIAL INSTRUCTIONS**

Perform extraction of TCLP analysis and await direction from J. Kessner before proceeding to analysis.

(1) ICP Metals - 8010TR (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)

\* Custodian unavailable to remove samples from controlled storage. Shipper removed samples, taking custody for shipment to lab.



FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time
--------------------------	-----------------	-------------	-----------

WCH-EE-011

**Appendix 5**  
**Data Validation Supporting Documentation**

**GC/MS ORGANIC DATA VALIDATION CHECKLIST**

VALIDATION LEVEL:	A	B	<b>C</b>	D	E
PROJECT:	600-332		DATA PACKAGE: X0074		
VALIDATOR:	ELR	LAB: Crel	DATE: 10/5/14		
		SDG: X0074			
ANALYSES PERFORMED					
SW-846 8260		SW-846 8260 (TCLP)	<b>SW-846 8270</b>		SW-846 8270 (TCLP)
SAMPLES/MATRIX					
JITFX8					
soil					

**1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE**

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

Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

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

GC/MS tuning/performance check acceptable? ..... Yes No **N/A**  
 Initial calibrations acceptable? ..... Yes No **N/A**  
 Continuing calibrations acceptable? ..... Yes No **N/A**  
 Standards traceable? ..... Yes No **N/A**  
 Standards expired? ..... Yes No **N/A**  
 Calculation check acceptable? ..... Yes No **N/A**

Comments: \_\_\_\_\_  
 \_\_\_\_\_

**GC/MS ORGANIC DATA VALIDATION CHECKLIST**

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

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

Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_ NO FB \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

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

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

Comments: LCS-11 - J all  
MS-11 - J all MSD-11  
 \_\_\_\_\_  
 \_\_\_\_\_ no PA \_\_\_\_\_  
 \_\_\_\_\_

**GC/MS ORGANIC DATA VALIDATION CHECKLIST**

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

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

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**6. SYSTEM PERFORMANCE (Levels D and E)**

Internal standards analyzed?..... Yes No N/A  
Internal standard areas acceptable?..... Yes No N/A  
Internal standard retention times acceptable?..... Yes No N/A  
Standards traceable?..... Yes No N/A  
Standards expired?..... Yes No N/A  
Transcription/calculation errors?..... Yes No N/A

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**7. HOLDING TIMES (all levels )**

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

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**GC/MS ORGANIC DATA VALIDATION CHECKLIST**

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

Compound identification acceptable? (Levels D, E) .....	Yes	No	N/A
Compound quantitation acceptable? (Levels D, E) .....	Yes	No	N/A
Results reported for all requested analyses? .....	<input checked="" type="radio"/>	<input type="radio"/>	N/A
Results supported in the raw data? (Levels D, E) .....	Yes	No	N/A
Samples properly prepared? (Levels D, E) .....	Yes	No	N/A
Laboratory properly identified and coded all TIC? (Levels D, E) .....	Yes	No	N/A
Detection limits meet RDL? .....	<input checked="" type="radio"/>	<input type="radio"/>	N/A
Transcription/calculation errors? (Levels D, E) .....	Yes	No	N/A

Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**9. SAMPLE CLEANUP (Levels D and E)**

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

Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**Appendix 6**

**Additional Documentation Requested by Client**

# GEL LABORATORIES LLC

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

## QC Summary

Report Date: September 16, 2014

Page 1 of 14

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

Contact: Joan Kessner

Workorder: 354864

Client SDG: X0074

Project Description: RC-232 Soil

Parmname	NOM	Sample Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Semi-Volatile-GC/MS									
Batch 1412740									
QC1203151246 LCS									
1,2,4-Trichlorobenzene	1670		1160	ug/kg	69.7	(37%-98%)	RMB	08/20/14	10:40
1,2-Dichlorobenzene	1670		1080	ug/kg	64.8	(39%-93%)			
1,3-Dichlorobenzene	1670		1010	ug/kg	60.5	(39%-110%)			
1,4-Dichlorobenzene	1670		1030	ug/kg	61.7	(40%-110%)			
2,4,5-Trichlorophenol	1670		1080	ug/kg	65.1	(41%-103%)			
2,4,6-Trichlorophenol	1670		1110	ug/kg	66.6	(36%-98%)			
2,4-Dichlorophenol	1670		1220	ug/kg	73.4	(35%-110%)			
2,4-Dimethylphenol	1670		1130	ug/kg	67.6	(35%-102%)			
2,4-Dinitrophenol	1670	J	417	ug/kg	25.1	(22%-83%)			
2,4-Dinitrotoluene	1670		1170	ug/kg	70.6	(43%-109%)			
2,6-Dinitrotoluene	1670		1180	ug/kg	70.8	(41%-103%)			
2-Chloronaphthalene	1670		1130	ug/kg	67.7	(39%-101%)			
2-Chlorophenol	1670		1210	ug/kg	72.6	(38%-100%)			
2-Methyl-4,6-dinitrophenol	1670		967	ug/kg	58.1	(33%-103%)			
2-Methylnaphthalene	1670		1100	ug/kg	65.8	(36%-107%)			
2-Nitrophenol	1670		1170	ug/kg	70.4	(35%-106%)			
3,3'-Dichlorobenzidine	1670		1010	ug/kg	61	(32%-111%)			
3- and/or 4-Methylphenol	1670		1360	ug/kg	81.6	(39%-115%)			
4-Bromophenylphenylether	1670		1250	ug/kg	75	(42%-110%)			
4-Chloro-3-methylphenol	1670		1220	ug/kg	73.3	(35%-104%)			

# GEL LABORATORIES LLC

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## QC Summary

Workorder: 354864

Client SDG: X0074

Project Description: RC-232 Soil

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Parmname	NOM	Sample Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Semi-Volatile-GC/MS									
Batch	1412740								
4-Chloroaniline	1670		1180	ug/kg		70.9	(32%-106%)	RMB	08/20/14 10:40
4-Chlorophenylphenylether	1670		1110	ug/kg		66.5	(41%-104%)		
4-Nitrophenol	1670		897	ug/kg		53.9	(23%-114%)		
Acenaphthene	1670		1080	ug/kg		65.1	(36%-105%)		
Acenaphthylene	1670		1150	ug/kg		68.8	(38%-103%)		
Anthracene	1670		1160	ug/kg		69.6	(43%-104%)		
Benzo(a)anthracene	1670		1300	ug/kg		78.3	(46%-108%)		
Benzo(a)pyrene	1670		1240	ug/kg		74.5	(45%-109%)		
Benzo(b)fluoranthene	1670		1220	ug/kg		73.1	(42%-111%)		
Benzo(ghi)perylene	1670		1310	ug/kg		78.4	(43%-115%)		
Benzo(k)fluoranthene	1670		1240	ug/kg		74.5	(43%-103%)		
Butylbenzylphthalate	1670		1610	ug/kg		96.9	(37%-107%)		
Carbazole	1670		1340	ug/kg		80.4	(53%-118%)		
Chrysene	1670		1160	ug/kg		69.6	(47%-107%)		
Di-n-butylphthalate	1670		1310	ug/kg		78.7	(46%-112%)		
Di-n-octylphthalate	1670		1530	ug/kg		91.6	(41%-110%)		
Dibenzo(a,h)anthracene	1670		1390	ug/kg		83.3	(39%-128%)		
Dibenzofuran	1670		1120	ug/kg		67.1	(38%-104%)		
Diethylphthalate	1670		1170	ug/kg		70.1	(42%-109%)		
Dimethylphthalate	1670		1170	ug/kg		70.5	(41%-105%)		
Diphenylamine	1670		1210	ug/kg		72.6	(40%-101%)		

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## QC Summary

Workorder: 354864

Client SDG: X0074

Project Description: RC-232 Soil

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Parmname	NOM	Sample Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Semi-Volatile-GC/MS</b>										
Batch	1412740									
Fluoranthene	1670		1190	ug/kg		71.6	(44%-106%)			
Fluorene	1670		1090	ug/kg		65.7	(39%-102%)	RMB	08/20/14	10:40
Hexachlorobenzene	1670		1420	ug/kg		85.5	(41%-108%)			
Hexachlorobutadiene	1670		1080	ug/kg		64.6	(32%-104%)			
Hexachlorocyclopentadiene	1670		714	ug/kg		42.9	(24%-84%)			
Hexachloroethane	1670		1020	ug/kg		61.4	(34%-98%)			
Indeno(1,2,3-cd)pyrene	1670		1290	ug/kg		77.6	(45%-115%)			
Isophorone	1670		1260	ug/kg		75.4	(36%-98%)			
N-Nitrosodipropylamine	1670		1170	ug/kg		70.1	(34%-106%)			
Naphthalene	1670		1130	ug/kg		67.9	(38%-106%)			
Nitrobenzene	1670		1200	ug/kg		71.8	(35%-99%)			
Pentachlorophenol	1670		1030	ug/kg		62	(31%-93%)			
Phenanthrene	1670		1150	ug/kg		69	(43%-105%)			
Phenol	1670		1200	ug/kg		71.9	(38%-98%)			
Pyrene	1670		1410	ug/kg		84.8	(33%-99%)			
bis(2-Chloro-1-methylethyl)ether	1670		1060	ug/kg		64	(27%-109%)			
bis(2-Chloroethoxy)methane	1670		1180	ug/kg		71.1	(37%-98%)			
bis(2-Chloroethyl) ether	1670		1120	ug/kg		67.4	(35%-96%)			
bis(2-Ethylhexyl)phthalate	1670		1590	ug/kg		95.7	(41%-104%)			
m-Nitroaniline	1670		1150	ug/kg		69.3	(32%-113%)			
o-Cresol	1670		1210	ug/kg		72.7	(37%-97%)			
o-Nitroaniline	1670		1100	ug/kg		66	(34%-116%)			

# GEL LABORATORIES LLC

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

## QC Summary

Workorder: 354864      Client SDG: X0074      Project Description: RC-232 Soil      Page 4 of 14

Parmname	NOM	Sample Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Semi-Volatile-GC/MS									
Batch 1412740									
p-Nitroaniline	1670		1270	ug/kg		76.4	(35%-150%)		
**2,4,6-Tribromophenol	3330		2760	ug/kg		82.9	(20%-122%)	RMB	08/20/14 10:40
**2-Fluorobiphenyl	1670		1110	ug/kg		66.6	(25%-100%)		
**2-Fluorophenol	3330		2470	ug/kg		74.1	(23%-107%)		
**Nitrobenzene-d5	1670		1190	ug/kg		71.6	(21%-103%)		
**Phenol-d5	3330		2450	ug/kg		73.5	(25%-108%)		
**p-Terphenyl-d14	1670		1440	ug/kg		86.2	(31%-124%)		
QC1203151245 MB									
1,2,4-Trichlorobenzene		U	99.9	ug/kg					08/20/14 10:08
1,2-Dichlorobenzene		U	99.9	ug/kg					
1,3-Dichlorobenzene		U	99.9	ug/kg					
1,4-Dichlorobenzene		U	99.9	ug/kg					
2,4,5-Trichlorophenol		U	99.9	ug/kg					
2,4,6-Trichlorophenol		U	99.9	ug/kg					
2,4-Dichlorophenol		U	99.9	ug/kg					
2,4-Dimethylphenol		U	99.9	ug/kg					
2,4-Dinitrophenol		U	99.9	ug/kg					
2,4-Dinitrotoluene		U	99.9	ug/kg					
2,6-Dinitrotoluene		U	99.9	ug/kg					
2-Chloronaphthalene		U	9.99	ug/kg					
2-Chlorophenol		U	99.9	ug/kg					
2-Methyl-4,6-dinitrophenol		U	99.9	ug/kg					
2-Methylnaphthalene		U	9.99	ug/kg					

# GEL LABORATORIES LLC

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

## QC Summary

Workorder: 354864

Client SDG: X0074

Project Description: RC-232 Soil

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Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatile-GC/MS											
Batch	1412740										
2-Nitrophenol			U	99.9	ug/kg				RMB	08/20/14	10:08
3,3'-Dichlorobenzidine			U	99.9	ug/kg						
3- and/or 4-Methylphenol			U	99.9	ug/kg						
4-Bromophenylphenylether			U	99.9	ug/kg						
4-Chloro-3-methylphenol			U	133	ug/kg						
4-Chloroaniline			U	99.9	ug/kg						
4-Chlorophenylphenylether			U	99.9	ug/kg						
4-Nitrophenol			U	99.9	ug/kg						
Acenaphthene			U	9.99	ug/kg						
Acenaphthylene			U	9.99	ug/kg						
Anthracene			U	9.99	ug/kg						
Benzo(a)anthracene			U	9.99	ug/kg						
Benzo(a)pyrene			U	9.99	ug/kg						
Benzo(b)fluoranthene			U	9.99	ug/kg						
Benzo(ghi)perylene			U	9.99	ug/kg						
Benzo(k)fluoranthene			U	9.99	ug/kg						
Butylbenzylphthalate			U	99.9	ug/kg						
Carbazole			U	9.99	ug/kg						
Chrysene			U	9.99	ug/kg						
Di-n-butylphthalate			U	99.9	ug/kg						
Di-n-octylphthalate			U	99.9	ug/kg						

# GEL LABORATORIES LLC

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

## QC Summary

Workorder: 354864

Client SDG: X0074

Project Description: RC-232 Soil

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Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Semi-Volatile-GC/MS</b>											
Batch	1412740										
Dibenzo(a,h)anthracene			U	9.99	ug/kg						
Dibenzofuran			U	99.9	ug/kg				RMB	08/20/14	10:08
Diethylphthalate			U	99.9	ug/kg						
Dimethylphthalate			U	99.9	ug/kg						
Diphenylamine			U	99.9	ug/kg						
Fluoranthene			U	9.99	ug/kg						
Fluorene			U	9.99	ug/kg						
Hexachlorobenzene			U	99.9	ug/kg						
Hexachlorobutadiene			U	99.9	ug/kg						
Hexachlorocyclopentadiene			U	99.9	ug/kg						
Hexachloroethane			U	99.9	ug/kg						
Indeno(1,2,3-cd)pyrene			U	9.99	ug/kg						
Isophorone			U	99.9	ug/kg						
N-Nitrosodipropylamine			U	99.9	ug/kg						
Naphthalene			U	9.99	ug/kg						
Nitrobenzene			U	99.9	ug/kg						
Pentachlorophenol			U	99.9	ug/kg						
Phenanthrene			U	9.99	ug/kg						
Phenol			U	99.9	ug/kg						
Pyrene			U	9.99	ug/kg						
bis(2-Chloro-1-methylethyl)ether			U	99.9	ug/kg						
bis(2-Chloroethoxy)methane			U	99.9	ug/kg						

# GEL LABORATORIES LLC

2040 Savage Road Charleston, SC 29407 - (843) 558-8171 - www.gel.com

## QC Summary

Workorder: 354864

Client SDG: X0074

Project Description: RC-232 Soil

Page 7 of 14

Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Semi-Volatile-GC/MS</b>											
Batch	1412740										
bis(2-Chloroethyl) ether			U	99.9	ug/kg						
bis(2-Ethylhexyl)phthalate			U	99.9	ug/kg				RMB	08/20/14	10:08
m-Nitroaniline			U	99.9	ug/kg						
o-Cresol			U	99.9	ug/kg						
o-Nitroaniline			U	110	ug/kg						
p-Nitroaniline			U	99.9	ug/kg						
**2,4,6-Tribromophenol	3330			2570	ug/kg		77.2	(20%-122%)			
**2-Fluorobiphenyl	1670			1070	ug/kg		64.4	(25%-100%)			
**2-Fluorophenol	3330			2150	ug/kg		64.4	(23%-107%)			
**Nitrobenzene-d5	1670			1220	ug/kg		73.2	(21%-103%)			
**Phenol-d5	3330			2100	ug/kg		63.1	(25%-108%)			
**p-Terphenyl-d14	1670			1220	ug/kg		73.5	(31%-124%)			
QC1203151247 354864001 MS											
1,2,4-Trichlorobenzene	1680	U	101	1110	ug/kg		66	(25%-102%)		08/20/14	11:44
1,2-Dichlorobenzene	1680	U	101	1010	ug/kg		60.4	(25%-99%)			
1,3-Dichlorobenzene	1680	U	101	945	ug/kg		56.4	(24%-96%)			
1,4-Dichlorobenzene	1680	U	101	963	ug/kg		57.4	(24%-97%)			
2,4,5-Trichlorophenol	1680	U	101	1170	ug/kg		70	(38%-109%)			
2,4,6-Trichlorophenol	1680	U	101	1140	ug/kg		68.3	(32%-103%)			
2,4-Dichlorophenol	1680	U	101	1230	ug/kg		73.7	(31%-103%)			
2,4-Dimethylphenol	1680	U	101	1200	ug/kg		71.7	(30%-109%)			
2,4-Dinitrophenol	1680	U	101	J 513	ug/kg		30.6	(19%-101%)			
2,4-Dinitrotoluene	1680	U	101	1240	ug/kg		74.1	(36%-115%)			

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## QC Summary

Workorder: 354864

Client SDG: X0074

Project Description: RC-232 Soil

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatile-GC/MS Batch 1412740											
2,6-Dinitrotoluene	1680	U	101	1180	ug/kg	70.7	(36%-107%)	RMB	08/20/14	11:44	
2-Chloronaphthalene	1680	U	10.1	1110	ug/kg	66.2	(27%-109%)				
2-Chlorophenol	1680	U	101	1150	ug/kg	68.4	(28%-108%)				
2-Methyl-4,6-dinitrophenol	1680	U	101	1020	ug/kg	60.7	(14%-116%)				
2-Methylnaphthalene	1680	U	10.1	1070	ug/kg	63.6	(23%-107%)				
2-Nitrophenol	1680	U	101	1160	ug/kg	69.3	(24%-106%)				
3,3'-Dichlorobenzidine	1680	U	101	1010	ug/kg	60.5	(28%-105%)				
3- and/or 4-Methylphenol	1680	U	101	1330	ug/kg	79.4	(32%-123%)				
4-Bromophenylphenylether	1680	U	101	1250	ug/kg	74.5	(37%-112%)				
4-Chloro-3-methylphenol	1680	U	134	1270	ug/kg	75.8	(32%-112%)				
4-Chloroaniline	1680	U	101	1020	ug/kg	60.8	(27%-100%)				
4-Chlorophenylphenylether	1680	U	101	1140	ug/kg	67.9	(37%-110%)				
4-Nitrophenol	1680	U	101	1120	ug/kg	66.6	(12%-128%)				
Acenaphthene	1680	U	10.1	1080	ug/kg	64.3	(28%-102%)				
Acenaphthylene	1680	U	10.1	1140	ug/kg	68.2	(32%-103%)				
Anthracene	1680	U	10.1	1210	ug/kg	72.2	(36%-104%)				
Benzo(a)anthracene	1680	U	10.1	1310	ug/kg	78.1	(27%-120%)				
Benzo(a)pyrene	1680	U	10.1	1300	ug/kg	77.4	(31%-116%)				
Benzo(b)fluoranthene	1680	U	10.1	1300	ug/kg	77.3	(30%-119%)				
Benzo(ghi)perylene	1680	U	10.1	1040	ug/kg	61.8	(30%-109%)				
Benzo(k)fluoranthene	1680	U	10.1	1320	ug/kg	79.1	(31%-125%)				

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## QC Summary

Workorder: 354864

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatile-GC/MS											
Batch 1412740											
Butylbenzylphthalate	1680	U	101	1440	ug/kg		86.1	(33%-121%)			
Carbazole	1680	U	10.1	1410	ug/kg		84.2	(40%-133%)	RMB	08/20/14	11:44
Chrysene	1680	U	10.1	1260	ug/kg		75.1	(33%-114%)			
Di-n-butylphthalate	1680	U	101	1370	ug/kg		82	(42%-119%)			
Di-n-octylphthalate	1680	U	101	1440	ug/kg		85.9	(36%-115%)			
Dibenzo(a,h)anthracene	1680	U	10.1	1220	ug/kg		72.8	(26%-128%)			
Dibenzofuran	1680	U	101	1130	ug/kg		67.3	(28%-117%)			
Diethylphthalate	1680	U	101	1180	ug/kg		70.5	(40%-113%)			
Dimethylphthalate	1680	U	101	1140	ug/kg		68	(38%-110%)			
Diphenylamine	1680	U	101	1230	ug/kg		73.6	(34%-111%)			
Fluoranthene	1680	U	10.1	1230	ug/kg		73.7	(32%-115%)			
Fluorene	1680	U	10.1	1120	ug/kg		66.9	(30%-115%)			
Hexachlorobenzene	1680	U	101	1420	ug/kg		84.8	(34%-111%)			
Hexachlorobutadiene	1680	U	101	1030	ug/kg		61.2	(24%-105%)			
Hexachlorocyclopentadiene	1680	U	101	584	ug/kg		34.8	(12%-106%)			
Hexachloroethane	1680	U	101	954	ug/kg		57	(24%-102%)			
Indeno(1,2,3-cd)pyrene	1680	U	10.1	1090	ug/kg		64.8	(29%-117%)			
Isophorone	1680	U	101	1230	ug/kg		73.1	(24%-108%)			
N-Nitrosodipropylamine	1680	U	101	1100	ug/kg		65.7	(23%-117%)			
Naphthalene	1680	U	10.1	1080	ug/kg		64.6	(21%-107%)			
Nitrobenzene	1680	U	101	1150	ug/kg		68.6	(25%-104%)			
Pentachlorophenol	1680	U	101	1210	ug/kg		72.2	(22%-108%)			

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## QC Summary

Workorder: 354864

Client SDG: X0074

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Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Semi-Volatile-GC/MS</b>												
Batch	1412740											
Phenanthrene	1680	U	10.1		1200	ug/kg		71.7	(28%-119%)			
Phenol	1680	U	101		1150	ug/kg		68.5	(28%-108%)	RMB	08/20/14	11:44
Pyrene	1680	U	10.1		1340	ug/kg		80.1	(25%-119%)			
bis(2-Chloro-1-methylethyl)ether	1680	U	101		984	ug/kg		58.7	(25%-105%)			
bis(2-Chloroethoxy)methane	1680	U	101		1150	ug/kg		68.8	(27%-104%)			
bis(2-Chloroethyl) ether	1680	U	101		1020	ug/kg		60.8	(25%-102%)			
bis(2-Ethylhexyl)phthalate	1680	U	101		1380	ug/kg		82.4	(33%-124%)			
m-Nitroaniline	1680	U	101		1130	ug/kg		67.2	(31%-110%)			
o-Cresol	1680	U	101		1160	ug/kg		69.1	(27%-105%)			
o-Nitroaniline	1680	U	111		1170	ug/kg		69.9	(37%-114%)			
p-Nitroaniline	1680	U	101		1370	ug/kg		81.7	(36%-141%)			
**2,4,6-Tribromophenol	3350		2980		2850	ug/kg		84.9	(20%-122%)			
**2-Fluorobiphenyl	1680		1060		1070	ug/kg		63.8	(25%-100%)			
**2-Fluorophenol	3350		2260		2250	ug/kg		67.3	(23%-107%)			
**Nitrobenzene-d5	1680		1080		1120	ug/kg		66.9	(21%-103%)			
**Phenol-d5	3350		2330		2290	ug/kg		68.2	(25%-108%)			
**p-Terphenyl-d14	1680		1290		1350	ug/kg		80.5	(31%-124%)			
QC1203151248 354864001 MSD												
1,2,4-Trichlorobenzene	1680	U	101		1090	ug/kg	1.59	65	(0%-30%)		08/20/14	12:16
1,2-Dichlorobenzene	1680	U	101		988	ug/kg	2.35	59	(0%-30%)			
1,3-Dichlorobenzene	1680	U	101		926	ug/kg	2.11	55.3	(0%-30%)			
1,4-Dichlorobenzene	1680	U	101		935	ug/kg	2.93	55.8	(0%-30%)			
2,4,5-Trichlorophenol	1680	U	101		1190	ug/kg	1.10	70.8	(0%-30%)			

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## QC Summary

Workorder: 354864

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Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Semi-Volatile-GC/MS											
Batch 1412740											
2,4,6-Trichlorophenol	1680	U	101	1140	ug/kg	0.150	68.2	(0%-30%)	RMB	08/20/14	12:16
2,4-Dichlorophenol	1680	U	101	1180	ug/kg	4.76	70.3	(0%-30%)			
2,4-Dimethylphenol	1680	U	101	1050	ug/kg	13.9	62.4	(0%-30%)			
2,4-Dinitrophenol	1680	U	101 J	436	ug/kg	16.3	26	(0%-30%)			
2,4-Dinitrotoluene	1680	U	101	1250	ug/kg	0.371	74.4	(0%-30%)			
2,6-Dinitrotoluene	1680	U	101	1200	ug/kg	1.32	71.7	(0%-30%)			
2-Chloronaphthalene	1680	U	10.1	1120	ug/kg	0.899	66.8	(0%-30%)			
2-Chlorophenol	1680	U	101	1060	ug/kg	7.72	63.3	(0%-30%)			
2-Methyl-4,6-dinitrophenol	1680	U	101	950	ug/kg	6.88	56.7	(0%-30%)			
2-Methylnaphthalene	1680	U	10.1	1040	ug/kg	2.26	62.2	(0%-30%)			
2-Nitrophenol	1680	U	101	1100	ug/kg	5.64	65.5	(0%-30%)			
3,3'-Dichlorobenzidine	1680	U	101	872	ug/kg	15.1	52.1	(0%-30%)			
3- and/or 4-Methylphenol	1680	U	101	1270	ug/kg	4.99	75.6	(0%-30%)			
4-Bromophenylphenylether	1680	U	101	1250	ug/kg	0.101	74.6	(0%-30%)			
4-Chloro-3-methylphenol	1680	U	134	1240	ug/kg	2.81	73.8	(0%-30%)			
4-Chloroaniline	1680	U	101	950	ug/kg	6.98	56.7	(0%-30%)			
4-Chlorophenylphenylether	1680	U	101	1150	ug/kg	1.02	68.6	(0%-30%)			
4-Nitrophenol	1680	U	101	1150	ug/kg	3.25	68.8	(0%-30%)			
Acenaphthene	1680	U	10.1	1040	ug/kg	3.68	62	(0%-30%)			
Acenaphthylene	1680	U	10.1	1160	ug/kg	1.59	69.4	(0%-30%)			
Anthracene	1680	U	10.1	1210	ug/kg	0.133	72.3	(0%-30%)			

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## QC Summary

Workorder: 354864

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Semi-Volatile-GC/MS</b>											
Batch	1412740										
Benzo(a)anthracene	1680	U	10.1	1310	ug/kg	0.0589	78.1	(0%-30%)			
Benzo(a)pyrene	1680	U	10.1	1290	ug/kg	0.603	77	(0%-30%)	RMB	08/20/14	12:16
Benzo(b)fluoranthene	1680	U	10.1	1290	ug/kg	0.189	77.2	(0%-30%)			
Benzo(ghi)perylene	1680	U	10.1	999	ug/kg	3.56	59.6	(0%-30%)			
Benzo(k)fluoranthene	1680	U	10.1	1330	ug/kg	0.295	79.3	(0%-30%)			
Butylbenzylphthalate	1680	U	101	1530	ug/kg	5.61	91.1	(0%-30%)			
Carbazole	1680	U	10.1	1400	ug/kg	0.844	83.5	(0%-30%)			
Chrysene	1680	U	10.1	1120	ug/kg	11.9	66.6	(0%-30%)			
Di-n-butylphthalate	1680	U	101	1330	ug/kg	3.38	79.3	(0%-30%)			
Di-n-octylphthalate	1680	U	101	1470	ug/kg	2.31	88	(0%-30%)			
Dibenzo(a,h)anthracene	1680	U	10.1	1190	ug/kg	2.20	71.2	(0%-30%)			
Dibenzofuran	1680	U	101	1110	ug/kg	1.17	66.6	(0%-30%)			
Diethylphthalate	1680	U	101	1220	ug/kg	3.29	72.9	(0%-30%)			
Dimethylphthalate	1680	U	101	1180	ug/kg	3.23	70.3	(0%-30%)			
Diphenylamine	1680	U	101	1240	ug/kg	0.832	74.3	(0%-30%)			
Fluoranthene	1680	U	10.1	1160	ug/kg	6.39	69.1	(0%-30%)			
Fluorene	1680	U	10.1	1150	ug/kg	2.48	68.6	(0%-30%)			
Hexachlorobenzene	1680	U	101	1400	ug/kg	1.34	83.7	(0%-30%)			
Hexachlorobutadiene	1680	U	101	973	ug/kg	5.23	58.1	(0%-30%)			
Hexachlorocyclopentadiene	1680	U	101	540	ug/kg	7.72	32.3	(0%-30%)			
Hexachloroethane	1680	U	101	938	ug/kg	1.70	56	(0%-30%)			
Indeno(1,2,3-cd)pyrene	1680	U	10.1	1060	ug/kg	2.22	63.4	(0%-30%)			

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## QC Summary

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Semi-Volatile-GC/MS</b>											
Batch	1412740										
Isophorone	1680	U	101	1150	ug/kg	5.95	68.9	(0%-30%)			
N-Nitrosodipropylamine	1680	U	101	1020	ug/kg	7.85	60.8	(0%-30%)	RMB	08/20/14	12:16
Naphthalene	1680	U	10.1	1050	ug/kg	3.02	62.7	(0%-30%)			
Nitrobenzene	1680	U	101	1050	ug/kg	8.73	62.9	(0%-30%)			
Pentachlorophenol	1680	U	101	1130	ug/kg	7.18	67.2	(0%-30%)			
Phenanthrene	1680	U	10.1	1170	ug/kg	2.38	70	(0%-30%)			
Phenol	1680	U	101	1010	ug/kg	12.7	60.3	(0%-30%)			
Pyrene	1680	U	10.1	1390	ug/kg	3.64	83.1	(0%-30%)			
bis(2-Chloro-1-methylethyl)ether	1680	U	101	963	ug/kg	2.13	57.5	(0%-30%)			
bis(2-Chloroethoxy)methane	1680	U	101	1070	ug/kg	7.14	64.1	(0%-30%)			
bis(2-Chloroethyl) ether	1680	U	101	960	ug/kg	5.99	57.3	(0%-30%)			
bis(2-Ethylhexyl)phthalate	1680	U	101	1470	ug/kg	6.22	87.7	(0%-30%)			
m-Nitroaniline	1680	U	101	1140	ug/kg	1.50	68.3	(0%-30%)			
o-Cresol	1680	U	101	1040	ug/kg	10.5	62.3	(0%-30%)			
o-Nitroaniline	1680	U	111	1190	ug/kg	1.39	70.9	(0%-30%)			
p-Nitroaniline	1680	U	101	1410	ug/kg	3.22	84.4	(0%-30%)			
**2,4,6-Tribromophenol	3350		2980	2820	ug/kg		84.2	(20%-122%)			
**2-Fluorobiphenyl	1680		1060	1060	ug/kg		63.5	(25%-100%)			
**2-Fluorophenol	3350		2260	2110	ug/kg		62.8	(23%-107%)			
**Nitrobenzene-d5	1680		1080	1050	ug/kg		62.4	(21%-103%)			
**Phenol-d5	3350		2330	2140	ug/kg		63.8	(25%-108%)			
**p-Terphenyl-d14	1680		1290	1360	ug/kg		81.2	(31%-124%)			

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## QC Summary

Workorder: 354864

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Project Description: RC-232 Soil

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
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### 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 or %RPD not applicable.

^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

\* Indicates that a Quality Control parameter was not within specifications.

For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

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

Date: 6 October 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 600-332  
 Subject: Wet Chemistry - Data Package No. X0074-GEL

**INTRODUCTION**

This memo presents the results of data validation on Data Package No. X0074 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
J1TXF8	8/12/14	Soil	C	See note 1

1 – Nitrate/nitrite by 353.2.

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: 28 days for nitrate/nitrite.

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 Blanks

Method blank analyses are performed to determine the extent of laboratory contamination introduced through sampling, sample preparation and analysis. At least one acceptable method blank analysis must be conducted for every 20 samples. No contaminants should be present in the method blank. All blank results must fall below the contract required detection limit (CRQL) to be acceptable.

All method blank results were acceptable.

### Field Blanks

No field blanks were submitted for analysis.

## · **Accuracy**

### Matrix Spike and Laboratory Control Sample

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

All 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 (39.8%), all nitrate/nitrite results were qualified as estimates and flagged "J".

All other laboratory duplicate results were acceptable.

#### Field Duplicate

No field duplicates were submitted for analysis.

#### **Analytical Detection Levels**

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

#### **Completeness**

Data package X0074 was submitted for validation and verified for completeness. Completeness is based on the percentage of data determined to be valid (i.e., not rejected). The completion percentage was 100%.

#### **MAJOR DEFICIENCIES**

None found.

#### **MINOR DEFICIENCIES**

The following minor deficiencies were noted:

- Due to an RPD outside QC limits (39.8%), all nitrate/nitrite 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*.

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**

WET CHEMISTRY DATA QUALIFICATION SUMMARY\*

<b>SDG: X0074</b>	<b>REVIEWER: ELR</b>	<b>Project: 600-332</b>	<b>PAGE <u>1</u> OF <u>1</u></b>
<b>COMPOUND</b>	<b>QUALIFIER</b>	<b>SAMPLES AFFECTED</b>	<b>REASON</b>
Nitrate/nitrite	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: September 12, 2014

Company : WC-Hanford, Inc.  
 Address : 2620 Fermi Avenue  
 MSIN H4-21  
 Richland, Washington 99354

Contact: Joan Kessner  
 Project: RC-232 Soil

Client SDG: X0074

Client Sample ID: J1TXF8  
 Sample ID: 354864001  
 Matrix: SOIL  
 Collect Date: 12-AUG-14 13:14  
 Receive Date: 15-AUG-14  
 Collector: Client  
 Moisture: .541%

Project: WCHN00213  
 Client ID: WCHN001

*Handwritten signature and date: 10/5/14*

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
<b>Nutrient Analysis</b>											
EPA 353.2 Nitrogen, Nitrate/Nitrite "Dry Weight Corrected"											
Nitrogen, Nitrate/Nitrite		3.09 <i>J</i>	0.161	0.473	mg/kg	1	KLP1	08/28/14	1446	1412268	1

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 353.2 Modified	EPA 353.2 Modified Nitrate/Nitrite	KLP1	08/28/14	0930	1412267

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 353.2 Modified	

Notes:

**Appendix 4**

**Laboratory Narrative and Chain-of-Custody Documentation**

**General Chemistry Narrative  
WC-HANFORD, INC. (WCHN)  
SDG X0074**

**Method/Analysis Information**

<b>Product:</b>	Nitrate + Nitrite		
<b>Analytical Batch:</b>	1412268	<b>Method:</b>	EPA 353.2 Nitrogen and Nitrate/Nitrite
<b>Prep Batch :</b>	1412267	<b>Method:</b>	EEPA 353.2 Modified

**Sample Analysis**

The following samples were analyzed using the analytical protocol as established in EPA 353.2 Modified:

<b>Sample ID</b>	<b>Client ID</b>
354864001	J1TXF8
1203150098	MB for batch 1412267
1203150099	Laboratory Control Sample (LCS)
1203150100	354864001(J1TXF8) Sample Duplicate (DUP)
1203150101	354864001(J1TXF8) Matrix Spike (MS)

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

**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-GC-E-128 REV# 8.

**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.

**Calibration Information**

The Nutrient analysis was performed on a Lachat QuickChem FIA+ 8500 Series.

**Calibration Verification Information**

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

**Continuing Calibration Blanks**

All continuing calibration blanks (CCBs) associated with reported data from this batch were within acceptance limits.

**Y Intercept Rule**

The absolute value of the intercept is less than 3 times the MDL.

**Quality Control (QC) Information****Method Blank (MB) Statement**

The MB analyzed with this SDG met the acceptance criteria.

**Laboratory Control Sample (LCS) Recovery**

The LCS spike recovery met the acceptance limits.

**Quality Control (QC) Designation**

The following sample was selected for QC analysis: 354864001 (JITXF8).

**Matrix Spike (MS)/Post Spike (PS) Recovery Statement**

The MS/PS recovery for this sample set was within the required acceptance limits.

**Duplicate Relative Percent Difference (RPD) Statement**

The Relative Percent Difference (RPD) between the sample and duplicate falls outside of the established acceptance limits because of the heterogeneous matrix of the sample: 1203150100 (JITXF8).

**Technical Information**

GEL assigns holding times based on the date and time of sample collection. Those holding times expressed in hours are calculated in the AlphaLims system by hours. Those holding times expressed as days expire at midnight on the day of expiration.

**Holding Times**

All samples in this SDG met the specified holding time.

**Sample Dilutions**

The samples in this SDG did not require dilutions.

**Sample Re-analysis**

The samples in this SDG did not require re-analysis.

**Miscellaneous Information****Data Exception (DER) Documentation**

The following DER was generated for this SDG: 1329045. 1203150100 (JITXF8).

**Additional Comments**

Additional comments were not required for this SDG.

**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. 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.

**Certification Statement**

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

**Review Validation:**

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

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

Reviewer: \_\_\_\_\_ Date: 16Sep14

<b>DATA EXCEPTION REPORT</b>			
<b>Mo. Day Yr.</b> 28-AUG-14	<b>Division:</b> Industrial	<b>Quality Criteria:</b> Specifications	<b>Type:</b> Process
<b>Instrument Type:</b> LACHAT Flow Injection Analyzer	<b>Test / Method:</b> EPA 353.2 Modified	<b>Matrix Type:</b> Solid	<b>Client Code:</b> SONO, WCHN
<b>Batch ID:</b> 1412268	<b>Sample Numbers:</b> See Below		
<b>Potentially affected work order(s)(SDG): 354864(X0074),355092</b>			
<b>Application Issues:</b> Failed RPD for DUP			
<b>Specification and Requirements Exception Description:</b>		<b>DER Disposition:</b>	
1. Failed RPD for DUP:  QC   1203150100DUP		1. The Relative Percent Difference (RPD) between the sample and duplicate falls outside of the established acceptance limits because of the heterogeneous matrix of the sample.	

**Originator's Name:**  
Kristen Parson      28-AUG-14

**Data Validator/Group Leader:**  
Aubrey Kingsbury      29-AUG-14

<b>Washington Closure Hanford</b>		<b>CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST</b>				RC-232-087	Page 1 of 1
Director <i>W Stowe</i>	Company Contact Joan Kessner	Telephone No. 375-4888	Project Coordinator KESSNER, JH	Price Code 8C	Data Turnaround <b>15 Days</b>		
Project Designation 100-IU-2 & 100-IU-6 Remaining Waste Sites	Sampling Location 600-332, Gable Mt. firing range septic system	SAF No. RC-232	Method of Shipment Commerical Carrier / <i>Fed Ex</i>				
Field No. <i>RCL-07-012</i>	Field Logbook No. EL-1667-02	COA 0603322000	Bill of Lading/Air Bill No. <i>See OSAC</i>				
Shipped To GEL Laboratories Charleston	Offsite Property No. <i>A131218</i>						

POSSIBLE SAMPLE HAZARDS/REMARKS  Special Handling and/or Storage	Preservation	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	None
	Type of Container	GP	GP	aG	Gs*	aG	aG	aG	aG	GP
	No. of Container(s)	1	1	1	3	1	1	1	1	1
	Volume	250mL	250mL	125mL	40mL	250mL	250mL	250mL	250mL	500mL
	Sample Analysis	See item (1) in Special Instructions	NO2/NO3 - 353.1 (Nitrogen in Nitrite and Nitrate)	TPH-Diesel Range - WTPH-D-*	TPH-Gasoline Range - WTPH-G	Semi-VOA - 8270 (TCL)	PAHs - 8310	PCBs - 8082	Pesticides - 8081; Chloro-Herbicides - EPA8151	ICP Metals (TCLP) - 1311/8010; Mercury (TCLP) - 1311/7470

Sample No.	Matrix	Sample Date	Sample Time								
TXF09	SOIL	8/12/14	1314	✓	✓	✓	✓	✓	✓	✓	✓

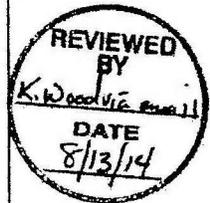
CHAIN OF POSSESSION		Sign/Print Names	
Relinquished By/Removed From <i>W Stowe</i>	Date/Time 8-12-14 1400	Received By/Stored In <i>Joan Kessner</i>	Date/Time 8/12/14 1400
Relinquished By/Removed From <i>W Stowe</i>	Date/Time 8-12-14 1637	Received By/Stored In <i>Fridge 3A Battelle</i>	Date/Time 8/12/14 1637
Relinquished By/Removed From <i>W Stowe</i>	Date/Time 8-13-14 0755	Received By/Stored In <i>STH Sexton</i>	Date/Time 8/13/14 0755
Relinquished By/Removed From <i>W Stowe</i>	Date/Time 8-13-14 0800	Received By/Stored In <i>FED EX</i>	Date/Time 8/13/14 0800
Relinquished By/Removed From <i>W Stowe</i>	Date/Time 8-13-14 0900	Received By/Stored In <i>Chris Sanchez</i>	Date/Time 8/13/14 0900
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time

**SPECIAL INSTRUCTIONS**

Perform extraction of TCLP analysis and await direction from J. Kessner before proceeding to analysis.

(1) ICP Metals - 8010TR (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)

\* Custodian unavailable to remove samples from controlled storage. Shipper removed samples, taking custody for shipment to lab.



ANAL SAMPLE DISPOSITION WCH-EE-011	Disposal Method	Disposed By	Date/Time
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**Appendix 5**  
**Data Validation Supporting Documentation**

**GENERAL CHEMISTRY ANALYSIS DATA VALIDATION CHECKLIST**

VALIDATION LEVEL:	A	B	<b>C</b>	D	E
PROJECT:	600-332		DATA PACKAGE: X0074		
VALIDATOR:	ELR	LAB: Cael	DATE: 10/5/14		
		SDG: X0074			
ANALYSES PERFORMED					
Anions/IC	TOC	TOX	TPH-418.1	Oil and Grease	Alkalinity
Ammonia	BOD/COD	Chloride	Chromium-VI	pH	<b>NO<sub>3</sub>/NO<sub>2</sub></b>
Sulfate	TDS	TKN	Phosphate		
SAMPLES/MATRIX					
J15XFB					
Soil					

**1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE**

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

Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

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

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

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

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

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

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

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

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

Comments: \_\_\_\_\_  
 \_\_\_\_\_

**GENERAL CHEMISTRY ANALYSIS DATA VALIDATION CHECKLIST**

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

ICB and CCB checks performed for all applicable analyses? (Levels D, E)..... Yes No N/A  
ICB and CCB results acceptable? (Levels D, E) ..... Yes No N/A  
Laboratory blanks analyzed? ..... Yes No N/A  
Laboratory blank results acceptable?..... Yes No N/A  
Field blanks analyzed? (Levels C, D, E) ..... Yes No N/A  
Field blank results acceptable? (Levels C, D, E)..... Yes No N/A  
Transcription/calculation errors? (Levels D, E)..... Yes No N/A

Comments: no FB  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

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

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

Comments: \_\_\_\_\_  
\_\_\_\_\_  
no FB  
\_\_\_\_\_

**GENERAL CHEMISTRY ANALYSIS DATA VALIDATION CHECKLIST**

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

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

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**6. HOLDING TIMES (all levels)**

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

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**GENERAL CHEMISTRY ANALYSIS DATA VALIDATION CHECKLIST**

**7. RESULT QUANTITATION AND DETECTION LIMITS (all levels)**

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

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Appendix 6**  
**Additional Documentation Requested by Client**

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

**QC Summary**

Report Date: September 12, 2014

Page 1 of 1

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

Workorder: 354864      Client SDG: X0074      Project Description: RC-232 Soil

Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
<b>Nutrient Analysis</b>											
Batch	1412268										
QC1203150100	354864001	DUP									
Nitrogen, Nitrate/Nitrite		3.09		4.63	mg/kg	39.8*		(0%-20%)	KLP1	08/28/14	14:52
QC1203150099	LCS										
Nitrogen, Nitrate/Nitrite	10.0			9.97	mg/kg		99.7	(90%-110%)		08/28/14	14:45
QC1203150098	MB										
Nitrogen, Nitrate/Nitrite			U	0.170	mg/kg					08/28/14	14:44
QC1203150101	354864001	MS									
Nitrogen, Nitrate/Nitrite	9.74	3.09		14.3	mg/kg		115	(75%-125%)		08/28/14	14:53

**Notes:**

The Qualifiers in this report are defined as follows:

- < Sample is below the EPA guidance level for Reactive Releasable Cyanide and/or Reactive Releasable Sulfide
- > Result greater than quantifiable range or greater than upper limit of the analysis range
- 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. The associated blank concentration is  $\geq$  EQL or is  $>$  5% of the measured concentration and/or decision level for associated samples.
- D Results are reported from a diluted aliquot of sample.
- 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

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more or %RPD not applicable.  
 ^ 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.