SAF-RC-107
100-H Remaining Sites Burial Grounds – Soil Full Protocol
FINAL VALIDATION PACKAGE

COMPLETE COPY OF FINAL VALIDATION PACKAGE TO:

Kathy Wendt H4-21

COMMENTS:

SDG XP0168 SAF-RC-107

Waste Site: 100-H-28

Date: 30 March 2015
To: Washington Closure Hanford Inc. (technical representative)
From: ELR Consulting
Project: 100-H Remaining Sites Burial Grounds – Soil Full Protocol - Waste Site 100-H-28
Subject: Semivolatile Organic - Data Package No. XP0168-GEL

INTRODUCTION

This memo presents the results of data validation on Data Package No. XP0168 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
J1V1L0	11/24/14	Soil	C	See note 1
J1V1L1	11/24/14	Soil	C	See note 1
J1V1L2	11/20/14	Soil	C	See note 1
J1V1L3	11/20/14	Soil	C	See note 1
J1V1L4	11/24/14	Soil	C	See note 1
J1V1L5	11/24/14	Soil	C	See note 1
J1V1L6	11/24/14	Soil	C	See note 1
J1V1L7	11/24/14	Soil	C	See note 1
J1V1L8	11/20/14	Soil	C	See note 1
J1V1L9	11/20/14	Soil	C	See note 1
J1V1M0	11/20/14	Soil	C	See note 1
J1V1M1	11/20/14	Soil	C	See note 1
J1V1M2	11/20/14	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 LCS recoveries outside QC limits, all 2,4-dichlorophenol (23.2%), 2-methyl-4,6-dinitrophenol (43%), hexachlorocyclopentadiene (48.5%) and pentachlorophenol (45.1%) results were qualified as estimates and flagged "J".

Due to matrix spike duplicate recoveries outside QC limits, all 1,2-dichlorobenzene (48.7%), 1,3-dichlorobenzene (46.5%), 1,4-dichlorobenzene (48.6%), 2,4,5-trichlorophenol (47.4%), 2,4,6-trichlorophenol (48.2%), 2,4-dichlorophenol (49.5%), 2,4-dimethylphenol (46.6%), 2,4-dinitrophenol (21.8%), 2,6-dinitrotoluene (48.9%), 2-chlorophenol (46.6%), 2-methyl-4,6-dinitrophenol (38.6%), 2-methylnaphthalene (49.3%), 2-nitrophenol (47.7%), 4-chloro-3-methylphenol (49.3%), 4-chloroanaline (49%), 4-nitrophenol (49%), acenaphthene (47.9%), anthracene (49.3%), benzo(a)anthracene (49.3%), benzo(a)pyrene (47.8%), benzo(b)fluoranthene (49.5%), benzo(g,h,i)perylene (43.1%), benzo(k)fluoranthene (49.9%), butylbenzylphthalate (49.4%), dibenzo(a,h)anthracene (45.1%), fluorene (49.4%), hexachlorobenzene (49.3%), hexachloroethane (47.8%), ideno(1,2,3-cd)pyrene (43.2%), n-nitrosodipropylamine (48.9%), naphthalene (49.5%), pentachlorophenol (44.8%), phenathrene (48%), phenol (47.5%%), pyrene (40.6%), bis(2-chloro-1-methylethyl)ether (46.4%), bis(2-chloroethyl)ether (47.2%) and o-cresol (47.1%) 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 RPDs outside QC limits, all 2,4,5-trichlorophenol (32.3%), 2,4,6-trichlorophenol (31.7%), 2,4-dinitrophenol (91.6%), 2,4-dinitrotoluene (34.8%), 2,6-dinitrotoluene (33.6%), 2-methyl-4,6-dinitrophenol (61.2%), 3,3-dichlorobenzidine (32.5%), 3 and/or 4-methylphenol (30.8%%), 4-bromophenylphenylether (35.2%), 4-nitrophenol (42.9%), acenaphthene (31.6%), anthracene (34.3%), benzo(a)anthracene (36.2%), benzo(a)pyrene (34.6%), benzo(b)fluoranthene (31.3%), benzo(g,h,i)perylene (54.4%), butylbenzylphthalate (41.6%), carbazole (35.6%), chrysene (35.3%), di-n-butylphthalate (34.7%), di-n-octylphthalate (30.6%), dibenzo(a,h)anthracene (52.3%), diethylphthalate (32.8%), dimethylphthalate (30.8%), diphenylamine (32.5%), fluoranthene (34.2%), fluorene (32.0%), hexachlorobenzene (37.7%), ideno(1,2,3-cd)pyrene (53.6%), n-nitrosodipropylamine (30.8%), naphthalene (30.9%), pentachlorophenol (42.6%), phenathrene (35.9%), pyrene (44.1%), bis(2-chloroethyl)ether (30.2%), bis(2-ethylhexyl)phthalate (36.0%), m-nitroanaline (31.7%) and p-nitroanaline (32.0%) results were qualified as estimates and flagged "J".

All other duplicate results were acceptable.

Field Duplicate Samples

One set field duplicates (J1V1L8/J1V1M2) were submitted for analysis. Laboratory duplicates are compared using the same criteria as for laboratory results. All field duplicate results are acceptable.

- **Analytical Detection Levels**

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

- **Completeness**

Data package No. XP0168 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 LCS recoveries outside QC limits, all 2,4-dichlorophenol (23.2%), 2-methyl-4,6-dinitrophenol (43%), hexachlorocyclopentadiene (48.5%) and pentachlorophenol (45.1%) results were qualified as estimates and flagged "J".

- Due to matrix spike duplicate recoveries outside QC limits, all 1,2-dichlorobenzene (48.7%), 1,3-dichlorobenzene (46.5%), 1,4-dichlorobenzene (48.6%), 2,4,5-trichlorophenol (47.4%), 2,4,6-trichlorophenol (48.2%), 2,4-dichlorophenol (49.5%), 2,4-dimethylphenol (46.6%), 2,4-dinitrophenol (21.8%), 2,6-dinitrotoluene (48.9%), 2-chlorophenol (46.6%), 2-methyl-4,6-dinitrophenol (38.6%), 2-methylnaphthalene (49.3%), 2-nitrophenol (47.7%), 4-chloro-3-methylphenol (49.3%), 4-chloroanaline (49%), 4-nitrophenol (49%), acenaphthene (47.9%), anthracene (49.3%), benzo(a)anthracene (49.3%), benzo(a)pyrene (47.8%), benzo(b)fluoranthene (49.5%), benzo(g,h,i)perylene (43.1%), benzo(k)fluoranthene (49.9%), butylbenzylphthalate (49.4%), dibenzo(a,h)anthracene (45.1%), fluorene (49.4%), hexachlorobenzene (49.3%), hexachloroethane (47.8%), ideno(1,2,3-cd)pyrene (43.2%), n-nitrosodipropylamine (48.9%), naphthalene (49.5%), pentachlorophenol (44.8%), phenathrene (48%), phenol (47.5%%), pyrene (40.6%), bis(2-chloro-1-methylethyl)ether (46.4%), bis(2-chloroethyl)ether (47.2%) and o-cresol (47.1%) results were qualified as estimates and flagged "J".

- Due to RPDs outside QC limits, all 2,4,5-trichlorophenol (32.3%), 2,4,6-trichlorophenol (31.7%), 2,4-dinitrophenol (91.6%), 2,4-dinitrotoluene (34.8%), 2,6-dinitrotoluene (33.6%), 2-methyl-4,6-dinitrophenol (61.2%), 3,3-dichlorobenzidine (32.5%), 3 and/or 4-methylphenol (30.8%%), 4-bromophenylphenylether (35.2%), 4-nitrophenol (42.9%), acenaphthene (31.6%), anthracene (34.3%), benzo(a)anthracene (36.2%), benzo(a)pyrene (34.6%), benzo(b)fluoranthene (31.3%), benzo(g,h,i)perylene (54.4%), butylbenzylphthalate (41.6%), carbazole (35.6%), chrysene (35.3%), di-n-butylphthalate (34.7%), di-n-octylphthalate (30.6%), dibenzo(a,h)anthracene (52.3%), diethylphthalate (32.8%), dimethylphthalate (30.8%), diphenylamine (32.5%), fluoranthene (34.2%), fluorene (32.0%),

hexachlorobenzene (37.7%), ideno(1,2,3-cd)pyrene (53.6%), n-nitrosodipropylamine (30.8%), naphthalene (30.9%), pentachlorophenol (42.6%), phenathrene (35.9%), pyrene (44.1%), bis(2-chloroethyl)ether (30.2%), bis(2-ethylhexyl)phthalate (36.0%), m-nitroanaline (31.7%) and p-nitroanaline (32.0%) 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 DATA QUALIFICATION SUMMARY*

SDG: XP0168	**REVIEWER: ELR**	**Project: 100-H-28**	**PAGE 1 OF 1**
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
2,4-dichlorophenol 2-methyl-4,6-dinitrophenol hexachlorocyclopentadiene pentachlorophenol	J	All	LCS recovery
1,2-dichlorobenzene 1,3-dichlorobenzene 1,4-dichlorobenzene 2,4,5-trichlorophenol 2,4,6-trichlorophenol 2,4-dichlorophenol 2,4-dimethylphenol 2,4-dinitrophenol 2,6-dinitrotoluene 2-chlorophenol 2-methyl-4,6-dinitrophenol 2-methylnaphthalene 2-nitrophenol 4-chloro-3-methylphenol 4-chloroanaline 4-nitrophenol acenaphthene anthracene benzo(a)anthracene benzo(a)pyrene benzo(b)fluoranthene benzo(g,h,i)perylene benzo(k)fluoranthene butylbenzylphthalate dibenzo(a,h)anthracene fluorine hexachlorobenzene* hexachloroethane ideno(1,2,3-cd)pyrene n-nitrosodipropylamine naphthalene pentachlorophenol phenathrene phenol pyrene bis(2-chloro-1-methylethyl)ether bis(2-chloroethyl)ether	J	All	MSD recovery

SEMIVOLATILE DATA QUALIFICATION SUMMARY*

SDG: XP0168	REVIEWER: ELR	Project: 100-H-28	PAGE_1_OF_1
o-cresol			
2,4,5-trichlorophenol 2,4,6-trichlorophenol 2,4-dinitrophenol 2,4-dinitrotoluene 2,6-dinitrotoluene 2-methyl-4,6-dinitrophenol 3,3-dichlorobenzidine 3 and/or 4-methylphenol 4-bromophenylphenylether 4-nitrophenol acenaphthene anthracene benzo(a)anthracene benzo(a)pyrene benzo(b)fluoranthene benzo(g,h,i)perylene butylbenzylphthalate carbazole chrysene di-n-butylphthalate di-n-octylphthalate dibenzo(a,h)anthracene diethylphthalate dimethylphthalate diphenylamine fluoranthene fluorine hexachlorobenzene ideno(1,2,3-cd)pyrene n-nitrosodipropylamine naphthalene pentachlorophenol phenathrene pyrene bis(2-chloroethyl)ether bis(2-ethylhexyl)phthalate m-nitroanaline p-nitroanaline	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

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: **RC-107 Soil**

Report Date: December 1, 2014

Client SDG: XP0168

Client Sample ID:	J1V1L2	Project:	WCHN00720
Sample ID:	361900001	Client ID:	WCHN001
Matrix:	Soil		
Collect Date:	20-NOV-14 11:02		
Receive Date:	25-NOV-14		
Collector:	Client		
Moisture:	2.5%		

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Semi-Volatile-GC/MS										
8270D/3541 BNA Soil Automated Soxhlet "Dry Weight Corrected"										
1,2,4-Trichlorobenzene	U	102	102	341	ug/kg	1	RMB 11/26/14	1154	1439085	1
1,2-Dichlorobenzene	U	102	102	341	ug/kg	1				
1,3-Dichlorobenzene	U	102	102	341	ug/kg	1				
1,4-Dichlorobenzene	U	102	102	341	ug/kg	1				
2,4,5-Trichlorophenol	U	102	102	341	ug/kg	1				
2,4,6-Trichlorophenol	U	102	102	341	ug/kg	1				
2,4-Dichlorophenol	U	102	102	341	ug/kg	1				
2,4-Dimethylphenol	U	102	102	341	ug/kg	1				
2,4-Dinitrophenol	U	102	102	682	ug/kg	1				
2,4-Dinitrotoluene	U	102	102	341	ug/kg	1				
2,6-Dinitrotoluene	U	102	102	341	ug/kg	1				
2-Chloronaphthalene	U	10.2	10.2	34.1	ug/kg	1				
2-Chlorophenol	U	102	102	341	ug/kg	1				
2-Methyl-4,6-dinitrophenol	U	102	102	341	ug/kg	1				
2-Methylnaphthalene	U	10.2	10.2	34.1	ug/kg	1				
2-Nitrophenol	U	102	102	341	ug/kg	1				
3,3'-Dichlorobenzidine	U	102	102	341	ug/kg	1				
4-Bromophenylphenylether	U	102	102	341	ug/kg	1				
4-Chloro-3-methylphenol	U	136	136	341	ug/kg	1				
4-Chloroaniline	U	102	102	341	ug/kg	1				
4-Chlorophenylphenylether	U	102	102	341	ug/kg	1				
4-Nitrophenol	U	102	102	341	ug/kg	1				
Acenaphthene	U	10.2	10.2	34.1	ug/kg	1				
Acenaphthylene	U	10.2	10.2	34.1	ug/kg	1				
Anthracene	U	10.2	10.2	34.1	ug/kg	1				
Benzo(a)anthracene	U	10.2	10.2	34.1	ug/kg	1				
Benzo(a)pyrene	U	10.2	10.2	34.1	ug/kg	1				
Benzo(b)fluoranthene	U	10.2	10.2	34.1	ug/kg	1				
Benzo(ghi)perylene	U	10.2	10.2	34.1	ug/kg	1				
Benzo(k)fluoranthene	U	10.2	10.2	34.1	ug/kg	1				
Butylbenzylphthalate	U	102	102	341	ug/kg	1				
Carbazole	U	10.2	10.2	34.1	ug/kg	1				
Chrysene	U	10.2	10.2	34.1	ug/kg	1				

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Contact: Joan Kessner
Project: **RC-107 Soil**

3/27/15

Report Date: December 1, 2014

Client SDG: XP0168

Client Sample ID: J1V1L2 Project: WCHN00720
Sample ID: 361900001 Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Semi-Volatile-GC/MS										
8270D/3541 BNA Soil Automated Soxhlet "Dry Weight Corrected"										
Di-n-butylphthalate	U	102	102	341	ug/kg	1				
Di-n-octylphthalate	U	102	102	341	ug/kg	1				
Dibenzo(a,h)anthracene	U	10.2	10.2	34.1	ug/kg	1				
Dibenzofuran	U	102	102	341	ug/kg	1				
Diethylphthalate	U	102	102	341	ug/kg	1				
Dimethylphthalate	U	102	102	341	ug/kg	1				
Diphenylamine	U	102	102	341	ug/kg	1				
Fluoranthene	J	13.6	10.2	34.1	ug/kg	1				
Fluorene	U	10.2	10.2	34.1	ug/kg	1				
Hexachlorobenzene	U	102	102	341	ug/kg	1				
Hexachlorobutadiene	U	102	102	341	ug/kg	1				
Hexachlorocyclopentadiene	U	102	102	341	ug/kg	1				
Hexachloroethane	U	102	102	341	ug/kg	1				
Indeno(1,2,3-cd)pyrene	U	10.2	10.2	34.1	ug/kg	1				
Isophorone	U	102	102	341	ug/kg	1				
N-Nitrosodipropylamine	U	102	102	341	ug/kg	1				
Naphthalene	U	10.2	10.2	34.1	ug/kg	1				
Nitrobenzene	U	102	102	341	ug/kg	1				
Pentachlorophenol	U	102	102	341	ug/kg	1				
Phenanthrene	U	10.2	10.2	34.1	ug/kg	1				
Phenol	U	102	102	341	ug/kg	1				
Pyrene	J	13.0	10.2	34.1	ug/kg	1				
bis(2-Chloro-1-methylethyl)ether	U	102	102	341	ug/kg	1				
bis(2-Chloroethoxy)methane	U	102	102	341	ug/kg	1				
bis(2-Chloroethyl) ether	U	102	102	341	ug/kg	1				
bis(2-Ethylhexyl)phthalate	U	102	102	341	ug/kg	1				
3- and/or 4-Methylphenol	U	102	102	341	ug/kg	1				
m-Nitroaniline	U	102	102	341	ug/kg	1				
o-Cresol	U	102	102	341	ug/kg	1				
o-Nitroaniline	U	113	113	341	ug/kg	1				
p-Nitroaniline	U	102	102	341	ug/kg	1				

Surrogate/Tracer recovery	*Result*	*Nominal*	*Recovery%*	*Acceptable Limits*	*Date Time:*	*11/26/14 11 54*
2,4,6-Tribromophenol	1470 ug/kg	3410	43.1	(20%-122%)		
2-Fluorophenol	1540 ug/kg	3410	45.2	(23%-107%)		
Phenol-d5	1540 ug/kg	3410	45.1	(25%-108%)		
p-Terphenyl-d14	651 ug/kg	1700	38.2	(31%-124%)		
Nitrobenzene-d5	804 ug/kg	1700	47.2	(21%-103%)		

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Project: **RC-107 Soil**

Report Date: December 1, 2014

Client SDG: XP0168

Client Sample ID: J1V1L2 Project: WCHN00720
Sample ID: 361900001 Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method

Semi-Volatile-GC/MS

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

2-Fluorobiphenyl	816 ug/kg	1700	47.8	(25%-100%)	

Tentatively Identified Compound (TIC)	*CAS No.*	*RT*	*Est. Concentration*	*Fit*	*Qual*	*Date Time:*	*11/26/14 11 54*
Trichloromethane	000067-66-3	2.025	161 ug/kg	94	NJ		
Furan, 2,5-dimethyl-	000625-86-5	2.525	377 ug/kg	91	NJ		
Unknown Aldol Condensate		3.816	5460 ug/kg		AJ		
5-Eicosene, (E)-	074685-30-6	15.121	486 ug/kg	97	NJ		

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	Prep Method 3541 8270D BNA for Soil	AXV1	11/25/14	1730	1439084

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	SW846 3541/8270D	

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Contact: Joan Kessner
Project: **RC-107 Soil**

3/27/15

Report Date: December 1, 2014

Client SDG: XP0168

Client Sample ID:	J1V1L3	Project:	WCHN00720
Sample ID:	361900002	Client ID:	WCHN001
Matrix:	Soil		
Collect Date:	20-NOV-14 10:51		
Receive Date:	25-NOV-14		
Collector:	Client		
Moisture:	1.67%		

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Semi-Volatile-GC/MS										
8270D/3541 BNA Soil Automated Soxhlet "Dry Weight Corrected"										
1,2,4-Trichlorobenzene	U	102	102	339	ug/kg	1	RMB 11/26/14	1329	1439085	1
1,2-Dichlorobenzene	U J	102	102	339	ug/kg	1				
1,3-Dichlorobenzene	U	102	102	339	ug/kg	1				
1,4-Dichlorobenzene	U	102	102	339	ug/kg	1				
2,4,5-Trichlorophenol	U	102	102	339	ug/kg	1				
2,4,6-Trichlorophenol	U	102	102	339	ug/kg	1				
2,4-Dichlorophenol	U	102	102	339	ug/kg	1				
2,4-Dimethylphenol	U	102	102	339	ug/kg	1				
2,4-Dinitrophenol	U	102	102	677	ug/kg	1				
2,4-Dinitrotoluene	U	102	102	339	ug/kg	1				
2,6-Dinitrotoluene	U	102	102	339	ug/kg	1				
2-Chloronaphthalene	U	10.2	10.2	33.9	ug/kg	1				
2-Chlorophenol	U J	102	102	339	ug/kg	1				
2-Methyl-4,6-dinitrophenol	U J	102	102	339	ug/kg	1				
2-Methylnaphthalene	U J	10.2	10.2	33.9	ug/kg	1				
2-Nitrophenol	U J	102	102	339	ug/kg	1				
3,3'-Dichlorobenzidine	U J	102	102	339	ug/kg	1				
4-Bromophenylphenylether	U J	102	102	339	ug/kg	1				
4-Chloro-3-methylphenol	U J	135	135	339	ug/kg	1				
4-Chloroaniline	U J	102	102	339	ug/kg	1				
4-Chlorophenylphenylether	U	102	102	339	ug/kg	1				
4-Nitrophenol	U J	102	102	339	ug/kg	1				
Acenaphthene	U J	10.2	10.2	33.9	ug/kg	1				
Acenaphthylene	U	10.2	10.2	33.9	ug/kg	1				
Anthracene	U J	10.2	10.2	33.9	ug/kg	1				
Benzo(a)anthracene	U	10.2	10.2	33.9	ug/kg	1				
Benzo(a)pyrene	U	10.2	10.2	33.9	ug/kg	1				
Benzo(b)fluoranthene	U	10.2	10.2	33.9	ug/kg	1				
Benzo(ghi)perylene	U	10.2	10.2	33.9	ug/kg	1				
Benzo(k)fluoranthene	U	10.2	10.2	33.9	ug/kg	1				
Butylbenzylphthalate	U	102	102	339	ug/kg	1				
Carbazole	U	10.2	10.2	33.9	ug/kg	1				
Chrysene	U	10.2	10.2	33.9	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-107 Soil**

Client SDG: XP0168

Report Date: December 1, 2014

Client Sample ID: J1V1L3
Sample ID: 361900002

Project: WCHN00720
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Semi-Volatile-GC/MS										
8270D/3541 BNA Soil Automated Soxhlet "Dry Weight Corrected"										
Di-n-butylphthalate	U	102	102	339	ug/kg	1				
Di-n-octylphthalate	U	102	102	339	ug/kg	1				
Dibenzo(a,h)anthracene	U	10.2	10.2	33.9	ug/kg	1				
Dibenzofuran	U	102	102	339	ug/kg	1				
Diethylphthalate	U	102	102	339	ug/kg	1				
Dimethylphthalate	U	102	102	339	ug/kg	1				
Diphenylamine	U	102	102	339	ug/kg	1				
Fluoranthene	U	10.2	10.2	33.9	ug/kg	1				
Fluorene	U	10.2	10.2	33.9	ug/kg	1				
Hexachlorobenzene	U	102	102	339	ug/kg	1				
Hexachlorobutadiene	U	102	102	339	ug/kg	1				
Hexachlorocyclopentadiene	U	102	102	339	ug/kg	1				
Hexachloroethane	U	102	102	339	ug/kg	1				
Indeno(1,2,3-cd)pyrene	U	10.2	10.2	33.9	ug/kg	1				
Isophorone	U	102	102	339	ug/kg	1				
N-Nitrosodipropylamine	U	102	102	339	ug/kg	1				
Naphthalene	U	10.2	10.2	33.9	ug/kg	1				
Nitrobenzene	U	102	102	339	ug/kg	1				
Pentachlorophenol	U	102	102	339	ug/kg	1				
Phenanthrene	U	10.2	10.2	33.9	ug/kg	1				
Phenol	U	102	102	339	ug/kg	1				
Pyrene	U	10.2	10.2	33.9	ug/kg	1				
bis(2-Chloro-1-methylethyl)ether	U	102	102	339	ug/kg	1				
bis(2-Chloroethoxy)methane	U	102	102	339	ug/kg	1				
bis(2-Chloroethyl) ether	U	102	102	339	ug/kg	1				
bis(2-Ethylhexyl)phthalate	U	102	102	339	ug/kg	1				
3- and/or 4-Methylphenol	U	102	102	339	ug/kg	1				
m-Nitroaniline	U	102	102	339	ug/kg	1				
o-Cresol	U	102	102	339	ug/kg	1				
o-Nitroaniline	U	112	112	339	ug/kg	1				
p-Nitroaniline	U	102	102	339	ug/kg	1				

Surrogate/Tracer recovery	*Result*	*Nominal*	*Recovery%*	*Acceptable Limits*	*Date Time:*	*11/26/14 13 29*
2-Fluorobiphenyl	1010 ug/kg	1690	59.8	(25%-100%)		
Phenol-d5	1960 ug/kg	3390	58.0	(25%-108%)		
2-Fluorophenol	1970 ug/kg	3390	58.2	(23%-107%)		
2,4,6-Tribromophenol	2000 ug/kg	3390	59.2	(20%-122%)		
p-Terphenyl-d14	856 ug/kg	1690	50.6	(31%-124%)		

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Project: **RC-107 Soil**

V 3/27/15

Report Date: December 1, 2014

Client SDG: XP0168

Client Sample ID: J1V1L3
Sample ID: 361900002

Project: WCHN00720
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method

Semi-Volatile-GC/MS

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

Nitrobenzene-d5	996 ug/kg	1690	58.8	(21%-103%)	

Tentatively Identified Compound (TIC)	*CAS No.*	*RT*	*Est. Concentration*	*Fit*	*Qual*	*Date Time:*	*11/26/14 13 29*
Trichloromethane	000067-66-3	2.015	181 ug/kg	97	NJ		
Furan, 2,5-dimethyl-	000625-86-5	2.52	278 ug/kg	94	NJ		
Unknown Aldol Condensate		3.82	6750 ug/kg		AJ		
Cyclopentane, (2-methylpropyl)-	003788-32-7	15.139	578 ug/kg	86	NJ		
unknown		22.025	144 ug/kg	0	J		

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	Prep Method 3541 8270D BNA for Soil	AXV1	11/25/14	1730	1439084

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	SW846 3541/8270D	

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Contact: Joan Kessner
Project: **RC-107 Soil**

3/27/15

Report Date: December 1, 2014

Client SDG: XP0168

Client Sample ID:	J1V1L8	Project:	WCHN00720
Sample ID:	361900003	Client ID:	WCHN001
Matrix:	Soil		
Collect Date:	20-NOV-14 10:08		
Receive Date:	25-NOV-14		
Collector:	Client		
Moisture:	3.57%		

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Semi-Volatile-GC/MS										
8270D/3541 BNA Soil Automated Soxhlet "Dry Weight Corrected"										
1,2,4-Trichlorobenzene	U	103	103	345	ug/kg	1	RMB 11/26/14	1400	1439085	1
1,2-Dichlorobenzene	U J	103	103	345	ug/kg	1				
1,3-Dichlorobenzene	U	103	103	345	ug/kg	1				
1,4-Dichlorobenzene	U	103	103	345	ug/kg	1				
2,4,5-Trichlorophenol	U	103	103	345	ug/kg	1				
2,4,6-Trichlorophenol	U	103	103	345	ug/kg	1				
2,4-Dichlorophenol	U	103	103	345	ug/kg	1				
2,4-Dimethylphenol	U	103	103	345	ug/kg	1				
2,4-Dinitrophenol	U	103	103	689	ug/kg	1				
2,4-Dinitrotoluene	U	103	103	345	ug/kg	1				
2,6-Dinitrotoluene	U	103	103	345	ug/kg	1				
2-Chloronaphthalene	U	10.3	10.3	34.5	ug/kg	1				
2-Chlorophenol	U J	103	103	345	ug/kg	1				
2-Methyl-4,6-dinitrophenol	U J	103	103	345	ug/kg	1				
2-Methylnaphthalene	U J	10.3	10.3	34.5	ug/kg	1				
2-Nitrophenol	U J	103	103	345	ug/kg	1				
3,3'-Dichlorobenzidine	U J	103	103	345	ug/kg	1				
4-Bromophenylphenylether	U J	103	103	345	ug/kg	1				
4-Chloro-3-methylphenol	U J	138	138	345	ug/kg	1				
4-Chloroaniline	U J	103	103	345	ug/kg	1				
4-Chlorophenylphenylether	U	103	103	345	ug/kg	1				
4-Nitrophenol	U J	103	103	345	ug/kg	1				
Acenaphthene	U J	10.3	10.3	34.5	ug/kg	1				
Acenaphthylene	U	10.3	10.3	34.5	ug/kg	1				
Anthracene	U J	10.3	10.3	34.5	ug/kg	1				
Benzo(a)anthracene	J	12.1	10.3	34.5	ug/kg	1				
Benzo(a)pyrene	U	10.3	10.3	34.5	ug/kg	1				
Benzo(b)fluoranthene	J	13.4	10.3	34.5	ug/kg	1				
Benzo(ghi)perylene	U	10.3	10.3	34.5	ug/kg	1				
Benzo(k)fluoranthene	U	10.3	10.3	34.5	ug/kg	1				
Butylbenzylphthalate	U	103	103	345	ug/kg	1				
Carbazole	U	10.3	10.3	34.5	ug/kg	1				
Chrysene	U	10.3	10.3	34.5	ug/kg	1				

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Contact: Joan Kessner
Project: **RC-107 Soil**

Report Date: December 1, 2014

Client SDG: XP0168

Client Sample ID: J1V1L8
Sample ID: 361900003

Project: WCHN00720
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Semi-Volatile-GC/MS										
8270D/3541 BNA Soil Automated Soxhlet "Dry Weight Corrected"										
Di-n-butylphthalate	U J	103	103	345	ug/kg	1				
Di-n-octylphthalate	U J	103	103	345	ug/kg	1				
Dibenzo(a,h)anthracene	U J	10.3	10.3	34.5	ug/kg	1				
Dibenzofuran	U	103	103	345	ug/kg	1				
Diethylphthalate	U J	103	103	345	ug/kg	1				
Dimethylphthalate	U	103	103	345	ug/kg	1				
Diphenylamine	U	103	103	345	ug/kg	1				
Fluoranthene	J	15.9	10.3	34.5	ug/kg	1				
Fluorene	U	10.3	10.3	34.5	ug/kg	1				
Hexachlorobenzene	U	103	103	345	ug/kg	1				
Hexachlorobutadiene	U	103	103	345	ug/kg	1				
Hexachlorocyclopentadiene	U J UJ	103	103	345	ug/kg	1				
Hexachloroethane	U J	103	103	345	ug/kg	1				
Indeno(1,2,3-cd)pyrene	U J	10.3	10.3	34.5	ug/kg	1				
Isophorone	U	103	103	345	ug/kg	1				
N-Nitrosodipropylamine	U J	103	103	345	ug/kg	1				
Naphthalene	U J	10.3	10.3	34.5	ug/kg	1				
Nitrobenzene	U	103	103	345	ug/kg	1				
Pentachlorophenol	U J	103	103	345	ug/kg	1				
Phenanthrene	U J	10.3	10.3	34.5	ug/kg	1				
Phenol	U J	103	103	345	ug/kg	1				
Pyrene	J J	12.4	10.3	34.5	ug/kg	1				
bis(2-Chloro-1-methylethyl)ether	U J	103	103	345	ug/kg	1				
bis(2-Chloroethoxy)methane	U	103	103	345	ug/kg	1				
bis(2-Chloroethyl) ether	U J	103	103	345	ug/kg	1				
bis(2-Ethylhexyl)phthalate	U J	103	103	345	ug/kg	1				
3- and/or 4-Methylphenol	U J	103	103	345	ug/kg	1				
m-Nitroaniline	U J	103	103	345	ug/kg	1				
o-Cresol	U J	103	103	345	ug/kg	1				
o-Nitroaniline	U	114	114	345	ug/kg	1				
p-Nitroaniline	U J	103	103	345	ug/kg	1				

Surrogate/Tracer recovery	*Result*	*Nominal*	*Recovery%*	*Acceptable Limits*	*Date Time:*	*11/26/14 14 00*
p-Terphenyl-d14	1080 ug/kg	1720	62.5	(31%-124%)		
Nitrobenzene-d5	1230 ug/kg	1720	71.4	(21%-103%)		
2-Fluorobiphenyl	1230 ug/kg	1720	71.1	(25%-100%)		
2-Fluorophenol	2320 ug/kg	3450	67.3	(23%-107%)		
Phenol-d5	2350 ug/kg	3450	68.0	(25%-108%)		

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Richland, Washington 99354
Contact: Joan Kessner
Project: **RC-107 Soil**

Client SDG: XP0168

Report Date: December 1, 2014

Client Sample ID: J1V1L8
Sample ID: 361900003

Project: WCHN00720
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method

Semi-Volatile-GC/MS

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

2,4,6-Tribromophenol	2540 ug/kg	3450	73.8	(20%-122%)	

Tentatively Identified Compound (TIC)	*CAS No.*	*RT*	*Est. Concentration*	*Fit*	*Qual*	*Date Time:*	*11/26/14 14 00*
Trichloromethane	000067-66-3	2.015	208 ug/kg	95	NJ		
Furan, 2,5-dimethyl-	000625-86-5	2.515	379 ug/kg	94	NJ		
unknown		3.544	163 ug/kg	0	J		
Unknown Aldol Condensate		3.82	8040 ug/kg		AJ		
1-Docosene	001599-67-3	15.13	850 ug/kg	99	NJ		
9-Octadecenamide, (Z)-	000301-02-0	17.259	253 ug/kg	86	NJ		

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	Prep Method 3541 8270D BNA for Soil	AXV1	11/25/14	1730	1439084

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	SW846 3541/8270D	

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Certificate of Analysis

Company : WC-Hanford, Inc.
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Richland, Washington 99354
Contact: Joan Kessner
Project: **RC-107 Soil**

Client SDG: XP0168

Report Date: December 1, 2014

Client Sample ID: J1V1L9
Sample ID: 361900004
Matrix: Soil
Collect Date: 20-NOV-14 10:38
Receive Date: 25-NOV-14
Collector: Client
Moisture: 4.25%

Project: WCHN00720
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Semi-Volatile-GC/MS										
8270D/3541 BNA Soil Automated Soxhlet "Dry Weight Corrected"										
1,2,4-Trichlorobenzene	U	104	104	348	ug/kg	1	RMB 11/26/14	1432	1439085	1
1,2-Dichlorobenzene	U	104	104	348	ug/kg	1				
1,3-Dichlorobenzene	U	104	104	348	ug/kg	1				
1,4-Dichlorobenzene	U	104	104	348	ug/kg	1				
2,4,5-Trichlorophenol	U	104	104	348	ug/kg	1				
2,4,6-Trichlorophenol	U	104	104	348	ug/kg	1				
2,4-Dichlorophenol	U	104	104	348	ug/kg	1				
2,4-Dimethylphenol	U	104	104	348	ug/kg	1				
2,4-Dinitrophenol	U	104	104	696	ug/kg	1				
2,4-Dinitrotoluene	U	104	104	348	ug/kg	1				
2,6-Dinitrotoluene	U	104	104	348	ug/kg	1				
2-Chloronaphthalene	U	10.4	10.4	34.8	ug/kg	1				
2-Chlorophenol	U	104	104	348	ug/kg	1				
2-Methyl-4,6-dinitrophenol	U	104	104	348	ug/kg	1				
2-Methylnaphthalene	U	10.4	10.4	34.8	ug/kg	1				
2-Nitrophenol	U	104	104	348	ug/kg	1				
3,3'-Dichlorobenzidine	U	104	104	348	ug/kg	1				
4-Bromophenylphenylether	U	104	104	348	ug/kg	1				
4-Chloro-3-methylphenol	U	139	139	348	ug/kg	1				
4-Chloroaniline	U	104	104	348	ug/kg	1				
4-Chlorophenylphenylether	U	104	104	348	ug/kg	1				
4-Nitrophenol	U	104	104	348	ug/kg	1				
Acenaphthene	U	10.4	10.4	34.8	ug/kg	1				
Acenaphthylene	U	10.4	10.4	34.8	ug/kg	1				
Anthracene	U	10.4	10.4	34.8	ug/kg	1				
Benzo(a)anthracene	J	23.3	10.4	34.8	ug/kg	1				
Benzo(a)pyrene	J	20.2	10.4	34.8	ug/kg	1				
Benzo(b)fluoranthene	J	29.2	10.4	34.8	ug/kg	1				
Benzo(ghi)perylene	J	11.8	10.4	34.8	ug/kg	1				
Benzo(k)fluoranthene	U	10.4	10.4	34.8	ug/kg	1				
Butylbenzylphthalate	U	104	104	348	ug/kg	1				
Carbazole	U	10.4	10.4	34.8	ug/kg	1				
Chrysene	J	21.9	10.4	34.8	ug/kg	1				

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3/27/15

Report Date: December 1, 2014

Client SDG: XP0168

Client Sample ID: J1V1L9
Sample ID: 361900004

Project: WCHN00720
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Semi-Volatile-GC/MS										
8270D/3541 BNA Soil Automated Soxhlet "Dry Weight Corrected"										
Di-n-butylphthalate	U J	104	104	348	ug/kg	1				
Di-n-octylphthalate	U J	104	104	348	ug/kg	1				
Dibenzo(a,h)anthracene	U J	10.4	10.4	34.8	ug/kg	1				
Dibenzofuran	U	104	104	348	ug/kg	1				
Diethylphthalate	U J	104	104	348	ug/kg	1				
Dimethylphthalate	U	104	104	348	ug/kg	1				
Diphenylamine	U	104	104	348	ug/kg	1				
Fluoranthene		44.2	10.4	34.8	ug/kg	1				
Fluorene	U	10.4	10.4	34.8	ug/kg	1				
Hexachlorobenzene	U	104	104	348	ug/kg	1				
Hexachlorobutadiene	U	104	104	348	ug/kg	1				
Hexachlorocyclopentadiene	U J	104	104	348	ug/kg	1				
Hexachloroethane	U J	104	104	348	ug/kg	1				
Indeno(1,2,3-cd)pyrene	J J	13.6	10.4	34.8	ug/kg	1				
Isophorone	U	104	104	348	ug/kg	1				
N-Nitrosodipropylamine	U J	104	104	348	ug/kg	1				
Naphthalene	U J	10.4	10.4	34.8	ug/kg	1				
Nitrobenzene	U	104	104	348	ug/kg	1				
Pentachlorophenol	U J	104	104	348	ug/kg	1				
Phenanthrene	J	29.9	10.4	34.8	ug/kg	1				
Phenol	U	104	104	348	ug/kg	1				
Pyrene	J	31.3	10.4	34.8	ug/kg	1				
bis(2-Chloro-1-methylethyl)ether	U	104	104	348	ug/kg	1				
bis(2-Chloroethoxy)methane	U	104	104	348	ug/kg	1				
bis(2-Chloroethyl) ether	U J	104	104	348	ug/kg	1				
bis(2-Ethylhexyl)phthalate	U J	104	104	348	ug/kg	1				
3- and/or 4-Methylphenol	U J	104	104	348	ug/kg	1				
m-Nitroaniline	U J	104	104	348	ug/kg	1				
o-Cresol	U J	104	104	348	ug/kg	1				
o-Nitroaniline	U	115	115	348	ug/kg	1				
p-Nitroaniline	U J	104	104	348	ug/kg	1				

Surrogate/Tracer recovery	*Result*	*Nominal*	*Recovery%*	*Acceptable Limits*	*Date Time:*	*11/26/14 14 32*
Nitrobenzene-d5	1090 ug/kg	1740	62.9	(21%-103%)		
2-Fluorobiphenyl	1110 ug/kg	1740	64.0	(25%-100%)		
2-Fluorophenol	2050 ug/kg	3480	58.9	(23%-107%)		
Phenol-d5	2100 ug/kg	3480	60.4	(25%-108%)		
2,4,6-Tribromophenol	2330 ug/kg	3480	66.9	(20%-122%)		

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Project: **RC-107 Soil**

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Report Date: December 1, 2014

Client Sample ID: J1V1L9
Sample ID: 361900004

Project: WCHN00720
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method

Semi-Volatile-GC/MS

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

p-Terphenyl-d14	970 ug/kg	1740	55.7	(31%-124%)	

Tentatively Identified Compound (TIC)	*CAS No.*	*RT*	*Est. Concentration*	*Fit*	*Qual*	*Date Time:*	*11/26/14 14 32*
unknown		2.015	178 ug/kg	0	J		
Unknown Aldol Condensate		3.82	7250 ug/kg		AJ		
unknown		4.93	157 ug/kg	0	J		
unknown		6.082	149 ug/kg	0	J		
unknown		6.158	160 ug/kg	0	J		
n-Hexadecanoic acid	000057-10-3	12.439	168 ug/kg	96	NJ		
Octadecanoic acid	000057-11-4	13.416	174 ug/kg	97	NJ		
unknown		14.059	181 ug/kg	0	J		
1-Docosene	001599-67-3	15.154	507 ug/kg	94	NJ		
Tridecane, 1-iodo-	035599-77-0	16.525	257 ug/kg	86	NJ		
Hexacosane	000630-01-3	17.992	179 ug/kg	89	NJ		
Heneicosane	000629-94-7	18.382	519 ug/kg	90	NJ		
1,16-Hexadecanediol	007735-42-4	20.059	264 ug/kg	90	NJ		
Sulfurous acid, butyl dodecyl este	1000309-17-9	20.797	363 ug/kg	90	NJ		
unknown		21.063	485 ug/kg	0	J		
1,21-Docosadiene	053057-53-7	22.463	314 ug/kg	87	NJ		

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	Prep Method 3541 8270D BNA for Soil	AXV1	11/25/14	1730	1439084

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	SW846 3541/8270D	

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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-107 Soil**

3/27/15

Report Date: December 1, 2014

Client SDG: XP0168

Client Sample ID:	J1V1M1	Project:	WCHN00720
Sample ID:	361900005	Client ID:	WCHN001
Matrix:	Soil		
Collect Date:	20-NOV-14 10:26		
Receive Date:	25-NOV-14		
Collector:	Client		
Moisture:	2.94%		

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Semi-Volatile-GC/MS										
8270D/3541 BNA Soil Automated Soxhlet "Dry Weight Corrected"										
1,2,4-Trichlorobenzene	U	103	103	343	ug/kg	1	RMB 11/26/14	1503	1439085	1
1,2-Dichlorobenzene	U	103	103	343	ug/kg	1				
1,3-Dichlorobenzene	U	103	103	343	ug/kg	1				
1,4-Dichlorobenzene	U	103	103	343	ug/kg	1				
2,4,5-Trichlorophenol	U	103	103	343	ug/kg	1				
2,4,6-Trichlorophenol	U	103	103	343	ug/kg	1				
2,4-Dichlorophenol	U	103	103	343	ug/kg	1				
2,4-Dimethylphenol	U	103	103	343	ug/kg	1				
2,4-Dinitrophenol	U	103	103	687	ug/kg	1				
2,4-Dinitrotoluene	U	103	103	343	ug/kg	1				
2,6-Dinitrotoluene	U	103	103	343	ug/kg	1				
2-Chloronaphthalene	U	10.3	10.3	34.3	ug/kg	1				
2-Chlorophenol	U	103	103	343	ug/kg	1				
2-Methyl-4,6-dinitrophenol	U	103	103	343	ug/kg	1				
2-Methylnaphthalene	U	10.3	10.3	34.3	ug/kg	1				
2-Nitrophenol	U	103	103	343	ug/kg	1				
3,3'-Dichlorobenzidine	U	103	103	343	ug/kg	1				
4-Bromophenylphenylether	U	103	103	343	ug/kg	1				
4-Chloro-3-methylphenol	U	137	137	343	ug/kg	1				
4-Chloroaniline	U	103	103	343	ug/kg	1				
4-Chlorophenylphenylether	U	103	103	343	ug/kg	1				
4-Nitrophenol	U	103	103	343	ug/kg	1				
Acenaphthene	U	10.3	10.3	34.3	ug/kg	1				
Acenaphthylene	U	10.3	10.3	34.3	ug/kg	1				
Anthracene	U	10.3	10.3	34.3	ug/kg	1				
Benzo(a)anthracene	U	10.3	10.3	34.3	ug/kg	1				
Benzo(a)pyrene	U	10.3	10.3	34.3	ug/kg	1				
Benzo(b)fluoranthene	U	10.3	10.3	34.3	ug/kg	1				
Benzo(ghi)perylene	U	10.3	10.3	34.3	ug/kg	1				
Benzo(k)fluoranthene	U	10.3	10.3	34.3	ug/kg	1				
Butylbenzylphthalate	U	103	103	343	ug/kg	1				
Carbazole	U	10.3	10.3	34.3	ug/kg	1				
Chrysene	U	10.3	10.3	34.3	ug/kg	1				

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Richland, Washington 99354
Contact: Joan Kessner
Project: **RC-107 Soil**

3/27/15

Report Date: December 1, 2014

Client SDG: XP0168

Client Sample ID: J1V1M1 Project: WCHN00720
Sample ID: 361900005 Client ID: WCHN001

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

Surrogate/Tracer recovery	*Result*	*Nominal*	*Recovery%*	*Acceptable Limits*	*Date Time:*	*11/26/14 15 03*
p-Terphenyl-d14	1020 ug/kg	1720	59.4	(31%-124%)		
2-Fluorobiphenyl	1110 ug/kg	1720	64.4	(25%-100%)		
Nitrobenzene-d5	1120 ug/kg	1720	65.0	(21%-103%)		
2-Fluorophenol	2110 ug/kg	3430	61.4	(23%-107%)		
Phenol-d5	2150 ug/kg	3430	62.5	(25%-108%)		

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Richland, Washington 99354
Contact: Joan Kessner
Project: **RC-107 Soil**

Report Date: December 1, 2014

Client SDG: XP0168

Client Sample ID: J1V1M1
Sample ID: 361900005

Project: WCHN00720
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Semi-Volatile-GC/MS										
8270D/3541 BNA Soil Automated Soxhlet "Dry Weight Corrected"										
2,4,6-Tribromophenol		2160 ug/kg	3430	62.8	(20%-122%)					

Tentatively Identified Compound (TIC)	*CAS No.*	*RT*	*Est. Concentration*	*Fit*	*Qual*	*Date Time:*	*11/26/14 15 03*
Trichloromethane	000067-66-3	2.02	175 ug/kg	94	NJ		
Furan, 2,5-dimethyl-	000625-86-5	2.52	322 ug/kg	95	NJ		
unknown		3.549	153 ug/kg	0	J		
Unknown Aldol Condensate		3.825	7740 ug/kg		AJ		
unknown		14.058	143 ug/kg	0	J		
1-Docosene	001599-67-3	15.144	711 ug/kg	94	NJ		
unknown		20.792	313 ug/kg	0	J		
unknown		22.925	383 ug/kg	0	J		

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	Prep Method 3541 8270D BNA for Soil	AXV1	11/25/14	1730	1439084

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	SW846 3541/8270D	

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Contact: Joan Kessner
Project: **RC-107 Soil**

Client SDG: XP0168

Report Date: December 1, 2014

Client Sample ID:	J1V1M2	Project:	WCHN00720
Sample ID:	361900006	Client ID:	WCHN001
Matrix:	Soil		
Collect Date:	20-NOV-14 10:08		
Receive Date:	25-NOV-14		
Collector:	Client		
Moisture:	3.32%		

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Semi-Volatile-GC/MS										
8270D/3541 BNA Soil Automated Soxhlet "Dry Weight Corrected"										
1,2,4-Trichlorobenzene	U	103	103	344	ug/kg	1	RMB 11/26/14	1534	1439085	1
1,2-Dichlorobenzene	U	103	103	344	ug/kg	1				
1,3-Dichlorobenzene	U	103	103	344	ug/kg	1				
1,4-Dichlorobenzene	U	103	103	344	ug/kg	1				
2,4,5-Trichlorophenol	U	103	103	344	ug/kg	1				
2,4,6-Trichlorophenol	U	103	103	344	ug/kg	1				
2,4-Dichlorophenol	U	103	103	344	ug/kg	1				
2,4-Dimethylphenol	U	103	103	344	ug/kg	1				
2,4-Dinitrophenol	U	103	103	688	ug/kg	1				
2,4-Dinitrotoluene	U	103	103	344	ug/kg	1				
2,6-Dinitrotoluene	U	103	103	344	ug/kg	1				
2-Chloronaphthalene	U	10.3	10.3	34.4	ug/kg	1				
2-Chlorophenol	U	103	103	344	ug/kg	1				
2-Methyl-4,6-dinitrophenol	U	103	103	344	ug/kg	1				
2-Methylnaphthalene	U	10.3	10.3	34.4	ug/kg	1				
2-Nitrophenol	U	103	103	344	ug/kg	1				
3,3'-Dichlorobenzidine	U	103	103	344	ug/kg	1				
4-Bromophenylphenylether	U	103	103	344	ug/kg	1				
4-Chloro-3-methylphenol	U	138	138	344	ug/kg	1				
4-Chloroaniline	U	103	103	344	ug/kg	1				
4-Chlorophenylphenylether	U	103	103	344	ug/kg	1				
4-Nitrophenol	U	103	103	344	ug/kg	1				
Acenaphthene	U	10.3	10.3	34.4	ug/kg	1				
Acenaphthylene	U	10.3	10.3	34.4	ug/kg	1				
Anthracene	U	10.3	10.3	34.4	ug/kg	1				
Benzo(a)anthracene	J	15.8	10.3	34.4	ug/kg	1				
Benzo(a)pyrene	J	10.7	10.3	34.4	ug/kg	1				
Benzo(b)fluoranthene	J	13.4	10.3	34.4	ug/kg	1				
Benzo(ghi)perylene	U	10.3	10.3	34.4	ug/kg	1				
Benzo(k)fluoranthene	U	10.3	10.3	34.4	ug/kg	1				
Butylbenzylphthalate	U	103	103	344	ug/kg	1				
Carbazole	U	10.3	10.3	34.4	ug/kg	1				
Chrysene	J	11.4	10.3	34.4	ug/kg	1				

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Richland, Washington 99354
Contact: Joan Kessner
Project: **RC-107 Soil**

Report Date: December 1, 2014

Client SDG: XP0168

Client Sample ID: J1V1M2
Sample ID: 361900006

Project: WCHN00720
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Semi-Volatile-GC/MS										
8270D/3541 BNA Soil Automated Soxhlet "Dry Weight Corrected"										
Di-n-butylphthalate	U J	103	103	344	ug/kg	1				
Di-n-octylphthalate	U J	103	103	344	ug/kg	1				
Dibenzo(a,h)anthracene	U J	10.3	10.3	34.4	ug/kg	1				
Dibenzofuran	U	103	103	344	ug/kg	1				
Diethylphthalate	U J	103	103	344	ug/kg	1				
Dimethylphthalate	U	103	103	344	ug/kg	1				
Diphenylamine	U	103	103	344	ug/kg	1				
Fluoranthene	J	23.1	10.3	34.4	ug/kg	1				
Fluorene	U	10.3	10.3	34.4	ug/kg	1				
Hexachlorobenzene	U	103	103	344	ug/kg	1				
Hexachlorobutadiene	U	103	103	344	ug/kg	1				
Hexachlorocyclopentadiene	U J field	103	103	344	ug/kg	1				
Hexachloroethane	U J	103	103	344	ug/kg	1				
Indeno(1,2,3-cd)pyrene	U J	10.3	10.3	34.4	ug/kg	1				
Isophorone	U	103	103	344	ug/kg	1				
N-Nitrosodipropylamine	U J	103	103	344	ug/kg	1				
Naphthalene	U J	10.3	10.3	34.4	ug/kg	1				
Nitrobenzene	U	103	103	344	ug/kg	1				
Pentachlorophenol	U J	103	103	344	ug/kg	1				
Phenanthrene	J J	14.1	10.3	34.4	ug/kg	1				
Phenol	U J	103	103	344	ug/kg	1				
Pyrene	J J	19.3	10.3	34.4	ug/kg	1				
bis(2-Chloro-1-methylethyl)ether	U J	103	103	344	ug/kg	1				
bis(2-Chloroethoxy)methane	U	103	103	344	ug/kg	1				
bis(2-Chloroethyl) ether	U J	103	103	344	ug/kg	1				
bis(2-Ethylhexyl)phthalate	U J	103	103	344	ug/kg	1				
3- and/or 4-Methylphenol	U J	103	103	344	ug/kg	1				
m-Nitroaniline	U J	103	103	344	ug/kg	1				
o-Cresol	U J	103	103	344	ug/kg	1				
o-Nitroaniline	U	114	114	344	ug/kg	1				
p-Nitroaniline	U J	103	103	344	ug/kg	1				

Surrogate/Tracer recovery	*Result*	*Nominal*	*Recovery%*	*Acceptable Limits*	*Date Time:*	*11/26/14 15 34*
p-Terphenyl-d14	1050 ug/kg	1720	61.2	(31%-124%)		
Nitrobenzene-d5	1120 ug/kg	1720	64.8	(21%-103%)		
2-Fluorobiphenyl	1160 ug/kg	1720	67.5	(25%-100%)		
2-Fluorophenol	2150 ug/kg	3440	62.5	(23%-107%)		
Phenol-d5	2190 ug/kg	3440	63.6	(25%-108%)		

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Certificate of Analysis

V 7/27/15

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
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Richland, Washington 99354
Contact: Joan Kessner
Project: **RC-107 Soil**

Report Date: December 1, 2014

Client SDG: XP0168

Client Sample ID: J1V1M2
Sample ID: 361900006

Project: WCHN00720
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method

Semi-Volatile-GC/MS

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

2,4,6-Tribromophenol	2390 ug/kg	3440	69.5	(20%-122%)	

Tentatively Identified Compound (TIC)	*CAS No.*	*RT*	*Est. Concentration*	*Fit*	*Qual*	*Date Time:*	*11/26/14 15 34*
Trichloromethane	000067-66-3	2.01	179 ug/kg	94	NJ		
Furan, 2,5-dimethyl-	000625-86-5	2.515	199 ug/kg	91	NJ		
unknown		3.544	157 ug/kg	0	J		
Unknown Aldol Condensate		3.82	7590 ug/kg		AJ		
1-Docosene	001599-67-3	15.144	747 ug/kg	91	NJ		
Octacosane	000630-02-4	18.377	289 ug/kg	90	NJ		
unknown		20.792	139 ug/kg	0	J		
unknown		21.139	507 ug/kg	0	J		

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	Prep Method 3541 8270D BNA for Soil	AXV1	11/25/14	1730	1439084

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	SW846 3541/8270D	

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Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
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Richland, Washington 99354
Contact: Joan Kessner
Project: **RC-107 Soil**

Report Date: December 1, 2014

Client SDG: XP0168

Client Sample ID:	J1V1L0	Project:	WCHN00720
Sample ID:	361900007	Client ID:	WCHN001
Matrix:	Soil		
Collect Date:	20-NOV-14 08:11		
Receive Date:	25-NOV-14		
Collector:	Client		
Moisture:	6.64%		

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Semi-Volatile-GC/MS										
8270D/3541 BNA Soil Automated Soxhlet "Dry Weight Corrected"										
1,2,4-Trichlorobenzene	U	107	107	357	ug/kg	1	RMB 11/26/14	1606	1439085	1
1,2-Dichlorobenzene	U J	107	107	357	ug/kg	1				
1,3-Dichlorobenzene	U	107	107	357	ug/kg	1				
1,4-Dichlorobenzene	U	107	107	357	ug/kg	1				
2,4,5-Trichlorophenol	U	107	107	357	ug/kg	1				
2,4,6-Trichlorophenol	U	107	107	357	ug/kg	1				
2,4-Dichlorophenol	U	107	107	357	ug/kg	1				
2,4-Dimethylphenol	U	107	107	357	ug/kg	1				
2,4-Dinitrophenol	U	107	107	714	ug/kg	1				
2,4-Dinitrotoluene	U	107	107	357	ug/kg	1				
2,6-Dinitrotoluene	U	107	107	357	ug/kg	1				
2-Chloronaphthalene	U	10.7	10.7	35.7	ug/kg	1				
2-Chlorophenol	U J	107	107	357	ug/kg	1				
2-Methyl-4,6-dinitrophenol	U J	107	107	357	ug/kg	1				
2-Methylnaphthalene	U J	10.7	10.7	35.7	ug/kg	1				
2-Nitrophenol	U J	107	107	357	ug/kg	1				
3,3'-Dichlorobenzidine	U J	107	107	357	ug/kg	1				
4-Bromophenylphenylether	U J	107	107	357	ug/kg	1				
4-Chloro-3-methylphenol	U J	143	143	357	ug/kg	1				
4-Chloroaniline	U J	107	107	357	ug/kg	1				
4-Chlorophenylphenylether	U	107	107	357	ug/kg	1				
4-Nitrophenol	U J	107	107	357	ug/kg	1				
Acenaphthene	U J	10.7	10.7	35.7	ug/kg	1				
Acenaphthylene	U	10.7	10.7	35.7	ug/kg	1				
Anthracene	U J	10.7	10.7	35.7	ug/kg	1				
Benzo(a)anthracene	J	26.8	10.7	35.7	ug/kg	1				
Benzo(a)pyrene	J	21.1	10.7	35.7	ug/kg	1				
Benzo(b)fluoranthene	J	25.3	10.7	35.7	ug/kg	1				
Benzo(ghi)perylene	U	10.7	10.7	35.7	ug/kg	1				
Benzo(k)fluoranthene	J	14.3	10.7	35.7	ug/kg	1				
Butylbenzylphthalate	U	107	107	357	ug/kg	1				
Carbazole	U	10.7	10.7	35.7	ug/kg	1				
Chrysene	J	21.1	10.7	35.7	ug/kg	1				

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Richland, Washington 99354
Contact: Joan Kessner
Project: **RC-107 Soil**

Report Date: December 1, 2014

Client SDG: XP0168

Client Sample ID: J1V1L0
Sample ID: 361900007

Project: WCHN00720
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Semi-Volatile-GC/MS										
8270D/3541 BNA Soil Automated Soxhlet "Dry Weight Corrected"										
Di-n-butylphthalate	U	107	107	357	ug/kg	1				
Di-n-octylphthalate	U	107	107	357	ug/kg	1				
Dibenzo(a,h)anthracene	U	10.7	10.7	35.7	ug/kg	1				
Dibenzofuran	U	107	107	357	ug/kg	1				
Diethylphthalate	U	107	107	357	ug/kg	1				
Dimethylphthalate	U	107	107	357	ug/kg	1				
Diphenylamine	U	107	107	357	ug/kg	1				
Fluoranthene		46.7	10.7	35.7	ug/kg	1				
Fluorene	U	10.7	10.7	35.7	ug/kg	1				
Hexachlorobenzene	U	107	107	357	ug/kg	1				
Hexachlorobutadiene	U	107	107	357	ug/kg	1				
Hexachlorocyclopentadiene	U	107	107	357	ug/kg	1				
Hexachloroethane	U	107	107	357	ug/kg	1				
Indeno(1,2,3-cd)pyrene	J	11.1	10.7	35.7	ug/kg	1				
Isophorone	U	107	107	357	ug/kg	1				
N-Nitrosodipropylamine	U	107	107	357	ug/kg	1				
Naphthalene	U	10.7	10.7	35.7	ug/kg	1				
Nitrobenzene	U	107	107	357	ug/kg	1				
Pentachlorophenol	U	107	107	357	ug/kg	1				
Phenanthrene	J	25.7	10.7	35.7	ug/kg	1				
Phenol	U	107	107	357	ug/kg	1				
Pyrene	J	33.9	10.7	35.7	ug/kg	1				
bis(2-Chloro-1-methylethyl)ether	U	107	107	357	ug/kg	1				
bis(2-Chloroethoxy)methane	U	107	107	357	ug/kg	1				
bis(2-Chloroethyl) ether	U	107	107	357	ug/kg	1				
bis(2-Ethylhexyl)phthalate	U	107	107	357	ug/kg	1				
3- and/or 4-Methylphenol	U	107	107	357	ug/kg	1				
m-Nitroaniline	U	107	107	357	ug/kg	1				
o-Cresol	U	107	107	357	ug/kg	1				
o-Nitroaniline	U	118	118	357	ug/kg	1				
p-Nitroaniline	U	107	107	357	ug/kg	1				

Surrogate/Tracer recovery	*Result*	*Nominal*	*Recovery%*	*Acceptable Limits*	*Date Time:*	*11/26/14 16 06*
2-Fluorophenol	1490 ug/kg	3570	41.8	(23%-107%)		
Phenol-d5	1510 ug/kg	3570	42.2	(25%-108%)		
2,4,6-Tribromophenol	1730 ug/kg	3570	48.4	(20%-122%)		
p-Terphenyl-d14	774 ug/kg	1780	43.4	(31%-124%)		
Nitrobenzene-d5	784 ug/kg	1780	44.0	(21%-103%)		

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Certificate of Analysis

V 3/27/15

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: **RC-107 Soil**

Report Date: December 1, 2014

Client SDG: XP0168

Client Sample ID: J1V1L0
Sample ID: 361900007

Project: WCHN00720
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method

Semi-Volatile-GC/MS

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

2-Fluorobiphenyl	814 ug/kg	1780	45.6	(25%-100%)	

Tentatively Identified Compound (TIC)	*CAS No.*	*RT*	*Est. Concentration*	*Fit*	*Qual*	*Date Time:*	*11/26/14 16 06*
Trichloromethane	000067-66-3	2.015	161 ug/kg	94	NJ		
Furan, 2,5-dimethyl-	000625-86-5	2.515	149 ug/kg	91	NJ		
Unknown Aldol Condensate		3.806	5470 ug/kg		AJ		
unknown		12.73	164 ug/kg	0	J		
unknown		15.192	273 ug/kg	0	J		
unknown		17.259	1030 ug/kg	0	J		
unknown		20.792	251 ug/kg	0	J		
unknown		22.925	507 ug/kg	0	J		

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	Prep Method 3541 8270D BNA for Soil	AXV1	11/25/14	1730	1439084

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	SW846 3541/8270D	

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Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: **RC-107 Soil**

Client SDG: XP0168

Report Date: December 1, 2014

Client Sample ID:	J1V1L1	Project:	WCHN00720
Sample ID:	361900008	Client ID:	WCHN001
Matrix:	Soil		
Collect Date:	20-NOV-14 08:04		
Receive Date:	25-NOV-14		
Collector:	Client		
Moisture:	5.8%		

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Semi-Volatile-GC/MS										
8270D/3541 BNA Soil Automated Soxhlet "Dry Weight Corrected"										
1,2,4-Trichlorobenzene	U	106	106	353	ug/kg	1	RMB 11/26/14	1637	1439085	1
1,2-Dichlorobenzene	U J	106	106	353	ug/kg	1				
1,3-Dichlorobenzene	U	106	106	353	ug/kg	1				
1,4-Dichlorobenzene	U	106	106	353	ug/kg	1				
2,4,5-Trichlorophenol	U	106	106	353	ug/kg	1				
2,4,6-Trichlorophenol	U	106	106	353	ug/kg	1				
2,4-Dichlorophenol	U	106	106	353	ug/kg	1				
2,4-Dimethylphenol	U	106	106	353	ug/kg	1				
2,4-Dinitrophenol	U	106	106	705	ug/kg	1				
2,4-Dinitrotoluene	U	106	106	353	ug/kg	1				
2,6-Dinitrotoluene	U	106	106	353	ug/kg	1				
2-Chloronaphthalene	U	10.6	10.6	35.3	ug/kg	1				
2-Chlorophenol	U J	106	106	353	ug/kg	1				
2-Methyl-4,6-dinitrophenol	U J	106	106	353	ug/kg	1				
2-Methylnaphthalene	U J	10.6	10.6	35.3	ug/kg	1				
2-Nitrophenol	U J	106	106	353	ug/kg	1				
3,3'-Dichlorobenzidine	U J	106	106	353	ug/kg	1				
4-Bromophenylphenylether	U J	106	106	353	ug/kg	1				
4-Chloro-3-methylphenol	U J	141	141	353	ug/kg	1				
4-Chloroaniline	U J	106	106	353	ug/kg	1				
4-Chlorophenylphenylether	U	106	106	353	ug/kg	1				
4-Nitrophenol	U J	106	106	353	ug/kg	1				
Acenaphthene	J J	16.9	10.6	35.3	ug/kg	1				
Acenaphthylene	U	10.6	10.6	35.3	ug/kg	1				
Anthracene	J	35.6	10.6	35.3	ug/kg	1				
Benzo(a)anthracene		146	10.6	35.3	ug/kg	1				
Benzo(a)pyrene		138	10.6	35.3	ug/kg	1				
Benzo(b)fluoranthene		192	10.6	35.3	ug/kg	1				
Benzo(ghi)perylene		67.0	10.6	35.3	ug/kg	1				
Benzo(k)fluoranthene		76.2	10.6	35.3	ug/kg	1				
Butylbenzylphthalate	U	106	106	353	ug/kg	1				
Carbazole	J	27.2	10.6	35.3	ug/kg	1				
Chrysene		146	10.6	35.3	ug/kg	1				

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Certificate of Analysis

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
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Richland, Washington 99354
Contact: Joan Kessner
Project: **RC-107 Soil**

Client SDG: XP0168

Report Date: December 1, 2014

Client Sample ID: J1V1L1
Sample ID: 361900008

Project: WCHN00720
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Semi-Volatile-GC/MS										
8270D/3541 BNA Soil Automated Soxhlet "Dry Weight Corrected"										
Di-n-butylphthalate	U	106	106	353	ug/kg	1				
Di-n-octylphthalate	U	106	106	353	ug/kg	1				
Dibenzo(a,h)anthracene	J	20.5	10.6	35.3	ug/kg	1				
Dibenzofuran	U	106	106	353	ug/kg	1				
Diethylphthalate	U	106	106	353	ug/kg	1				
Dimethylphthalate	U	106	106	353	ug/kg	1				
Diphenylamine	U	106	106	353	ug/kg	1				
Fluoranthene		273	10.6	35.3	ug/kg	1				
Fluorene	J	13.8	10.6	35.3	ug/kg	1				
Hexachlorobenzene	U	106	106	353	ug/kg	1				
Hexachlorobutadiene	U	106	106	353	ug/kg	1				
Hexachlorocyclopentadiene	U	106	106	353	ug/kg	1				
Hexachloroethane	U	106	106	353	ug/kg	1				
Indeno(1,2,3-cd)pyrene		73.4	10.6	35.3	ug/kg	1				
Isophorone	U	106	106	353	ug/kg	1				
N-Nitrosodipropylamine	U	106	106	353	ug/kg	1				
Naphthalene	U	10.6	10.6	35.3	ug/kg	1				
Nitrobenzene	U	106	106	353	ug/kg	1				
Pentachlorophenol	U	106	106	353	ug/kg	1				
Phenanthrene		148	10.6	35.3	ug/kg	1				
Phenol	U	106	106	353	ug/kg	1				
Pyrene		202	10.6	35.3	ug/kg	1				
bis(2-Chloro-1-methylethyl)ether	U	106	106	353	ug/kg	1				
bis(2-Chloroethoxy)methane	U	106	106	353	ug/kg	1				
bis(2-Chloroethyl) ether	U	106	106	353	ug/kg	1				
bis(2-Ethylhexyl)phthalate	U	106	106	353	ug/kg	1				
3- and/or 4-Methylphenol	U	106	106	353	ug/kg	1				
m-Nitroaniline	U	106	106	353	ug/kg	1				
o-Cresol	U	106	106	353	ug/kg	1				
o-Nitroaniline	U	116	116	353	ug/kg	1				
p-Nitroaniline	U	106	106	353	ug/kg	1				

Surrogate/Tracer recovery	*Result*	*Nominal*	*Recovery%*	*Acceptable Limits*	*Date Time:*	*11/26/14 16 37*
Nitrobenzene-d5	1010 ug/kg	1760	57.4	(21%-103%)		
2-Fluorobiphenyl	1050 ug/kg	1760	59.8	(25%-100%)		
2-Fluorophenol	1990 ug/kg	3530	56.4	(23%-107%)		
Phenol-d5	1990 ug/kg	3530	56.4	(25%-108%)		
2,4,6-Tribromophenol	2130 ug/kg	3530	60.3	(20%-122%)		

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Certificate of Analysis

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
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Richland, Washington 99354
Contact: Joan Kessner
Project: **RC-107 Soil**

Report Date: December 1, 2014

Client SDG: XP0168

Client Sample ID: J1V1L1
Sample ID: 361900008

Project: WCHN00720
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method

Semi-Volatile-GC/MS

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

p-Terphenyl-d14	997 ug/kg	1760	56.5	(31%-124%)	

Tentatively Identified Compound (TIC)	*CAS No.*	*RT*	*Est. Concentration*	*Fit*	*Qual*	*Date Time:*	*11/26/14 16 37*
unknown		2.015	146 ug/kg	0	J		
unknown		3.544	153 ug/kg	0	J		
Unknown Aldol Condensate		3.815	6910 ug/kg		AJ		
Pyrene, 1-methyl-	002381-21-7	14.073	146 ug/kg	90	NJ		
Cyclohexadecane, 1,2-diethyl-	1000155-85-3	15.154	697 ug/kg	98	NJ		
unknown		16.52	145 ug/kg	0	J		
unknown		21.187	224 ug/kg	0	J		

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	Prep Method 3541 8270D BNA for Soil	AXV1	11/25/14	1730	1439084

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	SW846 3541/8270D	

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Contact: Joan Kessner
Project: **RC-107 Soil**

Client SDG: XP0168

Report Date: December 1, 2014

Client Sample ID:	J1V1L4	Project:	WCHN00720
Sample ID:	361900009	Client ID:	WCHN001
Matrix:	Soil		
Collect Date:	20-NOV-14 07:58		
Receive Date:	25-NOV-14		
Collector:	Client		
Moisture:	5.2%		

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Semi-Volatile-GC/MS										
8270D/3541 BNA Soil Automated Soxhlet "Dry Weight Corrected"										
1,2,4-Trichlorobenzene	U	105	105	351	ug/kg	1	RMB 11/26/14	1709	1439085	1
1,2-Dichlorobenzene	U J	105	105	351	ug/kg	1				
1,3-Dichlorobenzene	U	105	105	351	ug/kg	1				
1,4-Dichlorobenzene	U	105	105	351	ug/kg	1				
2,4,5-Trichlorophenol	U	105	105	351	ug/kg	1				
2,4,6-Trichlorophenol	U	105	105	351	ug/kg	1				
2,4-Dichlorophenol	U	105	105	351	ug/kg	1				
2,4-Dimethylphenol	U	105	105	351	ug/kg	1				
2,4-Dinitrophenol	U	105	105	702	ug/kg	1				
2,4-Dinitrotoluene	U	105	105	351	ug/kg	1				
2,6-Dinitrotoluene	U	105	105	351	ug/kg	1				
2-Chloronaphthalene	U	10.5	10.5	35.1	ug/kg	1				
2-Chlorophenol	U J	105	105	351	ug/kg	1				
2-Methyl-4,6-dinitrophenol	U J	105	105	351	ug/kg	1				
2-Methylnaphthalene	U J	10.5	10.5	35.1	ug/kg	1				
2-Nitrophenol	U J	105	105	351	ug/kg	1				
3,3'-Dichlorobenzidine	U J	105	105	351	ug/kg	1				
4-Bromophenylphenylether	U J	105	105	351	ug/kg	1				
4-Chloro-3-methylphenol	U J	140	140	351	ug/kg	1				
4-Chloroaniline	U J	105	105	351	ug/kg	1				
4-Chlorophenylphenylether	U	105	105	351	ug/kg	1				
4-Nitrophenol	U J	105	105	351	ug/kg	1				
Acenaphthene	J J	21.8	10.5	35.1	ug/kg	1				
Acenaphthylene	U	10.5	10.5	35.1	ug/kg	1				
Anthracene	J	55.4	10.5	35.1	ug/kg	1				
Benzo(a)anthracene		239	10.5	35.1	ug/kg	1				
Benzo(a)pyrene		265	10.5	35.1	ug/kg	1				
Benzo(b)fluoranthene		348	10.5	35.1	ug/kg	1				
Benzo(ghi)perylene		138	10.5	35.1	ug/kg	1				
Benzo(k)fluoranthene		134	10.5	35.1	ug/kg	1				
Butylbenzylphthalate	U	105	105	351	ug/kg	1				
Carbazole	J	31.9	10.5	35.1	ug/kg	1				
Chrysene		247	10.5	35.1	ug/kg	1				

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Certificate of Analysis

Company : WC-Hanford, Inc.
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Richland, Washington 99354
Contact: Joan Kessner
Project: **RC-107 Soil**

Client SDG: XP0168

Report Date: December 1, 2014

Client Sample ID: J1V1L4
Sample ID: 361900009

Project: WCHN00720
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Semi-Volatile-GC/MS										
8270D/3541 BNA Soil Automated Soxhlet "Dry Weight Corrected"										
Di-n-butylphthalate	U	105	105	351	ug/kg	1				
Di-n-octylphthalate	U	105	105	351	ug/kg	1				
Dibenzo(a,h)anthracene	J	34.4	10.5	35.1	ug/kg	1				
Dibenzofuran	U	105	105	351	ug/kg	1				
Diethylphthalate	U	105	105	351	ug/kg	1				
Dimethylphthalate	U	105	105	351	ug/kg	1				
Diphenylamine	U	105	105	351	ug/kg	1				
Fluoranthene		421	10.5	35.1	ug/kg	1				
Fluorene	J	16.8	10.5	35.1	ug/kg	1				
Hexachlorobenzene	U	105	105	351	ug/kg	1				
Hexachlorobutadiene	U	105	105	351	ug/kg	1				
Hexachlorocyclopentadiene	U	105	105	351	ug/kg	1				
Hexachloroethane	U	105	105	351	ug/kg	1				
Indeno(1,2,3-cd)pyrene		141	10.5	35.1	ug/kg	1				
Isophorone	U	105	105	351	ug/kg	1				
N-Nitrosodipropylamine	U	105	105	351	ug/kg	1				
Naphthalene	U	10.5	10.5	35.1	ug/kg	1				
Nitrobenzene	U	105	105	351	ug/kg	1				
Pentachlorophenol	U	105	105	351	ug/kg	1				
Phenanthrene		200	10.5	35.1	ug/kg	1				
Phenol	U	105	105	351	ug/kg	1				
Pyrene		375	10.5	35.1	ug/kg	1				
bis(2-Chloro-1-methylethyl)ether	U	105	105	351	ug/kg	1				
bis(2-Chloroethoxy)methane	U	105	105	351	ug/kg	1				
bis(2-Chloroethyl) ether	U	105	105	351	ug/kg	1				
bis(2-Ethylhexyl)phthalate	U	105	105	351	ug/kg	1				
3- and/or 4-Methylphenol	U	105	105	351	ug/kg	1				
m-Nitroaniline	U	105	105	351	ug/kg	1				
o-Cresol	U	105	105	351	ug/kg	1				
o-Nitroaniline	U	116	116	351	ug/kg	1				
p-Nitroaniline	U	105	105	351	ug/kg	1				

Surrogate/Tracer recovery	*Result*	*Nominal*	*Recovery%*	*Acceptable Limits*	*Date Time:*	*11/26/14 17 09*
Nitrobenzene-d5	1120 ug/kg	1750	64.1	(21%-103%)		
2-Fluorobiphenyl	1130 ug/kg	1750	64.4	(25%-100%)		
p-Terphenyl-d14	1190 ug/kg	1750	67.6	(31%-124%)		
2-Fluorophenol	2110 ug/kg	3510	60.1	(23%-107%)		
Phenol-d5	2110 ug/kg	3510	60.0	(25%-108%)		

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Certificate of Analysis

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Address : 2620 Fermi Avenue
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Richland, Washington 99354
Contact: Joan Kessner
Project: **RC-107 Soil**

V 3/27/15

Report Date: December 1, 2014

Client SDG: XP0168

Client Sample ID: J1V1L4
Sample ID: 361900009

Project: WCHN00720
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method

Semi-Volatile-GC/MS

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

2,4,6-Tribromophenol		2250 ug/kg	3510	64.0	(20%-122%)					

Tentatively Identified Compound (TIC)	*CAS No.*	*RT*	*Est. Concentration*	*Fit*	*Qual*	*Date Time:*	*11/26/14 17 09*
Trichloromethane	000067-66-3	2.02	419 ug/kg	90	NJ		
unknown		3.553	164 ug/kg	0	J		
Unknown Aldol Condensate		3.82	7380 ug/kg		AJ		
unknown		5.42	243 ug/kg	0	J		
unknown		12.144	145 ug/kg	0	J		
unknown		12.763	157 ug/kg	0	J		
unknown		13.139	161 ug/kg	0	J		
Octadecanoic acid	000057-11-4	13.416	155 ug/kg	86	NJ		
Fluoranthene, 2-methyl-	033543-31-6	13.982	156 ug/kg	95	NJ		
unknown		14.125	192 ug/kg	0	J		
unknown		14.297	206 ug/kg	0	J		
unknown		14.749	159 ug/kg	0	J		
5-Eicosene, (E)-	074685-30-6	15.211	544 ug/kg	95	NJ		
unknown		15.777	167 ug/kg	0	J		
unknown		16.525	195 ug/kg	0	J		
Benzo[e]pyrene	000192-97-2	18.525	205 ug/kg	96	NJ		
unknown		22.02	398 ug/kg	0	J		

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	Prep Method 3541 8270D BNA for Soil	AXV1	11/25/14	1730	1439084

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	SW846 3541/8270D	

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Certificate of Analysis

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
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Richland, Washington 99354
Contact: Joan Kessner
Project: **RC-107 Soil**

Client SDG: XP0168

Report Date: December 1, 2014

Client Sample ID: J1V1L5
Sample ID: 361900010
Matrix: Soil
Collect Date: 20-NOV-14 07:43
Receive Date: 25-NOV-14
Collector: Client
Moisture: 5.36%

Project: WCHN00720
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Semi-Volatile-GC/MS										
8270D/3541 BNA Soil Automated Soxhlet "Dry Weight Corrected"										
1,2,4-Trichlorobenzene	U	105	105	351	ug/kg	1	RMB 11/28/14	1440	1439085	1
1,2-Dichlorobenzene	U J	105	105	351	ug/kg	1				
1,3-Dichlorobenzene	U	105	105	351	ug/kg	1				
1,4-Dichlorobenzene	U	105	105	351	ug/kg	1				
2,4,5-Trichlorophenol	U	105	105	351	ug/kg	1				
2,4,6-Trichlorophenol	U	105	105	351	ug/kg	1				
2,4-Dichlorophenol	U	105	105	351	ug/kg	1				
2,4-Dimethylphenol	U	105	105	351	ug/kg	1				
2,4-Dinitrophenol	U	105	105	702	ug/kg	1				
2,4-Dinitrotoluene	U	105	105	351	ug/kg	1				
2,6-Dinitrotoluene	U	105	105	351	ug/kg	1				
2-Chloronaphthalene	U	10.5	10.5	35.1	ug/kg	1				
2-Chlorophenol	U J	105	105	351	ug/kg	1				
2-Methyl-4,6-dinitrophenol	U J	105	105	351	ug/kg	1				
2-Methylnaphthalene	U J	10.5	10.5	35.1	ug/kg	1				
2-Nitrophenol	U J	105	105	351	ug/kg	1				
3,3'-Dichlorobenzidine	U J	105	105	351	ug/kg	1				
4-Bromophenylphenylether	U J	105	105	351	ug/kg	1				
4-Chloro-3-methylphenol	U J	140	140	351	ug/kg	1				
4-Chloroaniline	U J	105	105	351	ug/kg	1				
4-Chlorophenylphenylether	U	105	105	351	ug/kg	1				
4-Nitrophenol	U J	105	105	351	ug/kg	1				
Acenaphthene	U J	10.5	10.5	35.1	ug/kg	1				
Acenaphthylene	U	10.5	10.5	35.1	ug/kg	1				
Anthracene	U J	10.5	10.5	35.1	ug/kg	1				
Benzo(a)anthracene	U	10.5	10.5	35.1	ug/kg	1				
Benzo(a)pyrene	U	10.5	10.5	35.1	ug/kg	1				
Benzo(b)fluoranthene	U	10.5	10.5	35.1	ug/kg	1				
Benzo(ghi)perylene	U	10.5	10.5	35.1	ug/kg	1				
Benzo(k)fluoranthene	U	10.5	10.5	35.1	ug/kg	1				
Butylbenzylphthalate	U	105	105	351	ug/kg	1				
Carbazole	U	10.5	10.5	35.1	ug/kg	1				
Chrysene	U	10.5	10.5	35.1	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-107 Soil**

Client SDG: XP0168

Report Date: December 1, 2014

Client Sample ID: J1V1L5
Sample ID: 361900010

Project: WCHN00720
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Semi-Volatile-GC/MS										
8270D/3541 BNA Soil Automated Soxhlet "Dry Weight Corrected"										
Di-n-butylphthalate	U	105	105	351	ug/kg	1				
Di-n-octylphthalate	U	105	105	351	ug/kg	1				
Dibenzo(a,h)anthracene	U	10.5	10.5	35.1	ug/kg	1				
Dibenzofuran	U	105	105	351	ug/kg	1				
Diethylphthalate	U	105	105	351	ug/kg	1				
Dimethylphthalate	U	105	105	351	ug/kg	1				
Diphenylamine	U	105	105	351	ug/kg	1				
Fluoranthene	U	10.5	10.5	35.1	ug/kg	1				
Fluorene	U	10.5	10.5	35.1	ug/kg	1				
Hexachlorobenzene	U	105	105	351	ug/kg	1				
Hexachlorobutadiene	U	105	105	351	ug/kg	1				
Hexachlorocyclopentadiene	U	105	105	351	ug/kg	1				
Hexachloroethane	U	105	105	351	ug/kg	1				
Indeno(1,2,3-cd)pyrene	U	10.5	10.5	35.1	ug/kg	1				
Isophorone	U	105	105	351	ug/kg	1				
N-Nitrosodipropylamine	U	105	105	351	ug/kg	1				
Naphthalene	U	10.5	10.5	35.1	ug/kg	1				
Nitrobenzene	U	105	105	351	ug/kg	1				
Pentachlorophenol	U	105	105	351	ug/kg	1				
Phenanthrene	U	10.5	10.5	35.1	ug/kg	1				
Phenol	U	105	105	351	ug/kg	1				
Pyrene	U	10.5	10.5	35.1	ug/kg	1				
bis(2-Chloro-1-methylethyl)ether	U	105	105	351	ug/kg	1				
bis(2-Chloroethoxy)methane	U	105	105	351	ug/kg	1				
bis(2-Chloroethyl) ether	U	105	105	351	ug/kg	1				
bis(2-Ethylhexyl)phthalate	U	105	105	351	ug/kg	1				
3- and/or 4-Methylphenol	U	105	105	351	ug/kg	1				
m-Nitroaniline	U	105	105	351	ug/kg	1				
o-Cresol	U	105	105	351	ug/kg	1				
o-Nitroaniline	U	116	116	351	ug/kg	1				
p-Nitroaniline	U	105	105	351	ug/kg	1				

Surrogate/Tracer recovery	*Result*	*Nominal*	*Recovery%*	*Acceptable Limits*	*Date Time:*	*11/28/14 14 40*
2-Fluorobiphenyl	1090 ug/kg	1760	61.8	(25%-100%)		
Nitrobenzene-d5	1120 ug/kg	1760	64.1	(21%-103%)		
p-Terphenyl-d14	1150 ug/kg	1760	65.3	(31%-124%)		
Phenol-d5	2140 ug/kg	3510	60.9	(25%-108%)		
2-Fluorophenol	2150 ug/kg	3510	61.1	(23%-107%)		

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Certificate of Analysis

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Richland, Washington 99354
Contact: Joan Kessner
Project: **RC-107 Soil**

✓ 3/27/15

Report Date: December 1, 2014

Client SDG: XP0168

Client Sample ID: J1V1L5
Sample ID: 361900010

Project: WCHN00720
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Semi-Volatile-GC/MS										
8270D/3541 BNA Soil Automated Soxhlet "Dry Weight Corrected"										
2,4,6-Tribromophenol		2350 ug/kg	3510	66.8	(20%-122%)					

Tentatively Identified Compound (TIC)	*CAS No.*	*RT*	*Est. Concentration*	*Fit*	*Qual*	*Date Time:*	*11/28/14 14 40*
Trichloromethane	000067-66-3	2.02	142 ug/kg	90	NJ		
Furan, 2,5-dimethyl-	000625-86-5	2.52	282 ug/kg	94	NJ		
Unknown Aldol Condensate		3.82	6940 ug/kg		AJ		
13-Docosenamide, (Z)-	000112-84-5	17.259	172 ug/kg	87	NJ		
Octacosane	000630-02-4	18.373	148 ug/kg	87	NJ		

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	Prep Method 3541 8270D BNA for Soil	AXV1	11/25/14	1730	1439084

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	SW846 3541/8270D	

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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-107 Soil**

3/27/15

Report Date: December 1, 2014

Client SDG: XP0168

Client Sample ID:	J1V1L6	Project:	WCHN00720
Sample ID:	361900011	Client ID:	WCHN001
Matrix:	Soil		
Collect Date:	20-NOV-14 07:38		
Receive Date:	25-NOV-14		
Collector:	Client		
Moisture:	4.88%		

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Semi-Volatile-GC/MS										
8270D/3541 BNA Soil Automated Soxhlet "Dry Weight Corrected"										
1,2,4-Trichlorobenzene	U	105	105	350	ug/kg	1	RMB 11/26/14	1811	1439085	1
1,2-Dichlorobenzene	U J	105	105	350	ug/kg	1				
1,3-Dichlorobenzene	U	105	105	350	ug/kg	1				
1,4-Dichlorobenzene	U	105	105	350	ug/kg	1				
2,4,5-Trichlorophenol	U	105	105	350	ug/kg	1				
2,4,6-Trichlorophenol	U	105	105	350	ug/kg	1				
2,4-Dichlorophenol	U	105	105	350	ug/kg	1				
2,4-Dimethylphenol	U	105	105	350	ug/kg	1				
2,4-Dinitrophenol	U	105	105	701	ug/kg	1				
2,4-Dinitrotoluene	U	105	105	350	ug/kg	1				
2,6-Dinitrotoluene	U	105	105	350	ug/kg	1				
2-Chloronaphthalene	U	10.5	10.5	35.0	ug/kg	1				
2-Chlorophenol	U J	105	105	350	ug/kg	1				
2-Methyl-4,6-dinitrophenol	U J	105	105	350	ug/kg	1				
2-Methylnaphthalene	U J	10.5	10.5	35.0	ug/kg	1				
2-Nitrophenol	U J	105	105	350	ug/kg	1				
3,3'-Dichlorobenzidine	U J	105	105	350	ug/kg	1				
4-Bromophenylphenylether	U J	105	105	350	ug/kg	1				
4-Chloro-3-methylphenol	U J	140	140	350	ug/kg	1				
4-Chloroaniline	U J	105	105	350	ug/kg	1				
4-Chlorophenylphenylether	U	105	105	350	ug/kg	1				
4-Nitrophenol	U J	105	105	350	ug/kg	1				
Acenaphthene	U J	10.5	10.5	35.0	ug/kg	1				
Acenaphthylene	U	10.5	10.5	35.0	ug/kg	1				
Anthracene	U J	10.5	10.5	35.0	ug/kg	1				
Benzo(a)anthracene	U	10.5	10.5	35.0	ug/kg	1				
Benzo(a)pyrene	U	10.5	10.5	35.0	ug/kg	1				
Benzo(b)fluoranthene	U	10.5	10.5	35.0	ug/kg	1				
Benzo(ghi)perylene	U	10.5	10.5	35.0	ug/kg	1				
Benzo(k)fluoranthene	U	10.5	10.5	35.0	ug/kg	1				
Butylbenzylphthalate	U	105	105	350	ug/kg	1				
Carbazole	U	10.5	10.5	35.0	ug/kg	1				
Chrysene	U	10.5	10.5	35.0	ug/kg	1				

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Certificate of Analysis

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Richland, Washington 99354
Contact: Joan Kessner
Project: **RC-107 Soil**

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Report Date: December 1, 2014

Client SDG: XP0168

Client Sample ID: J1V1L6
Sample ID: 361900011

Project: WCHN00720
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Semi-Volatile-GC/MS										
8270D/3541 BNA Soil Automated Soxhlet "Dry Weight Corrected"										
Di-n-butylphthalate	U J	105	105	350	ug/kg	1				
Di-n-octylphthalate	U J	105	105	350	ug/kg	1				
Dibenzo(a,h)anthracene	U J	10.5	10.5	35.0	ug/kg	1				
Dibenzofuran	U	105	105	350	ug/kg	1				
Diethylphthalate	U J	105	105	350	ug/kg	1				
Dimethylphthalate	U	105	105	350	ug/kg	1				
Diphenylamine	U	105	105	350	ug/kg	1				
Fluoranthene	U	10.5	10.5	35.0	ug/kg	1				
Fluorene	U	10.5	10.5	35.0	ug/kg	1				
Hexachlorobenzene	U	105	105	350	ug/kg	1				
Hexachlorobutadiene	U	105	105	350	ug/kg	1				
Hexachlorocyclopentadiene	U J UJ	105	105	350	ug/kg	1				
Hexachloroethane	U	105	105	350	ug/kg	1				
Indeno(1,2,3-cd)pyrene	U J	10.5	10.5	35.0	ug/kg	1				
Isophorone	U	105	105	350	ug/kg	1				
N-Nitrosodipropylamine	U J	105	105	350	ug/kg	1				
Naphthalene	U J	10.5	10.5	35.0	ug/kg	1				
Nitrobenzene	U	105	105	350	ug/kg	1				
Pentachlorophenol	U J	105	105	350	ug/kg	1				
Phenanthrene	U	10.5	10.5	35.0	ug/kg	1				
Phenol	U	105	105	350	ug/kg	1				
Pyrene	U	10.5	10.5	35.0	ug/kg	1				
bis(2-Chloro-1-methylethyl)ether	U	105	105	350	ug/kg	1				
bis(2-Chloroethoxy)methane	U	105	105	350	ug/kg	1				
bis(2-Chloroethyl) ether	U J	105	105	350	ug/kg	1				
bis(2-Ethylhexyl)phthalate	U J	105	105	350	ug/kg	1				
3- and/or 4-Methylphenol	U J	105	105	350	ug/kg	1				
m-Nitroaniline	U J	105	105	350	ug/kg	1				
o-Cresol	U J	105	105	350	ug/kg	1				
o-Nitroaniline	U	116	116	350	ug/kg	1				
p-Nitroaniline	U J	105	105	350	ug/kg	1				

Surrogate/Tracer recovery	*Result*	*Nominal*	*Recovery%*	*Acceptable Limits*	*Date Time:*	*11/26/14 18 11*
Nitrobenzene-d5	1170 ug/kg	1750	66.9	(21%-103%)		
2-Fluorobiphenyl	1200 ug/kg	1750	68.6	(25%-100%)		
p-Terphenyl-d14	1250 ug/kg	1750	71.3	(31%-124%)		
2-Fluorophenol	2290 ug/kg	3500	65.3	(23%-107%)		
Phenol-d5	2320 ug/kg	3500	66.2	(25%-108%)		

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Certificate of Analysis

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Address : 2620 Fermi Avenue
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Richland, Washington 99354
Contact: Joan Kessner
Project: **RC-107 Soil**

Client SDG: XP0168

Report Date: December 1, 2014

Client Sample ID: J1V1L6
Sample ID: 361900011

Project: WCHN00720
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Semi-Volatile-GC/MS										
8270D/3541 BNA Soil Automated Soxhlet "Dry Weight Corrected"										
2,4,6-Tribromophenol		2560 ug/kg	3500	73.0	(20%-122%)					

Tentatively Identified Compound (TIC)	*CAS No.*	*RT*	*Est. Concentration*	*Fit*	*Qual*	*Date Time:*	*11/26/14 18 11*
unknown		2.025	160 ug/kg	0	J		
Furan, 2,5-dimethyl-	000625-86-5	2.525	315 ug/kg	94	NJ		
Unknown Aldol Condensate		3.825	7250 ug/kg		AJ		
unknown		13.135	204 ug/kg	0	J		
Octadecanoic acid	000057-11-4	13.416	152 ug/kg	98	NJ		
unknown		14.059	213 ug/kg	0	J		
Cycloeicosane	000296-56-0	15.206	664 ug/kg	90	NJ		
Octacosane	000630-02-4	18.378	161 ug/kg	87	NJ		
unknown		20.787	169 ug/kg	0	J		

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	Prep Method 3541 8270D BNA for Soil	AXV1	11/25/14	1730	1439084

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	SW846 3541/8270D	

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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-107 Soil**

Client SDG: XP0168

Report Date: December 1, 2014

Client Sample ID:	J1V1L7	Project:	WCHN00720
Sample ID:	361900012	Client ID:	WCHN001
Matrix:	Soil		
Collect Date:	20-NOV-14 07:32		
Receive Date:	25-NOV-14		
Collector:	Client		
Moisture:	8.22%		

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Semi-Volatile-GC/MS										
8270D/3541 BNA Soil Automated Soxhlet "Dry Weight Corrected"										
1,2,4-Trichlorobenzene	U	109	109	362	ug/kg	1	RMB 11/26/14	1843	1439085	1
1,2-Dichlorobenzene	U J	109	109	362	ug/kg	1				
1,3-Dichlorobenzene	U	109	109	362	ug/kg	1				
1,4-Dichlorobenzene	U	109	109	362	ug/kg	1				
2,4,5-Trichlorophenol	U	109	109	362	ug/kg	1				
2,4,6-Trichlorophenol	U	109	109	362	ug/kg	1				
2,4-Dichlorophenol	U	109	109	362	ug/kg	1				
2,4-Dimethylphenol	U	109	109	362	ug/kg	1				
2,4-Dinitrophenol	U	109	109	725	ug/kg	1				
2,4-Dinitrotoluene	U	109	109	362	ug/kg	1				
2,6-Dinitrotoluene	U	109	109	362	ug/kg	1				
2-Chloronaphthalene	U	10.9	10.9	36.2	ug/kg	1				
2-Chlorophenol	U J	109	109	362	ug/kg	1				
2-Methyl-4,6-dinitrophenol	U J	109	109	362	ug/kg	1				
2-Methylnaphthalene	U J	10.9	10.9	36.2	ug/kg	1				
2-Nitrophenol	U J	109	109	362	ug/kg	1				
3,3'-Dichlorobenzidine	U J	109	109	362	ug/kg	1				
4-Bromophenylphenylether	U J	109	109	362	ug/kg	1				
4-Chloro-3-methylphenol	U J	145	145	362	ug/kg	1				
4-Chloroaniline	U J	109	109	362	ug/kg	1				
4-Chlorophenylphenylether	U	109	109	362	ug/kg	1				
4-Nitrophenol	U J	109	109	362	ug/kg	1				
Acenaphthene	U J	10.9	10.9	36.2	ug/kg	1				
Acenaphthylene	U	10.9	10.9	36.2	ug/kg	1				
Anthracene	U J	10.9	10.9	36.2	ug/kg	1				
Benzo(a)anthracene	J	23.2	10.9	36.2	ug/kg	1				
Benzo(a)pyrene	J	20.3	10.9	36.2	ug/kg	1				
Benzo(b)fluoranthene	J	32.2	10.9	36.2	ug/kg	1				
Benzo(ghi)perylene	U	10.9	10.9	36.2	ug/kg	1				
Benzo(k)fluoranthene	U	10.9	10.9	36.2	ug/kg	1				
Butylbenzylphthalate	U	109	109	362	ug/kg	1				
Carbazole	U	10.9	10.9	36.2	ug/kg	1				
Chrysene	J	21.4	10.9	36.2	ug/kg	1				

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Contact: Joan Kessner
Project: **RC-107 Soil**

Client SDG: XP0168

Report Date: December 1, 2014

Client Sample ID: J1V1L7
Sample ID: 361900012

Project: WCHN00720
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Semi-Volatile-GC/MS										
8270D/3541 BNA Soil Automated Soxhlet "Dry Weight Corrected"										
Di-n-butylphthalate	U	109	109	362	ug/kg	1				
Di-n-octylphthalate	U	109	109	362	ug/kg	1				
Dibenzo(a,h)anthracene	U	10.9	10.9	36.2	ug/kg	1				
Dibenzofuran	U	109	109	362	ug/kg	1				
Diethylphthalate	U	109	109	362	ug/kg	1				
Dimethylphthalate	U	109	109	362	ug/kg	1				
Diphenylamine	U	109	109	362	ug/kg	1				
Fluoranthene	J	35.1	10.9	36.2	ug/kg	1				
Fluorene	U	10.9	10.9	36.2	ug/kg	1				
Hexachlorobenzene	U	109	109	362	ug/kg	1				
Hexachlorobutadiene	U	109	109	362	ug/kg	1				
Hexachlorocyclopentadiene	U	109	109	362	ug/kg	1				
Hexachloroethane	U	109	109	362	ug/kg	1				
Indeno(1,2,3-cd)pyrene	U	10.9	10.9	36.2	ug/kg	1				
Isophorone	U	109	109	362	ug/kg	1				
N-Nitrosodipropylamine	U	109	109	362	ug/kg	1				
Naphthalene	U	10.9	10.9	36.2	ug/kg	1				
Nitrobenzene	U	109	109	362	ug/kg	1				
Pentachlorophenol	U	109	109	362	ug/kg	1				
Phenanthrene	J	14.1	10.9	36.2	ug/kg	1				
Phenol	U	109	109	362	ug/kg	1				
Pyrene	J	30.4	10.9	36.2	ug/kg	1				
bis(2-Chloro-1-methylethyl)ether	U	109	109	362	ug/kg	1				
bis(2-Chloroethoxy)methane	U	109	109	362	ug/kg	1				
bis(2-Chloroethyl) ether	U	109	109	362	ug/kg	1				
bis(2-Ethylhexyl)phthalate	U	109	109	362	ug/kg	1				
3- and/or 4-Methylphenol	U	109	109	362	ug/kg	1				
m-Nitroaniline	U	109	109	362	ug/kg	1				
o-Cresol	U	109	109	362	ug/kg	1				
o-Nitroaniline	U	120	120	362	ug/kg	1				
p-Nitroaniline	U	109	109	362	ug/kg	1				

Surrogate/Tracer recovery	*Result*	*Nominal*	*Recovery%*	*Acceptable Limits*	*Date Time:*	*11/26/14 18 43*
p-Terphenyl-d14	1160 ug/kg	1810	63.8	(31%-124%)		
Nitrobenzene-d5	1170 ug/kg	1810	64.4	(21%-103%)		
2-Fluorobiphenyl	1170 ug/kg	1810	64.6	(25%-100%)		
2-Fluorophenol	2220 ug/kg	3620	61.4	(23%-107%)		
Phenol-d5	2240 ug/kg	3620	61.7	(25%-108%)		

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Contact: Joan Kessner
Project: **RC-107 Soil**

Client SDG: XP0168

Report Date: December 1, 2014

Client Sample ID: J1V1L7
Sample ID: 361900012

Project: WCHN00720
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Semi-Volatile-GC/MS										
8270D/3541 BNA Soil Automated Soxhlet "Dry Weight Corrected"										
2,4,6-Tribromophenol		2330 ug/kg	3620	64.2	(20%-122%)					

Tentatively Identified Compound (TIC)	*CAS No.*	*RT*	*Est. Concentration*	*Fit*	*Qual*	*Date Time:*	*11/26/14 18 43*
Trichloromethane	000067-66-3	2.03	524 ug/kg	91	NJ		
unknown		3.554	187 ug/kg	0	J		
Unknown Aldol Condensate		3.825	6020 ug/kg		AJ		
unknown		5.42	160 ug/kg	0	J		
unknown		12.73	295 ug/kg	0	J		
unknown		15.206	594 ug/kg	0	J		
9-Octadecenamide, (Z)-	000301-02-0	17.263	183 ug/kg	87	NJ		
unknown		18.378	174 ug/kg	0	J		
unknown		22.459	947 ug/kg	0	J		

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	Prep Method 3541 8270D BNA for Soil	AXV1	11/25/14	1730	1439084

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	SW846 3541/8270D	

GEL LABORATORIES LLC

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

Certificate of Analysis

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: **RC-107 Soil**

Client SDG: XP0168

Report Date: December 1, 2014

Client Sample ID:	J1V1M0	Project:	WCHN00720
Sample ID:	361900013	Client ID:	WCHN001
Matrix:	Soil		
Collect Date:	20-NOV-14 07:26		
Receive Date:	25-NOV-14		
Collector:	Client		
Moisture:	5.33%		

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Semi-Volatile-GC/MS										
8270D/3541 BNA Soil Automated Soxhlet "Dry Weight Corrected"										
1,2,4-Trichlorobenzene	U	105	105	351	ug/kg	1	RMB 11/26/14	1914	1439085	1
1,2-Dichlorobenzene	U J	105	105	351	ug/kg	1				
1,3-Dichlorobenzene	U	105	105	351	ug/kg	1				
1,4-Dichlorobenzene	U	105	105	351	ug/kg	1				
2,4,5-Trichlorophenol	U	105	105	351	ug/kg	1				
2,4,6-Trichlorophenol	U	105	105	351	ug/kg	1				
2,4-Dichlorophenol	U	105	105	351	ug/kg	1				
2,4-Dimethylphenol	U	105	105	351	ug/kg	1				
2,4-Dinitrophenol	U	105	105	703	ug/kg	1				
2,4-Dinitrotoluene	U	105	105	351	ug/kg	1				
2,6-Dinitrotoluene	U	105	105	351	ug/kg	1				
2-Chloronaphthalene	U	10.5	10.5	35.1	ug/kg	1				
2-Chlorophenol	U J	105	105	351	ug/kg	1				
2-Methyl-4,6-dinitrophenol	U J	105	105	351	ug/kg	1				
2-Methylnaphthalene	U J	10.5	10.5	35.1	ug/kg	1				
2-Nitrophenol	U J	105	105	351	ug/kg	1				
3,3'-Dichlorobenzidine	U J	105	105	351	ug/kg	1				
4-Bromophenylphenylether	U J	105	105	351	ug/kg	1				
4-Chloro-3-methylphenol	U J	141	141	351	ug/kg	1				
4-Chloroaniline	U J	105	105	351	ug/kg	1				
4-Chlorophenylphenylether	U	105	105	351	ug/kg	1				
4-Nitrophenol	U J	105	105	351	ug/kg	1				
Acenaphthene	U J	10.5	10.5	35.1	ug/kg	1				
Acenaphthylene	U	10.5	10.5	35.1	ug/kg	1				
Anthracene	U J	10.5	10.5	35.1	ug/kg	1				
Benzo(a)anthracene	J	17.2	10.5	35.1	ug/kg	1				
Benzo(a)pyrene	J	11.6	10.5	35.1	ug/kg	1				
Benzo(b)fluoranthene	J	18.6	10.5	35.1	ug/kg	1				
Benzo(ghi)perylene	U	10.5	10.5	35.1	ug/kg	1				
Benzo(k)fluoranthene	U	10.5	10.5	35.1	ug/kg	1				
Butylbenzylphthalate	U	105	105	351	ug/kg	1				
Carbazole	U	10.5	10.5	35.1	ug/kg	1				
Chrysene	U	10.5	10.5	35.1	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-107 Soil**

Client SDG: XP0168

Report Date: December 1, 2014

Client Sample ID: J1V1M0
Sample ID: 361900013

Project: WCHN00720
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Semi-Volatile-GC/MS										
8270D/3541 BNA Soil Automated Soxhlet "Dry Weight Corrected"										
Di-n-butylphthalate	U	105	105	351	ug/kg	1				
Di-n-octylphthalate	U	105	105	351	ug/kg	1				
Dibenzo(a,h)anthracene	U	10.5	10.5	35.1	ug/kg	1				
Dibenzofuran	U	105	105	351	ug/kg	1				
Diethylphthalate	U	105	105	351	ug/kg	1				
Dimethylphthalate	U	105	105	351	ug/kg	1				
Diphenylamine	U	105	105	351	ug/kg	1				
Fluoranthene	J	20.7	10.5	35.1	ug/kg	1				
Fluorene	U	10.5	10.5	35.1	ug/kg	1				
Hexachlorobenzene	U	105	105	351	ug/kg	1				
Hexachlorobutadiene	U	105	105	351	ug/kg	1				
Hexachlorocyclopentadiene	U	105	105	351	ug/kg	1				
Hexachloroethane	U	105	105	351	ug/kg	1				
Indeno(1,2,3-cd)pyrene	U	10.5	10.5	35.1	ug/kg	1				
Isophorone	U	105	105	351	ug/kg	1				
N-Nitrosodipropylamine	U	105	105	351	ug/kg	1				
Naphthalene	U	10.5	10.5	35.1	ug/kg	1				
Nitrobenzene	U	105	105	351	ug/kg	1				
Pentachlorophenol	U	105	105	351	ug/kg	1				
Phenanthrene	U	10.5	10.5	35.1	ug/kg	1				
Phenol	U	105	105	351	ug/kg	1				
Pyrene	J	17.2	10.5	35.1	ug/kg	1				
bis(2-Chloro-1-methylethyl)ether	U	105	105	351	ug/kg	1				
bis(2-Chloroethoxy)methane	U	105	105	351	ug/kg	1				
bis(2-Chloroethyl) ether	U	105	105	351	ug/kg	1				
bis(2-Ethylhexyl)phthalate	U	105	105	351	ug/kg	1				
3- and/or 4-Methylphenol	U	105	105	351	ug/kg	1				
m-Nitroaniline	U	105	105	351	ug/kg	1				
o-Cresol	U	105	105	351	ug/kg	1				
o-Nitroaniline	U	116	116	351	ug/kg	1				
p-Nitroaniline	U	105	105	351	ug/kg	1				

Surrogate/Tracer recovery	*Result*	*Nominal*	*Recovery%*	*Acceptable Limits*	*Date Time:*	*11/26/14 19 14*
Nitrobenzene-d5	1120 ug/kg	1760	63.5	(21%-103%)		
2-Fluorobiphenyl	1120 ug/kg	1760	64.0	(25%-100%)		
p-Terphenyl-d14	1160 ug/kg	1760	66.2	(31%-124%)		
2-Fluorophenol	2120 ug/kg	3510	60.4	(23%-107%)		
Phenol-d5	2150 ug/kg	3510	61.2	(25%-108%)		

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-107 Soil**

Report Date: December 1, 2014

Client SDG: XP0168

Client Sample ID: J1V1M0
Sample ID: 361900013

Project: WCHN00720
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method

Semi-Volatile-GC/MS

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

2,4,6-Tribromophenol	2410 ug/kg	3510	68.5	(20%-122%)	

Tentatively Identified Compound (TIC)	*CAS No.*	*RT*	*Est. Concentration*	*Fit*	*Qual*	*Date Time:*	*11/26/14 19 14*
unknown		2.016	182 ug/kg	0	J		
Unknown Aldol Condensate		3.82	6970 ug/kg		AJ		
unknown		12.478	149 ug/kg	0	J		
Octadecanoic acid	000057-11-4	13.416	147 ug/kg	98	NJ		
unknown		14.059	185 ug/kg	0	J		
1-Eicosanol	000629-96-9	15.22	497 ug/kg	87	NJ		
unknown		21.43	253 ug/kg	0	J		

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	Prep Method 3541 8270D BNA for Soil	AXV1	11/25/14	1730	1439084

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 XP0168

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:	1439085
Prep Batch Number:	1439084

Sample Analysis

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

Sample ID	Client ID
361900001	J1V1L2
361900002	J1V1L3
361900003	J1V1L8
361900004	J1V1L9
361900005	J1V1M1
361900006	J1V1M2
361900007	J1V1L0
361900008	J1V1L1
361900009	J1V1L4
361900010	J1V1L5
361900011	J1V1L6
361900012	J1V1L7
361900013	J1V1M0
1203217572	MB for batch 1439084
1203217573	Laboratory Control Sample (LCS)
1203217574	361900001(J1V1L2) Matrix Spike (MS)
1203217575	361900001(J1V1L2) 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# 34.

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 361900001 (J1V1L2) 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
Multiple RPD values between the MS and MSD, 1203217574 (J1V1L2MS) and 1203217575 (J1V1L2MSD), were not within the 0-30% limits. Please see the QC Summary/Spike Recovery Report for the specific analytes and RPD values. These RPD failures are attributed to the large difference in the recovery values between analyte pairs in the MS and MSD. The MS and MSD passed recoveries for all the analytes. The LCS passed recoveries for all the analytes. The data are reported.

Internal Standard (ISTD) Acceptance

Washington Closure Hanford — CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

RC-107-119 | Page 2 of 3

Collector: Q Stowe	Company Contact: Joan Kessner	Telephone No.: 375-4688	Project Coordinator: KESSNER, JH
Project Designation: 100-H Field Remediation	Sampling Location: 100-H-28 et al, north overburden pile		SAF No.: RC-107
Ice Chest No.: RCC-07-002	Field Logbook No.: EL-1627-08	COA: 01H2832000	Method of Shipment: Commerical Carrier - fed ex
Shipped To: GEL Laboratories Charlston	Offsite Property No.: A131294		Bill of Lading/Air Bill No.: See OSPC

Price Code: 8B | Data Turnaround: 7 days

Other Labs Shipped To: Eberline Services Oak Ridge

POSSIBLE SAMPLE HAZARDS/REMARKS
none

Special Handling and/or Storage
none

Preservation	None	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C		
Type of Container	G/P	G/P	G/P	aG	aG	aG	aG	G		
No. of Container(s)	1	1	1	1	1	1	1	1		
Volume	250mL	125mL	250mL	250mL	250mL	250mL	250mL	125mL		
Sample Analysis	See item (1) in Special Instructions	Chromium Hex - 7196	See item (2) in Special Instructions	PCBs - 8082	Pesticides - 8081	PAHs - 8310	Semi-VOA - 8270 (TCL)	TPH-Diesel Range - WTPH-D +		

Sample No.	Matrix	Sample Date	Sample Time										
~~J1V1L5~~ or ~~J1V1L6~~	~~SOIL~~	DWSHEA 11/20/14											
~~J1V1L7~~	~~SOIL~~												
J1V1L8	SOIL	11/20/14	1008	✓	✓	✓	✓	✓	✓	✓	✓		
J1V1L9	SOIL	11/20/14	1038	✓	✓	✓	✓	✓	✓	✓	✓		

CHAIN OF POSSESSION / Sign/Print Names

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Quincy Stowe [signature]	11-20-14 1110	WCH DWSHEA	11/20/14 1110
DWSHEA	11/20/14 1545	C. Bingham [signature]	11-20-14 1545
C. Bingham [signature]	11-20-14 1550	1060 Battelle, fridge #1A	11-20-14 1550
1060 Battelle, fridge #1A	11-24-14 0715	C. Bingham [signature]	11-24-14 0715
C. Bingham [signature] WCH	11-24-14 0730	fed ex	
FED EX		P. Dent Patricia Dent	11-25-14 0930

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

SPECIAL INSTRUCTIONS

(1) ICP Metals - 6010TR (Close-out List) (Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silicon, Silver, Sodium, Vanadium, Zinc); Mercury - 7471 - (CV)
(2) IC Anions - 9056 (Bromide, Chloride, Fluoride, Nitrogen in Nitrate, Nitrogen in Nitrite, Phosphorous in phosphate, Sulfate); NO2/NO3 - 353.2 (Nitrogen in Nitrite and Nitrate); pH (Soil) - 9045 (pH Measurement)

REVIEWED BY K. Woodvia email DATE 11-24-14

XP0168

WCH-EE-011

Washington Closure Hanford — CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

RC-107-119 | Page 3 of 3

Collector: Q Stowe	Company Contact: Joan Kessner	Telephone No.: 375-4688	Project Coordinator: KESSNER, JH
Price Code: 8B	Data Turnaround: 7 days		
Project Designation: 100-H Field Remediation	Sampling Location: 100-H-28 et al, north overburden pile		SAF No.: RC-107
Ice Chest No.: RCC-07-002	Field Logbook No.: EL-1627-08	COA: 01H2832000	Method of Shipment: Commerical Carrier - fed ex
Shipped To: GEL Laboratories Charlston	Offsite Property No.: A131294		Bill of Lading/Air Bill No.: See OSPC

Other Labs Shipped To: Eberline Services Oak Ridge

POSSIBLE SAMPLE HAZARDS/REMARKS: none

Special Handling and/or Storage: none

Preservation	None	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C		
Type of Container	G/P	G/P	G/P	aG	aG	aG	aG	G		
No. of Container(s)	1	1	1	1	1	1	1	1		
Volume	250mL	125mL	250mL	250mL	250mL	250mL	250mL	125mL		
Sample Analysis	See item (1) in Special instructions	Chromium Hex - 7196	See item (2) in Special Instructions	PCBs - 8082	Pesticides - 8081	PAHs - 8310	Semi-VOA - 8270 (TCL)	TPH-Diesel Range - WTPH-D +		

Sample No.	Matrix	Sample Date	Sample Time										
~~J1V1M0~~	~~SOIL~~	DWS 11/20/14											
J1V1M1	SOIL	11/20/14	1026	✓	✓	✓	✓	✓	✓	✓	✓		
J1V1M2	SOIL	11/20/14	1008	✓	✓	✓	✓	✓	✓	✓	✓		

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Quincy Stowe	11-20-14 1110	DWSHEA DWSHEA	11/20/14 1110
DWSHEA DWSHEA	11/20/14 1545	C. Bingham	11-20-14 1545
C. Bingham	11-20-14 1550	1060 Battelle, Fridge #14	11-20-14 1550
1060 Battelle, Fridge #14	11-24-14 0715	C. Bingham	11-24-14 0715
C. Bingham WCH	11-24-14 0730	Fed ex	
FED EX		P. Dent Patricia Dent	0930 11-25-14

FINAL SAMPLE DISPOSITION: Disposal Method | Disposed By | Date/Time

SPECIAL INSTRUCTIONS

(1) ICP Metals - 6010TR (Close-out List) (Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silicon, Silver, Sodium, Vanadium, Zinc); Mercury - 7471 - (CV)
(2) IC Anions - 9056 (Bromide, Chloride, Fluoride, Nitrogen in Nitrate, Nitrogen in Nitrite, Phosphorous in phosphate, Sulfate); NO2/NO3 - 353.2 (Nitrogen in Nitrite and Nitrate); pH (Soil) - 9045 (pH Measurement)

REVIEWED BY K. Wood Vincent DATE 11-24-14

XP0168

WCH-EE-011

Washington Closure Hanford — CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

RC-107-119 | Page 1 of 3

Collector	Q Stowe
Company Contact	Joan Kessner
Telephone No.	375-4688
Project Coordinator	KESSNER, JH
Price Code	8B
Data Turnaround	7days
Project Designation	100-H Field Remediation
Sampling Location	100-H-28 et al, north overburden pile
SAF No.	RC-107
Ice Chest No.	RCC-07-002
Field Logbook No.	EL-1627-08
COA	01H2832000
Method of Shipment	Commerical Carrier — fed ex
Shipped To	GEL Laboratories Charlston
Offsite Property No.	A131294
Bill of Lading/Air Bill No.	See OSPC
Other Labs Shipped To	Eberline Services Oak Ridge

POSSIBLE SAMPLE HAZARDS/REMARKS
none

Special Handling and/or Storage
none

Preservation	None	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C		
Type of Container	G/P	G/P	G/P	aG	aG	aG	aG	G		
No. of Container(s)	1	1	1	1	1	1	1	1		
Volume	250mL	125mL	250mL	250mL	250mL	250mL	250mL	125mL		
Sample Analysis	See item (1) in Special Instructions	Chromium Hex - 7196	See item (2) in Special Instructions	PCBs - 8082	Pesticides - 8081	PAHs - 8310	Semi-VOA - 8270 (TCL)	TPH-Diesel Range - WTPH-D +		

Sample No.	Matrix	Sample Date	Sample Time									
J1V1L0	SOIL	11/24/14	0801	✓	✓	✓	✓	✓	✓	✓	✓	
J1V1L1	SOIL	11/24/14	0804	✓	✓	✓	✓	✓	✓	✓	✓	
~~J1V1L2~~	~~SOIL~~	DWSHEA										
~~J1V1L3~~	~~SOIL~~	11/20/14										
J1V1L4	SOIL	11/24/14	0758	✓	✓	✓	✓	✓	✓	✓	✓	

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Quincy Stowe	0822 11/24/14	DWSHEA DWSHEA WCH	11/24/14 0822
DWSHEA DWSHEA	11/24/14 0933	C. Bingham	11-24-14 0933
C. Bingham WCH	11-24-14 0950	Fed ex	
FED EX		P. Dent Pat RICKE Dent	11-25-14 0930

FINAL SAMPLE DISPOSITION — Disposal Method | Disposed By | Date/Time

SPECIAL INSTRUCTIONS

(1) ICP Metals - 6010TR (Close-out List) (Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silicon, Silver, Sodium, Vanadium, Zinc); Mercury - 7471 - (CV)
(2) IC Anions - 9056 (Bromide, Chloride, Fluoride, Nitrogen in Nitrate, Nitrogen in Nitrite, Phosphorous in phosphate, Sulfate); NO2/NO3 - 353.2 (Nitrogen in Nitrite and Nitrate); pH (Soil) - 9045 (pH Measurement)

REVIEWED BY K. Woodhead DATE 11-24-14

11-24-14 cmb

XP0169 8

WCH-EE-011

Washington Closure Hanford — CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

RC-107-119 | Page 2 of 3

Collector: Q Stowe	Company Contact: Joan Kessner	Telephone No.: 375-4688	Project Coordinator: KESSNER, JH
Project Designation: 100-H Field Remediation	Sampling Location: 100-H-28 et al, north overburden pile		SAF No.: RC-107
Ice Chest No.: RCC-07-002	Field Logbook No.: EL-1627-08	COA: 01H2832000	Method of Shipment: Commerical Carrier fed ex
Shipped To: GEL Laboratories Charlston	Offsite Property No.: A131 294		Bill of Lading/Air Bill No.: See OSPC

Price Code: 8B | Data Turnaround: 7 days

Other Labs Shipped To: Eberline Services Oak Ridge

POSSIBLE SAMPLE HAZARDS/REMARKS
none

Special Handling and/or Storage
none

Preservation	None	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C		
Type of Container	G/P	G/P	G/P	aG	aG	aG	aG	G		
No. of Container(s)	1	1	1	1	1	1	1	1		
Volume	250mL	125mL	250mL	250mL	250mL	250mL	250mL	125mL		
Sample Analysis	See item (1) in Special Instructions	Chromium Hex - 7196	See item (2) in Special Instructions	PCBs - 8082	Pesticides - 8081	PAHs - 8310	Semi-VOA - 8270 (TCL)	TPH-Diesel Range - WTPH-D +		

Sample No.	Matrix	Sample Date	Sample Time										
J1V1L5	SOIL	11/24/14	0743	✓	✓	✓	✓	✓	✓	✓	✓		
J1V1L6	SOIL	11/24/14	0738	✓	✓	✓	✓	✓	✓	✓	✓		
J1V1L7	SOIL	11/24/14	0732	✓	✓	✓	✓	✓	✓	✓	✓		
~~J1V1L8~~	~~SOIL~~	DWShea											
~~J1V1L9~~	~~SOIL~~	11/20/14											

CHAIN OF POSSESSION / Sign/Print Names

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Quincy Stowe	11/24/14 0822	DWShea DWSHEA WCH	11/24/14 0822
DWShea DWShea	11/24/14 0933	C. Bingham	11-24-14 0933
C. Bingham WCH	11-24-14 0950	fed ex	
FED EX		P. Dent Patricie Dent	11-25-14 0930

FINAL SAMPLE DISPOSITION: Disposal Method | Disposed By | Date/Time

SPECIAL INSTRUCTIONS

(1) ICP Metals - 6010TR (Close-out List) (Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silicon, Silver, Sodium, Vanadium, Zinc); Mercury - 7471 - (CV)
(2) IC Anions - 9056 (Bromide, Chloride, Fluoride, Nitrogen in Nitrate, Nitrogen in Nitrite, Phosphorous in phosphate, Sulfate); NO2/NO3 - 353.2 (Nitrogen in Nitrite and Nitrate); pH (Soil) - 9045 (pH Measurement)

REVIEWED BY K. Woodvineman DATE 11-24-14

11-24-14 CMB

XP0169/8

WCH-EE-011

Washington Closure Hanford — CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

RC-107-119 | Page 3 of 3

Collector: Q Stowe	Company Contact: Joan Kessner	Telephone No.: 375-4688	Project Coordinator: KESSNER, JH
Project Designation: 100-H Field Remediation	Sampling Location: 100-H-28 et al, north overburden pile		SAF No.: RC-107
Ice Chest No.: RCC-07-002	Field Logbook No.: EL-1627-08	COA: 01H2832000	Method of Shipment: Commerical Carrier - fed ex
Shipped To: GEL Laboratories Charlston	Offsite Property No.: A131294		Bill of Lading/Air Bill No.: See OSPC

Price Code: 8B | Data Turnaround: 7days

Other Labs Shipped To: Eberline Services Oak Ridge

POSSIBLE SAMPLE HAZARDS/REMARKS
none

Special Handling and/or Storage
none

Preservation	None	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C		
Type of Container	G/P	G/P	G/P	aG	aG	aG	aG	G		
No. of Container(s)	1	1	1	1	1	1	1	1		
Volume	250mL	125mL	250mL	250mL	250mL	250mL	250mL	125mL		
Sample Analysis	See item (1) in Special Instructions	Chromium Hex - 7196	See item (2) in Special Instructions	PCBs - 8082	Pesticides - 8081	PAHs - 8310	Semi-VOA - 8270 (TCL)	TPH-Diesel Range - WTPH-D +		

Sample No.	Matrix	Sample Date	Sample Time										
J1V1M0	SOIL	11/24/14	0726	✓	✓	✓	✓	✓	✓	✓	✓		
~~J1V1M1~~	~~SOIL~~	DWShea											
~~J1V1M2~~	~~SOIL~~	11/20/14											

CHAIN OF POSSESSION / Sign/Print Names

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Quincy Stowe	11/24/14 0822	WCH DWSHEA	11/24/14 0822
DWSHEA	11/24/14 0933	C. Bingham	11-24-14 0933
C. Bingham WCH	11-24-14 0950	fed ex	
FED EX		P. Dent Patricia Dent	11-25-14 0930

FINAL SAMPLE DISPOSITION: Disposal Method | Disposed By | Date/Time

SPECIAL INSTRUCTIONS

(1) ICP Metals - 6010TR (Close-out List) {Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silicon, Silver, Sodium, Vanadium, Zinc}; Mercury - 7471 - (CV)
(2) IC Anions - 9056 {Bromide, Chloride, Fluoride, Nitrogen in Nitrate, Nitrogen in Nitrite, Phosphorous in phosphate, Sulfate}; NO2/NO3 - 353.2 {Nitrogen in Nitrite and Nitrate}; pH (Soil) - 9045 {pH Measurement}

REVIEWED BY K. Wood Vlacmal DATE 11-24-14

11-24-14CMD

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WCH-EE-011

Appendix 5

Data Validation Supporting Documentation

GC/MS ORGANIC DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E
PROJECT:	100-H-28		DATA PACKAGE:	XP0168	
VALIDATOR:	BCR	LAB:	GeL	DATE:	3/26/15
			SDG:	XP0168	
ANALYSES PERFORMED					
SW-846 8260		SW-846 8260 (TCLP)	SW-846 8270		SW-846 8270 (TCLP)
SAMPLES/MATRIX					
J1VIL0	J1VIL1	J1VIL2	J1VIL3	J1VIL4	J1VIL5
J1VIL6	J1VIL7	J1VIL8	J1VIL9	J1VIM0	J1VIM1
J1VIM2					
					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:

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 - |||| - J all MS - ok

MSD = ~~||||~~ ~~||||~~ ~~||||~~ ~~||||~~ ~~||||~~ ~~||||~~ ~~||||~~ ||| - J all

no RPD

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:

RPD - ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ IIII - J all

6. SYSTEM PERFORMANCE (Levels D and E)

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

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

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

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

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

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

Comments:

7. HOLDING TIMES (all levels)

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

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

Comments:

GC/MS ORGANIC DATA VALIDATION CHECKLIST

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

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

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

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

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

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

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

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

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

Comments: _____

9. SAMPLE CLEANUP (Levels D and E)

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

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

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

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

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

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

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

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

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

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

Comments: _____

Appendix 6

Additional Documentation Requested by Client

GEL LABORATORIES LLC

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

QC Summary

Report Date: December 1, 2014

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

Contact: Joan Kessner

Workorder: 361900 **Client SDG:** XP0168 **Project Description:** RC-107 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Semi-Volatile-GC/MS										
Batch 1439085										
QC1203217573 LCS										
1,2,4-Trichlorobenzene	1660			992	ug/kg		59.6	(37%-98%)	RMB	11/26/14 19:45
1,2-Dichlorobenzene	1660			939	ug/kg		56.5	(39%-93%)		
1,3-Dichlorobenzene	1660			906	ug/kg		54.5	(39%-110%)		
1,4-Dichlorobenzene	1660			967	ug/kg		58.1	(40%-110%)		
2,4,5-Trichlorophenol	1660			987	ug/kg		59.3	(41%-103%)		
2,4,6-Trichlorophenol	1660			986	ug/kg		59.3	(36%-98%)		
2,4-Dichlorophenol	1660			942	ug/kg		56.6	(35%-110%)		
2,4-Dimethylphenol	1660			869	ug/kg		52.2	(35%-102%)		
2,4-Dinitrophenol	1660		J	386	ug/kg		23.2	(22%-83%)		
2,4-Dinitrotoluene	1660			1070	ug/kg		64.4	(43%-109%)		
2,6-Dinitrotoluene	1660			1000	ug/kg		60.4	(41%-103%)		
2-Chloronaphthalene	1660			946	ug/kg		56.9	(39%-101%)		
2-Chlorophenol	1660			990	ug/kg		59.5	(38%-100%)		
2-Methyl-4,6-dinitrophenol	1660			716	ug/kg		43	(33%-103%)		
2-Methylnaphthalene	1660			949	ug/kg		57.1	(36%-107%)		
2-Nitrophenol	1660			948	ug/kg		57	(35%-106%)		
3,3'-Dichlorobenzidine	1660			1120	ug/kg		67.4	(32%-111%)		
3- and/or 4-Methylphenol	1660			1110	ug/kg		66.4	(39%-115%)		
4-Bromophenylphenylether	1660			974	ug/kg		58.5	(42%-110%)		
4-Chloro-3-methylphenol	1660			985	ug/kg		59.2	(35%-104%)		

QC Summary

Workorder: 361900 **Client SDG:** XP0168 **Project Description:** RC-107 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Semi-Volatile-GC/MS										
Batch 1439085										
4-Chloroaniline	1660			900	ug/kg		54.1	(32%-106%)	RMB	11/26/14 19:45
4-Chlorophenylphenylether	1660			1060	ug/kg		63.4	(41%-104%)		
4-Nitrophenol	1660			950	ug/kg		57.1	(23%-114%)		
Acenaphthene	1660			957	ug/kg		57.5	(36%-105%)		
Acenaphthylene	1660			988	ug/kg		59.4	(38%-103%)		
Anthracene	1660			977	ug/kg		58.7	(43%-104%)		
Benzo(a)anthracene	1660			1000	ug/kg		60.3	(46%-108%)		
Benzo(a)pyrene	1660			974	ug/kg		58.6	(45%-109%)		
Benzo(b)fluoranthene	1660			994	ug/kg		59.8	(42%-111%)		
Benzo(ghi)perylene	1660			832	ug/kg		50	(43%-115%)		
Benzo(k)fluoranthene	1660			1010	ug/kg		60.6	(43%-103%)		
Butylbenzylphthalate	1660			1160	ug/kg		69.8	(37%-107%)		
Carbazole	1660			1120	ug/kg		67.5	(53%-118%)		
Chrysene	1660			1030	ug/kg		61.8	(47%-107%)		
Di-n-butylphthalate	1660			1090	ug/kg		65.4	(46%-112%)		
Di-n-octylphthalate	1660			1270	ug/kg		76	(41%-110%)		
Dibenzo(a,h)anthracene	1660			906	ug/kg		54.4	(39%-128%)		
Dibenzofuran	1660			1080	ug/kg		64.8	(38%-104%)		
Diethylphthalate	1660			1050	ug/kg		63	(42%-109%)		
Dimethylphthalate	1660			1040	ug/kg		62.7	(41%-105%)		
Diphenylamine	1660			1030	ug/kg		61.6	(40%-101%)		

QC Summary

Workorder: 361900 **Client SDG:** XP0168 **Project Description:** RC-107 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Semi-Volatile-GC/MS										
Batch 1439085										
Fluoranthene	1660			1040	ug/kg		62.6	(44%-106%)		
Fluorene	1660			989	ug/kg		59.5	(39%-102%)	RMB	11/26/14 19:45
Hexachlorobenzene	1660			962	ug/kg		57.8	(41%-108%)		
Hexachlorobutadiene	1660			983	ug/kg		59.1	(32%-104%)		
Hexachlorocyclopentadiene	1660			807	ug/kg		48.5	(24%-84%)		
Hexachloroethane	1660			956	ug/kg		57.5	(34%-98%)		
Indeno(1,2,3-cd)pyrene	1660			883	ug/kg		53.1	(45%-115%)		
Isophorone	1660			1000	ug/kg		60.3	(36%-98%)		
N-Nitrosodipropylamine	1660			1030	ug/kg		61.7	(34%-106%)		
Naphthalene	1660			958	ug/kg		57.6	(38%-106%)		
Nitrobenzene	1660			1000	ug/kg		60.2	(35%-99%)		
Pentachlorophenol	1660			751	ug/kg		45.1	(31%-93%)		
Phenanthrene	1660			929	ug/kg		55.8	(43%-105%)		
Phenol	1660			974	ug/kg		58.5	(38%-98%)		
Pyrene	1660			973	ug/kg		58.5	(33%-99%)		
bis(2-Chloro-1-methylethyl)ether	1660			944	ug/kg		56.7	(27%-109%)		
bis(2-Chloroethoxy)methane	1660			1010	ug/kg		60.4	(37%-98%)		
bis(2-Chloroethyl) ether	1660			994	ug/kg		59.7	(35%-96%)		
bis(2-Ethylhexyl)phthalate	1660			1280	ug/kg		76.7	(41%-104%)		
m-Nitroaniline	1660			1040	ug/kg		62.7	(32%-113%)		
o-Cresol	1660			960	ug/kg		57.7	(37%-97%)		
o-Nitroaniline	1660			1080	ug/kg		64.8	(34%-116%)		

QC Summary

Workorder: 361900 **Client SDG:** XP0168 **Project Description:** RC-107 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Semi-Volatile-GC/MS										
Batch 1439085										
p-Nitroaniline	1660			1390	ug/kg		83.8	(35%-150%)		
**2,4,6-Tribromophenol	3330			2110	ug/kg		63.3	(20%-122%)	RMB	11/26/14 19:45
**2-Fluorobiphenyl	1660			960	ug/kg		57.7	(25%-100%)		
**2-Fluorophenol	3330			1900	ug/kg		57.1	(23%-107%)		
**Nitrobenzene-d5	1660			981	ug/kg		59	(21%-103%)		
**Phenol-d5	3330			1880	ug/kg		56.6	(25%-108%)		
**p-Terphenyl-d14	1660			995	ug/kg		59.8	(31%-124%)		
QC1203217572 MB										
1,2,4-Trichlorobenzene			U	99.9	ug/kg					11/26/14 10:52
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					

QC Summary

Workorder: 361900 **Client SDG:** XP0168 **Project Description:** RC-107 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Semi-Volatile-GC/MS										
Batch 1439085										
2-Nitrophenol			U	99.9	ug/kg				RMB	11/26/14 10:52
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					

QC Summary

Workorder: 361900 **Client SDG:** XP0168 **Project Description:** RC-107 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Semi-Volatile-GC/MS										
Batch 1439085										
Dibenzo(a,h)anthracene			U	9.99	ug/kg					
Dibenzofuran			U	99.9	ug/kg				RMB	11/26/14 10:52
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					

QC Summary

Workorder: 361900 **Client SDG:** XP0168 **Project Description:** RC-107 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Semi-Volatile-GC/MS											
Batch 1439085											
bis(2-Chloroethyl) ether				U	99.9	ug/kg					
bis(2-Ethylhexyl)phthalate				U	99.9	ug/kg				RMB	11/26/14 10:52
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				1750	ug/kg		52.6	(20%-122%)		
**2-Fluorobiphenyl	1670				1090	ug/kg		65.4	(25%-100%)		
**2-Fluorophenol	3330				1880	ug/kg		56.6	(23%-107%)		
**Nitrobenzene-d5	1670				1060	ug/kg		63.9	(21%-103%)		
**Phenol-d5	3330				1900	ug/kg		57	(25%-108%)		
**p-Terphenyl-d14	1670				851	ug/kg		51.1	(31%-124%)		
QC1203217574 361900001 MS											
1,2,4-Trichlorobenzene	1710	U	102		1180	ug/kg		69.1	(25%-102%)		11/26/14 12:26
1,2-Dichlorobenzene	1710	U	102		1110	ug/kg		64.8	(25%-99%)		
1,3-Dichlorobenzene	1710	U	102		1050	ug/kg		61.3	(24%-96%)		
1,4-Dichlorobenzene	1710	U	102		1100	ug/kg		64.7	(24%-97%)		
2,4,5-Trichlorophenol	1710	U	102		1120	ug/kg		65.6	(38%-109%)		
2,4,6-Trichlorophenol	1710	U	102		1130	ug/kg		66.4	(32%-103%)		
2,4-Dichlorophenol	1710	U	102		1030	ug/kg		60.6	(31%-103%)		
2,4-Dimethylphenol	1710	U	102		1030	ug/kg		60.1	(30%-109%)		
2,4-Dinitrophenol	1710	U	102		1000	ug/kg		58.8	(19%-101%)		
2,4-Dinitrotoluene	1710	U	102		1230	ug/kg		72.3	(36%-115%)		

GEL LABORATORIES LLC

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

QC Summary

Workorder: 361900 **Client SDG:** XP0168 **Project Description:** RC-107 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Semi-Volatile-GC/MS											
Batch 1439085											
2,6-Dinitrotoluene	1710	U	102		1170	ug/kg		68.7	(36%-107%)	RMB	11/26/14 12:26
2-Chloronaphthalene	1710	U	10.2		1150	ug/kg		67.1	(27%-109%)		
2-Chlorophenol	1710	U	102		1070	ug/kg		62.5	(28%-108%)		
2-Methyl-4,6-dinitrophenol	1710	U	102		1240	ug/kg		72.7	(14%-116%)		
2-Methylnaphthalene	1710	U	10.2		1070	ug/kg		62.9	(23%-107%)		
2-Nitrophenol	1710	U	102		1030	ug/kg		60.3	(24%-106%)		
3,3'-Dichlorobenzidine	1710	U	102		1310	ug/kg		76.7	(28%-105%)		
3- and/or 4-Methylphenol	1710	U	102		1250	ug/kg		73.2	(32%-123%)		
4-Bromophenylphenylether	1710	U	102		1220	ug/kg		71.4	(37%-112%)		
4-Chloro-3-methylphenol	1710	U	136		1110	ug/kg		65	(32%-112%)		
4-Chloroaniline	1710	U	102		1110	ug/kg		65.1	(27%-100%)		
4-Chlorophenylphenylether	1710	U	102		1210	ug/kg		71.1	(37%-110%)		
4-Nitrophenol	1710	U	102		1290	ug/kg		75.8	(12%-128%)		
Acenaphthene	1710	U	10.2		1130	ug/kg		65.9	(28%-102%)		
Acenaphthylene	1710	U	10.2		1180	ug/kg		69	(32%-103%)		
Anthracene	1710	U	10.2		1190	ug/kg		69.7	(36%-104%)		
Benzo(a)anthracene	1710	U	10.2		1210	ug/kg		71.2	(27%-120%)		
Benzo(a)pyrene	1710	U	10.2		1160	ug/kg		67.9	(31%-116%)		
Benzo(b)fluoranthene	1710	U	10.2		1160	ug/kg		67.8	(30%-119%)		
Benzo(ghi)perylene	1710	U	10.2		1290	ug/kg		75.4	(30%-109%)		
Benzo(k)fluoranthene	1710	U	10.2		1140	ug/kg		66.8	(31%-125%)		

QC Summary

Workorder: 361900 **Client SDG:** XP0168 **Project Description:** RC-107 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Semi-Volatile-GC/MS										
Batch 1439085										
Butylbenzylphthalate	1710	U	102	1290	ug/kg		75.4	(33%-121%)		
Carbazole	1710	U	10.2	1390	ug/kg		81.6	(40%-133%)	RMB	11/26/14 12:26
Chrysene	1710	U	10.2	1240	ug/kg		72.9	(33%-114%)		
Di-n-butylphthalate	1710	U	102	1390	ug/kg		81.6	(42%-119%)		
Di-n-octylphthalate	1710	U	102	1460	ug/kg		85.8	(36%-115%)		
Dibenzo(a,h)anthracene	1710	U	10.2	1310	ug/kg		77	(26%-128%)		
Dibenzofuran	1710	U	102	1250	ug/kg		73.2	(28%-117%)		
Diethylphthalate	1710	U	102	1260	ug/kg		74.1	(40%-113%)		
Dimethylphthalate	1710	U	102	1220	ug/kg		71.4	(38%-110%)		
Diphenylamine	1710	U	102	1240	ug/kg		72.4	(34%-111%)		
Fluoranthene	1710	J	13.6	1320	ug/kg		76.3	(32%-115%)		
Fluorene	1710	U	10.2	1170	ug/kg		68.3	(30%-115%)		
Hexachlorobenzene	1710	U	102	1230	ug/kg		72.3	(34%-111%)		
Hexachlorobutadiene	1710	U	102	1200	ug/kg		70.4	(24%-105%)		
Hexachlorocyclopentadiene	1710	U	102	1010	ug/kg		59.2	(12%-106%)		
Hexachloroethane	1710	U	102	1060	ug/kg		62.2	(24%-102%)		
Indeno(1,2,3-cd)pyrene	1710	U	10.2	1280	ug/kg		74.9	(29%-117%)		
Isophorone	1710	U	102	1160	ug/kg		67.8	(24%-108%)		
N-Nitrosodipropylamine	1710	U	102	1140	ug/kg		66.8	(23%-117%)		
Naphthalene	1710	U	10.2	1150	ug/kg		67.6	(21%-107%)		
Nitrobenzene	1710	U	102	1090	ug/kg		63.8	(25%-104%)		
Pentachlorophenol	1710	U	102	1180	ug/kg		69.2	(22%-108%)		

QC Summary

Workorder: 361900 **Client SDG:** XP0168 **Project Description:** RC-107 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Semi-Volatile-GC/MS											
Batch 1439085											
Phenanthrene	1710	U	10.2		1180	ug/kg		69	(28%-119%)		
Phenol	1710	U	102		1090	ug/kg		64	(28%-108%)	RMB	11/26/14 12:26
Pyrene	1710	J	13.0		1110	ug/kg		64	(25%-119%)		
bis(2-Chloro-1-methylethyl)ether	1710	U	102		1060	ug/kg		62.1	(25%-105%)		
bis(2-Chloroethoxy)methane	1710	U	102		1130	ug/kg		66.1	(27%-104%)		
bis(2-Chloroethyl) ether	1710	U	102		1090	ug/kg		64.1	(25%-102%)		
bis(2-Ethylhexyl)phthalate	1710	U	102		1390	ug/kg		81.7	(33%-124%)		
m-Nitroaniline	1710	U	102		1210	ug/kg		70.8	(31%-110%)		
o-Cresol	1710	U	102		1060	ug/kg		62.3	(27%-105%)		
o-Nitroaniline	1710	U	113		1230	ug/kg		72.1	(37%-114%)		
p-Nitroaniline	1710	U	102		1620	ug/kg		95.1	(36%-141%)		
**2,4,6-Tribromophenol	3410		1470		2440	ug/kg		71.5	(20%-122%)		
**2-Fluorobiphenyl	1710		816		1140	ug/kg		66.5	(25%-100%)		
**2-Fluorophenol	3410		1540		2220	ug/kg		65	(23%-107%)		
**Nitrobenzene-d5	1710		804		1090	ug/kg		64.1	(21%-103%)		
**Phenol-d5	3410		1540		2080	ug/kg		60.8	(25%-108%)		
**p-Terphenyl-d14	1710		651		1090	ug/kg		63.6	(31%-124%)		
QC1203217575 361900001 MSD											
1,2,4-Trichlorobenzene	1710	U	102		931	ug/kg	23.5	54.5	(0%-30%)		11/26/14 12:57
1,2-Dichlorobenzene	1710	U	102		831	ug/kg	28.4	48.7	(0%-30%)		
1,3-Dichlorobenzene	1710	U	102		794	ug/kg	27.4	46.5	(0%-30%)		
1,4-Dichlorobenzene	1710	U	102		829	ug/kg	28.5	48.6	(0%-30%)		
2,4,5-Trichlorophenol	1710	U	102		809	ug/kg	32.3*	47.4	(0%-30%)		

QC Summary

Workorder: 361900 **Client SDG:** XP0168 **Project Description:** RC-107 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Semi-Volatile-GC/MS											
Batch 1439085											
2,4,6-Trichlorophenol	1710	U	102		824	ug/kg	31.7*	48.2	(0%-30%)	RMB	11/26/14 12:57
2,4-Dichlorophenol	1710	U	102		846	ug/kg	20.1	49.5	(0%-30%)		
2,4-Dimethylphenol	1710	U	102		796	ug/kg	25.2	46.6	(0%-30%)		
2,4-Dinitrophenol	1710	U	102	J	373	ug/kg	91.6*	21.8	(0%-30%)		
2,4-Dinitrotoluene	1710	U	102		867	ug/kg	34.8*	50.8	(0%-30%)		
2,6-Dinitrotoluene	1710	U	102		834	ug/kg	33.6*	48.9	(0%-30%)		
2-Chloronaphthalene	1710	U	10.2		855	ug/kg	29.0	50.1	(0%-30%)		
2-Chlorophenol	1710	U	102		796	ug/kg	29.0	46.6	(0%-30%)		
2-Methyl-4,6-dinitrophenol	1710	U	102		660	ug/kg	61.2*	38.6	(0%-30%)		
2-Methylnaphthalene	1710	U	10.2		842	ug/kg	24.1	49.3	(0%-30%)		
2-Nitrophenol	1710	U	102		814	ug/kg	23.4	47.7	(0%-30%)		
3,3'-Dichlorobenzidine	1710	U	102		944	ug/kg	32.5*	55.3	(0%-30%)		
3- and/or 4-Methylphenol	1710	U	102		916	ug/kg	30.8*	53.6	(0%-30%)		
4-Bromophenylphenylether	1710	U	102		854	ug/kg	35.2*	50	(0%-30%)		
4-Chloro-3-methylphenol	1710	U	136		842	ug/kg	27.3	49.3	(0%-30%)		
4-Chloroaniline	1710	U	102		836	ug/kg	28.3	49	(0%-30%)		
4-Chlorophenylphenylether	1710	U	102		922	ug/kg	27.3	54	(0%-30%)		
4-Nitrophenol	1710	U	102		836	ug/kg	42.9*	49	(0%-30%)		
Acenaphthene	1710	U	10.2		818	ug/kg	31.6*	47.9	(0%-30%)		
Acenaphthylene	1710	U	10.2		877	ug/kg	29.2	51.4	(0%-30%)		
Anthracene	1710	U	10.2		842	ug/kg	34.3*	49.3	(0%-30%)		

QC Summary

Workorder: 361900 **Client SDG:** XP0168 **Project Description:** RC-107 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Semi-Volatile-GC/MS										
Batch 1439085										
Benzo(a)anthracene	1710	U	10.2	843	ug/kg	36.2*	49.3	(0%-30%)		
Benzo(a)pyrene	1710	U	10.2	817	ug/kg	34.6*	47.8	(0%-30%)	RMB	11/26/14 12:57
Benzo(b)fluoranthene	1710	U	10.2	845	ug/kg	31.3*	49.5	(0%-30%)		
Benzo(ghi)perylene	1710	U	10.2	736	ug/kg	54.4*	43.1	(0%-30%)		
Benzo(k)fluoranthene	1710	U	10.2	853	ug/kg	28.8	49.9	(0%-30%)		
Butylbenzylphthalate	1710	U	102	844	ug/kg	41.6*	49.4	(0%-30%)		
Carbazole	1710	U	10.2	971	ug/kg	35.6*	56.9	(0%-30%)		
Chrysene	1710	U	10.2	871	ug/kg	35.3*	51	(0%-30%)		
Di-n-butylphthalate	1710	U	102	981	ug/kg	34.7*	57.4	(0%-30%)		
Di-n-octylphthalate	1710	U	102	1080	ug/kg	30.6*	63	(0%-30%)		
Dibenzo(a,h)anthracene	1710	U	10.2	770	ug/kg	52.3*	45.1	(0%-30%)		
Dibenzofuran	1710	U	102	927	ug/kg	29.7	54.3	(0%-30%)		
Diethylphthalate	1710	U	102	909	ug/kg	32.8*	53.2	(0%-30%)		
Dimethylphthalate	1710	U	102	894	ug/kg	30.8*	52.3	(0%-30%)		
Diphenylamine	1710	U	102	890	ug/kg	32.5*	52.1	(0%-30%)		
Fluoranthene	1710	J	13.6	931	ug/kg	34.2*	53.7	(0%-30%)		
Fluorene	1710	U	10.2	844	ug/kg	32.0*	49.4	(0%-30%)		
Hexachlorobenzene	1710	U	102	843	ug/kg	37.7*	49.3	(0%-30%)		
Hexachlorobutadiene	1710	U	102	926	ug/kg	25.9	54.2	(0%-30%)		
Hexachlorocyclopentadiene	1710	U	102	885	ug/kg	13.3	51.8	(0%-30%)		
Hexachloroethane	1710	U	102	817	ug/kg	26.1	47.8	(0%-30%)		
Indeno(1,2,3-cd)pyrene	1710	U	10.2	738	ug/kg	53.6*	43.2	(0%-30%)		

QC Summary

Workorder: 361900 **Client SDG:** XP0168 **Project Description:** RC-107 Soil

Parmname	NOM	Qual	Sample	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Semi-Volatile-GC/MS										
Batch 1439085										
Isophorone	1710	U	102	890	ug/kg	26.1	52.1	(0%-30%)		
N-Nitrosodipropylamine	1710	U	102	836	ug/kg	30.8*	48.9	(0%-30%)	RMB	11/26/14 12:57
Naphthalene	1710	U	10.2	845	ug/kg	30.9*	49.5	(0%-30%)		
Nitrobenzene	1710	U	102	872	ug/kg	22.2	51.1	(0%-30%)		
Pentachlorophenol	1710	U	102	765	ug/kg	42.6*	44.8	(0%-30%)		
Phenanthrene	1710	U	10.2	819	ug/kg	35.9*	48	(0%-30%)		
Phenol	1710	U	102	810	ug/kg	29.6	47.5	(0%-30%)		
Pyrene	1710	J	13.0	707	ug/kg	44.1*	40.6	(0%-30%)		
bis(2-Chloro-1-methylethyl)ether	1710	U	102	792	ug/kg	28.8	46.4	(0%-30%)		
bis(2-Chloroethoxy)methane	1710	U	102	876	ug/kg	25.1	51.3	(0%-30%)		
bis(2-Chloroethyl) ether	1710	U	102	806	ug/kg	30.2*	47.2	(0%-30%)		
bis(2-Ethylhexyl)phthalate	1710	U	102	969	ug/kg	36.0*	56.7	(0%-30%)		
m-Nitroaniline	1710	U	102	878	ug/kg	31.7*	51.4	(0%-30%)		
o-Cresol	1710	U	102	805	ug/kg	27.6	47.1	(0%-30%)		
o-Nitroaniline	1710	U	113	910	ug/kg	30.0	53.3	(0%-30%)		
p-Nitroaniline	1710	U	102	1180	ug/kg	32.0*	68.8	(0%-30%)		
**2,4,6-Tribromophenol	3420		1470	1690	ug/kg		49.5	(20%-122%)		
**2-Fluorobiphenyl	1710		816	809	ug/kg		47.4	(25%-100%)		
**2-Fluorophenol	3420		1540	1650	ug/kg		48.2	(23%-107%)		
**Nitrobenzene-d5	1710		804	871	ug/kg		51	(21%-103%)		
**Phenol-d5	3420		1540	1540	ug/kg		45	(25%-108%)		
**p-Terphenyl-d14	1710		651	687	ug/kg		40.2	(31%-124%)		

QC Summary

Workorder: 361900 **Client SDG:** XP0168 **Project Description:** RC-107 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time

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 (0rganics 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: 30 March 2015
To: Washington Closure Hanford Inc. (technical representative)
From: ELR Consulting
Project: 100-H Remaining Sites Burial Grounds – Soil Full Protocol - Waste Site 100-H-28
Subject: Radiochemistry - Data Package No. XP0168-GEL

INTRODUCTION

This memo presents the results of data validation on Data Package No. XP0168 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
J1V1L0	11/24/14	Soil	C	See note 1
J1V1L1	11/24/14	Soil	C	See note 1
J1V1L2	11/20/14	Soil	C	See note 1
J1V1L3	11/20/14	Soil	C	See note 1
J1V1L4	11/24/14	Soil	C	See note 1
J1V1L5	11/24/14	Soil	C	See note 1
J1V1L6	11/24/14	Soil	C	See note 1
J1V1L7	11/24/14	Soil	C	See note 1
J1V1L8	11/20/14	Soil	C	See note 1
J1V1L9	11/20/14	Soil	C	See note 1
J1V1M0	11/20/14	Soil	C	See note 1
J1V1M1	11/20/14	Soil	C	See note 1
J1V1M2	11/20/14	Soil	C	See note 1

1 – Nickel-63, carbon-14 and gamma spectroscopy.

Data validation was conducted in accordance with the Washington Closure Hanford Incorporated (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 PARAMETERS

- **Holding Times**

Holding times are calculated from Chain-of-Custody forms to determine the validity of the results. The maximum holding time for radiochemical analysis is 6 months.

All holding times were acceptable.

- **Preparation (Method) Blanks**

Laboratory Blanks

Blank samples are analyzed to determine if positive results are due to laboratory reagent, sample container, or detector contamination. If blank analysis results indicate the presence of an analyte above the minimum detectable activity (MDA), the following qualifiers are applied: All positive sample results less than five times the highest blank concentration are qualified as estimates and flagged "J"; sample results below the MDA are qualified as undetected and flagged "U"; sample results above the MDA and greater than five times the highest blank concentration are not qualified.

All laboratory blank results were acceptable.

Field (Equipment) Blank

No equipment blanks were submitted for analysis.

- **Accuracy**

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

All accuracy results were acceptable.

- **Laboratory Duplicates**

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

All duplicate results were acceptable.

Field Duplicates

One set of field duplicates (J1V1L8/J1V1M2) were submitted for analysis. Laboratory duplicates are compared using the same criteria as for laboratory results. All field duplicate results are acceptable.

- **Detection Levels**

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

- **Completeness**

Data package No. XP0168 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.*

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 statement of work are as follows:

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

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

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

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

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

Appendix 2

Summary of Data Qualification

RADIOCHEMISTRY DATA QUALIFICATION SUMMARY*

SDG: XP0168	REVIEWER: ELR	Project: 100-H-28	PAGE_1_OF_1
COMMENTS: No qualifiers assigned			

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

Appendix 3

Annotated Laboratory Reports

Joan Kessner
Washington Closure Hanford
2620 Fermi Avenue
Richland, WA 99354

SAF: RC-107
SDG: XP0168
Work Order: 14-11131
Date Received: 11/25/2014
Matrix: Soil

Sample Number	Lab Sample ID	QC Type	Date Analyzed	Method Name	CAS Number	Isotope	Result	2-Sigma Counting Error	Total Propagated Uncertainty	MDA	Lab Qualifier	Analysis Units
J1V1M1	14-11131-08		11/27/2014	C14_CHEM_LSC	14762-75-5	Carbon-14	0.273	0.59	0.59	1.00	U	pCi/g
			11/26/2014	GAMMA_GS	14391-65-2	Silver-108m	0.001	0.02	0.02	0.04	U	pCi/g
			11/26/2014	GAMMA_GS	14596-10-2	Americium-241	0.018	0.06	0.06	0.10	U	pCi/g
			11/26/2014	GAMMA_GS	13981-41-4	Barium-133	-0.005	0.02	0.02	0.06	U	pCi/g
			11/26/2014	GAMMA_GS	14733-03-0	Bismuth-214	0.542	0.09	0.09	0.15		pCi/g
			11/26/2014	GAMMA_GS	10198-40-0	Cobalt-60	-0.030	0.05	0.05	0.06	U	pCi/g
			11/26/2014	GAMMA_GS	10045-97-3	Cesium-137	-0.003	0.04	0.04	0.06	U	pCi/g
			11/26/2014	GAMMA_GS	14683-23-9	Europium-152	-0.009	0.22	0.22	0.16	U	pCi/g
			11/26/2014	GAMMA_GS	15585-10-1	Europium-154	0.052	0.12	0.12	0.08	U	pCi/g
			11/26/2014	GAMMA_GS	14391-16-3	Europium-155	0.143	0.12	0.12	0.14		pCi/g
			11/26/2014	GAMMA_GS	13966-00-2	Potassium-40	14.427	2.00	2.13	1.46		pCi/g
			11/26/2014	GAMMA_GS	15100-28-4	Protactinium-234m	-0.018	4.15	4.15	6.22	U	pCi/g
			11/26/2014	GAMMA_GS	15092-94-1	Lead-212	0.634	0.10	0.10	0.17		pCi/g
			11/26/2014	GAMMA_GS	15067-28-4	Lead-214	0.552	0.10	0.10	0.19		pCi/g
			11/26/2014	GAMMA_GS	15065-10-8	Thorium-234	0.956	0.61	0.61	1.00	U	pCi/g
			11/26/2014	GAMMA_GS	14913-50-9	Thallium-208	0.586	0.15	0.15	0.20		pCi/g
			11/26/2014	GAMMA_GS	15117-96-1	Uranium-235	-0.006	0.24	0.24	0.32	U	pCi/g
			12/2/2014	NI63_LSC	13981-37-8	Nickel-63	1.390	1.34	1.34	2.24	U	pCi/g
J1V1M2	14-11131-09		11/27/2014	C14_CHEM_LSC	14762-75-5	Carbon-14	0.401	0.61	0.61	1.03	U	pCi/g
			11/26/2014	GAMMA_GS	14391-65-2	Silver-108m	-0.043	0.05	0.05	0.04	U	pCi/g
			11/26/2014	GAMMA_GS	14596-10-2	Americium-241	-0.026	0.06	0.06	0.09	U	pCi/g
			11/26/2014	GAMMA_GS	13981-41-4	Barium-133	-0.014	0.02	0.02	0.06	U	pCi/g
			11/26/2014	GAMMA_GS	14733-03-0	Bismuth-214	0.855	0.11	0.12	0.19		pCi/g
			11/26/2014	GAMMA_GS	10198-40-0	Cobalt-60	0.038	0.04	0.04	0.05	U	pCi/g
			11/26/2014	GAMMA_GS	10045-97-3	Cesium-137	-0.041	0.04	0.04	0.05	U	pCi/g
			11/26/2014	GAMMA_GS	14683-23-9	Europium-152	0.046	0.16	0.16	0.15	U	pCi/g
			11/26/2014	GAMMA_GS	15585-10-1	Europium-154	0.088	0.10	0.10	0.08		pCi/g
			11/26/2014	GAMMA_GS	14391-16-3	Europium-155	0.127	0.12	0.12	0.12		pCi/g
			11/26/2014	GAMMA_GS	13966-00-2	Potassium-40	13.806	1.77	1.90	0.64		pCi/g
			11/26/2014	GAMMA_GS	15100-28-4	Protactinium-234m	3.231	3.78	3.78	6.47	U	pCi/g
			11/26/2014	GAMMA_GS	15092-94-1	Lead-212	0.633	0.10	0.10	0.15		pCi/g
			11/26/2014	GAMMA_GS	15067-28-4	Lead-214	0.557	0.10	0.10	0.16		pCi/g
			11/26/2014	GAMMA_GS	15065-10-8	Thorium-234	1.364	1.04	1.04	1.72	U	pCi/g
			11/26/2014	GAMMA_GS	14913-50-9	Thallium-208	0.594	0.16	0.16	0.22		pCi/g
			11/26/2014	GAMMA_GS	15117-96-1	Uranium-235	0.075	0.24	0.24	0.32	U	pCi/g
			12/2/2014	NI63_LSC	13981-37-8	Nickel-63	1.716	1.47	1.47	2.44	U	pCi/g

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SAF: RC-107
SDG: XP0168
Work Order: 14-11131
Date Received: 11/25/2014
Matrix: Soil

Sample Number	Lab Sample ID	QC Type	Date Analyzed	Method Name	CAS Number	Isotope	Result	2-Sigma Counting Error	Total Propagated Uncertainty	MDA	Lab Qualifier	Analysis Units
J1V1L0	14-11131-10		11/27/2014	C14_CHEM_LSC	14762-75-5	Carbon-14	0.351	0.53	0.54	0.90	U	pCi/g
			11/26/2014	GAMMA_GS	14391-65-2	Silver-108m	-0.003	0.03	0.03	0.06	U	pCi/g
			11/26/2014	GAMMA_GS	14596-10-2	Americium-241	-0.073	0.12	0.12	0.14	U	pCi/g
			11/26/2014	GAMMA_GS	13981-41-4	Barium-133	-0.049	0.11	0.11	0.11	U	pCi/g
			11/26/2014	GAMMA_GS	14733-03-0	Bismuth-214	0.637	0.14	0.14	0.22		pCi/g
			11/26/2014	GAMMA_GS	10198-40-0	Cobalt-60	-0.005	0.06	0.06	0.08	U	pCi/g
			11/26/2014	GAMMA_GS	10045-97-3	Cesium-137	0.012	0.05	0.05	0.07	U	pCi/g
			11/26/2014	GAMMA_GS	14683-23-9	Europium-152	-0.050	0.38	0.38	0.20	U	pCi/g
			11/26/2014	GAMMA_GS	15585-10-1	Europium-154	0.070	0.17	0.17	0.10	U	pCi/g
			11/26/2014	GAMMA_GS	14391-16-3	Europium-155	0.085	0.13	0.13	0.16	U	pCi/g
			11/26/2014	GAMMA_GS	13966-00-2	Potassium-40	16.256	1.93	2.11	0.73		pCi/g
			11/26/2014	GAMMA_GS	15100-28-4	Protactinium-234m	17.834	8.32	8.37	12.60		pCi/g
			11/26/2014	GAMMA_GS	15092-94-1	Lead-212	0.805	0.11	0.12	0.19		pCi/g
			11/26/2014	GAMMA_GS	15067-28-4	Lead-214	0.644	0.10	0.11	0.31		pCi/g
			11/26/2014	GAMMA_GS	15065-10-8	Thorium-234	0.940	1.07	1.07	1.43	U	pCi/g
			11/26/2014	GAMMA_GS	14913-50-9	Thallium-208	0.778	0.13	0.14	0.18		pCi/g
			11/26/2014	GAMMA_GS	15117-96-1	Uranium-235	0.226	0.24	0.24	0.40	U	pCi/g
			12/2/2014	NI63_LSC	13981-37-8	Nickel-63	1.156	1.39	1.39	2.33	U	pCi/g
J1V1L1	14-11131-11		11/27/2014	C14_CHEM_LSC	14762-75-5	Carbon-14	0.876	0.59	0.60	0.98	U	pCi/g
			11/26/2014	GAMMA_GS	14391-65-2	Silver-108m	-0.023	0.09	0.09	0.10	U	pCi/g
			11/26/2014	GAMMA_GS	14596-10-2	Americium-241	0.049	0.09	0.09	0.14	U	pCi/g
			11/26/2014	GAMMA_GS	13981-41-4	Barium-133	-0.010	0.04	0.04	0.19	U	pCi/g
			11/26/2014	GAMMA_GS	14733-03-0	Bismuth-214	0.592	0.20	0.20	0.29		pCi/g
			11/26/2014	GAMMA_GS	10198-40-0	Cobalt-60	0.020	0.09	0.09	0.12	U	pCi/g
			11/26/2014	GAMMA_GS	10045-97-3	Cesium-137	0.001	0.05	0.05	0.12	U	pCi/g
			11/26/2014	GAMMA_GS	14683-23-9	Europium-152	0.204	0.48	0.48	0.30	U	pCi/g
			11/26/2014	GAMMA_GS	15585-10-1	Europium-154	0.136	0.27	0.27	0.15	U	pCi/g
			11/26/2014	GAMMA_GS	14391-16-3	Europium-155	0.161	0.16	0.16	0.26	U	pCi/g
			11/26/2014	GAMMA_GS	13966-00-2	Potassium-40	16.506	2.65	2.79	1.00		pCi/g
			11/26/2014	GAMMA_GS	15100-28-4	Protactinium-234m	6.234	5.48	5.49	8.57	U	pCi/g
			11/26/2014	GAMMA_GS	15092-94-1	Lead-212	1.068	0.22	0.23	0.28		pCi/g
			11/26/2014	GAMMA_GS	15067-28-4	Lead-214	0.659	0.19	0.19	0.31		pCi/g
			11/26/2014	GAMMA_GS	15065-10-8	Thorium-234	0.001	0.93	0.93	1.42	U	pCi/g
			11/26/2014	GAMMA_GS	14913-50-9	Thallium-208	0.794	0.23	0.24	0.07		pCi/g
			11/26/2014	GAMMA_GS	15117-96-1	Uranium-235	-0.022	0.41	0.41	0.63	U	pCi/g
			12/2/2014	NI63_LSC	13981-37-8	Nickel-63	1.326	1.47	1.47	2.47	U	pCi/g

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SAF: RC-107
SDG: XP0168
Work Order: 14-11131
Date Received: 11/25/2014
Matrix: Soil

Sample Number	Lab Sample ID	QC Type	Date Analyzed	Method Name	CAS Number	Isotope	Result	2-Sigma Counting Error	Total Propagated Uncertainty	MDA	Lab Qualifier	Analysis Units
J1V1L4	14-11131-12		11/27/2014	C14_CHEM_LSC	14762-75-5	Carbon-14	0.532	0.54	0.55	0.91	U	pCi/g
			11/26/2014	GAMMA_GS	14391-65-2	Silver-108m	-0.096	0.05	0.05	0.04	U	pCi/g
			11/26/2014	GAMMA_GS	14596-10-2	Americium-241	-0.074	0.10	0.10	0.12	U	pCi/g
			11/26/2014	GAMMA_GS	13981-41-4	Barium-133	0.009	0.02	0.02	0.06	U	pCi/g
			11/26/2014	GAMMA_GS	14733-03-0	Bismuth-214	0.563	0.10	0.10	0.11		pCi/g
			11/26/2014	GAMMA_GS	10198-40-0	Cobalt-60	0.029	0.04	0.04	0.06	U	pCi/g
			11/26/2014	GAMMA_GS	10045-97-3	Cesium-137	-0.004	0.01	0.01	0.05	U	pCi/g
			11/26/2014	GAMMA_GS	14683-23-9	Europium-152	0.149	0.16	0.16	0.15	U	pCi/g
			11/26/2014	GAMMA_GS	15585-10-1	Europium-154	-0.065	0.11	0.11	0.08	U	pCi/g
			11/26/2014	GAMMA_GS	14391-16-3	Europium-155	-0.034	0.12	0.12	0.13	U	pCi/g
			11/26/2014	GAMMA_GS	13966-00-2	Potassium-40	15.403	1.73	1.90	0.78		pCi/g
			11/26/2014	GAMMA_GS	15100-28-4	Protactinium-234m	2.786	2.56	2.57	4.11	U	pCi/g
			11/26/2014	GAMMA_GS	15092-94-1	Lead-212	0.737	0.09	0.10	0.15		pCi/g
			11/26/2014	GAMMA_GS	15067-28-4	Lead-214	0.520	0.09	0.10	0.14		pCi/g
			11/26/2014	GAMMA_GS	15065-10-8	Thorium-234	1.256	0.92	0.92	1.25		pCi/g
			11/26/2014	GAMMA_GS	14913-50-9	Thallium-208	0.634	0.13	0.14	0.25		pCi/g
			11/26/2014	GAMMA_GS	15117-96-1	Uranium-235	-0.037	0.25	0.25	0.32	U	pCi/g
			12/2/2014	NI63_LSC	13981-37-8	Nickel-63	1.176	1.41	1.41	2.37	U	pCi/g
J1V1L5	14-11131-13		11/27/2014	C14_CHEM_LSC	14762-75-5	Carbon-14	0.326	0.62	0.62	1.04	U	pCi/g
			11/26/2014	GAMMA_GS	14391-65-2	Silver-108m	0.002	0.02	0.02	0.04	U	pCi/g
			11/26/2014	GAMMA_GS	14596-10-2	Americium-241	0.049	0.07	0.07	0.11	U	pCi/g
			11/26/2014	GAMMA_GS	13981-41-4	Barium-133	-0.044	0.06	0.06	0.06	U	pCi/g
			11/26/2014	GAMMA_GS	14733-03-0	Bismuth-214	0.605	0.11	0.11	0.15		pCi/g
			11/26/2014	GAMMA_GS	10198-40-0	Cobalt-60	0.050	0.04	0.04	0.05	U	pCi/g
			11/26/2014	GAMMA_GS	10045-97-3	Cesium-137	0.014	0.04	0.04	0.07	U	pCi/g
			11/26/2014	GAMMA_GS	14683-23-9	Europium-152	-0.021	0.23	0.23	0.18	U	pCi/g
			11/26/2014	GAMMA_GS	15585-10-1	Europium-154	0.047	0.11	0.11	0.09	U	pCi/g
			11/26/2014	GAMMA_GS	14391-16-3	Europium-155	0.010	0.13	0.13	0.15	U	pCi/g
			11/26/2014	GAMMA_GS	13966-00-2	Potassium-40	16.523	2.10	2.26	0.87		pCi/g
			11/26/2014	GAMMA_GS	15100-28-4	Protactinium-234m	2.071	4.03	4.03	6.56	U	pCi/g
			11/26/2014	GAMMA_GS	15092-94-1	Lead-212	1.090	0.16	0.16	0.17		pCi/g
			11/26/2014	GAMMA_GS	15067-28-4	Lead-214	0.609	0.09	0.10	0.30		pCi/g
			11/26/2014	GAMMA_GS	15065-10-8	Thorium-234	0.791	0.63	0.64	1.02	U	pCi/g
			11/26/2014	GAMMA_GS	14913-50-9	Thallium-208	0.790	0.16	0.16	0.19		pCi/g
			11/26/2014	GAMMA_GS	15117-96-1	Uranium-235	-0.045	0.28	0.28	0.36	U	pCi/g
			12/2/2014	NI63_LSC	13981-37-8	Nickel-63	0.076	1.08	1.08	1.84	U	pCi/g

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SAF: RC-107
SDG: XP0168
Work Order: 14-11131
Date Received: 11/25/2014
Matrix: Soil

Sample Number	Lab Sample ID	QC Type	Date Analyzed	Method Name	CAS Number	Isotope	Result	2-Sigma Counting Error	Total Propagated Uncertainty	MDA	Lab Qualifier	Analysis Units
J1V1L6	14-11131-14		11/27/2014	C14_CHEM_LSC	14762-75-5	Carbon-14	0.074	0.56	0.56	0.95	U	pCi/g
			11/26/2014	GAMMA_GS	14391-65-2	Silver-108m	-0.006	0.04	0.04	0.06	U	pCi/g
			11/26/2014	GAMMA_GS	14596-10-2	Americium-241	-0.127	0.12	0.12	0.15	U	pCi/g
			11/26/2014	GAMMA_GS	13981-41-4	Barium-133	0.027	0.04	0.04	0.11	U	pCi/g
			11/26/2014	GAMMA_GS	14733-03-0	Bismuth-214	0.678	0.11	0.11	0.15		pCi/g
			11/26/2014	GAMMA_GS	10198-40-0	Cobalt-60	-0.012	0.05	0.05	0.07	U	pCi/g
			11/26/2014	GAMMA_GS	10045-97-3	Cesium-137	-0.005	0.05	0.05	0.08	U	pCi/g
			11/26/2014	GAMMA_GS	14683-23-9	Europium-152	0.134	0.34	0.34	0.20	U	pCi/g
			11/26/2014	GAMMA_GS	15585-10-1	Europium-154	-0.001	0.11	0.11	0.10	U	pCi/g
			11/26/2014	GAMMA_GS	14391-16-3	Europium-155	0.129	0.13	0.13	0.16	U	pCi/g
			11/26/2014	GAMMA_GS	13966-00-2	Potassium-40	14.645	1.77	1.93	0.41		pCi/g
			11/26/2014	GAMMA_GS	15100-28-4	Protactinium-234m	3.449	5.12	5.12	8.61	U	pCi/g
			11/26/2014	GAMMA_GS	15092-94-1	Lead-212	0.901	0.12	0.13	0.21		pCi/g
			11/26/2014	GAMMA_GS	15067-28-4	Lead-214	0.648	0.12	0.12	0.16		pCi/g
			11/26/2014	GAMMA_GS	15065-10-8	Thorium-234	0.419	1.11	1.11	1.45	U	pCi/g
			11/26/2014	GAMMA_GS	14913-50-9	Thallium-208	0.690	0.14	0.15	0.09		pCi/g
			11/26/2014	GAMMA_GS	15117-96-1	Uranium-235	-0.056	0.24	0.24	0.38	U	pCi/g
			12/2/2014	NI63_LSC	13981-37-8	Nickel-63	0.824	1.47	1.48	2.49	U	pCi/g
J1V1L7	14-11131-15		11/27/2014	C14_CHEM_LSC	14762-75-5	Carbon-14	0.349	0.59	0.59	1.00	U	pCi/g
			11/26/2014	GAMMA_GS	14391-65-2	Silver-108m	0.016	0.02	0.02	0.04	U	pCi/g
			11/26/2014	GAMMA_GS	14596-10-2	Americium-241	0.007	0.07	0.07	0.10	U	pCi/g
			11/26/2014	GAMMA_GS	13981-41-4	Barium-133	0.004	0.02	0.02	0.07	U	pCi/g
			11/26/2014	GAMMA_GS	14733-03-0	Bismuth-214	0.579	0.09	0.09	0.24		pCi/g
			11/26/2014	GAMMA_GS	10198-40-0	Cobalt-60	-0.015	0.05	0.05	0.05	U	pCi/g
			11/26/2014	GAMMA_GS	10045-97-3	Cesium-137	0.038	0.03	0.03	0.06	U	pCi/g
			11/26/2014	GAMMA_GS	14683-23-9	Europium-152	0.233	0.18	0.18	0.16		pCi/g
			11/26/2014	GAMMA_GS	15585-10-1	Europium-154	0.015	0.11	0.11	0.08	U	pCi/g
			11/26/2014	GAMMA_GS	14391-16-3	Europium-155	-0.027	0.12	0.12	0.13	U	pCi/g
			11/26/2014	GAMMA_GS	13966-00-2	Potassium-40	15.656	1.99	2.15	0.84		pCi/g
			11/26/2014	GAMMA_GS	15100-28-4	Protactinium-234m	0.686	3.69	3.69	5.91	U	pCi/g
			11/26/2014	GAMMA_GS	15092-94-1	Lead-212	0.620	0.10	0.10	0.17		pCi/g
			11/26/2014	GAMMA_GS	15067-28-4	Lead-214	0.589	0.11	0.11	0.16		pCi/g
			11/26/2014	GAMMA_GS	15065-10-8	Thorium-234	0.971	0.60	0.60	0.99	U	pCi/g
			11/26/2014	GAMMA_GS	14913-50-9	Thallium-208	0.689	0.16	0.17	0.22		pCi/g
			11/26/2014	GAMMA_GS	15117-96-1	Uranium-235	0.117	0.25	0.25	0.34	U	pCi/g
			12/2/2014	NI63_LSC	13981-37-8	Nickel-63	0.372	1.32	1.32	2.25	U	pCi/g

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0031

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SAF: RC-107
SDG: XP0168
Work Order: 14-11131
Date Received: 11/25/2014
Matrix: Soil

Sample Number	Lab Sample ID	QC Type	Date Analyzed	Method Name	CAS Number	Isotope	Result	2-Sigma Counting Error	Total Propagated Uncertainty	MDA	Lab Qualifier	Analysis Units
J1V1M0	14-11131-16		11/27/2014	C14_CHEM_LSC	14762-75-5	Carbon-14	0.595	0.61	0.61	1.02	U	pCi/g
			11/26/2014	GAMMA_GS	14391-65-2	Silver-108m	-0.010	0.02	0.02	0.07	U	pCi/g
			11/26/2014	GAMMA_GS	14596-10-2	Americium-241	-0.049	0.13	0.13	0.16	U	pCi/g
			11/26/2014	GAMMA_GS	13981-41-4	Barium-133	-0.116	0.07	0.07	0.11	U	pCi/g
			11/26/2014	GAMMA_GS	14733-03-0	Bismuth-214	0.577	0.13	0.13	0.20		pCi/g
			11/26/2014	GAMMA_GS	10198-40-0	Cobalt-60	0.018	0.07	0.07	0.09	U	pCi/g
			11/26/2014	GAMMA_GS	10045-97-3	Cesium-137	0.008	0.05	0.05	0.08	U	pCi/g
			11/26/2014	GAMMA_GS	14683-23-9	Europium-152	0.157	0.30	0.30	0.19	U	pCi/g
			11/26/2014	GAMMA_GS	15585-10-1	Europium-154	0.095	0.16	0.16	0.10	U	pCi/g
			11/26/2014	GAMMA_GS	14391-16-3	Europium-155	0.035	0.13	0.13	0.17	U	pCi/g
			11/26/2014	GAMMA_GS	13966-00-2	Potassium-40	16.831	2.08	2.25	1.19		pCi/g
			11/26/2014	GAMMA_GS	15100-28-4	Protactinium-234m	0.801	5.47	5.47	8.70	U	pCi/g
			11/26/2014	GAMMA_GS	15092-94-1	Lead-212	0.866	0.11	0.12	0.19		pCi/g
			11/26/2014	GAMMA_GS	15067-28-4	Lead-214	0.591	0.10	0.11	0.15		pCi/g
			11/26/2014	GAMMA_GS	15065-10-8	Thorium-234	1.202	1.12	1.12	1.52	U	pCi/g
			11/26/2014	GAMMA_GS	14913-50-9	Thallium-208	0.882	0.17	0.17	0.04		pCi/g
			11/26/2014	GAMMA_GS	15117-96-1	Uranium-235	0.086	0.25	0.25	0.41	U	pCi/g
			12/2/2014	NI63_LSC	13981-37-8	Nickel-63	3.939	1.44	1.46	2.33		pCi/g
J1V1M0	14-11131-17	MS	11/27/2014	C14_CHEM_LSC	14762-75-5	Carbon-14	264.065	2.65	36.86	1.02		pCi/g
J1V1L2	14-11131-17	MS	12/2/2014	NI63_LSC	13981-37-8	Nickel-63	2077.907	12.06	122.77	2.60		pCi/g

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0032

EBERLINE SERVICES
EBERLINE ANALYTICAL CORPORATION
601 SCARBORO ROAD OAK RIDGE, TN 37830 865/481-0683 FAX 865/483-4621

Joan Kessner
Washington Closure Hanford
2620 Fermi Avenue
Richland, WA 99354

SAF: RC-107
SDG: XP0168
Work Order: 14-11131
Date Received: 11/25/2014
Matrix: Soil

Sample Number	Lab Sample ID	QC Type	Date Analyzed	Method Name	CAS Number	Isotope	Result	2-Sigma Counting Error	Total Propagated Uncertainty	MDA	Lab Qualifier	Analysis Units
J1V1L8	14-11131-06		11/27/2014	C14_CHEM_LSC	14762-75-5	Carbon-14	0.253	0.55	0.55	0.93	U	pCi/g
			11/26/2014	GAMMA_GS	14391-65-2	Silver-108m	0.007	0.09	0.09	0.10	U	pCi/g
			11/26/2014	GAMMA_GS	14596-10-2	Americium-241	0.015	0.09	0.09	0.14	U	pCi/g
			11/26/2014	GAMMA_GS	13981-41-4	Barium-133	0.004	0.03	0.03	0.20	U	pCi/g
			11/26/2014	GAMMA_GS	14733-03-0	Bismuth-214	0.625	0.16	0.17	0.56		pCi/g
			11/26/2014	GAMMA_GS	10198-40-0	Cobalt-60	-0.069	0.10	0.10	0.13	U	pCi/g
			11/26/2014	GAMMA_GS	10045-97-3	Cesium-137	-0.022	0.08	0.08	0.13	U	pCi/g
			11/26/2014	GAMMA_GS	14683-23-9	Europium-152	-0.261	0.52	0.52	0.30	U	pCi/g
			11/26/2014	GAMMA_GS	15585-10-1	Europium-154	0.062	0.22	0.22	0.15	U	pCi/g
			11/26/2014	GAMMA_GS	14391-16-3	Europium-155	-0.198	0.19	0.19	0.21	U	pCi/g
			11/26/2014	GAMMA_GS	13966-00-2	Potassium-40	16.031	2.72	2.84	1.43		pCi/g
			11/26/2014	GAMMA_GS	15100-28-4	Protactinium-234m	7.463	8.35	8.36	15.32	U	pCi/g
			11/26/2014	GAMMA_GS	15092-94-1	Lead-212	0.641	0.21	0.21	0.32		pCi/g
			11/26/2014	GAMMA_GS	15067-28-4	Lead-214	0.740	0.18	0.18	0.28		pCi/g
			11/26/2014	GAMMA_GS	15065-10-8	Thorium-234	1.068	0.90	0.90	1.42	U	pCi/g
			11/26/2014	GAMMA_GS	14913-50-9	Thallium-208	0.871	0.21	0.21	0.07		pCi/g
			11/26/2014	GAMMA_GS	15117-96-1	Uranium-235	0.235	0.41	0.41	0.65	U	pCi/g
			12/2/2014	NI63_LSC	13981-37-8	Nickel-63	0.653	1.33	1.33	2.26	U	pCi/g
J1V1L9	14-11131-07		11/27/2014	C14_CHEM_LSC	14762-75-5	Carbon-14	0.239	0.60	0.60	1.02	U	pCi/g
			11/26/2014	GAMMA_GS	14391-65-2	Silver-108m	-0.080	0.05	0.05	0.04	U	pCi/g
			11/26/2014	GAMMA_GS	14596-10-2	Americium-241	-0.112	0.11	0.11	0.12	U	pCi/g
			11/26/2014	GAMMA_GS	13981-41-4	Barium-133	0.002	0.02	0.02	0.05	U	pCi/g
			11/26/2014	GAMMA_GS	14733-03-0	Bismuth-214	0.645	0.10	0.11	0.04		pCi/g
			11/26/2014	GAMMA_GS	10198-40-0	Cobalt-60	0.005	0.04	0.04	0.05	U	pCi/g
			11/26/2014	GAMMA_GS	10045-97-3	Cesium-137	-0.001	0.03	0.03	0.05	U	pCi/g
			11/26/2014	GAMMA_GS	14683-23-9	Europium-152	-0.026	0.21	0.21	0.16	U	pCi/g
			11/26/2014	GAMMA_GS	15585-10-1	Europium-154	-0.030	0.11	0.11	0.08	U	pCi/g
			11/26/2014	GAMMA_GS	14391-16-3	Europium-155	0.084	0.13	0.13	0.14	U	pCi/g
			11/26/2014	GAMMA_GS	13966-00-2	Potassium-40	16.626	1.82	2.01	0.67		pCi/g
			11/26/2014	GAMMA_GS	15100-28-4	Protactinium-234m	2.268	3.88	3.88	6.17	U	pCi/g
			11/26/2014	GAMMA_GS	15092-94-1	Lead-212	0.811	0.10	0.11	0.16		pCi/g
			11/26/2014	GAMMA_GS	15067-28-4	Lead-214	0.695	0.09	0.09	0.14		pCi/g
			11/26/2014	GAMMA_GS	15065-10-8	Thorium-234	1.079	0.96	0.96	1.28	U	pCi/g
			11/26/2014	GAMMA_GS	14913-50-9	Thallium-208	0.681	0.15	0.15	0.19		pCi/g
			11/26/2014	GAMMA_GS	15117-96-1	Uranium-235	0.083	0.26	0.26	0.34	U	pCi/g
			12/2/2014	NI63_LSC	13981-37-8	Nickel-63	1.005	1.21	1.21	2.03	U	pCi/g

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3/30/15

00027

EBERLINE SERVICES
EBERLINE ANALYTICAL CORPORATION
601 SCARBORO ROAD OAK RIDGE, TN 37830 865/481-0683 FAX 865/483-4621

Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

EBERLINE SERVICES

EBERLINE ANALYTICAL CORPORATION
601 SCARBORO ROAD
OAK RIDGE, TENNESSEE 37830
PHONE (865) 481-0683
FAX (865) 483-4621

EBS-OR-38269

December 9, 2014

Joan Kessner
Washington Closure Hanford
2620 Fermi Avenue
Richland, WA 99354

CASE NARRATIVE
SAF: RC-107, SDG: XP0168
Work Order # 14-11131-OR

SAMPLE RECEIPT

This work order contains thirteen soil samples received 11/25/2014. These samples were analyzed for Carbon-14, Nickel-63 and by Gamma Spectroscopy.

CLIENT ID	LAB ID	CLIENT ID	LAB ID
J1V1L2	14-11131-04	J1V1L1	14-11131-11
J1V1L3	14-11131-05	J1V1L4	14-11131-12
J1V1L8	14-11131-06	J1V1L5	14-11131-13
J1V1L9	14-11131-07	J1V1L6	14-11131-14
J1V1M1	14-11131-08	J1V1L7	14-11131-15
J1V1M2	14-11131-09	J1V1M0	14-11131-16
J1V1L0	14-11131-10		

ANALYTICAL METHODS

Carbon-14 was performed using EPA Method 520.0 Modified. Nickel-63 was performed using Method ASTM 3500-Ni Modified. Gamma Spectroscopy was performed using Method LANL ER-130 Modified.

Laboratory qualifier is as follows:

U - Result is less than or equal to MDA.

ANALYTICAL RESULTS

Combined Standard Uncertainty is reported at 2-sigma value.

SPECIAL CIRCUMSTANCES

Results for Nickel-63 and Gamma Spectroscopy are reported on a "dry weight" basis.

ANALYTICAL RESULTS CONTINUED

CARBON-14

Representative aliquots of samples were placed into a 1-liter reaction vessel. A carbonate solution was added. Samples were oxidized using Potassium Permanganate. Carbon dioxide was evolved and Carbon-14 was captured into Harvey brand, Carb-Sorb cocktail. Carbon-14 beta emissions were then determined by beta liquid scintillation using an energy selective region.

Samples demonstrated acceptable results for all Carbon-14 analyses. The Carbon-14 method blank demonstrated an acceptable result. Results for the Carbon-14 duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Carbon-14 laboratory control sample demonstrated an acceptable percent recovery. Results for the Carbon-14 matrix spike demonstrated an acceptable percent recovery.

NICKEL-63

A representative aliquot of each sample was placed into an appropriately sized beaker. Stable elemental Nickel carrier was added to each sample prior to digestion. Samples were digested in concentrated Nitric acid. After digestion, sample pH was adjusted and Nickel-63 was precipitated selectively with Dimethylglyoxime. Precipitates were selectively separated, redissolved, and residual acid was effectively neutralized. Sample residuals were placed into scintillation vials, scintillation cocktail was added and Nickel-63 activity was determined by beta liquid scintillation.

Samples demonstrated acceptable results for all Nickel-63 analyses. The Nickel-63 method blank demonstrated an acceptable result. Results for the Nickel-63 duplicate demonstrated a high relative percent difference; however, normalized difference is within acceptable limits for the analytical technique. Results for the Nickel-63 laboratory control sample demonstrated an acceptable percent recovery. Results for the Nickel-63 matrix spike demonstrated an acceptable percent recovery.

GAMMA SPECTROSCOPY

Samples for Gamma Spectroscopy analysis were prepared by transferring a known mass/aliquot of each prepared and homogenized sample to a standard geometry container. Samples were counted on High Purity Germanium (HPGe) gamma ray detectors.

Samples demonstrated acceptable results for all gamma-emitting radionuclides as reported. Some results demonstrated slightly high detection limits. The method blank demonstrated acceptable results for all radionuclides as reported. Results for the Bismuth-214, Lead-214 and Potassium-40 replicate demonstrated an acceptable relative percent difference and normalized difference. Results for the Cobalt-60 and Cesium-137 laboratory control sample demonstrated an acceptable percent recovery.

CERTIFICATION OF ACCURACY

I certify that this data report is in compliance with the terms and conditions of the Purchase Order, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hard copy data package has been authorized by the cognizant project manager or his/her designee to be accurate as verified by the following signature.

M.R. McDougall
Laboratory Manager

Date: 12/9/2014

Eberline Analytical wants and encourages your feedback regarding our performance providing radioanalytical services. Please visit http://www.eberlineservices.com/client.htm to provide us with feedback on our services.

Washington Closure Hanford

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

RC-107-119

Collector: Q Stowe	Company Contact: Joan Kessner	Telephone No.: 375-4688	Project Coordinator: KESSNER, JH
Price Code: 8B	Data Turnaround: 7days		
Project Designation: 100-H Field Remediation	Sampling Location: 100-H-28 at al, north overburden pile		SAF No.: RC-107
Ice Chest No.: RCC-08-022	Field Logbook No.: EL-1627-08	COA: 01H2832000	Method of Shipment: Commercial Carrier – fed ex
Shipped To: Eberline Services Oak Ridge	Offsite Property No.: A131 204		Bill of Lading/Air Bill No.: See OSPC

Other Labs Shipped To: GEL Laboratories Charlston

14-11131

Preservation	None	None									
Type of Container	G/P	G/P									
No. of Container(s)	1	1									
Volume	1000mL	120mL									
Sample Analysis	See item (3) in Special Instructions	See item (4) in Special Instructions					REC'D	NOV 25 2014			

POSSIBLE SAMPLE HAZARDS/REMARKS
none

Special Handling and/or Storage
none

Sample No.		Matrix	Sample Date	Sample Time									
~~J1V1L3~~		~~SOIL~~	? DWShea										
~~J1V1L1~~		~~SOIL~~	J 11/20/14										
J1V1L2	4	SOIL	11/20/14	1102	✓	✓							
J1V1L3	5	SOIL	11/20/14	1051	✓	✓							
~~J1V1L4~~		~~SOIL~~	DWShea 11/20/14										

CHAIN OF POSSESSION / Sign/Print Names

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Quincy Stowe	11-20-14 1110	DWShea DWSHEA WCH	11/20/14 1110
DWShea DWSHEA	11/20/14 1545	C. Bingham	11-20-14 1545
C. Bingham WCH	11-20-14 1550	1060 Battelle, fridge #1A	11-20-14 1550
1060 Battelle, fridge #1A	11-24-14 0715	C. Bingham	11-24-14 0715
C. Bingham WCH	11-24-14 0730	fed ex	
Fed Ex		Kristen Coulston	11/25/14 1130

FINAL SAMPLE DISPOSITION: Disposal Method: 005 | Disposed By | Date/Time

WCH-EE-011

SPECIAL INSTRUCTIONS

(3) Gamma Spec (Client List) {Americium-241, Barium-133, Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155, Silver-108 metastable}
(4) Carbon-14 Low Level; Nickel-63; Strontium-89,90 -- Total Sr; Tritium - H3 Low Level Soil

REVIEWED BY K. Woodhaemel DATE 11-24-14

XP0168

Washington Closure Hanford

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

RC-107-119

Collector: Q Stowe	Company Contact: Joan Kessner	Telephone No.: 375-4688	Project Coordinator: KESSNER, JH
Project Designation: 100-H Field Remediation	Sampling Location: 100-H-28 et al, north overburden pile		SAF No.: RC-107
Ice Chest No.: RCC-08-022	Field Logbook No.: EL-1627-08	COA: 01H2832000	Method of Shipment: Commercial Carrier - fed ex
Shipped To: Eberline Services Oak Ridge	Offsite Property No.: A131204		Bill of Lading/Air Bill No.: See OSPC

Price Code: 8B

Data Turnaround: 7 days

Other Labs Shipped To: GEL Laboratories Charlston

14-11131

Preservation	None	None
Type of Container	G/P	G/P
No. of Container(s)	1	1
Volume	1000mL	120mL
Sample Analysis	See item (3) in Special Instructions	See item (4) in Special Instructions

POSSIBLE SAMPLE HAZARDS/REMARKS

none

Special Handling and/or Storage

none

REC'D NOV 25 2014

Sample No.	Matrix	Sample Date	Sample Time		
~~J1V1L5~~	~~SOIL~~	DWS 11/20/14			
~~J1V1L6~~	~~SOIL~~				
~~J1V1L7~~	~~SOIL~~				
J1V1L8 6	SOIL	11/20/14	1008	✓	✓
J1V1L9 7	SOIL	11/20/14	DWS 11/20/14 ~~1039~~ 1038	✓	✓

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

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Quincy Stowe	11-20-14 1110	WCH Dwshea DWSHEA	11/20/14 1110
Dwshea DWSHEA	11/20/14 1545	C. Bingham	11-20-14 1545
C. Bingham	11-20-14 1550	1060 Battelle, Fridge #1A	11-20-14 1550
1060 Battelle, Fridge #1A	11-24-14 0715	C. Bingham	11-24-14 0715
C. Bingham WCH	11-24-14 0730	fed ex	
FedEx		Kristen Carlst	11/25/14 1130

FINAL SAMPLE DISPOSITION — Disposal Method: 9000 — Disposed By: — Date/Time:

SPECIAL INSTRUCTIONS

(3) Gamma Spec (Client List) {Americium-241, Barium-133, Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155, Silver-108 metastable}

(4) Carbon-14 Low Level; Nickel-63; Strontium-89,90 -- Total Sr; Tritium - H3 Low Level Soil

REVIEWED BY K. Woodviaemael DATE 11-24-14

XPO168

WCH-EE-011

Washington Closure Hanford

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

RC-107-119

Collector: Q Stowe	Company Contact: Joan Kessner	Telephone No.: 375-4688	Project Coordinator: KESSNER, JH
Project Designation: 100-H Field Remediation	Sampling Location: 100-H-28 et al, north overburden pile		SAF No.: RC-107
Ice Chest No.: RCC-08-022	Field Logbook No.: EL-1627-08	COA: 01H2832000	Method of Shipment: Commercial Carrier - fed ex
Shipped To: Eberline Services Oak Ridge	Offsite Property No.: A131 204		Bill of Lading/Air Bill No.: See OSPC

Price Code: 8B

Data Turnaround: 7days

Other Labs Shipped To: GEL Laboratories Charlston

14-11131

Preservation	None	None
Type of Container	G/P	G/P
No. of Container(s)	1	1
Volume	1000mL	120mL
Sample Analysis	See item (3) in Special Instructions	See item (4) in Special Instructions

REC'D NOV 25 2014

POSSIBLE SAMPLE HAZARDS/REMARKS

none

Special Handling and/or Storage

none

Sample No.	Matrix	Sample Date	Sample Time		
~~J1V1M0~~	~~SOIL~~	DWS 11/20/14			
J1V1M1 8	SOIL	11/20/14	1026	✓	✓
J1V1M2 9	SOIL	11/20/14	1008	✓	✓

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

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Quincy Stowe	11-20-14 1110	Dwshea DWSHEA WCH	11/20/14 1110
Dwshea DWSHEA	11/20/14 1545	~~1060 Battelle, fridge~~ 11-20-14 GMB #1A	C. Bingham 11-20-14 1545
C. Bingham	11-20-14 1550	1060 Battelle, fridge #1A	11-20-14 1550
1060 Battelle, fridge #1A	11-24-14 0715	C. Bingham	11-24-14 0715
C. Bingham WCH	11-24-14 1130	fed ex	
Fed Ex		Luister Carlston	11/25/14 1180

SPECIAL INSTRUCTIONS

(3) Gamma Spec (Client List) {Americium-241, Barium-133, Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155, Silver-108 metastable}
(4) Carbon-14 Low Level; Nickel-63; Strontium-89,90 -- Total Sr; Tritium - H3 Low Level Soil

REVIEWED BY K. Woodvine [signature] DATE 11-24-14

FINAL SAMPLE DISPOSITION Disposal Method: 007 Disposed By: Date/Time:

XP0168

WCH-EE-011

Washington Closure Hanford

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

RC-107-119

Collector: Q Stowe	Company Contact: Joan Kessner	Telephone No.: 375-4688	Project Coordinator: KESSNER, JH
Project Designation: 100-H Field Remediation	Sampling Location: 100-H-28 et al, north overburden pile		SAF No.: RC-107
Ice Chest No.: RCC-08-022	Field Logbook No.: EL-1627-08	COA: 01H2832000	Method of Shipment: Commercial Carrier - fed ex
Shipped To: Eberline Services Oak Ridge	Offsite Property No.: A131204		Bill of Lading/Air Bill No.: See OSPC

Price Code: 8B

Data Turnaround: 7 days

Other Labs Shipped To: GEL Laboratories Charlston

Preservation	None	None					14-11131				
Type of Container	G/P	G/P									
No. of Container(s)	1	1									
Volume	1000mL	120mL									
Sample Analysis	See item (3) in Special Instructions	See item (4) in Special Instructions					REC'D NOV 25 2014				

POSSIBLE SAMPLE HAZARDS/REMARKS

none

Special Handling and/or Storage

none

Sample No.	Matrix	Sample Date	Sample Time									
J1V1L0 10	SOIL	11/24/14	0811	✓	✓							
J1V1L1 11	SOIL	11/24/14	0804	✓	✓							
~~J1V1L2~~	~~SOIL~~	DWShea										
~~J1V1L3~~	~~SOIL~~	11/20/14										
J1V1L4 12	SOIL	11/24/14	0758	✓	✓							

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

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Quincy Stowe	11/24/14 0822	WCH DWSHEA	11/24/14 0822
DWSHEA	11/24/14 0933	C. Bingham	11-24-14 0933
C. Bingham WCH	11-24-14 0950	fed ex	
Fed Ex		Kuster Carlst	11/25/14 1130

SPECIAL INSTRUCTIONS

(3) Gamma Spec (Client List) {Americium-241, Barium-133, Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155, Silver-108 metastable}
(4) Carbon-14 Low Level; Nickel-63; Strontium-89,90 -- Total Sr; Tritium - H3 Low Level Soil

REVIEWED BY K Woodvia email DATE 11-24-14

11-24-14 cmb

FINAL SAMPLE DISPOSITION Disposal Method: 0 0 8 Disposed By Date/Time

XP01698

WCH-EE-011

Washington Closure Hanford

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

RC-107-119

Collector: Q Stowe	Company Contact: Joan Kessner	Telephone No.: 375-4688	Project Coordinator: KESSNER, JH
Price Code: 8B	Data Turnaround: 7 days		
Project Designation: 100-H Field Remediation	Sampling Location: 100-H-28 et al, north overburden pile		SAF No.: RC-107
Ice Chest No.: RCC-08-022	Field Logbook No.: EL-1627-08	COA: 01H2832000	Method of Shipment: Commercial Carrier - fed ex
Shipped To: Eberline Services Oak Ridge	Offsite Property No.: A131 204		Bill of Lading/Air Bill No.: See OSPC

Other Labs Shipped To: GEL Laboratories Charlston

POSSIBLE SAMPLE HAZARDS/REMARKS
none

Special Handling and/or Storage
none

Preservation	None	None						14-11131			
Type of Container	G/P	G/P									
No. of Container(s)	1	1									
Volume	1000mL	120mL									
Sample Analysis	See item (3) in Special Instructions	See item (4) in Special Instructions						REC'D NOV 25 2014			

Sample No.	Matrix	Sample Date	Sample Time									
J1V1L5 13	SOIL	11/24/14	0743	✓	✓							
J1V1L6 14	SOIL	11/24/14	0738	✓	✓							
J1V1L7 15	SOIL	11/24/14	0732	✓	✓							
~~J1V1L8~~	~~SOIL~~	DWShea										
~~J1V1L9~~	~~SOIL~~	11/20/14										

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By/Removed From: Quincy Stowe	Date/Time: 11/24/14 0822	Received By/Stored In: DWShea DWSHEA	Date/Time: 11/24/14 0822
Relinquished By/Removed From: DWShea DWSHEA	Date/Time: 11/24/14 0933	Received By/Stored In: C. Bingham	Date/Time: 11-24-14 0933
Relinquished By/Removed From: C. Bingham WCH	Date/Time: 11-24-14 0950	Received By/Stored In: fed ex	Date/Time:
Relinquished By/Removed From: Fed Ex	Date/Time:	Received By/Stored In: Kurt Culbt	Date/Time: 11/25/14 1130
Relinquished By/Removed From:	Date/Time:	Received By/Stored In:	Date/Time:
Relinquished By/Removed From:	Date/Time:	Received By/Stored In:	Date/Time:
Relinquished By/Removed From:	Date/Time:	Received By/Stored In:	Date/Time:

FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

WCH-EE-011

SPECIAL INSTRUCTIONS

(3) Gamma Spec (Client List) {Americium-241, Barium-133, Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155, Silver-108 metastable}
(4) Carbon-14 Low Level; Nickel-63; Strontium-89,90 -- Total Sr; Tritium - H3 Low Level Soil

11-24-14 CMB

XP016918

REVIEWED BY K. Woodvineamal
DATE 11-24-14

009

Washington Closure Hanford

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

RC-107-119

Collector: Q Stowe	Company Contact: Joan Kessner	Telephone No.: 375-4688	Project Coordinator: KESSNER, JH
Project Designation: 100-H Field Remediation	Sampling Location: 100-H-28 et al, north overburden pile		SAF No.: RC-107
Ice Chest No.: RCC-08-022	Field Logbook No.: EL-1627-08	COA: 01H2832000	Method of Shipment: Commercial Carrier fed ex
Shipped To: Eberline Services Oak Ridge	Offsite Property No.: A131204		Bill of Lading/Air Bill No.: See OSPC

Price Code: 8B

Data Turnaround: 7 days

Other Labs Shipped To: GEL Laboratories Charlston

14-11131

Preservation	None	None
Type of Container	G/P	G/P
No. of Container(s)	1	1
Volume	1000mL	120mL
Sample Analysis	See item (3) in Special Instructions	See item (4) in Special Instructions

POSSIBLE SAMPLE HAZARDS/REMARKS

none

Special Handling and/or Storage

none

REC'D NOV 25 2014

Sample No.	Matrix	Sample Date	Sample Time		
J1V1M0 16	SOIL	11/24/14	0726	✓	✓
~~J1V1M1~~	~~SOIL~~	DWShea 11/20/14			
~~J1V1M2~~	~~SOIL~~				

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

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Quincy Stowe	0822 11/24/14	WCH DWShea DWSHEA	11/24/14 0822
DW Shea DWSHEA	0933 11/24/14	C. Bingham	11-24-14 0933
C. Bingham WCH	0950 11-24-14	fed ex	
FedEx		Kristen Coulst	11/25/14 1130

FINAL SAMPLE DISPOSITION — Disposal Method: 0010 — Disposed By: — Date/Time:

SPECIAL INSTRUCTIONS

(3) Gamma Spec (Client List) {Americium-241, Barium-133, Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155, Silver-108 metastable}
(4) Carbon-14 Low Level; Nickel-63; Strontium-89,90 -- Total Sr; Tritium - H3 Low Level Soil

REVIEWED BY K Wood Vlaemore DATE 11-24-14

11-24-14 CMB

XP0169 8

WCH-EE-011

Appendix 5

Data Validation Supporting Documentation

APPENDIX A

RADIOCHEMICAL DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E
PROJECT: 100-H-28			DATA PACKAGE: XP0168		
VALIDATOR: ELR		LAB: GEL		DATE: 3/27/15	
			SDG: XP0168		

ANALYSES PERFORMED					
☐ Gross Alpha/Beta	☐ Strontium-90	☐ Technetium-99	☐ Alpha Spectroscopy	☒ Gamma Spectroscopy	
☐ Total Uranium	☐ Radium-22	☐ Tritium	XCL4	XM1-C3	

SAMPLES/MATRIX					
J1V1L0	J1V1L1	J1V1L2	J1V1L3	J1V1L4	J1V1L5
J1V1L6	J1V1L7	J1V1L8	J1V1L9	J1V1M0	J1V1M1
J1V1M2					
					Soil

1. Completeness ..... ☐ N/A

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

Comments: _____

2. Initial Calibration (Levels D, E) ..... ☒ N/A

Instruments/detectors calibrated? ..... Yes No N/A

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

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

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

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

Comments: _____

3. Continuing Calibration (Levels D, E) ☒ N/A

Calibration checked within required frequency? ..... Yes No N/A

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

Calibration check standards traceable? ..... Yes No N/A

Calibration check standards expired? ..... Yes No N/A

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

Comments: _____

_____

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_____

4. Background Counts (Levels D, E) ..... ☒ N/A

Background Counts checked within required frequency? ..... Yes No N/A

Background Counts acceptable? ..... Yes No N/A

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

Comments: _____

_____

_____

_____

_____

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

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

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

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

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

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

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

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

Comments: no FB

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

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

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

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

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

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

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

Comments:

7. Chemical Carrier Recovery (Levels C, D, E) ..... ☒ N/A

Chemical carrier added? ..... Yes No N/A

Chemical recovery acceptable? ..... Yes No N/A

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

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

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

Comments: _____

_____

_____

_____

_____

8. Tracer Recovery (Levels C, D, E) ..... ☐ N/A

Tracer added? ..... Yes No N/A

Tracer recovery acceptable? ..... Yes No N/A

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

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

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

Comments: _____

_____

_____

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_____

9. Matrix Spikes (Levels C, D, E) ..... ☐ N/A

Matrix spike analyzed? ..... Yes No N/A

Spike recoveries acceptable? ..... Yes No N/A

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

Spike source expired? Levels D, E) ..... Yes No N/A

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

Comments: _____

_____

_____

_____

_____

10. Duplicates (Levels C, D, E) ..... ☐ N/A

Duplicates Analyzed at required frequency? ..... Yes No N/A

RPD Values Acceptable? ..... Yes No N/A

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

Comments: _____

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

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

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

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

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

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

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

Comments: no FS or PAT

12. Holding Times (All levels)

Are sample holding times acceptable? ..... Yes No N/A

Comments: _____

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

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

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

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

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

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

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

Comments: 15 only

Appendix 6

Additional Documentation Requested by Client

Joan Kessner
Washington Closure Hanford
2620 Fermi Avenue
Richland, WA 99354

SAF: RC-107
SDG: XP0168
Work Order: 14-11131
Date Received: 11/25/2014
Matrix: Soil

Sample Number	Lab Sample ID	QC Type	Date Analyzed	Method Name	CAS Number	Isotope	Result	2-Sigma Counting Error	Total Propagated Uncertainty	MDA	Lab Qualifier	Analysis Units
NA	14-11131-01	LCS	11/27/2014	C14_CHEM_LSC	14762-75-5	Carbon-14	1406.461	13.85	196.32	5.21		pCi/g
		LCS	11/26/2014	GAMMA_GS	10198-40-0	Cobalt-60	141.532	9.76	12.17	1.91		pCi/g
		LCS	11/26/2014	GAMMA_GS	10045-97-3	Cesium-137	87.572	8.44	9.57	2.36		pCi/g
		LCS	12/1/2014	NI63_LSC	13981-37-8	Nickel-63	1342.196	9.65	79.51	2.56		pCi/g
NA	14-11131-02	BLK	11/27/2014	C14_CHEM_LSC	14762-75-5	Carbon-14	0.386	0.59	0.59	0.99	U	pCi/g
		BLK	11/26/2014	GAMMA_GS	14391-65-2	Silver-108m	0.006	0.04	0.04	0.06	U	pCi/g
		BLK	11/26/2014	GAMMA_GS	14596-10-2	Americium-241	-0.001	0.04	0.04	0.06	U	pCi/g
		BLK	11/26/2014	GAMMA_GS	13981-41-4	Barium-133	0.062	0.06	0.06	0.08	U	pCi/g
		BLK	11/26/2014	GAMMA_GS	10198-40-0	Cobalt-60	0.001	0.05	0.05	0.07	U	pCi/g
		BLK	11/26/2014	GAMMA_GS	10045-97-3	Cesium-137	0.047	0.04	0.04	0.08	U	pCi/g
		BLK	11/26/2014	GAMMA_GS	14683-23-9	Europium-152	-0.010	0.28	0.28	0.14	U	pCi/g
		BLK	11/26/2014	GAMMA_GS	15585-10-1	Europium-154	0.043	0.09	0.09	0.07	U	pCi/g
		BLK	11/26/2014	GAMMA_GS	14391-16-3	Europium-155	-0.062	0.09	0.09	0.09	U	pCi/g
		BLK	11/26/2014	GAMMA_GS	13966-00-2	Potassium-40	0.311	0.37	0.37	0.85	U	pCi/g
		BLK	11/26/2014	GAMMA_GS	15100-28-4	Protactinium-234m	-0.954	4.74	4.74	7.28	U	pCi/g
		BLK	11/26/2014	GAMMA_GS	15092-94-1	Lead-212	0.012	0.06	0.06	0.10	U	pCi/g
		BLK	11/26/2014	GAMMA_GS	15067-28-4	Lead-214	0.059	0.08	0.08	0.14	U	pCi/g
		BLK	11/26/2014	GAMMA_GS	15065-10-8	Thorium-234	0.176	0.40	0.40	0.65	U	pCi/g
		BLK	11/26/2014	GAMMA_GS	14913-50-9	Thallium-208	-0.046	0.14	0.14	0.21	U	pCi/g
		BLK	11/26/2014	GAMMA_GS	15117-96-1	Uranium-235	0	0.21	0.21	0.32	U	pCi/g
		BLK	12/1/2014	NI63_LSC	13981-37-8	Nickel-63	0	1.39	1.39	2.38	U	pCi/g
J1V1L2	14-11131-03	DUP	11/27/2014	C14_CHEM_LSC	14762-75-5	Carbon-14	0.348	0.53	0.53	0.89	U	pCi/g
		DUP	11/26/2014	GAMMA_GS	14391-65-2	Silver-108m	-0.052	0.06	0.06	0.06	U	pCi/g
		DUP	11/26/2014	GAMMA_GS	14596-10-2	Americium-241	-0.122	0.13	0.13	0.15	U	pCi/g
		DUP	11/26/2014	GAMMA_GS	13981-41-4	Barium-133	0.016	0.03	0.03	0.11	U	pCi/g
		DUP	11/26/2014	GAMMA_GS	14733-03-0	Bismuth-214	0.573	0.13	0.13	0.20		pCi/g
		DUP	11/26/2014	GAMMA_GS	10198-40-0	Cobalt-60	-0.030	0.06	0.06	0.08	U	pCi/g
		DUP	11/26/2014	GAMMA_GS	10045-97-3	Cesium-137	-0.014	0.05	0.05	0.07	U	pCi/g
		DUP	11/26/2014	GAMMA_GS	14683-23-9	Europium-152	-0.144	0.37	0.37	0.20	U	pCi/g
		DUP	11/26/2014	GAMMA_GS	15585-10-1	Europium-154	-0.012	0.18	0.18	0.10	U	pCi/g
		DUP	11/26/2014	GAMMA_GS	14391-16-3	Europium-155	0.168	0.12	0.12	0.17	U	pCi/g
		DUP	11/26/2014	GAMMA_GS	13966-00-2	Potassium-40	16.577	1.96	2.13	0.29		pCi/g
		DUP	11/26/2014	GAMMA_GS	15100-28-4	Protactinium-234m	1.773	4.98	4.98	8.23	U	pCi/g
		DUP	11/26/2014	GAMMA_GS	15092-94-1	Lead-212	0.994	0.12	0.13	0.20		pCi/g
		DUP	11/26/2014	GAMMA_GS	15067-28-4	Lead-214	0.636	0.12	0.12	0.15		pCi/g
		DUP	11/26/2014	GAMMA_GS	15065-10-8	Thorium-234	0.655	1.13	1.13	1.49	U	pCi/g
		DUP	11/26/2014	GAMMA_GS	14913-50-9	Thallium-208	0.600	0.14	0.14	0.18		pCi/g
		DUP	11/26/2014	GAMMA_GS	15117-96-1	Uranium-235	-0.181	0.24	0.24	0.37	U	pCi/g
		DUP	12/1/2014	NI63_LSC	13981-37-8	Nickel-63	1.520	1.38	1.38	2.30	U	pCi/g

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EBERLINE SERVICES
EBERLINE ANALYTICAL CORPORATION
601 SCARBORO ROAD OAK RIDGE, TN 37830 865/481-0683 FAX 865/483-4621

Joan Kessner
Washington Closure Hanford
2620 Fermi Avenue
Richland, WA 99354

SAF: RC-107
SDG: XP0168
Work Order: 14-11131
Date Received: 11/25/2014
Matrix: Soil

Sample Number	Lab Sample ID	QC Type	Date Analyzed	Method Name	CAS Number	Isotope	Result	2-Sigma Counting Error	Total Propagated Uncertainty	MDA	Lab Qualifier	Analysis Units
J1V1L2	14-11131-04		11/27/2014	C14_CHEM_LSC	14762-75-5	Carbon-14	0.624	0.56	0.57	0.94	U	pCi/g
			11/26/2014	GAMMA_GS	14391-65-2	Silver-108m	-0.003	0.02	0.02	0.05	U	pCi/g
			11/26/2014	GAMMA_GS	14596-10-2	Americium-241	-0.145	0.13	0.13	0.15	U	pCi/g
			11/26/2014	GAMMA_GS	13981-41-4	Barium-133	0.001	0.03	0.03	0.11	U	pCi/g
			11/26/2014	GAMMA_GS	14733-03-0	Bismuth-214	0.577	0.13	0.14	0.20		pCi/g
			11/26/2014	GAMMA_GS	10198-40-0	Cobalt-60	0.019	0.06	0.06	0.09	U	pCi/g
			11/26/2014	GAMMA_GS	10045-97-3	Cesium-137	-0.009	0.05	0.05	0.07	U	pCi/g
			11/26/2014	GAMMA_GS	14683-23-9	Europium-152	0.167	0.34	0.34	0.20	U	pCi/g
			11/26/2014	GAMMA_GS	15585-10-1	Europium-154	-0.199	0.23	0.23	0.10	U	pCi/g
			11/26/2014	GAMMA_GS	14391-16-3	Europium-155	-0.002	0.12	0.12	0.16	U	pCi/g
			11/26/2014	GAMMA_GS	13966-00-2	Potassium-40	16.356	1.99	2.16	0.92		pCi/g
			11/26/2014	GAMMA_GS	15100-28-4	Protactinium-234m	-0.768	5.34	5.34	8.13	U	pCi/g
			11/26/2014	GAMMA_GS	15092-94-1	Lead-212	0.754	0.11	0.11	0.20		pCi/g
			11/26/2014	GAMMA_GS	15067-28-4	Lead-214	0.651	0.12	0.12	0.21		pCi/g
			11/26/2014	GAMMA_GS	15065-10-8	Thorium-234	0.709	1.14	1.14	1.50	U	pCi/g
			11/26/2014	GAMMA_GS	14913-50-9	Thallium-208	0.739	0.13	0.14	0.10		pCi/g
			11/26/2014	GAMMA_GS	15117-96-1	Uranium-235	0.216	0.24	0.24	0.40	U	pCi/g
			12/1/2014	NI63_LSC	13981-37-8	Nickel-63	0.758	1.36	1.36	2.29	U	pCi/g
J1V1L3	14-11131-05		11/27/2014	C14_CHEM_LSC	14762-75-5	Carbon-14	0.602	0.58	0.58	0.97	U	pCi/g
			11/26/2014	GAMMA_GS	14391-65-2	Silver-108m	0.060	0.09	0.09	0.09	U	pCi/g
			11/26/2014	GAMMA_GS	14596-10-2	Americium-241	0.088	0.09	0.09	0.14	U	pCi/g
			11/26/2014	GAMMA_GS	13981-41-4	Barium-133	0.025	0.04	0.04	0.20	U	pCi/g
			11/26/2014	GAMMA_GS	14733-03-0	Bismuth-214	0.575	0.17	0.18	0.56		pCi/g
			11/26/2014	GAMMA_GS	10198-40-0	Cobalt-60	0.042	0.09	0.09	0.13	U	pCi/g
			11/26/2014	GAMMA_GS	10045-97-3	Cesium-137	0.010	0.08	0.08	0.13	U	pCi/g
			11/26/2014	GAMMA_GS	14683-23-9	Europium-152	0.053	0.42	0.42	0.30	U	pCi/g
			11/26/2014	GAMMA_GS	15585-10-1	Europium-154	0.017	0.24	0.24	0.15	U	pCi/g
			11/26/2014	GAMMA_GS	14391-16-3	Europium-155	0.109	0.12	0.12	0.20	U	pCi/g
			11/26/2014	GAMMA_GS	13966-00-2	Potassium-40	16.310	2.76	2.88	1.53		pCi/g
			11/26/2014	GAMMA_GS	15100-28-4	Protactinium-234m	-3.907	9.81	9.81	15.03	U	pCi/g
			11/26/2014	GAMMA_GS	15092-94-1	Lead-212	0.804	0.17	0.17	0.28		pCi/g
			11/26/2014	GAMMA_GS	15067-28-4	Lead-214	0.405	0.19	0.19	0.35		pCi/g
			11/26/2014	GAMMA_GS	15065-10-8	Thorium-234	0.972	0.91	0.91	1.43	U	pCi/g
			11/26/2014	GAMMA_GS	14913-50-9	Thallium-208	0.813	0.23	0.24	0.07		pCi/g
			11/26/2014	GAMMA_GS	15117-96-1	Uranium-235	-0.213	0.42	0.42	0.83	U	pCi/g
			12/1/2014	NI63_LSC	13981-37-8	Nickel-63	1.393	1.26	1.26	2.11	U	pCi/g

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WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
14-11131	C0014	1	pCi	g	Washington Closure Hanford

Laboratory Control Sample

Analyte	Normalized Difference	LCS Measured	CSU Measured	LCS Expected	Uncert. Expected	Known	Known Error	Result	CSU	Standard ID	Standard ACT (dpm)	Standard Error	Standard Added (g)
C-14	0.07	99.52%	13.96%	100.00%	2.80%	1.41E+03	3.96E+01	1.41E+03	1.96E+02	C-3a	3.02E+03	2.80E+00	1.04E+00

Matrix Spike

Analyte	Normalized Difference	MS Actual % Rec	Expected MS Result	Expected MS Uncert	Actual MS Result	Actual MS CSU	Sample Result	Sample CSU	Sample Aliquot	Standard ID	Standard ACT (dpm)	Standard Error %	Standard Added (g)
C-14	0.52	96.38%	2.73E+02	7.65E+00	2.64E+02	3.69E+01	5.95E-01	6.14E-01	5.17E+00	C-3a	3.02E+03	2.80	1.04E+00

Replicate Sample

Analyte	Normalized Difference	RPD	Original Result	Original CSU	Replicate Result	Replicate CSU
C-14	0.69	56.85	6.24E-01	5.71E-01	3.48E-01	5.32E-01

QC Summary

LCS Relative Bias	LCS % R	LCS ND	MS % R	MS ND	Rep RPD	Rep ND
1.00	OK	OK		OK	INV	OK

Eberline Services
Analysis Control Chart

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
14-11131	Ni063	1	pCi	g	Washington Closure Hanford

Laboratory Control Sample

Analyte	Normalized Difference	LCS Measured	CSU Measured	LCS Expected	Uncert. Expected	Known	Known Error	Result	CSU	Standard ID	Standard ACT (dpm)	Standard Error	Standard Added (g)
NI-63	9.24	76.68%	5.92%	100.00%	3.00%	1.75E+03	5.25E+01	1.34E+03	7.95E+01	Ni-3	2.21E+04	3.00E+00	1.76E-01

Matrix Spike

Analyte	Normalized Difference	MS Actual % Rec	Expected MS Result	Expected MS Uncert	Actual MS Result	Actual MS CSU	Sample Result	Sample CSU	Sample Aliquot	Standard ID	Standard ACT (dpm)	Standard Error %	Standard Added (g)
NI-63	13.36	69.11%	3.01E+03	9.02E+01	2.08E+03	1.23E+02	7.58E-01	1.36E+00	1.07E+00	Ni-3	2.21E+04	3.00	3.24E-01

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Replicate Sample

Analyte	Normalized Difference	RPD	Original Result	Original CSU	Replicate Result	Replicate CSU
NI-63	0.77	66.87	7.58E-01	1.36E+00	1.52E+00	1.38E+00

QC Summary

LCS Relative Bias	LCS % R	LCS ND	MS % R	MS ND	Rep RPD	Rep ND
0.77	OK	INV		INV	INV	OK

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Version

Eberline Services
Analysis Control Chart

WO	Analysis	Run	Activity Units	Aliquot Units	Client Name
14-11131	Gamma	1	pCi	g	Washington Closure Hanford

Laboratory Control Sample

Analyte	Normalized Difference	LCS Measured	CSU Measured	LCS Expected	Uncert. Expected	Known	Known Error	Result	CSU	Standard ID	Standard ACT (dpm)	Standard Error	Standard Added (g)
CO-60	0.69	103.28%	8.60%	100.00%	4.00%	1.37E+02	5.48E+00	1.42E+02	1.22E+01	GAS-1302	1.37E+02	5.48E+00	7.36E+02
CS-137	0.13	100.74%	10.92%	100.00%	4.00%	8.69E+01	3.48E+00	8.76E+01	9.57E+00	GAS-1302	8.69E+01	3.48E+00	7.36E+02

Matrix Spike

Analyte	Normalized Difference	MS Actual % Rec	Expected MS Result	Expected MS Uncert	Actual MS Result	Actual MS CSU	Sample Result	Sample CSU	Sample Aliquot	Standard ID	Standard ACT (dpm)	Standard Error %	Standard Added (g)

38

Replicate Sample

Analyte	Normalized Difference	RPD	Original Result	Original CSU	Replicate Result	Replicate CSU
BI-214	0.04	0.67	5.77E-01	1.37E-01	5.73E-01	1.32E-01
K-40	0.14	1.34	1.64E+01	2.16E+00	1.66E+01	2.13E+00
PB-214	0.18	2.39	6.51E-01	1.23E-01	6.36E-01	1.20E-01

QC Summary

LCS Relative Bias	LCS % R	LCS ND	MS % R	MS ND	Rep RPD	Rep ND
1.03	OK	OK	<CS-137	BI-214>	NA	
1.01	OK	OK	<CO-60	K-40>	NA	OK
				PB-214>	NA	OK

0045

Version

Date: 30 March 2015
To: Washington Closure Hanford Inc. (technical representative)
From: ELR Consulting
Project: 100-H Remaining Sites Burial Grounds – Soil Full Protocol - Waste Site 100-H-28
Subject: Wet Chemistry - Data Package No. XP0168-GEL

INTRODUCTION

This memo presents the results of data validation on Data Package No. XP0168 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
J1V1L0	11/24/14	Soil	C	See note 1
J1V1L1	11/24/14	Soil	C	See note 1
J1V1L2	11/20/14	Soil	C	See note 1
J1V1L3	11/20/14	Soil	C	See note 1
J1V1L4	11/24/14	Soil	C	See note 1
J1V1L5	11/24/14	Soil	C	See note 1
J1V1L6	11/24/14	Soil	C	See note 1
J1V1L7	11/24/14	Soil	C	See note 1
J1V1L8	11/20/14	Soil	C	See note 1
J1V1L9	11/20/14	Soil	C	See note 1
J1V1M0	11/20/14	Soil	C	See note 1
J1V1M1	11/20/14	Soil	C	See note 1
J1V1M2	11/20/14	Soil	C	See note 1

1 – IC anions by 300.0, nitrate/nitrite by 353.2, chromium VI by 7196A & pH by 9045D.

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: 30 days for chromium VI; 28 days for nitrate/nitrite, chloride, fluoride, bromide, sulfate; 48 hours for nitrate, nitrite and orthophosphate; and immediate (24 hours) for pH.

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

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

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

All other holding times were acceptable.

- **Method Blanks**

Method Blanks

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

Due to method blank contamination, all chloride results (except J1V1L0 & J1V1M0) were qualified as undetected and flagged "U".

All other 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.

All laboratory duplicate results were acceptable.

Field Duplicate

One set of field duplicates (J1V1L8/J1V1M2) were submitted for analysis. Field duplicates are compared using the same criteria as for laboratory duplicates. All field duplicate results were acceptable.

- **Analytical Detection Levels**

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

- **Completeness**

Data package XP0168 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 81.5%.

MAJOR DEFICIENCIES

The following major deficiency was noted:

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

Rejected data is unusable and should not be reported.

MINOR DEFICIENCIES

The following minor deficiencies were noted:

- Due to method blank contamination, all chloride results (except J1V1L0 & J1V1M0) were qualified as undetected and flagged "U".

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

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*

SDG: XP0168	**REVIEWER: ELR**	**Project: 100-H-28**	**PAGE_1_OF_1**
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
Nitrate pH	J	All	Hold time
Nitrite	UR	All	Hold time
Orthophosphate	UR	All (except J1V1M1 & J1V1L4)	Hold time
Orthophosphate	J	J1V1M1 & J1V1L4	Hold time
Chloride	U	All except (J1V1L0 & J1V1M0)	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: December 3, 2014

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-107 Soil

Client SDG: XP0168

Client Sample ID: J1V1L2
Sample ID: 361900001
Matrix: Soil
Collect Date: 20-NOV-14 11:02
Receive Date: 25-NOV-14
Collector: Client
Moisture: 2.5%

Project: WCHN00720
Client ID: WCHN001

4/5/15

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography											
SW846 9056A Anions "Dry Weight Corrected"											
Bromide	U	0.687	0.687	2.05	mg/kg	1	MAR1	11/29/14	0656	1439133	1
Chloride	BC U	1.58	0.687	2.05	mg/kg	1					
Fluoride		1.31	0.338	1.03	mg/kg	1					
Nitrate-N	J	1.29	0.338	1.03	mg/kg	1					
Nitrite-N	U R	0.338	0.338	1.03	mg/kg	1					
O-Phosphate as P	U R	0.687	0.687	2.05	mg/kg	1					
Sulfate		5.08	1.36	4.10	mg/kg	1					
Nutrient Analysis											
EPA 353.2 Nitrogen, Nitrate/Nitrite "Dry Weight Corrected"											
Nitrogen, Nitrate/Nitrite	B	0.249	0.171	0.502	mg/kg	1	AXH3	11/28/14	1046	1439246	2
Spectrometric Analysis											
SW846_7196A Hexavalent Chromium "Dry Weight Corrected"											
Hexavalent Chromium	U	0.122	0.122	0.408	mg/kg	1	PXO1	11/29/14	1647	1439217	3
Titration and Ion Analysis											
SW9045D pH "As Received"											
pH at Temp 21.8C	X J	8.99	0.010	0.100	pH	1	PXO1	11/29/14	1436	1439826	4

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 353.2 Modified	EPA 353.2 Modified Nitrate/Nitrite	AXH3	11/28/14	0851	1439245
SW846 3060A	SW846_7196A Hexavalent Chromium in Soil	PXO1	11/26/14	1327	1439216
SW846 9056A	SW846 9056A Total Anions in Soil	MXL2	11/28/14	1138	1439132

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	EPA 353.2 Modified	
3	SW846 7196A	
4	SW846 9045D	

Notes:

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: December 3, 2014

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-107 Soil

Client SDG: XP0168

Client Sample ID: J1V1L3
Sample ID: 361900002
Matrix: Soil
Collect Date: 20-NOV-14 10:51
Receive Date: 25-NOV-14
Collector: Client
Moisture: 1.67%

Project: WCHN00720
Client ID: WCHN001

4/5/15

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography											
SW846 9056A Anions "Dry Weight Corrected"											
Bromide	U	0.681	0.681	2.03	mg/kg	1	MAR1	11/29/14	0826	1439133	1
Chloride	BC U	1.56	0.681	2.03	mg/kg	1					
Fluoride	B	0.991	0.336	1.02	mg/kg	1					
Nitrate-N	B J	0.936	0.336	1.02	mg/kg	1					
Nitrite-N	U R	0.336	0.336	1.02	mg/kg	1					
O-Phosphate as P	U R	0.681	0.681	2.03	mg/kg	1					
Sulfate		4.87	1.35	4.07	mg/kg	1					
Nutrient Analysis											
EPA 353.2 Nitrogen, Nitrate/Nitrite "Dry Weight Corrected"											
Nitrogen, Nitrate/Nitrite	B	0.219	0.169	0.497	mg/kg	1	AXH3	11/28/14	1050	1439246	2
Spectrometric Analysis											
SW846_7196A Hexavalent Chromium "Dry Weight Corrected"											
Hexavalent Chromium	U	0.114	0.114	0.379	mg/kg	1	PXO1	11/29/14	1649	1439217	3
Titration and Ion Analysis											
SW9045D pH "As Received"											
pH at Temp 21.7C	X J	9.07	0.010	0.100	pH	1	PXO1	11/29/14	1438	1439826	4

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 353.2 Modified	EPA 353.2 Modified Nitrate/Nitrite	AXH3	11/28/14	0851	1439245
SW846 3060A	SW846_7196A Hexavalent Chromium in Soil	PXO1	11/26/14	1327	1439216
SW846 9056A	SW846 9056A Total Anions in Soil	MXL2	11/28/14	1138	1439132

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	EPA 353.2 Modified	
3	SW846 7196A	
4	SW846 9045D	

Notes:

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: December 3, 2014

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-107 Soil

Client SDG: XP0168

Client Sample ID: J1V1L8
Sample ID: 361900003
Matrix: Soil
Collect Date: 20-NOV-14 10:08
Receive Date: 25-NOV-14
Collector: Client
Moisture: 3.57%

Project: WCHN00720
Client ID: WCHN001

4/2/15

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography											
SW846 9056A Anions "Dry Weight Corrected"											
Bromide	U	0.695	0.695	2.07	mg/kg	1	MAR1	11/29/14	0955	1439133	1
Chloride	BC U	1.28	0.695	2.07	mg/kg	1					
Fluoride		1.34	0.342	1.04	mg/kg	1					
Nitrate-N	B J	0.842	0.342	1.04	mg/kg	1					
Nitrite-N	U R	0.342	0.342	1.04	mg/kg	1					
O-Phosphate as P	U R	0.695	0.695	2.07	mg/kg	1					
Sulfate		4.87	1.38	4.15	mg/kg	1					
Nutrient Analysis											
EPA 353.2 Nitrogen, Nitrate/Nitrite "Dry Weight Corrected"											
Nitrogen, Nitrate/Nitrite	B	0.244	0.176	0.519	mg/kg	1	AXH3	11/28/14	1053	1439246	2
Spectrometric Analysis											
SW846_7196A Hexavalent Chromium "Dry Weight Corrected"											
Hexavalent Chromium	U	0.122	0.122	0.407	mg/kg	1	PXO1	11/29/14	1649	1439217	3
Titration and Ion Analysis											
SW9045D pH "As Received"											
pH at Temp 21.7C	X J	9.15	0.010	0.100	pH	1	PXO1	11/29/14	1440	1439826	4

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 353.2 Modified	EPA 353.2 Modified Nitrate/Nitrite	AXH3	11/28/14	0851	1439245
SW846 3060A	SW846_7196A Hexavalent Chromium in Soil	PXO1	11/26/14	1327	1439216
SW846 9056A	SW846 9056A Total Anions in Soil	MXL2	11/28/14	1138	1439132

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	EPA 353.2 Modified	
3	SW846 7196A	
4	SW846 9045D	

Notes:

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: December 3, 2014

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-107 Soil

Client SDG: XP0168

Client Sample ID: J1V1L9
Sample ID: 361900004
Matrix: Soil
Collect Date: 20-NOV-14 10:38
Receive Date: 25-NOV-14
Collector: Client
Moisture: 4.25%

Project: WCHN00720
Client ID: WCHN001

4/5/15

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography											
SW846 9056A Anions "Dry Weight Corrected"											
Bromide	U	0.700	0.700	2.09	mg/kg	1	MAR1	11/29/14	1125	1439133	1
Chloride	BC U	1.90	0.700	2.09	mg/kg	1					
Fluoride		1.29	0.345	1.04	mg/kg	1					
Nitrate-N	J	1.60	0.345	1.04	mg/kg	1					
Nitrite-N	U R	0.345	0.345	1.04	mg/kg	1					
O-Phosphate as P	U R	0.700	0.700	2.09	mg/kg	1					
Sulfate		11.4	1.39	4.18	mg/kg	1					
Nutrient Analysis											
EPA 353.2 Nitrogen, Nitrate/Nitrite "Dry Weight Corrected"											
Nitrogen, Nitrate/Nitrite		0.814	0.167	0.493	mg/kg	1	AXH3	11/28/14	1059	1439246	2
Spectrometric Analysis											
SW846_7196A Hexavalent Chromium "Dry Weight Corrected"											
Hexavalent Chromium	B	0.292	0.114	0.380	mg/kg	1	PXO1	11/29/14	1650	1439217	3
Titration and Ion Analysis											
SW9045D pH "As Received"											
pH at Temp 21.7C	X J	8.87	0.010	0.100	pH	1	PXO1	11/29/14	1441	1439826	4

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 353.2 Modified	EPA 353.2 Modified Nitrate/Nitrite	AXH3	11/28/14	0851	1439245
SW846 3060A	SW846_7196A Hexavalent Chromium in Soil	PXO1	11/26/14	1327	1439216
SW846 9056A	SW846 9056A Total Anions in Soil	MXL2	11/28/14	1138	1439132

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	EPA 353.2 Modified	
3	SW846 7196A	
4	SW846 9045D	

Notes:

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: December 3, 2014

Company :	WC-Hanford, Inc.		
Address :	2620 Fermi Avenue MSIN H4-21 Richland, Washington 99354		
Contact:	Joan Kessner	Client SDG:	XP0168
Project:	RC-107 Soil		

Client Sample ID:	J1V1M1	Project:	WCHN00720
Sample ID:	361900005	Client ID:	WCHN001
Matrix:	Soil		
Collect Date:	20-NOV-14 10:26		
Receive Date:	25-NOV-14		
Collector:	Client		
Moisture:	2.94%		

4/5/15

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography											
SW846 9056A Anions "Dry Weight Corrected"											
Bromide	U	0.690	0.690	2.06	mg/kg	1	MAR1	11/29/14	1155	1439133	1
Chloride	C J	2.34	0.690	2.06	mg/kg	1					
Fluoride		1.34	0.340	1.03	mg/kg	1					
Nitrate-N	J	1.06	0.340	1.03	mg/kg	1					
Nitrite-N	U R	0.340	0.340	1.03	mg/kg	1					
O-Phosphate as P	B J	1.24	0.690	2.06	mg/kg	1					
Sulfate		11.1	1.37	4.12	mg/kg	1					
Nutrient Analysis											
EPA 353.2 Nitrogen, Nitrate/Nitrite "Dry Weight Corrected"											
Nitrogen, Nitrate/Nitrite	B	0.336	0.170	0.501	mg/kg	1	AXH3	11/28/14	1100	1439246	2
Spectrometric Analysis											
SW846_7196A Hexavalent Chromium "Dry Weight Corrected"											
Hexavalent Chromium	U	0.127	0.127	0.424	mg/kg	1	PXO1	11/29/14	1652	1439217	3
Titration and Ion Analysis											
SW9045D pH "As Received"											
pH at Temp 21.9C	X J	9.15	0.010	0.100	pH	1	PXO1	11/29/14	1444	1439826	4

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 353.2 Modified	*EPA 353.2 Modified Nitrate/Nitrite*	*AXH3*	*11/28/14*	*0851*	*1439245*
SW846 3060A	SW846_7196A Hexavalent Chromium in Soil	PXO1	11/26/14	1327	1439216
SW846 9056A	SW846 9056A Total Anions in Soil	MXL2	11/28/14	1138	1439132

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	EPA 353.2 Modified	
3	SW846 7196A	
4	SW846 9045D	

Notes:

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: December 3, 2014

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-107 Soil

Client SDG: XP0168

Client Sample ID: J1V1M2
Sample ID: 361900006
Matrix: Soil
Collect Date: 20-NOV-14 10:08
Receive Date: 25-NOV-14
Collector: Client
Moisture: 3.32%

Project: WCHN00720
Client ID: WCHN001

4/5/15

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography											
SW846 9056A Anions "Dry Weight Corrected"											
Bromide	U	0.693	0.693	2.07	mg/kg	1	MAR1	11/29/14	1225	1439133	1
Chloride	BC U	1.16	0.693	2.07	mg/kg	1					
Fluoride		1.30	0.341	1.03	mg/kg	1					
Nitrate-N	B J	0.826	0.341	1.03	mg/kg	1					
Nitrite-N	U R	0.341	0.341	1.03	mg/kg	1					
O-Phosphate as P	U R	0.693	0.693	2.07	mg/kg	1					
Sulfate		4.72	1.38	4.14	mg/kg	1					
Nutrient Analysis											
EPA 353.2 Nitrogen, Nitrate/Nitrite "Dry Weight Corrected"											
Nitrogen, Nitrate/Nitrite	B	0.278	0.174	0.512	mg/kg	1	AXH3	11/28/14	1101	1439246	2
Spectrometric Analysis											
SW846_7196A Hexavalent Chromium "Dry Weight Corrected"											
Hexavalent Chromium	U	0.122	0.122	0.405	mg/kg	1	PXO1	11/29/14	1708	1439217	3
Titration and Ion Analysis											
SW9045D pH "As Received"											
pH at Temp 21.8C	X J	9.03	0.010	0.100	pH	1	PXO1	11/29/14	1446	1439826	4

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 353.2 Modified	EPA 353.2 Modified Nitrate/Nitrite	AXH3	11/28/14	0851	1439245
SW846 3060A	SW846_7196A Hexavalent Chromium in Soil	PXO1	11/26/14	1327	1439216
SW846 9056A	SW846 9056A Total Anions in Soil	MXL2	11/28/14	1138	1439132

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	EPA 353.2 Modified	
3	SW846 7196A	
4	SW846 9045D	

Notes:

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Certificate of Analysis

Report Date: December 3, 2014

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-107 Soil

Client SDG: XP0168

Client Sample ID: J1V1L0
Sample ID: 361900007
Matrix: Soil
Collect Date: 20-NOV-14 08:11
Receive Date: 25-NOV-14
Collector: Client
Moisture: 6.64%

Project: WCHN00720
Client ID: WCHN001

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography											
SW846 9056A Anions "Dry Weight Corrected"											
Bromide	U	0.718	0.718	2.14	mg/kg	1	MAR1	11/29/14	1255	1439133	1
Chloride	C	11.2	0.718	2.14	mg/kg	1					
Fluoride		1.40	0.353	1.07	mg/kg	1					
Nitrate-N	J	10.8	0.353	1.07	mg/kg	1					
Nitrite-N	U R	0.353	0.353	1.07	mg/kg	1					
O-Phosphate as P	U R	0.718	0.718	2.14	mg/kg	1					
Sulfate		145	1.42	4.28	mg/kg	1					
Nutrient Analysis											
EPA 353.2 Nitrogen, Nitrate/Nitrite "Dry Weight Corrected"											
Nitrogen, Nitrate/Nitrite	D	10.6	0.897	2.64	mg/kg	5	AXH3	11/28/14	1103	1439246	2
Spectrometric Analysis											
SW846_7196A Hexavalent Chromium "Dry Weight Corrected"											
Hexavalent Chromium	U	0.127	0.127	0.424	mg/kg	1	PXO1	11/29/14	1708	1439217	3
Titration and Ion Analysis											
SW9045D pH "As Received"											
pH at Temp 21.8C	X J	8.66	0.010	0.100	pH	1	PXO1	11/29/14	1447	1439826	4

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 353.2 Modified	EPA 353.2 Modified Nitrate/Nitrite	AXH3	11/28/14	0851	1439245
SW846 3060A	SW846_7196A Hexavalent Chromium in Soil	PXO1	11/26/14	1327	1439216
SW846 9056A	SW846 9056A Total Anions in Soil	MXL2	11/28/14	1138	1439132

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	EPA 353.2 Modified	
3	SW846 7196A	
4	SW846 9045D	

Notes:

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Certificate of Analysis

Report Date: December 3, 2014

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-107 Soil

Client SDG: XP0168

Client Sample ID: J1V1L1
Sample ID: 361900008
Matrix: Soil
Collect Date: 20-NOV-14 08:04
Receive Date: 25-NOV-14
Collector: Client
Moisture: 5.8%

Project: WCHN00720
Client ID: WCHN001

4/5/15

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography											
SW846 9056A Anions "Dry Weight Corrected"											
Bromide	U	0.711	0.711	2.12	mg/kg	1	MAR1	11/29/14	1325	1439133	1
Chloride	C U	3.33	0.711	2.12	mg/kg	1					
Fluoride		1.28	0.350	1.06	mg/kg	1					
Nitrate-N	J	1.30	0.350	1.06	mg/kg	1					
Nitrite-N	U R	0.350	0.350	1.06	mg/kg	1					
O-Phosphate as P	U R	0.711	0.711	2.12	mg/kg	1					
Sulfate		16.4	1.41	4.25	mg/kg	1					
Nutrient Analysis											
EPA 353.2 Nitrogen, Nitrate/Nitrite "Dry Weight Corrected"											
Nitrogen, Nitrate/Nitrite	B	0.444	0.180	0.531	mg/kg	1	AXH3	11/28/14	1104	1439246	2
Spectrometric Analysis											
SW846_7196A Hexavalent Chromium "Dry Weight Corrected"											
Hexavalent Chromium	U	0.123	0.123	0.410	mg/kg	1	PXO1	11/29/14	1708	1439217	3
Titration and Ion Analysis											
SW9045D pH "As Received"											
pH at Temp 21.5C	X J	9.18	0.010	0.100	pH	1	PXO1	11/29/14	1450	1439826	4

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 353.2 Modified	EPA 353.2 Modified Nitrate/Nitrite	AXH3	11/28/14	0851	1439245
SW846 3060A	SW846_7196A Hexavalent Chromium in Soil	PXO1	11/26/14	1327	1439216
SW846 9056A	SW846 9056A Total Anions in Soil	MXL2	11/28/14	1138	1439132

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	EPA 353.2 Modified	
3	SW846 7196A	
4	SW846 9045D	

Notes:

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Certificate of Analysis

Report Date: December 3, 2014

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-107 Soil

Client SDG: XP0168

Client Sample ID: J1V1L4
Sample ID: 361900009
Matrix: Soil
Collect Date: 20-NOV-14 07:58
Receive Date: 25-NOV-14
Collector: Client
Moisture: 5.2%

Project: WCHN00720
Client ID: WCHN001

V 4/5/15

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography											
SW846 9056A Anions "Dry Weight Corrected"											
Bromide	U	0.707	0.707	2.11	mg/kg	1	MAR1	11/29/14	1355	1439133	1
Chloride	C J	4.63	0.707	2.11	mg/kg	1					
Fluoride		1.29	0.348	1.05	mg/kg	1					
Nitrate-N	J	4.16	0.348	1.05	mg/kg	1					
Nitrite-N	U R	0.348	0.348	1.05	mg/kg	1					
O-Phosphate as P	B J	0.807	0.707	2.11	mg/kg	1					
Sulfate		158	1.40	4.22	mg/kg	1					
Nutrient Analysis											
EPA 353.2 Nitrogen, Nitrate/Nitrite "Dry Weight Corrected"											
Nitrogen, Nitrate/Nitrite		1.55	0.178	0.525	mg/kg	1	AXH3	11/28/14	1105	1439246	2
Spectrometric Analysis											
SW846_7196A Hexavalent Chromium "Dry Weight Corrected"											
Hexavalent Chromium	U	0.121	0.121	0.402	mg/kg	1	PXO1	11/29/14	1729	1439217	3
Titration and Ion Analysis											
SW9045D pH "As Received"											
pH at Temp 21.9C	X J	8.55	0.010	0.100	pH	1	PXO1	11/29/14	1453	1439826	4

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 353.2 Modified	EPA 353.2 Modified Nitrate/Nitrite	AXH3	11/28/14	0851	1439245
SW846 3060A	SW846_7196A Hexavalent Chromium in Soil	PXO1	11/26/14	1327	1439216
SW846 9056A	SW846 9056A Total Anions in Soil	MXL2	11/28/14	1138	1439132

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	EPA 353.2 Modified	
3	SW846 7196A	
4	SW846 9045D	

Notes:

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Certificate of Analysis

Report Date: December 3, 2014

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-107 Soil

Client SDG: XP0168

Client Sample ID: J1V1L5
Sample ID: 361900010
Matrix: Soil
Collect Date: 20-NOV-14 07:43
Receive Date: 25-NOV-14
Collector: Client
Moisture: 5.36%

Project: WCHN00720
Client ID: WCHN001

V 4/5/15

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography											
SW846 9056A Anions "Dry Weight Corrected"											
Bromide	U	0.708	0.708	2.11	mg/kg	1	MAR1	11/29/14	1425	1439133	1
Chloride	C U	2.39	0.708	2.11	mg/kg	1					
Fluoride		1.30	0.349	1.06	mg/kg	1					
Nitrate-N	J	1.28	0.349	1.06	mg/kg	1					
Nitrite-N	U R	0.349	0.349	1.06	mg/kg	1					
O-Phosphate as P	U R	0.708	0.708	2.11	mg/kg	1					
Sulfate		6.07	1.41	4.23	mg/kg	1					
Nutrient Analysis											
EPA 353.2 Nitrogen, Nitrate/Nitrite "Dry Weight Corrected"											
Nitrogen, Nitrate/Nitrite		0.718	0.174	0.513	mg/kg	1	AXH3	11/28/14	1106	1439246	2
Spectrometric Analysis											
SW846_7196A Hexavalent Chromium "Dry Weight Corrected"											
Hexavalent Chromium	U	0.126	0.126	0.421	mg/kg	1	PXO1	11/29/14	1730	1439217	3
Titration and Ion Analysis											
SW9045D pH "As Received"											
pH at Temp 21.7C	X J	9.11	0.010	0.100	pH	1	PXO1	11/29/14	1456	1439826	4

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 353.2 Modified	EPA 353.2 Modified Nitrate/Nitrite	AXH3	11/28/14	0851	1439245
SW846 3060A	SW846_7196A Hexavalent Chromium in Soil	PXO1	11/26/14	1327	1439216
SW846 9056A	SW846 9056A Total Anions in Soil	MXL2	11/28/14	1138	1439132

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	EPA 353.2 Modified	
3	SW846 7196A	
4	SW846 9045D	

Notes:

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Certificate of Analysis

Report Date: December 3, 2014

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-107 Soil

Client SDG: XP0168

Client Sample ID: J1V1L6
Sample ID: 361900011
Matrix: Soil
Collect Date: 20-NOV-14 07:38
Receive Date: 25-NOV-14
Collector: Client
Moisture: 4.88%

Project: WCHN00720
Client ID: WCHN001

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Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography											
SW846 9056A Anions "Dry Weight Corrected"											
Bromide	U	0.704	0.704	2.10	mg/kg	1	MAR1	11/29/14	1454	1439133	1
Chloride	C U	2.46	0.704	2.10	mg/kg	1					
Fluoride		1.33	0.347	1.05	mg/kg	1					
Nitrate-N	B J	0.958	0.347	1.05	mg/kg	1					
Nitrite-N	U R	0.347	0.347	1.05	mg/kg	1					
O-Phosphate as P	U R	0.704	0.704	2.10	mg/kg	1					
Sulfate		5.71	1.40	4.21	mg/kg	1					
Nutrient Analysis											
EPA 353.2 Nitrogen, Nitrate/Nitrite "Dry Weight Corrected"											
Nitrogen, Nitrate/Nitrite	B	0.297	0.176	0.518	mg/kg	1	AXH3	11/28/14	1107	1439246	2
Spectrometric Analysis											
SW846_7196A Hexavalent Chromium "Dry Weight Corrected"											
Hexavalent Chromium	U	0.117	0.117	0.391	mg/kg	1	PXO1	11/29/14	1731	1439217	3
Titration and Ion Analysis											
SW9045D pH "As Received"											
pH at Temp 21.6C	X J	9.02	0.010	0.100	pH	1	PXO1	11/29/14	1457	1439826	4

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 353.2 Modified	EPA 353.2 Modified Nitrate/Nitrite	AXH3	11/28/14	0851	1439245
SW846 3060A	SW846_7196A Hexavalent Chromium in Soil	PXO1	11/26/14	1327	1439216
SW846 9056A	SW846 9056A Total Anions in Soil	MXL2	11/28/14	1138	1439132

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	EPA 353.2 Modified	
3	SW846 7196A	
4	SW846 9045D	

Notes:

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: December 3, 2014

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-107 Soil

Client SDG: XP0168

Client Sample ID: J1V1L7
Sample ID: 361900012
Matrix: Soil
Collect Date: 20-NOV-14 07:32
Receive Date: 25-NOV-14
Collector: Client
Moisture: 8.22%

Project: WCHN00720
Client ID: WCHN001

4/5/15

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography											
SW846 9056A Anions "Dry Weight Corrected"											
Bromide	U	0.730	0.730	2.18	mg/kg	1	MAR1	11/29/14	1524	1439133	1
Chloride	C U	2.85	0.730	2.18	mg/kg	1					
Fluoride		1.30	0.360	1.09	mg/kg	1					
Nitrate-N	J	1.09	0.360	1.09	mg/kg	1					
Nitrite-N	U R	0.360	0.360	1.09	mg/kg	1					
O-Phosphate as P	U R	0.730	0.730	2.18	mg/kg	1					
Sulfate		8.90	1.45	4.36	mg/kg	1					
Nutrient Analysis											
EPA 353.2 Nitrogen, Nitrate/Nitrite "Dry Weight Corrected"											
Nitrogen, Nitrate/Nitrite	B	0.450	0.170	0.500	mg/kg	1	AXH3	11/28/14	1109	1439246	2
Spectrometric Analysis											
SW846_7196A Hexavalent Chromium "Dry Weight Corrected"											
Hexavalent Chromium	U	0.120	0.120	0.399	mg/kg	1	PXO1	11/29/14	1732	1439217	3
Titration and Ion Analysis											
SW9045D pH "As Received"											
pH at Temp 21.6C	X J	8.86	0.010	0.100	pH	1	PXO1	11/29/14	1458	1439826	4

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 353.2 Modified	EPA 353.2 Modified Nitrate/Nitrite	AXH3	11/28/14	0851	1439245
SW846 3060A	SW846_7196A Hexavalent Chromium in Soil	PXO1	11/26/14	1327	1439216
SW846 9056A	SW846 9056A Total Anions in Soil	MXL2	11/28/14	1138	1439132

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	EPA 353.2 Modified	
3	SW846 7196A	
4	SW846 9045D	

Notes:

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Certificate of Analysis

Report Date: December 3, 2014

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-107 Soil

Client SDG: XP0168

Client Sample ID: J1V1M0
Sample ID: 361900013
Matrix: Soil
Collect Date: 20-NOV-14 07:26
Receive Date: 25-NOV-14
Collector: Client
Moisture: 5.33%

Project: WCHN00720
Client ID: WCHN001

4/5/15

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography											
SW846 9056A Anions "Dry Weight Corrected"											
Bromide	U	0.708	0.708	2.11	mg/kg	1	MAR1	11/29/14	1554	1439133	1
Chloride	C	6.33	0.708	2.11	mg/kg	1					
Fluoride		1.31	0.349	1.06	mg/kg	1					
Nitrate-N	J	2.33	0.349	1.06	mg/kg	1					
Nitrite-N	U R	0.349	0.349	1.06	mg/kg	1					
O-Phosphate as P	U R	0.708	0.708	2.11	mg/kg	1					
Sulfate		14.1	1.40	4.23	mg/kg	1					
Nutrient Analysis											
EPA 353.2 Nitrogen, Nitrate/Nitrite "Dry Weight Corrected"											
Nitrogen, Nitrate/Nitrite		1.46	0.170	0.501	mg/kg	1	AXH3	11/28/14	1110	1439246	2
Spectrometric Analysis											
SW846_7196A Hexavalent Chromium "Dry Weight Corrected"											
Hexavalent Chromium	U	0.119	0.119	0.397	mg/kg	1	PXO1	11/29/14	1745	1439217	3
Titration and Ion Analysis											
SW9045D pH "As Received"											
pH at Temp 21.5C	X J	9.07	0.010	0.100	pH	1	PXO1	11/29/14	1501	1439826	4

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 353.2 Modified	EPA 353.2 Modified Nitrate/Nitrite	AXH3	11/28/14	0851	1439245
SW846 3060A	SW846_7196A Hexavalent Chromium in Soil	PXO1	11/26/14	1327	1439216
SW846 9056A	SW846 9056A Total Anions in Soil	MXL2	11/28/14	1138	1439132

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 9056A	
2	EPA 353.2 Modified	
3	SW846 7196A	
4	SW846 9045D	

Notes:

Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

General Chemistry Narrative
WC-HANFORD, INC. (WCHN)
SDG XP0168

Method/Analysis Information

Product:	**Ion Chromatography**		
Analytical Batch:	1439133	**Method:**	SW846 9056A Anions
Prep Batch :	1439132	**Method:**	SW846 9056A

Sample Analysis

The following samples were analyzed using the analytical protocol as established in SW846 9056A:

Sample ID	**Client ID**
361900001	J1V1L2
361900002	J1V1L3
361900003	J1V1L8
361900004	J1V1L9
361900005	J1V1M1
361900006	J1V1M2
361900007	J1V1L0
361900008	J1V1L1
361900009	J1V1L4
361900010	J1V1L5
361900011	J1V1L6
361900012	J1V1L7
361900013	J1V1M0
1203217663	Method Blank (MB)
1203217664	Laboratory Control Sample (LCS)
1203217665	361900001(J1V1L2) Sample Duplicate (DUP)
1203217666	361900002(J1V1L3) Sample Duplicate (DUP)
1203217667	361900001(J1V1L2) Matrix Spike (MS)
1203217668	361900002(J1V1L3) 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-086 REV# 23.

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 Ion Chromatography analysis was performed on a Dionex ICS-3000 Ion Chromatograph.

Initial Calibration
All initial calibration requirements have been met for this SDG.

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

Calibration Verification Information (CCV)
All continuing calibration verification standards (CCVs) 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 samples were selected for QC analysis: 361900001 (J1V1L2) and 361900002 (J1V1L3).

Matrix Spike (MS)/Post Spike (PS) Recovery Statement
The MS/PS recoveries for this sample set were within the required acceptance limits.

Duplicate Relative Percent Difference (RPD) Statement
The RPD between the sample and its duplicate met the acceptance limits.

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: 1360745. 1203217663 (MB), 1203217664 (LCS), 1203217665 (J1V1L2DUP), 1203217666 (J1V1L3DUP), 1203217667 (J1V1L2MS), 1203217668 (J1V1L3MS), 361900001 (J1V1L2), 361900002 (J1V1L3), 361900003 (J1V1L8), 361900004 (J1V1L9), 361900005 (J1V1M1), 361900006 (J1V1M2), 361900007 (J1V1L0), 361900008 (J1V1L1), 361900009 (J1V1L4), 361900010 (J1V1L5), 361900011 (J1V1L6), 361900012 (J1V1L7) and 361900013 (J1V1M0).

Manual Integrations
The following samples from this sample group had to be manually integrated due to errors in the instrument software peak integration: 1203217663 (MB), 1203217665 (J1V1L2DUP), 1203217666 (J1V1L3DUP), 361900001 (J1V1L2), 361900002 (J1V1L3), 361900003 (J1V1L8), 361900006 (J1V1M2), 361900008 (J1V1L1), 361900009 (J1V1L4), 361900010 (J1V1L5), 361900011 (J1V1L6) and 361900012 (J1V1L7).

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.

Method/Analysis Information

Product:	**Nitrate + Nitrite**		
Analytical Batch:	1439246	**Method:**	EPA 353.2 Nitrogen and Nitrate/Nitrite
Prep Batch :	1439245	**Method:**	EEPA 353.2 Modified

Sample Analysis

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

Sample ID	Client ID
361900001	J1V1L2
361900002	J1V1L3
361900003	J1V1L8
361900004	J1V1L9
361900005	J1V1M1
361900006	J1V1M2
361900007	J1V1L0
361900008	J1V1L1
361900009	J1V1L4
361900010	J1V1L5
361900011	J1V1L6
361900012	J1V1L7
361900013	J1V1M0
1203217935	Method Blank (MB)
1203217936	Laboratory Control Sample (LCS)
1203217937	361900001(J1V1L2) Sample Duplicate (DUP)
1203217938	361900002(J1V1L3) Sample Duplicate (DUP)
1203217939	361900001(J1V1L2) Matrix Spike (MS)
1203217940	361900002(J1V1L3) 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 samples were selected for QC analysis: 361900001 (J1V1L2) and 361900002 (J1V1L3).

Matrix Spike (MS)/Post Spike (PS) Recovery Statement
The MS/PS recoveries for this sample set were within the required acceptance limits.

Duplicate Relative Percent Difference (RPD) Statement
The RPD between the sample and its duplicate met the acceptance limits.

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 following sample in this sample group was diluted due to high concentration: 361900007 (J1V1L0).

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

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.

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.

Method/Analysis Information

Product:	**Hexavalent Chromium**		
Analytical Batch:	1439217	**Method:**	SW846_7196A Hexavalent Chromium
Prep Batch :	1439216	**Method:**	SW846 3060A

Sample Analysis

The following samples were analyzed using the analytical protocol as established in SW846 7196A:

Sample ID	Client ID
361900001	J1V1L2
361900002	J1V1L3
361900003	J1V1L8
361900004	J1V1L9
361900005	J1V1M1
361900006	J1V1M2
361900007	J1V1L0
361900008	J1V1L1
361900009	J1V1L4
361900010	J1V1L5
361900011	J1V1L6
361900012	J1V1L7
361900013	J1V1M0
1203217843	Method Blank (MB)
1203217844	Laboratory Control Sample (LCS)
1203217846	361900007(J1V1L0) Sample Duplicate (DUP)
1203217847	361900013(J1V1M0) Sample Duplicate (DUP)
1203217848	361900013(J1V1M0) Matrix Spike (MS)
1203217850	361900007(J1V1L0) Matrix Spike (MS)
1203217853	361900007(J1V1L0) Matrix Spike Duplicate (MSD)
1203217854	361900013(J1V1M0) Matrix Spike Duplicate (MSD)
1203217845	Insoluble Lab Control Sample (ILCS)

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-044 REV# 19.

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 Spectrometric analysis was performed on a Spectronic 20D+ Digital Spectrophotometer.

Initial Calibration
All initial calibration requirements have been met for this SDG.

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

Calibration Verification Information (CCV)
All continuing calibration verification standards (CCVs) 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 samples were selected for QC analysis: 361900007 (J1V1L0) and 361900013 (J1V1M0).

Matrix Spike (MS)/Post Spike (PS) Recovery Statement
The MS/PS recoveries for this sample set were within the required acceptance limits.

Matrix Spike Duplicate (MSD) Recovery Statement
The MSD recoveries for this sample set were within the required acceptance limits.

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

Duplicate Relative Percent Difference (RPD) Statement
The RPD between the sample and its duplicate met the acceptance limits.

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 following samples was re-analyzed to verify the result.The reanalysis data was reported. 1203217845 (ILCS).

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.

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.

Method/Analysis Information

Product: pH

Analytical Batch: 1439826 **Method:** SW9045D pH

Sample Analysis

The following samples were analyzed using the analytical protocol as established in SW846 9045D:

Sample ID	Client ID
361900001	J1V1L2
361900002	J1V1L3
361900003	J1V1L8
361900004	J1V1L9
361900005	J1V1M1
361900006	J1V1M2
361900007	J1V1L0
361900008	J1V1L1
361900009	J1V1L4
361900010	J1V1L5
361900011	J1V1L6
361900012	J1V1L7
361900013	J1V1M0
1203219277	Laboratory Control Sample (LCS)
1203219278	361900007(J1V1L0) Sample Duplicate (DUP)
1203219279	361900013(J1V1M0) Sample Duplicate (DUP)

The samples in this SDG were analyzed on an "as received" 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-008 REV# 21.

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 Titration and Ion analysis was performed on a Thermo Orion Star A111. Immediates

Initial Standardization
The titrant was properly standardized

Quality Control (QC) Information

Method Blank (MB) Statement
This batch does not require a method blank.

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

Quality Control (QC) Designation
The following samples were selected for QC analysis: 361900007 (J1V1L0) and 361900013 (J1V1M0).

Duplicate Relative Percent Difference (RPD) Statement
The RPD between the sample and its duplicate met the acceptance limits.

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
The following samples from this sample group were received by the lab outside of the method specified holding time: 361900001 (J1V1L2), 361900002 (J1V1L3), 361900003 (J1V1L8), 361900004 (J1V1L9), 361900005 (J1V1M1), 361900006 (J1V1M2), 361900007 (J1V1L0), 361900008 (J1V1L1), 361900009 (J1V1L4), 361900010 (J1V1L5), 361900011 (J1V1L6), 361900012 (J1V1L7) and 361900013 (J1V1M0).

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: 1360341. 361900001 (J1V1L2), 361900002 (J1V1L3), 361900003 (J1V1L8), 361900004 (J1V1L9), 361900005 (J1V1M1), 361900006 (J1V1M2), 361900007 (J1V1L0), 361900008 (J1V1L1), 361900009 (J1V1L4), 361900010 (J1V1L5), 361900011 (J1V1L6), 361900012 (J1V1L7) and 361900013 (J1V1M0).

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:** 05Dec14

DATA EXCEPTION REPORT

Mo.Day Yr.	Division:	Quality Criteria:	Type:
29-NOV-14	Industrial	Specifications	Process
Instrument Type: ELECTRODE	**Test / Method:** SW846 9045D	**Matrix Type:** Solid	**Client Code:** WCHN
Batch ID: 1439826	**Sample Numbers:** See Below		

Potentially affected work order(s)(SDG): 361900(XP0168)

Application Issues:

Sample received out of holding

Specification and Requirements Exception Description:	DER Disposition:
1. Sample received out of holding: 361900 001,002,003,004,005,006,007,008,009, 010,011,012,013	1. Samples were received and analyzed outside of method specified holding time.

Originator's Name:
Patrick Orgel 29-NOV-14

Data Validator/Group Leader:
Elzbieta Szulc 02-DEC-14

DATA EXCEPTION REPORT

Mo.Day Yr.	Division:	Quality Criteria:	Type:
01-DEC-14	Federal	SOP	Process
Instrument Type:	**Test / Method:**	**Matrix Type:**	**Client Code:**
	ICX9056	Solid	WCHN
Batch ID:	**Sample Numbers:**		
1439133	see below		

Potentially affected work order(s)(SDG): 361900(XP0168)

Application Issues:

Other

Specification and Requirements Exception Description:	DER Disposition:
1. Error on Raw Data 3619000 001, 002, 003, 004, 005, 006, 007 008, 009, 010, 011, 012, 013 QC 1203217663 MB, 1203217664 LCS, 1203217665 DUP, 1203217667 MS, 1203217666 DUP, 1203217668 MS	1. Due to an unknown computer glich the raw data has an incorrect month. The month should be November instead of December. The day and times are correct.

Originator's Name:
Mary Sherwood 01-DEC-14

Data Validator/Group Leader:
Thomas Lewis 02-DEC-14

Washington Closure Hanford — CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

RC-107-119 | Page 1 of 3

Collector: Q Stowe	Company Contact: Joan Kessner	Telephone No.: 375-4688	Project Coordinator: KESSNER, JH
Price Code: 8B	Data Turnaround: 7days		
Project Designation: 100-H Field Remediation	Sampling Location: 100-H-28 et al, north overburden pile		SAF No.: RC-107
Ice Chest No.: RCC-07-002	Field Logbook No.: EL-1627-08	COA: 01H2832000	Method of Shipment: Commerical Carrier - fedex
Shipped To: GEL Laboratories Charlston	Offsite Property No.: A 131294		Bill of Lading/Air Bill No.: See OSPC

Other Labs Shipped To: Eberline Services Oak Ridge

POSSIBLE SAMPLE HAZARDS/REMARKS: none

Special Handling and/or Storage: none

Preservation	None	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C		
Type of Container	G/P	G/P	G/P	aG	aG	aG	aG	G		
No. of Container(s)	1	1	1	1	1	1	1	1		
Volume	250mL	125mL	250mL	250mL	250mL	250mL	250mL	125mL		
Sample Analysis	See item (1) in Special Instructions	Chromium Hex - 7196	See item (2) in Special Instructions	PCBs - 8082	Pesticides - 8081	PAHs - 8310	Semi-VOA - 8270 (TCL)	TPH-Diesel Range - WTPH-D +		

Sample No.	Matrix	Sample Date	Sample Time									
~~J1V1L0~~	~~SOIL~~	DWS 11/20/14										
~~J1V1L1~~	~~SOIL~~											
J1V1L2	SOIL	11/20/14	1102	✓	✓	✓	✓	✓	✓	✓	✓	
J1V1L3	SOIL	11/20/14	1051	✓	✓	✓	✓	✓	✓	✓	✓	
~~J1V1L4~~	~~SOIL~~	DWS 11/20/14										

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Quincy Stowe	11-20-14 1110	DWSHEA DWSHEA 11/20/14 WCH	1110
DWSHEA DWSHEA	11/20/14 1545	C. Bingham	11-20-14 1545
C. Bingham	11-20-14 1550	1060 Battelle, fridge #14	11-20-14 1550
1060 Battelle, fridge #14	11-24-14 0715	C. Bingham	11-24-14 0715
C. Bingham WCH	11-24-14 0730	fed ex	
FED EX		P. Ward Patricia Dent	11-25-14 0930

FINAL SAMPLE DISPOSITION: Disposal Method | Disposed By | Date/Time

SPECIAL INSTRUCTIONS

(1) ICP Metals - 6010TR (Close-out List) {Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silicon, Silver, Sodium, Vanadium, Zinc); Mercury - 7471 - (CV)
(2) IC Anions - 9056 {Bromide, Chloride, Fluoride, Nitrogen in Nitrate, Nitrogen in Nitrite, Phosphorous in phosphate, Sulfate); NO2/NO3 - 353.2 {Nitrogen in Nitrite and Nitrate}; pH (Soil) - 9045 {pH Measurement}

REVIEWED BY K. Woodraemer DATE 11-24-14

XP0168

WCH-EE-011

Washington Closure Hanford — CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

RC-107-119 | Page 2 of 3

Collector: Q Stowe	Company Contact: Joan Kessner	Telephone No.: 375-4688	Project Coordinator: KESSNER, JH
Project Designation: 100-H Field Remediation	Sampling Location: 100-H-28 et al, north overburden pile		SAF No.: RC-107
Ice Chest No.: RCC-07-002	Field Logbook No.: EL-1627-08	COA: 01H2832000	Method of Shipment: Commerical Carrier - fed ex
Shipped To: GEL Laboratories Charlston	Offsite Property No.: A131294		Bill of Lading/Air Bill No.: See OSPC

Price Code: 8B | Data Turnaround: 7 days

Other Labs Shipped To: Eberline Services Oak Ridge

POSSIBLE SAMPLE HAZARDS/REMARKS
none

Special Handling and/or Storage
none

Preservation	None	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C		
Type of Container	G/P	G/P	G/P	aG	aG	aG	aG	G		
No. of Container(s)	1	1	1	1	1	1	1	1		
Volume	250mL	125mL	250mL	250mL	250mL	250mL	250mL	125mL		
Sample Analysis	See item (1) in Special Instructions	Chromium Hex - 7196	See item (2) in Special Instructions	PCBs - 8082	Pesticides - 8081	PAHs - 8310	Semi-VOA - 8270 (TCL)	TPH-Diesel Range - WTPH-D +		

Sample No.	Matrix	Sample Date	Sample Time										
~~J1V1L5~~	~~SOIL~~	DWShea 11/20/14											
~~J1V1L6~~	~~SOIL~~												
~~J1V1L7~~	~~SOIL~~												
J1V1L8	SOIL	11/20/14	1008	✓	✓	✓	✓	✓	✓	✓	✓		
J1V1L9	SOIL	11/20/14	1038	✓	✓	✓	✓	✓	✓	✓	✓		

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Quincy Stowe [signature]	11-20-14 1110	WCH DWSHEA	11/20/14 1110
DWSHEA DWSHEA	11/20/14 1545	C. Bingham [signature]	11-20-14 1545
C. Bingham [signature]	11-20-14 1550	1060 Battelle, fridge #1A	11-20-14 1550
1060 Battelle, fridge #1A	11-24-14 0715	C. Bingham [signature]	11-24-14 0715
C. Bingham [signature] WCH	11-24-14 0730	fed ex	
FED EX		P. Dent Patricia Dent	11-25-14 0930

FINAL SAMPLE DISPOSITION — Disposal Method | Disposed By | Date/Time

SPECIAL INSTRUCTIONS

(1) ICP Metals - 6010TR (Close-out List) {Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silicon, Silver, Sodium, Vanadium, Zinc}; Mercury - 7471 - (CV)
(2) IC Anions - 9056 {Bromide, Chloride, Fluoride, Nitrogen in Nitrate, Nitrogen in Nitrite, Phosphorous in phosphate, Sulfate}; NO2/NO3 - 353.2 {Nitrogen in Nitrite and Nitrate}; pH (Soil) - 9045 {pH Measurement}

REVIEWED BY K. Woodvia email DATE 11-24-14

XP0168

WCH-EE-011

Washington Closure Hanford — CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

RC-107-119 | Page 3 of 3

Collector: Q Stowe	Company Contact: Joan Kessner	Telephone No.: 375-4688	Project Coordinator: KESSNER, JH
Price Code: 8B	Data Turnaround: 7 days		
Project Designation: 100-H Field Remediation	Sampling Location: 100-H-28 et al, north overburden pile		SAF No.: RC-107
Ice Chest No.: RCC-07-002	Field Logbook No.: EL-1627-08	COA: 01H2832000	Method of Shipment: Commerical Carrier - fed ex
Shipped To: GEL Laboratories Charlston	Offsite Property No.: A131294		Bill of Lading/Air Bill No.: See OSPC
Other Labs Shipped To: Eberline Services Oak Ridge			

POSSIBLE SAMPLE HAZARDS/REMARKS
none

Special Handling and/or Storage
none

Sample No.	Matrix	Sample Date	Sample Time	Preservation	Type of Container	No. of Container(s)	Volume	Sample Analysis
				None	G/P	1	250mL	See item (1) in Special Instructions
				Cool 4C	G/P	1	125mL	Chromium Hex - 7196
				Cool 4C	G/P	1	250mL	See item (2) in Special Instructions
				Cool 4C	aG	1	250mL	PCBs - 8082
				Cool 4C	aG	1	250mL	Pesticides - 8081
				Cool 4C	aG	1	250mL	PAHs - 8310
				Cool 4C	aG	1	250mL	Semi-VOA - 8270 (TCL)
				Cool 4C	G	1	125mL	TPH-Diesel Range - WTPH-D +
~~J1V1M0~~	~~SOIL~~	DWS 11/20/14						
J1V1M1	SOIL	11/20/14	1026	✓	✓	✓	✓	✓
J1V1M2	SOIL	11/20/14	1008	✓	✓	✓	✓	✓

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Quincy Stowe	11-20-14 1110	WCH DWSHEA	11/20/14 1110
DWSHEA DWSHEA	11/20/14 1545	C. Bingham	11-20-14 1545
C. Bingham	11-20-14 1550	1060 Battelle, Fridge #14	11-20-14 1550
1060 Battelle, Fridge #14	11-24-14 0715	C. Bingham	11-24-14 0715
C. Bingham WCH	11-24-14 0730	fed ex	
FED EX		P. Dent Patricia Dent	11-25-14 0930

FINAL SAMPLE DISPOSITION — Disposal Method: | Disposed By: | Date/Time:

SPECIAL INSTRUCTIONS

(1) ICP Metals - 6010TR (Close-out List) (Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silicon, Silver, Sodium, Vanadium, Zinc); Mercury - 7471 - (CV)
(2) IC Anions - 9056 (Bromide, Chloride, Fluoride, Nitrogen in Nitrate, Nitrogen in Nitrite, Phosphorous in phosphate, Sulfate); NO2/NO3 - 353.2 (Nitrogen in Nitrite and Nitrate); pH (Soil) - 9045 (pH Measurement)

REVIEWED BY K. Wood Vincent DATE 11-24-14

XP0168

WCH-EE-011

Washington Closure Hanford — CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

RC-107-119 | Page 1 of 3

Collector: Q Stowe	Company Contact: Joan Kessner	Telephone No.: 375-4688	Project Coordinator: KESSNER, JH
Price Code: 8B	Data Turnaround: 7 days		
Project Designation: 100-H Field Remediation	Sampling Location: 100-H-28 et al, north overburden pile		SAF No.: RC-107
Ice Chest No.: RCC-07-002	Field Logbook No.: EL-1627-08	COA: 01H2832000	Method of Shipment: Commerical Carrier fed ex
Shipped To: GEL Laboratories Charlston	Offsite Property No.: A131294		Bill of Lading/Air Bill No.: See OSPC

Other Labs Shipped To: Eberline Services Oak Ridge

POSSIBLE SAMPLE HAZARDS/REMARKS: none

Special Handling and/or Storage: none

Preservation	None	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C		
Type of Container	G/P	G/P	G/P	aG	aG	aG	aG	G		
No. of Container(s)	1	1	1	1	1	1	1	1		
Volume	250mL	125mL	250mL	250mL	250mL	250mL	250mL	125mL		
Sample Analysis	See item (1) in Special Instructions	Chromium Hex - 7196	See item (2) in Special Instructions	PCBs - 8082	Pesticides - 8081	PAHs - 8310	Semi-VOA - 8270 (TCL)	TPH-Diesel Range - WTPH-D +		

Sample No.	Matrix	Sample Date	Sample Time									
J1V1L0	SOIL	11/24/14	0801	✓	✓	✓	✓	✓	✓	✓	✓	
J1V1L1	SOIL	11/24/14	0804	✓	✓	✓	✓	✓	✓	✓	✓	
~~J1V1L2~~	~~SOIL~~	DWshea 11/20/14										
~~J1V1L3~~	~~SOIL~~											
J1V1L4	SOIL	11/24/14	0758	✓	✓	✓	✓	✓	✓	✓	✓	

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Quincy Stowe	0822 11/24/14	DWshea DWSHEA WCH	11/24/14 0822
DWshea DWSHEA	11/24/14 0933	C. Bingham	11-24-14 0933
C. Bingham WCH	11-24-14 0950	fed ex	
FED EX		P. Dent Patricia Dent	11-25-14 0930

FINAL SAMPLE DISPOSITION: Disposal Method | Disposed By | Date/Time

SPECIAL INSTRUCTIONS

(1) ICP Metals - 6010TR (Close-out List) {Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silicon, Silver, Sodium, Vanadium, Zinc}; Mercury - 7471 - (CV)
(2) IC Anions - 9056 {Bromide, Chloride, Fluoride, Nitrogen in Nitrate, Nitrogen in Nitrite, Phosphorous in phosphate, Sulfate}; NO2/NO3 - 353.2 {Nitrogen in Nitrite and Nitrate}; pH (Soil) - 9045 {pH Measurement}

REVIEWED BY K. Woodworth DATE 11-24-14

11-24-14 cmb

XP0169 8

WCH-EE-011

Washington Closure Hanford — CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

RC-107-119 | Page 2 of 3

Collector: Q Stowe	Company Contact: Joan Kessner	Telephone No.: 375-4688	Project Coordinator: KESSNER, JH
Price Code: 8B	Data Turnaround: 7 days		
Project Designation: 100-H Field Remediation	Sampling Location: 100-H-28 et al, north overburden pile		SAF No.: RC-107
Ice Chest No.: RCC-07-002	Field Logbook No.: EL-1627-08	COA: 01H2832000	Method of Shipment: Commerical Carrier, fed ex
Shipped To: GEL Laboratories Charlston	Offsite Property No.: A131 294		Bill of Lading/Air Bill No.: See OSPC

Other Labs Shipped To: Eberline Services Oak Ridge

POSSIBLE SAMPLE HAZARDS/REMARKS: *none*

Special Handling and/or Storage: *none*

Preservation	None	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C		
Type of Container	G/P	G/P	G/P	aG	aG	aG	aG	G		
No. of Container(s)	1	1	1	1	1	1	1	1		
Volume	250mL	125mL	250mL	250mL	250mL	250mL	250mL	125mL		
Sample Analysis	See item (1) in Special Instructions	Chromium Hex - 7196	See item (2) in Special Instructions	PCBs - 8082	Pesticides - 8081	PAHs - 8310	Semi-VOA - 8270 (TCL)	TPH-Diesel Range - WTPH-D +		

Sample No.	Matrix	Sample Date	Sample Time										
J1V1L5	SOIL	11/24/14	0743	✓	✓	✓	✓	✓	✓	✓	✓		
J1V1L6	SOIL	11/24/14	0738	✓	✓	✓	✓	✓	✓	✓	✓		
J1V1L7	SOIL	11/24/14	0732	✓	✓	✓	✓	✓	✓	✓	✓		
~~J1V1L8~~	~~SOIL~~	JDWShea											
~~J1V1L9~~	SOIL	11/20/14											

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Quincy Stowe	11/24/14 0822	JDWShea JDWSHEA WCH	11/24/14 0822
JDWShea JDWShea	11/24/14 0933	C. Bingham	11-24-14 0933
C. Bingham WCH	11-24-14 0950	fed ex	
FED EX		P. Dent Patricia Dent	11-25-14 0930

FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

SPECIAL INSTRUCTIONS

(1) ICP Metals - 6010TR (Close-out List) {Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silicon, Silver, Sodium, Vanadium, Zinc}; Mercury - 7471 - (CV)
(2) IC Anions - 9056 {Bromide, Chloride, Fluoride, Nitrogen in Nitrate, Nitrogen in Nitrite, Phosphorous in phosphate, Sulfate}; NO2/NO3 - 353.2 {Nitrogen in Nitrite and Nitrate}; pH (Soil) - 9045 {pH Measurement}

11-24-14 cmD

XP0169/8

REVIEWED BY K. Wood Vincent DATE 11-24-14

WCH-EE-011

Washington Closure Hanford

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

RC-107-119

Collector: Q Stowe	Company Contact: Joan Kessner	Telephone No.: 375-4688	Project Coordinator: KESSNER, JH
Project Designation: 100-H Field Remediation	Sampling Location: 100-H-28 et al, north overburden pile		SAF No.: RC-107
Ice Chest No.: RCC-07-002	Field Logbook No.: EL-1627-08	COA: 01H2832000	Method of Shipment: Commerical Carrier - fed ex
Shipped To: GEL Laboratories Charlston	Offsite Property No.: A131294		Bill of Lading/Air Bill No.: See OSPC

Price Code: 8B

Data Turnaround: 7days

Other Labs Shipped To: Eberline Services Oak Ridge

POSSIBLE SAMPLE HAZARDS/REMARKS

none

Special Handling and/or Storage

none

Preservation	None	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C		
Type of Container	G/P	G/P	G/P	aG	aG	aG	aG	G		
No. of Container(s)	1	1	1	1	1	1	1	1		
Volume	250mL	125mL	250mL	250mL	250mL	250mL	250mL	125mL		
Sample Analysis	See item (1) in Special Instructions	Chromium Hex - 7196	See item (2) in Special Instructions	PCBs - 8082	Pesticides - 8081	PAHs - 8310	Semi-VOA - 8270 (TCL)	TPH-Diesel Range - WTPH-D +		

Sample No.	Matrix	Sample Date	Sample Time										
J1V1M0	SOIL	11/24/14	0726	✓	✓	✓	✓	✓	✓	✓	✓		
~~J1V1M1~~	~~SOIL~~	DWShea 11/20/14											
~~J1V1M2~~	~~SOIL~~												

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

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Quincy Stowe	11/24/14 0822	WCH DWSHEA	11/24/14 0822
DWSHEA	11/24/14 0933	C. Bingham	11-24-14 0933
C. Bingham WCH	11-24-14 0950	fed ex	
FED EX		P. Dent Patricia Dent	11-25-14 0930

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

SPECIAL INSTRUCTIONS

(1) ICP Metals - 6010TR (Close-out List) {Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silicon, Silver, Sodium, Vanadium, Zinc}; Mercury - 7471 - (CV)

(2) IC Anions - 9056 {Bromide, Chloride, Fluoride, Nitrogen in Nitrate, Nitrogen in Nitrite, Phosphorous in phosphate, Sulfate}; NO2/NO3 - 353.2 {Nitrogen in Nitrite and Nitrate}; pH (Soil) - 9045 {pH Measurement}

REVIEWED BY K. Wood Viacemo DATE 11-24-14

11-24-14 CMB

XP016~~9~~8

WCH-EE-011

Appendix 5

Data Validation Supporting Documentation

GENERAL CHEMISTRY ANALYSIS DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E
PROJECT:	100-H-28		DATA PACKAGE:	XP0168	
VALIDATOR:	ECR	LAB:	Cel	DATE:	3/20/15
			SDG:	XP0168	

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

SAMPLES/MATRIX					
J1VIL0	J1VIL1	J1VIL2	J1VIL3	J1VIL4	J1VIL5
J1VIL6	J1VIL7	J1VIL8	J1VIL9	J1VIM0	J1VIM1
J1VIM2					
					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: chloride - LO + MO - U
all except ↑

no FB

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

Spike samples analyzed? ..... Yes No N/A

Spike recoveries acceptable? ..... Yes No N/A

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

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

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

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

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

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

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

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

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

Comments:

no PAS

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: nitrate nitrite orth pH > 2x J/UR

GENERAL CHEMISTRY ANALYSIS DATA VALIDATION CHECKLIST

7. RESULT QUANTITATION AND DETECTION LIMITS (all levels)

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

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

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

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

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

Comments:

Appendix 6

Additional Documentation Requested by Client

GEL LABORATORIES LLC

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

QC Summary

Report Date: December 3, 2014

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

Contact: Joan Kessner

Workorder: 361900 **Client SDG:** XP0168 **Project Description:** RC-107 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Ion Chromatography										
Batch 1439133										
QC1203217665 361900001 DUP										
Bromide	U	0.687	U	0.687	mg/kg	N/A			MAR1	11/29/14 07:26
Chloride	BC	1.58	B	1.62	mg/kg	2.56 ^		(+/-2.05)		
Fluoride		1.31		1.38	mg/kg	5.35 ^		(+/-1.03)		
Nitrate-N		1.29		1.34	mg/kg	4.21 ^		(+/-1.03)		
Nitrite-N	U	0.338	U	0.338	mg/kg	N/A				
O-Phosphate as P	U	0.687	B	0.866	mg/kg	200 ^		(+/-2.05)		
Sulfate		5.08		5.54	mg/kg	8.63 ^		(+/-4.10)		
QC1203217666 361900002 DUP										
Bromide	U	0.681	U	0.681	mg/kg	N/A				11/29/14 08:56
Chloride	BC	1.56		2.13	mg/kg	31.0 ^		(+/-2.03)		
Fluoride	B	0.991	B	1.00	mg/kg	1.12 ^		(+/-1.02)		
Nitrate-N	B	0.936	B	0.944	mg/kg	0.866 ^		(+/-1.02)		
Nitrite-N	U	0.336	U	0.336	mg/kg	N/A				
O-Phosphate as P	U	0.681	U	0.681	mg/kg	N/A				
Sulfate		4.87		4.72	mg/kg	3.08 ^		(+/-4.07)		
QC1203217664 LCS										
Bromide	12.5			12.6	mg/kg		101	(90%-110%)		11/29/14 06:26
Chloride	50.0			47.0	mg/kg		94	(90%-110%)		
Fluoride	25.0			24.1	mg/kg		96.6	(90%-110%)		
Nitrate-N	25.0			23.9	mg/kg		95.4	(90%-110%)		
Nitrite-N	25.0			23.5	mg/kg		94.2	(90%-110%)		

GEL LABORATORIES LLC

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

QC Summary

Workorder: 361900 **Client SDG:** XP0168 **Project Description:** RC-107 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Ion Chromatography											
Batch 1439133											
O-Phosphate as P	12.5				12.7	mg/kg		102	(90%-110%)	MAR1	11/29/14 06:26
Sulfate	100				96.6	mg/kg		96.6	(90%-110%)		
QC1203217663 MB											
Bromide				U	0.670	mg/kg					11/29/14 05:56
Chloride				B	1.21	mg/kg					
Fluoride				U	0.330	mg/kg					
Nitrate-N				U	0.330	mg/kg					
Nitrite-N				U	0.330	mg/kg					
O-Phosphate as P				U	0.670	mg/kg					
Sulfate				U	1.33	mg/kg					
QC1203217667 361900001 MS											
Bromide	12.8	U	0.687		13.0	mg/kg		101	(72%-133%)		11/29/14 07:56
Chloride	51.3	BC	1.58		49.7	mg/kg		93.8	(53%-137%)		
Fluoride	25.6		1.31		25.7	mg/kg		95.3	(35%-133%)		
Nitrate-N	25.6		1.29		25.8	mg/kg		95.7	(64%-131%)		
Nitrite-N	25.6	U	0.338		25.0	mg/kg		97.4	(66%-128%)		
O-Phosphate as P	12.8	U	0.687		12.7	mg/kg		99.1	(35%-134%)		
Sulfate	103		5.08		106	mg/kg		98.5	(44%-146%)		
QC1203217668 361900002 MS											
Bromide	12.7	U	0.681		13.0	mg/kg		103	(72%-133%)		11/29/14 09:26
Chloride	50.8	BC	1.56		50.0	mg/kg		95.3	(53%-137%)		
Fluoride	25.4	B	0.991		25.6	mg/kg		96.7	(35%-133%)		
Nitrate-N	25.4	B	0.936		25.4	mg/kg		96.2	(64%-131%)		

QC Summary

Workorder: 361900 **Client SDG:** XP0168 **Project Description:** RC-107 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Ion Chromatography											
Batch 1439133											
Nitrite-N	25.4	U	0.336		25.0	mg/kg		98.4	(66%-128%)		
O-Phosphate as P	12.7	U	0.681		12.8	mg/kg		101	(35%-134%)	MAR1	11/29/14 09:26
Sulfate	102		4.87		105	mg/kg		98.7	(44%-146%)		
Nutrient Analysis											
Batch 1439246											
QC1203217937 361900001 DUP											
Nitrogen, Nitrate/Nitrite		B	0.249	B	0.259	mg/kg	3.89 ^		(+/-0.495)	AXH3	11/28/14 10:47
QC1203217938 361900002 DUP											
Nitrogen, Nitrate/Nitrite		B	0.219	B	0.200	mg/kg	8.79 ^		(+/-0.501)		11/28/14 10:51
QC1203217936 LCS											
Nitrogen, Nitrate/Nitrite	10.0				9.85	mg/kg		98.5	(90%-110%)		11/28/14 10:45
QC1203217935 MB											
Nitrogen, Nitrate/Nitrite				U	0.170	mg/kg					11/28/14 10:44
QC1203217939 361900001 MS											
Nitrogen, Nitrate/Nitrite	9.70	B	0.249		9.67	mg/kg		97.1	(75%-125%)		11/28/14 10:48
QC1203217940 361900002 MS											
Nitrogen, Nitrate/Nitrite	10.0	B	0.219		9.78	mg/kg		95.4	(75%-125%)		11/28/14 10:52
Spectrometric Analysis											
Batch 1439217											
QC1203217846 361900007 DUP											
Hexavalent Chromium		U	0.127	U	0.127	mg/kg	N/A			PXO1	11/29/14 17:08
QC1203217847 361900013 DUP											
Hexavalent Chromium		U	0.119	U	0.126	mg/kg	N/A				11/29/14 17:45
QC1203217845 ILCS											
Hexavalent Chromium	7.98				6.39	mg/kg		80.1	(80%-120%)		12/02/14 12:44
QC1203217844 LCS											
Hexavalent Chromium	4.00				3.29	mg/kg		82.3	(80%-120%)		11/29/14 16:43
QC1203217843 MB											
Hexavalent Chromium				U	0.120	mg/kg					11/29/14 16:43
QC1203217848 361900013 MS											
Hexavalent Chromium	4.25	U	0.119		4.07	mg/kg		95.8	(75%-125%)		11/29/14 17:46
QC1203217850 361900007 MS											

QC Summary

Workorder: 361900 **Client SDG:** XP0168 **Project Description:** RC-107 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Spectrometric Analysis											
Batch 1439217											
Hexavalent Chromium	4.15	U	0.127		3.98	mg/kg		95.8	(75%-125%)		11/29/14 17:08
QC1203217853 361900007 MSD											
Hexavalent Chromium	4.15	U	0.127		4.04	mg/kg	1.62	97.5	(0%-30%)	PXO1	11/29/14 17:08
QC1203217854 361900013 MSD											
Hexavalent Chromium	4.15	U	0.119		3.98	mg/kg	2.39	95.8	(0%-30%)		11/29/14 17:47
Titration and Ion Analysis											
Batch 1439826											
QC1203219278 361900007 DUP											
pH		X	8.66	X	8.81	pH	1.72		(0%-10%)	PXO1	11/29/14 14:49
QC1203219279 361900013 DUP											
pH		X	9.07	X	9.06	pH	0.110		(0%-10%)		11/29/14 15:03
QC1203219277 LCS											
pH	7.00				7.01	pH		100	(99%-101%)		11/29/14 14:36

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 >= 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.

Date: 30 March 2015
To: Washington Closure Hanford Inc. (technical representative)
From: *ELR Consulting*
Project: 100-H Remaining Sites Burial Grounds – Soil Full Protocol - Waste Site 100-H-28
Subject: Polyaromatic Hydrocarbon - Data Package No. XP0168-GEL

INTRODUCTION

This memo presents the results of data validation on Data Package No. XP0168 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
J1V1L0	11/24/14	Soil	C	See note 1
J1V1L1	11/24/14	Soil	C	See note 1
J1V1L2	11/20/14	Soil	C	See note 1
J1V1L3	11/20/14	Soil	C	See note 1
J1V1L4	11/24/14	Soil	C	See note 1
J1V1L5	11/24/14	Soil	C	See note 1
J1V1L6	11/24/14	Soil	C	See note 1
J1V1L7	11/24/14	Soil	C	See note 1
J1V1L8	11/20/14	Soil	C	See note 1
J1V1L9	11/20/14	Soil	C	See note 1
J1V1M0	11/20/14	Soil	C	See note 1
J1V1M1	11/20/14	Soil	C	See note 1
J1V1M2	11/20/14	Soil	C	See note 1

1 – Polyaromatic Hydrocarbons by 3550B.

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

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

DATA QUALITY OBJECTIVES

· Holding Times

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

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

All holding times were acceptable.

· Method Blanks

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

All method blank results were acceptable.

Field (equipment) Blanks

No field blanks were submitted for analysis.

· Accuracy

Matrix Spike/Matrix Spike Duplicate & Blank Spike Recoveries

Matrix spike/matrix spike duplicate analyses are used to assess the analytical accuracy of the reported data and the effect of the matrix on the ability to accurately quantify sample concentrations. Matrix spike/matrix spike duplicate analyses are performed in

duplicate using five compounds for which percent recoveries must be within a range of 50-150% or within laboratory control limits. If spike recoveries are outside control limits, detected sample results less than five times the spike concentration are qualified as estimates and flagged "J". Undetected sample results with spike recoveries below control limits are qualified as estimates and flagged "UJ". Undetected sample results are not qualified if the spike recovery is above control limits. Sample results greater than five times the spike concentration require no qualification.

All accuracy results were acceptable.

Surrogate Recovery

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

All surrogate results were acceptable.

- **Precision**

Matrix Spike/Matrix Spike Duplicate Samples

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

All duplicate results were acceptable.

Field Duplicate Samples

One set of field duplicates (J1V1L8/J1V1M2) were submitted for analysis. Field duplicates are compared using the same criteria as for laboratory duplicates. All field

duplicate results were acceptable.

- **Analytical Detection Levels**

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

- **Completeness**

Data package No. XP0168 was submitted for validation and verified for completeness. Completeness is based on the percentage of data determined to be valid (i.e., not rejected). The completion percentage was 100%.

MAJOR DEFICIENCIES

None found.

MINOR DEFICIENCIES

None found.

REFERENCES

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

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

Appendix 1

Glossary of Data Reporting Qualifiers

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

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

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

J - Indicates the compound or analyte was analyzed for and detected. Due to a minor QC deficiency identified during the data validation, the associated quantitation limit is an estimate.

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

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

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

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

Appendix 2

Summary of Data Qualification

POLYAROMATIC HYDROCARBON DATA QUALIFICATION SUMMARY*

SDG: XP0168	REVIEWER: ELR	Project: 100-H-28	PAGE 1 OF 1
COMMENTS: No qualifiers assigned			

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

Appendix 3

Annotated Laboratory Reports

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: December 2, 2014

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-107 Soil

Client SDG: XP0168

Client Sample ID: J1V1L2
Sample ID: 361900001
Matrix: Soil
Collect Date: 20-NOV-14 11:02
Receive Date: 25-NOV-14
Collector: Client
Moisture: 2.5%

Project: WCHN00720
Client ID: WCHN001

3/27/11

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
HPLC-PAH											
8310/3550 PAH Std list Soil "Dry Weight Corrected"											
Acenaphthene	U	5.12	5.12	17.1	ug/kg	1	CWW	11/28/14	1222	1439317	1
Acenaphthylene	U	5.12	5.12	17.1	ug/kg	1					
Anthracene	U	1.71	1.71	17.1	ug/kg	1					
Benzo(a)anthracene		14.7	0.546	1.71	ug/kg	1					
Benzo(a)pyrene		11.7	0.546	1.71	ug/kg	1					
Benzo(b)fluoranthene		10.4	0.546	1.71	ug/kg	1					
Benzo(ghi)perylene		7.93	0.546	1.71	ug/kg	1					
Benzo(k)fluoranthene	U	0.273	0.273	0.854	ug/kg	1					
Chrysene		13.4	0.546	1.71	ug/kg	1					
Dibenzo(a,h)anthracene	U	0.546	0.546	1.71	ug/kg	1					
Fluoranthene		21.8	0.546	1.71	ug/kg	1					
Fluorene	U	5.12	5.12	17.1	ug/kg	1					
Indeno(1,2,3-cd)pyrene	U	0.546	0.546	1.71	ug/kg	1					
Naphthalene	U	5.12	5.12	17.1	ug/kg	1					
Phenanthrene		17.1	5.12	17.1	ug/kg	1					
Pyrene		29.4	0.546	1.71	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	11/26/14	1754	1439316

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"	5670 ug/kg	8540	66.4	(46%-101%)

Notes:

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: December 2, 2014

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-107 Soil

Client SDG: XP0168

Client Sample ID: J1V1L3
Sample ID: 361900002
Matrix: Soil
Collect Date: 20-NOV-14 10:51
Receive Date: 25-NOV-14
Collector: Client
Moisture: 1.67%

Project: WCHN00720
Client ID: WCHN001

3/27/15

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
HPLC-PAH											
8310/3550 PAH Std list Soil "Dry Weight Corrected"											
Acenaphthene	U	5.08	5.08	16.9	ug/kg	1	CWW	11/28/14	1304	1439317	1
Acenaphthylene	U	5.08	5.08	16.9	ug/kg	1					
Anthracene	U	1.69	1.69	16.9	ug/kg	1					
Benzo(a)anthracene		2.63	0.541	1.69	ug/kg	1					
Benzo(a)pyrene		2.14	0.541	1.69	ug/kg	1					
Benzo(b)fluoranthene		1.92	0.541	1.69	ug/kg	1					
Benzo(ghi)perylene	J	1.53	0.541	1.69	ug/kg	1					
Benzo(k)fluoranthene	U	0.271	0.271	0.846	ug/kg	1					
Chrysene	P	3.12	0.541	1.69	ug/kg	1					
Dibenzo(a,h)anthracene	U	0.541	0.541	1.69	ug/kg	1					
Fluoranthene		4.25	0.541	1.69	ug/kg	1					
Fluorene	U	5.08	5.08	16.9	ug/kg	1					
Indeno(1,2,3-cd)pyrene	U	0.541	0.541	1.69	ug/kg	1					
Naphthalene	U	5.08	5.08	16.9	ug/kg	1					
Phenanthrene	U	5.08	5.08	16.9	ug/kg	1					
Pyrene		4.54	0.541	1.69	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	11/26/14	1754	1439316

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"	5310 ug/kg	8460	62.8	(46%-101%)

Notes:

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

Certificate of Analysis

Report Date: December 2, 2014

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-107 Soil

Client SDG: XP0168

Client Sample ID: J1V1L8
Sample ID: 361900003
Matrix: Soil
Collect Date: 20-NOV-14 10:08
Receive Date: 25-NOV-14
Collector: Client
Moisture: 3.57%

Project: WCHN00720
Client ID: WCHN001

3/27/15

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
HPLC-PAH											
8310/3550 PAH Std list Soil "Dry Weight Corrected"											
Acenaphthene	U	5.18	5.18	17.3	ug/kg	1	CWW	11/28/14	1346	1439317	1
Acenaphthylene	U	5.18	5.18	17.3	ug/kg	1					
Anthracene	U	1.73	1.73	17.3	ug/kg	1					
Benzo(a)anthracene		8.96	0.552	1.73	ug/kg	1					
Benzo(a)pyrene		7.68	0.552	1.73	ug/kg	1					
Benzo(b)fluoranthene		8.83	0.552	1.73	ug/kg	1					
Benzo(ghi)perylene	U	0.552	0.552	1.73	ug/kg	1					
Benzo(k)fluoranthene	U	0.276	0.276	0.863	ug/kg	1					
Chrysene		6.51	0.552	1.73	ug/kg	1					
Dibenzo(a,h)anthracene	U	0.552	0.552	1.73	ug/kg	1					
Fluoranthene		11.8	0.552	1.73	ug/kg	1					
Fluorene	U	5.18	5.18	17.3	ug/kg	1					
Indeno(1,2,3-cd)pyrene	U	0.552	0.552	1.73	ug/kg	1					
Naphthalene	U	5.18	5.18	17.3	ug/kg	1					
Phenanthrene	J	7.11	5.18	17.3	ug/kg	1					
Pyrene		12.4	0.552	1.73	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	11/26/14	1754	1439316

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"	4650 ug/kg	8630	53.9	(46%-101%)

Notes:

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: December 2, 2014

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-107 Soil

Client SDG: XP0168

Client Sample ID: J1V1L9
Sample ID: 361900004
Matrix: Soil
Collect Date: 20-NOV-14 10:38
Receive Date: 25-NOV-14
Collector: Client
Moisture: 4.25%

Project: WCHN00720
Client ID: WCHN001

3/22/14

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
HPLC-PAH											
8310/3550 PAH Std list Soil "Dry Weight Corrected"											
Acenaphthene	U	5.20	5.20	17.3	ug/kg	1	CWW	11/28/14	1428	1439317	1
Acenaphthylene	U	5.20	5.20	17.3	ug/kg	1					
Anthracene	J	5.36	1.73	17.3	ug/kg	1					
Benzo(a)anthracene		21.5	0.555	1.73	ug/kg	1					
Benzo(a)pyrene		19.0	0.555	1.73	ug/kg	1					
Benzo(b)fluoranthene		21.4	0.555	1.73	ug/kg	1					
Benzo(ghi)perylene		11.1	0.555	1.73	ug/kg	1					
Benzo(k)fluoranthene		12.0	0.278	0.867	ug/kg	1					
Chrysene		17.7	0.555	1.73	ug/kg	1					
Dibenzo(a,h)anthracene	U	0.555	0.555	1.73	ug/kg	1					
Fluoranthene		32.8	0.555	1.73	ug/kg	1					
Fluorene	U	5.20	5.20	17.3	ug/kg	1					
Indeno(1,2,3-cd)pyrene	U	0.555	0.555	1.73	ug/kg	1					
Naphthalene	U	5.20	5.20	17.3	ug/kg	1					
Phenanthrene		25.4	5.20	17.3	ug/kg	1					
Pyrene		31.3	0.555	1.73	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	11/26/14	1754	1439316

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"	4850 ug/kg	8670	55.9	(46%-101%)

Notes:

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Certificate of Analysis

Report Date: December 2, 2014

Company :	WC-Hanford, Inc.		
Address :	2620 Fermi Avenue MSIN H4-21 Richland, Washington 99354		
Contact:	Joan Kessner	Client SDG:	XP0168
Project:	RC-107 Soil		

Client Sample ID:	J1V1M1	Project:	WCHN00720
Sample ID:	361900005	Client ID:	WCHN001
Matrix:	Soil		
Collect Date:	20-NOV-14 10:26		
Receive Date:	25-NOV-14		
Collector:	Client		
Moisture:	2.94%		

✓ 3/27/15

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
HPLC-PAH											
8310/3550 PAH Std list Soil "Dry Weight Corrected"											
Acenaphthene	U	5.14	5.14	17.1	ug/kg	1	CWW	11/28/14	1510	1439317	1
Acenaphthylene	U	5.14	5.14	17.1	ug/kg	1					
Anthracene	U	1.71	1.71	17.1	ug/kg	1					
Benzo(a)anthracene		5.34	0.549	1.71	ug/kg	1					
Benzo(a)pyrene		5.34	0.549	1.71	ug/kg	1					
Benzo(b)fluoranthene		5.87	0.549	1.71	ug/kg	1					
Benzo(ghi)perylene		4.20	0.549	1.71	ug/kg	1					
Benzo(k)fluoranthene	U	0.274	0.274	0.857	ug/kg	1					
Chrysene		4.84	0.549	1.71	ug/kg	1					
Dibenzo(a,h)anthracene	U	0.549	0.549	1.71	ug/kg	1					
Fluoranthene		7.48	0.549	1.71	ug/kg	1					
Fluorene	U	5.14	5.14	17.1	ug/kg	1					
Indeno(1,2,3-cd)pyrene	U	0.549	0.549	1.71	ug/kg	1					
Naphthalene	U	5.14	5.14	17.1	ug/kg	1					
Phenanthrene	U	5.14	5.14	17.1	ug/kg	1					
Pyrene		7.88	0.549	1.71	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	11/26/14	1754	1439316

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"	5110 ug/kg	8570	59.6	(46%-101%)

Notes:

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Certificate of Analysis

Report Date: December 2, 2014

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-107 Soil

Client SDG: XP0168

Client Sample ID: J1V1M2
Sample ID: 361900006
Matrix: Soil
Collect Date: 20-NOV-14 10:08
Receive Date: 25-NOV-14
Collector: Client
Moisture: 3.32%

Project: WCHN00720
Client ID: WCHN001

3/22/15

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
HPLC-PAH											
8310/3550 PAH Std list Soil "Dry Weight Corrected"											
Acenaphthene	U	5.16	5.16	17.2	ug/kg	1	CWW	11/28/14	1552	1439317	1
Acenaphthylene	U	5.16	5.16	17.2	ug/kg	1					
Anthracene	J	2.56	1.72	17.2	ug/kg	1					
Benzo(a)anthracene		14.3	0.550	1.72	ug/kg	1					
Benzo(a)pyrene		12.3	0.550	1.72	ug/kg	1					
Benzo(b)fluoranthene		14.4	0.550	1.72	ug/kg	1					
Benzo(ghi)perylene		8.08	0.550	1.72	ug/kg	1					
Benzo(k)fluoranthene	U	0.275	0.275	0.860	ug/kg	1					
Chrysene		10.3	0.550	1.72	ug/kg	1					
Dibenzo(a,h)anthracene	U	0.550	0.550	1.72	ug/kg	1					
Fluoranthene		20.5	0.550	1.72	ug/kg	1					
Fluorene	U	5.16	5.16	17.2	ug/kg	1					
Indeno(1,2,3-cd)pyrene	U	0.550	0.550	1.72	ug/kg	1					
Naphthalene	U	5.16	5.16	17.2	ug/kg	1					
Phenanthrene	J	10.6	5.16	17.2	ug/kg	1					
Pyrene		18.6	0.550	1.72	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	11/26/14	1754	1439316

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"	5450 ug/kg	8600	63.4	(46%-101%)

Notes:

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: December 2, 2014

Company :	WC-Hanford, Inc.		
Address :	2620 Fermi Avenue MSIN H4-21 Richland, Washington 99354		
Contact:	Joan Kessner	Client SDG:	XP0168
Project:	RC-107 Soil		

Client Sample ID:	J1V1L0	Project:	WCHN00720
Sample ID:	361900007	Client ID:	WCHN001
Matrix:	Soil		
Collect Date:	20-NOV-14 08:11		
Receive Date:	25-NOV-14		
Collector:	Client		
Moisture:	6.64%		

3/27/15

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
HPLC-PAH											
8310/3550 PAH Std list Soil "Dry Weight Corrected"											
Acenaphthene	J	14.4	5.34	17.8	ug/kg	1	CWW	11/28/14	1635	1439317	1
Acenaphthylene	U	5.34	5.34	17.8	ug/kg	1					
Anthracene		23.3	1.78	17.8	ug/kg	1					
Benzo(a)anthracene		58.7	0.570	1.78	ug/kg	1					
Benzo(a)pyrene		50.6	0.570	1.78	ug/kg	1					
Benzo(b)fluoranthene		56.7	0.570	1.78	ug/kg	1					
Benzo(ghi)perylene		30.5	0.570	1.78	ug/kg	1					
Benzo(k)fluoranthene	U	0.285	0.285	0.891	ug/kg	1					
Chrysene		41.6	0.570	1.78	ug/kg	1					
Dibenzo(a,h)anthracene	U	0.570	0.570	1.78	ug/kg	1					
Fluoranthene		87.1	0.570	1.78	ug/kg	1					
Fluorene	J	11.2	5.34	17.8	ug/kg	1					
Indeno(1,2,3-cd)pyrene	U	0.570	0.570	1.78	ug/kg	1					
Naphthalene	U	5.34	5.34	17.8	ug/kg	1					
Phenanthrene		75.1	5.34	17.8	ug/kg	1					
Pyrene		81.5	0.570	1.78	ug/kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3550B	3550B PAH BY HPLC Prep in soil	AXV1	11/26/14	1754	1439316

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"	5290 ug/kg	8910	59.4	(46%-101%)

Notes:

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: December 2, 2014

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-107 Soil

Client SDG: XP0168

Client Sample ID: J1V1L1
Sample ID: 361900008
Matrix: Soil
Collect Date: 20-NOV-14 08:04
Receive Date: 25-NOV-14
Collector: Client
Moisture: 5.8%

Project: WCHN00720
Client ID: WCHN001

3/27/15

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
HPLC-PAH											
8310/3550 PAH Std list Soil "Dry Weight Corrected"											
Acenaphthene		85.2	5.31	17.7	ug/kg	1	CWW	11/28/14	1923	1439317	1
Acenaphthylene	U	5.31	5.31	17.7	ug/kg	1					
Anthracene		170	1.77	17.7	ug/kg	1					
Benzo(a)pyrene		318	0.566	1.77	ug/kg	1					
Benzo(ghi)perylene		172	0.566	1.77	ug/kg	1					
Benzo(k)fluoranthene		166	0.283	0.884	ug/kg	1					
Chrysene		244	0.566	1.77	ug/kg	1					
Dibenzo(a,h)anthracene	U	0.566	0.566	1.77	ug/kg	1					
Fluorene		72.5	5.31	17.7	ug/kg	1					
Indeno(1,2,3-cd)pyrene	U	0.566	0.566	1.77	ug/kg	1					
Naphthalene	U	5.31	5.31	17.7	ug/kg	1					
Phenanthrene		511	5.31	17.7	ug/kg	1					
Benzo(a)anthracene	D	375	2.26	7.07	ug/kg	4	CWW	11/29/14	0514	1439317	2
Benzo(b)fluoranthene	D	332	2.26	7.07	ug/kg	4					
Fluoranthene	D	593	2.26	7.07	ug/kg	4					
Pyrene	D	494	2.26	7.07	ug/kg	4					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3550B	3550B PAH BY HPLC Prep in soil	AXV1	11/26/14	1754	1439316

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 8310	
2	SW846 8310	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Decafluorobiphenyl	8310/3550 PAH Std list Soil "Dry Weight Corrected"	4760 ug/kg	8840	53.9	(46%-101%)
Decafluorobiphenyl	8310/3550 PAH Std list Soil "Dry Weight Corrected"	4870 ug/kg	8840	55.1	(46%-101%)

Notes:

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Certificate of Analysis

Report Date: December 2, 2014

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-107 Soil

Client SDG: XP0168

Client Sample ID: J1V1L4
Sample ID: 361900009
Matrix: Soil
Collect Date: 20-NOV-14 07:58
Receive Date: 25-NOV-14
Collector: Client
Moisture: 5.2%

Project: WCHN00720
Client ID: WCHN001

3/27/15

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
HPLC-PAH											
8310/3550 PAH Std list Soil "Dry Weight Corrected"											
Acenaphthene		57.8	5.27	17.6	ug/kg	1	CWW	11/28/14	2048	1439317	1
Acenaphthylene	U	5.27	5.27	17.6	ug/kg	1					
Anthracene		57.1	1.76	17.6	ug/kg	1					
Benzo(a)anthracene		273	0.562	1.76	ug/kg	1					
Benzo(a)pyrene		286	0.562	1.76	ug/kg	1					
Benzo(b)fluoranthene		329	0.562	1.76	ug/kg	1					
Benzo(ghi)perylene		173	0.562	1.76	ug/kg	1					
Benzo(k)fluoranthene		140	0.281	0.878	ug/kg	1					
Chrysene		191	0.562	1.76	ug/kg	1					
Dibenzo(a,h)anthracene	U	0.562	0.562	1.76	ug/kg	1					
Fluorene	P	18.9	5.27	17.6	ug/kg	1					
Indeno(1,2,3-cd)pyrene	U	0.562	0.562	1.76	ug/kg	1					
Naphthalene	U	5.27	5.27	17.6	ug/kg	1					
Phenanthrene		181	5.27	17.6	ug/kg	1					
Pyrene		327	0.562	1.76	ug/kg	1					
Fluoranthene	D	358	2.25	7.02	ug/kg	4	CWW	11/29/14	0638	1439317	2

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3550B	3550B PAH BY HPLC Prep in soil	AXV1	11/26/14	1754	1439316

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 8310	
2	SW846 8310	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Decafluorobiphenyl	8310/3550 PAH Std list Soil "Dry Weight Corrected"	4620 ug/kg	8780	52.6	(46%-101%)
Decafluorobiphenyl	8310/3550 PAH Std list Soil "Dry Weight Corrected"	4670 ug/kg	8780	53.2	(46%-101%)

Notes:

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: December 2, 2014

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-107 Soil

Client SDG: XP0168

Client Sample ID: J1V1L5
Sample ID: 361900010
Matrix: Soil
Collect Date: 20-NOV-14 07:43
Receive Date: 25-NOV-14
Collector: Client
Moisture: 5.36%

Project: WCHN00720
Client ID: WCHN001

3/22/15

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
HPLC-PAH											
8310/3550 PAH Std list Soil "Dry Weight Corrected"											
Acenaphthene	U	5.27	5.27	17.6	ug/kg	1	CWW	11/28/14	2212	1439317	1
Acenaphthylene	U	5.27	5.27	17.6	ug/kg	1					
Anthracene	U	1.76	1.76	17.6	ug/kg	1					
Benzo(a)anthracene		6.13	0.562	1.76	ug/kg	1					
Benzo(a)pyrene		5.48	0.562	1.76	ug/kg	1					
Benzo(b)fluoranthene		5.13	0.562	1.76	ug/kg	1					
Benzo(ghi)perylene		4.62	0.562	1.76	ug/kg	1					
Benzo(k)fluoranthene	U	0.281	0.281	0.878	ug/kg	1					
Chrysene		6.05	0.562	1.76	ug/kg	1					
Dibenzo(a,h)anthracene	U	0.562	0.562	1.76	ug/kg	1					
Fluoranthene		9.28	0.562	1.76	ug/kg	1					
Fluorene	U	5.27	5.27	17.6	ug/kg	1					
Indeno(1,2,3-cd)pyrene	U	0.562	0.562	1.76	ug/kg	1					
Naphthalene	U	5.27	5.27	17.6	ug/kg	1					
Phenanthrene	J	6.15	5.27	17.6	ug/kg	1					
Pyrene		10.4	0.562	1.76	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	11/26/14	1754	1439316

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"	4840 ug/kg	8780	55.1	(46%-101%)

Notes:

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: December 2, 2014

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-107 Soil

Client SDG: XP0168

Client Sample ID: J1V1L6
Sample ID: 361900011
Matrix: Soil
Collect Date: 20-NOV-14 07:38
Receive Date: 25-NOV-14
Collector: Client
Moisture: 4.88%

Project: WCHN00720
Client ID: WCHN001

3/27/15

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
HPLC-PAH											
8310/3550 PAH Std list Soil "Dry Weight Corrected"											
Acenaphthene	U	5.25	5.25	17.5	ug/kg	1	CWW	11/29/14	0019	1439317	1
Acenaphthylene	U	5.25	5.25	17.5	ug/kg	1					
Anthracene	U	1.75	1.75	17.5	ug/kg	1					
Benzo(a)anthracene		3.76	0.560	1.75	ug/kg	1					
Benzo(a)pyrene		3.37	0.560	1.75	ug/kg	1					
Benzo(b)fluoranthene		3.69	0.560	1.75	ug/kg	1					
Benzo(ghi)perylene		2.66	0.560	1.75	ug/kg	1					
Benzo(k)fluoranthene	U	0.280	0.280	0.874	ug/kg	1					
Chrysene		3.38	0.560	1.75	ug/kg	1					
Dibenzo(a,h)anthracene	U	0.560	0.560	1.75	ug/kg	1					
Fluoranthene		5.94	0.560	1.75	ug/kg	1					
Fluorene	U	5.25	5.25	17.5	ug/kg	1					
Indeno(1,2,3-cd)pyrene	U	0.560	0.560	1.75	ug/kg	1					
Naphthalene	U	5.25	5.25	17.5	ug/kg	1					
Phenanthrene	U	5.25	5.25	17.5	ug/kg	1					
Pyrene		5.02	0.560	1.75	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	11/26/14	1754	1439316

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"	5370 ug/kg	8740	61.4	(46%-101%)

Notes:

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: December 2, 2014

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-107 Soil

Client SDG: XP0168

Client Sample ID: J1V1L7
Sample ID: 361900012
Matrix: Soil
Collect Date: 20-NOV-14 07:32
Receive Date: 25-NOV-14
Collector: Client
Moisture: 8.22%

Project: WCHN00720
Client ID: WCHN001

3/22/15

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
HPLC-PAH											
8310/3550 PAH Std list Soil "Dry Weight Corrected"											
Acenaphthene	U	5.45	5.45	18.2	ug/kg	1	CWW	11/29/14	0101	1439317	1
Acenaphthylene	U	5.45	5.45	18.2	ug/kg	1					
Anthracene	U	1.82	1.82	18.2	ug/kg	1					
Benzo(a)anthracene		5.73	0.581	1.82	ug/kg	1					
Benzo(a)pyrene		4.64	0.581	1.82	ug/kg	1					
Benzo(b)fluoranthene		5.45	0.581	1.82	ug/kg	1					
Benzo(ghi)perylene		3.50	0.581	1.82	ug/kg	1					
Benzo(k)fluoranthene	U	0.290	0.290	0.908	ug/kg	1					
Chrysene		4.38	0.581	1.82	ug/kg	1					
Dibenzo(a,h)anthracene	U	0.581	0.581	1.82	ug/kg	1					
Fluoranthene		7.73	0.581	1.82	ug/kg	1					
Fluorene	U	5.45	5.45	18.2	ug/kg	1					
Indeno(1,2,3-cd)pyrene	U	0.581	0.581	1.82	ug/kg	1					
Naphthalene	U	5.45	5.45	18.2	ug/kg	1					
Phenanthrene	U	5.45	5.45	18.2	ug/kg	1					
Pyrene		6.59	0.581	1.82	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	11/26/14	1754	1439316

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"	5740 ug/kg	9080	63.2	(46%-101%)

Notes:

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: December 2, 2014

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-107 Soil

Client SDG: XP0168

Client Sample ID: J1V1M0
Sample ID: 361900013
Matrix: Soil
Collect Date: 20-NOV-14 07:26
Receive Date: 25-NOV-14
Collector: Client
Moisture: 5.33%

Project: WCHN00720
Client ID: WCHN001

3/27/15

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
HPLC-PAH											
8310/3550 PAH Std list Soil "Dry Weight Corrected"											
Acenaphthene	U	5.28	5.28	17.6	ug/kg	1	CWW	11/29/14	0349	1439317	1
Acenaphthylene	U	5.28	5.28	17.6	ug/kg	1					
Anthracene	J	4.23	1.76	17.6	ug/kg	1					
Benzo(a)anthracene		22.5	0.563	1.76	ug/kg	1					
Benzo(a)pyrene		19.8	0.563	1.76	ug/kg	1					
Benzo(b)fluoranthene		24.6	0.563	1.76	ug/kg	1					
Benzo(ghi)perylene		13.4	0.563	1.76	ug/kg	1					
Benzo(k)fluoranthene	U	0.281	0.281	0.880	ug/kg	1					
Chrysene		15.0	0.563	1.76	ug/kg	1					
Dibenzo(a,h)anthracene	U	0.563	0.563	1.76	ug/kg	1					
Fluoranthene		30.1	0.563	1.76	ug/kg	1					
Fluorene	U	5.28	5.28	17.6	ug/kg	1					
Indeno(1,2,3-cd)pyrene	U	0.563	0.563	1.76	ug/kg	1					
Naphthalene	U	5.28	5.28	17.6	ug/kg	1					
Phenanthrene	J	16.3	5.28	17.6	ug/kg	1					
Pyrene		26.7	0.563	1.76	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	11/26/14	1754	1439316

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"	5420 ug/kg	8800	61.6	(46%-101%)

Notes:

Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

HPLC-PAH
WC-HANFORD, INC. (WCHN)
SDG XP0168

Method/Analysis Information

Procedure:	**Polynuclear Aromatic Hydrocarbons**
Analytical Method:	SW846 8310
Prep Method:	SW846 3550B
Analytical Batch Number:	1439317
Prep Batch Number:	1439316

Sample Analysis

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

Sample ID	Client ID
361900001	J1V1L2
361900002	J1V1L3
361900003	J1V1L8
361900004	J1V1L9
361900005	J1V1M1
361900006	J1V1M2
361900007	J1V1L0
361900008	J1V1L1
361900009	J1V1L4
361900010	J1V1L5
361900011	J1V1L6
361900012	J1V1L7
361900013	J1V1M0
1203218127	MB for batch 1439316
1203218128	Laboratory Control Sample (LCS)
1203218129	361900010(J1V1L5) Matrix Spike (MS)
1203218130	361900010(J1V1L5) 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# 16.

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 inversed 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 361900010 (J1V1L5) 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
Samples 361900008 (J1V1L1) and 361900009 (J1V1L4) were diluted to bring over range target analytes within the calibration range.

Parmname	361900	
	008	009
Benzo(a)anthracene	4X	1X
Benzo(b)fluoranthene	4X	1X
Decafluorobiphenyl	4X 1X	4X 1X
Fluoranthene	4X	4X
Pyrene	4X	1X

Sample Re-extraction/Re-analysis
Re-extractions or re-analyses were not required for this SDG except for dilutions.

Samples 361900008 (J1V1L1) and 361900009 (J1V1L4) required re-analysis at a 1:4 dilution for multiply target analytes. Both sets of data were reported. In the diluted analysis, the target analytes were flagged with a 'D' qualifier.

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 samples 361900001 (J1V1L2), 361900002 (J1V1L3), 361900005 (J1V1M1), 361900006 (J1V1M2), 361900007 (J1V1L0), 361900008 (J1V1L1), 361900009 (J1V1L4), 361900010 (J1V1L5), 361900011 (J1V1L6), 361900012 (J1V1L7) and 361900013 (J1V1M0) 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 samples 361900002 (J1V1L3) and 361900009 (J1V1L4). 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 detectors, 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-107-119

Page 1 of 3

Collector: Q Stowe	Company Contact: Joan Kessner	Telephone No.: 375-4688	Project Coordinator: KESSNER, JH
Project Designation: 100-H Field Remediation	Sampling Location: 100-H-28 et al, north overburden pile		SAF No.: RC-107
Ice Chest No.: RCC-07-002	Field Logbook No.: EL-1627-08	COA: 01H2832000	Method of Shipment: Commerical Carrier - fed ex
Shipped To: GEL Laboratories Charlston	Offsite Property No.: A 131294		Bill of Lading/Air Bill No.: See OSPC

Price Code: 8B

Data Turnaround: 7days

Other Labs Shipped To: Eberline Services Oak Ridge

POSSIBLE SAMPLE HAZARDS/REMARKS
none

Special Handling and/or Storage
none

Preservation	None	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C		
Type of Container	G/P	G/P	G/P	aG	aG	aG	aG	G		
No. of Container(s)	1	1	1	1	1	1	1	1		
Volume	250mL	125mL	250mL	250mL	250mL	250mL	250mL	125mL		
Sample Analysis	See item (1) in Special Instructions	Chromium Hex - 7196	See item (2) in Special Instructions	PCBs - 8082	Pesticides - 8081	PAHs - 8310	Semi-VOA - 8270 (TCL)	TPH-Diesel Range - WTPH-D +		

Sample No.	Matrix	Sample Date	Sample Time										
~~J1V1L0~~	~~SOIL~~	DWS 11/20/14											
~~J1V1L1~~	~~SOIL~~												
J1V1L2	SOIL	11/20/14	1102	✓	✓	✓	✓	✓	✓	✓	✓		
J1V1L3	SOIL	11/20/14	1051	✓	✓	✓	✓	✓	✓	✓	✓		
~~J1V1L4~~	~~SOIL~~	DWS 11/20/14											

CHAIN OF POSSESSION

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Quincy Stowe	11-20-14 1110	DWSHEA 11/20/14 WCH	1110
DWSHEA DWSHEA	11/20/14 1545	C. Bingham	11-20-14 1545
C. Bingham	11-20-14 1550	1060 Battelle, fndge #1A	11-20-14 1550
1060 Battelle, fndge #1A	11-24-14 0715	C. Bingham	11-24-14 0715
C. Bingham WCH	11-24-14 0730	fed ex	
FED EX		P. Dent Patricia Dent	11-25-14 0930

Sign/Print Names

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

SPECIAL INSTRUCTIONS

(1) ICP Metals - 6010TR (Close-out List) {Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silicon, Silver, Sodium, Vanadium, Zinc}; Mercury - 7471 - (CV)
(2) IC Anions - 9056 {Bromide, Chloride, Fluoride, Nitrogen in Nitrate, Nitrogen in Nitrite, Phosphorous in phosphate, Sulfate}; NO2/NO3 - 353.2 {Nitrogen in Nitrite and Nitrate}; pH (Soil) - 9045 {pH Measurement}

REVIEWED BY K. Woodvraemer DATE 11-24-14

XP0168

WCH-EE-011

Washington Closure Hanford — CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

RC-107-119 | Page 2 of 3

Collector: Q Stowe	Company Contact: Joan Kessner	Telephone No.: 375-4688	Project Coordinator: KESSNER, JH
Project Designation: 100-H Field Remediation	Sampling Location: 100-H-28 et al, north overburden pile		SAF No.: RC-107
Ice Chest No.: RCC-07-002	Field Logbook No.: EL-1627-08	COA: 01H2832000	Method of Shipment: Commerical Carrier - fed ex
Shipped To: GEL Laboratories Charlston	Offsite Property No.: A131294		Bill of Lading/Air Bill No.: See OSPC

Price Code: 8B | Data Turnaround: 7days

Other Labs Shipped To: Eberline Services Oak Ridge

POSSIBLE SAMPLE HAZARDS/REMARKS
none

Special Handling and/or Storage
none

Preservation	None	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C		
Type of Container	G/P	G/P	G/P	aG	aG	aG	aG	G		
No. of Container(s)	1	1	1	1	1	1	1	1		
Volume	250mL	125mL	250mL	250mL	250mL	250mL	250mL	125mL		
Sample Analysis	See item (1) in Special Instructions	Chromium Hex - 7196	See item (2) in Special Instructions	PCBs - 8082	Pesticides - 8081	PAHs - 8310	Semi-VOA - 8270 (TCL)	TPH-Diesel Range - WTPH-D +		

Sample No.	Matrix	Sample Date	Sample Time										
~~J1V1L5~~	~~SOIL~~	DWShea 11/20/14											
~~J1V1L6~~	~~SOIL~~												
~~J1V1L7~~	~~SOIL~~												
J1V1L8	SOIL	11/20/14	1008	✓	✓	✓	✓	✓	✓	✓	✓		
J1V1L9	SOIL	11/20/14	1038	✓	✓	✓	✓	✓	✓	✓	✓		

CHAIN OF POSSESSION / Sign/Print Names

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Quincy Stowe [signature]	11-20-14 1110	WCH DWSHEA	11/20/14 1110
DWSHEA	11/20/14 1545	C. Bingham [signature]	11-20-14 1545
C. Bingham [signature]	11-20-14 1550	1060 Battelle, fridge #1A	11-20-14 1550
1060 Battelle, fridge #1A	11-24-14 0715	C. Bingham [signature]	11-24-14 0715
C. Bingham [signature] WCH	11-24-14 0730	fed ex	
FED EX		P. Ulent Patricia Dent	11-25-14 0930

FINAL SAMPLE DISPOSITION — Disposal Method: | Disposed By: | Date/Time:

SPECIAL INSTRUCTIONS

(1) ICP Metals - 6010TR (Close-out List) (Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silicon, Silver, Sodium, Vanadium, Zinc); Mercury - 7471 - (CV)
(2) IC Anions - 9056 (Bromide, Chloride, Fluoride, Nitrogen in Nitrate, Nitrogen in Nitrite, Phosphorous in phosphate, Sulfate); NO2/NO3 - 353.2 (Nitrogen in Nitrite and Nitrate); pH (Soil) - 9045 (pH Measurement)

REVIEWED BY K. Woodvine [signature] DATE 11-24-14

XP0168

WCH-EE-011

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-107-119	Page 3 of 3

Collector: Q Stowe	Company Contact: Joan Kessner	Telephone No.: 375-4688	Project Coordinator: KESSNER, JH
Price Code: 8B	Data Turnaround: 7 days		
Project Designation: 100-H Field Remediation	Sampling Location: 100-H-28 et al, north overburden pile		SAF No.: RC-107
Ice Chest No.: RCC-07-002	Field Logbook No.: EL-1627-08	COA: 01H2832000	Method of Shipment: Commerical Carrier - fed ex
Shipped To: GEL Laboratories Charlston	Offsite Property No.: A131294		Bill of Lading/Air Bill No.: See OSPC

Other Labs Shipped To: Eberline Services Oak Ridge

POSSIBLE SAMPLE HAZARDS/REMARKS
none

Special Handling and/or Storage
none

Preservation	None	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C		
Type of Container	G/P	G/P	G/P	aG	aG	aG	aG	G		
No. of Container(s)	1	1	1	1	1	1	1	1		
Volume	250mL	125mL	250mL	250mL	250mL	250mL	250mL	125mL		
Sample Analysis	See item (1) in Special Instructions	Chromium Hex - 7196	See item (2) in Special Instructions	PCBs - 8082	Pesticides - 8081	PAHs - 8310	Semi-VOA - 8270 (TCL)	TPH-Diesel Range - WTPH-D +		

Sample No.	Matrix	Sample Date	Sample Time									
~~J1V1M0~~	~~SOIL~~	DWS 11/20/14										
J1V1M1	SOIL	11/20/14	1026	✓	✓	✓	✓	✓	✓	✓	✓	
J1V1M2	SOIL	11/20/14	1008	✓	✓	✓	✓	✓	✓	✓	✓	

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By/Removed From: Quincy Stowe	Date/Time: 11-20-14 1110	Received By/Stored In: DWSHEA DWSHEA	Date/Time: 11/20/14 1110
Relinquished By/Removed From: DWSHEA DWSHEA	Date/Time: 11/20/14 1545	Received By/Stored In: C. Bingham	Date/Time: 11-20-14 1545
Relinquished By/Removed From: C. Bingham	Date/Time: 11-20-14 1550	Received By/Stored In: 1060 Battelle, fridge #14	Date/Time: 11-20-14 1550
Relinquished By/Removed From: 1060 Battelle, fridge #14	Date/Time: 11-24-14 0715	Received By/Stored In: C. Bingham	Date/Time: 11-24-14 0715
Relinquished By/Removed From: C. Bingham WCH	Date/Time: 11-24-14 0730	Received By/Stored In: fed ex	Date/Time:
Relinquished By/Removed From: FED EX	Date/Time:	Received By/Stored In: P. Dent Patricia Dent	Date/Time: 11-25-14 0930
Relinquished By/Removed From:	Date/Time:	Received By/Stored In:	Date/Time:

FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

WCH-EE-011

SPECIAL INSTRUCTIONS

(1) ICP Metals - 6010TR (Close-out List) (Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silicon, Silver, Sodium, Vanadium, Zinc); Mercury - 7471 - (CV)
(2) IC Anions - 9056 (Bromide, Chloride, Fluoride, Nitrogen in Nitrate, Nitrogen in Nitrite, Phosphorous in phosphate, Sulfate); NO2/NO3 - 353.2 (Nitrogen in Nitrite and Nitrate); pH (Soil) - 9045 (pH Measurement)

REVIEWED BY K. Wood Vincent DATE 11-24-14

XP0168

Washington Closure Hanford — CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

RC-107-119 | Page 1 of 3

Collector: Q Stowe	Company Contact: Joan Kessner	Telephone No.: 375-4688	Project Coordinator: KESSNER, JH
Price Code: 8B	Data Turnaround: 7days		
Project Designation: 100-H Field Remediation	Sampling Location: 100-H-28 et al, north overburden pile		SAF No.: RC-107
Ice Chest No.: RCC-07-002	Field Logbook No.: EL-1627-08	COA: 01H2832000	Method of Shipment: Commerical Carrier Fed ex
Shipped To: GEL Laboratories Charlston	Offsite Property No.: A131294		Bill of Lading/Air Bill No.: See OSPC
Other Labs Shipped To: Eberline Services Oak Ridge			

POSSIBLE SAMPLE HAZARDS/REMARKS
none

Special Handling and/or Storage
none

Sample No.	Matrix	Sample Date	Sample Time	Preservation: None	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C		
				Type of Container: G/P	G/P	G/P	aG	aG	aG	aG	G		
				No. of Container(s): 1	1	1	1	1	1	1	1		
				Volume: 250mL	125mL	250mL	250mL	250mL	250mL	250mL	125mL		
				Sample Analysis: See item (1) in Special Instructions	Chromium Hex - 7196	See item (2) in Special Instructions	PCBs - 8082	Pesticides - 8081	PAHs - 8310	Semi-VOA - 8270 (TCL)	TPH-Diesel Range - WTPH-D +		
J1V3L0	SOIL	11/24/14	0841	✓	✓	✓	✓	✓	✓	✓	✓		
J1V1L1	SOIL	11/24/14	0804	✓	✓	✓	✓	✓	✓	✓	✓		
~~J1V1L2~~	~~SOIL~~	DWSHEA 11/20/14											
~~J1V1L3~~	~~SOIL~~												
J1V1L4	SOIL	11/24/14	0758	✓	✓	✓	✓	✓	✓	✓	✓		

CHAIN OF POSSESSION

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Quincy Stowe	0822 11/24/14	DWSHEA DWSHEA WCH	11/24/14 0822
DWSHEA DWSHEA	11/24/14 0933	C. Bingham	11-24-14 0933
C. Bingham WCH	11-24-14 0950	Fed ex	
FED EX		P. Dent PATRICIE DENT	11-25-14 0930

Sign/Print Names

FINAL SAMPLE DISPOSITION — Disposal Method: | Disposed By: | Date/Time:

WCH-EE-011

SPECIAL INSTRUCTIONS

(1) ICP Metals - 6010TR (Close-out List) (Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silicon, Silver, Sodium, Vanadium, Zinc); Mercury - 7471 - (CV)
(2) IC Anions - 9056 (Bromide, Chloride, Fluoride, Nitrogen in Nitrate, Nitrogen in Nitrite, Phosphorous in phosphate, Sulfate); NO2/NO3 - 353.2 (Nitrogen in Nitrite and Nitrate); pH (Soil) - 9045 (pH Measurement)

REVIEWED BY K. Woodhaemel DATE 11-24-14

11-24-14 CMB

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Washington Closure Hanford — CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

RC-107-119 | Page 2 of 3

Collector	Q Stowe
Company Contact	Joan Kessner
Telephone No.	375-4688
Project Coordinator	KESSNER, JH
Price Code	8B
Data Turnaround	7 days
Project Designation	100-H Field Remediation
Sampling Location	100-H-28 et al, north overburden pile
SAF No.	RC-107
Ice Chest No.	RCC-07-002
Field Logbook No.	EL-1627-08
COA	01H2832000
Method of Shipment	Commerical Carrier fed ex
Shipped To	GEL Laboratories Charlston
Offsite Property No.	A131 294
Bill of Lading/Air Bill No.	See OSPC
Other Labs Shipped To	Eberline Services Oak Ridge

POSSIBLE SAMPLE HAZARDS/REMARKS
none

Special Handling and/or Storage
none

Sample No.	Matrix	Sample Date	Sample Time	Preservation: None	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C		
				Type of Container: G/P	G/P	G/P	aG	aG	aG	aG	G		
				No. of Container(s): 1	1	1	1	1	1	1	1		
				Volume: 250mL	125mL	250mL	250mL	250mL	250mL	250mL	125mL		
				Sample Analysis: See item (1) in Special Instructions	Chromium Hex - 7196	See item (2) in Special Instructions	PCBs - 8082	Pesticides - 8081	PAHs - 8310	Semi-VOA - 8270 (TCL)	TPH-Diesel Range - WTPH-D +		
J1V4L5	SOIL	11/24/14	0743	✓	✓	✓	✓	✓	✓	✓	✓		
J1V1L6	SOIL	11/24/14	0738	✓	✓	✓	✓	✓	✓	✓	✓		
J1V1L7	SOIL	11/24/14	0732	✓	✓	✓	✓	✓	✓	✓	✓		
~~J1V1L8~~	~~SOIL~~	DWShea											
~~J1V1L9~~	~~SOIL~~	11/20/14											

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Quincy Stowe	11/24/14 0822	DWSHEA DWSHEA WCH	11/24/14 0822
DWSHEA DWSHEA	11/24/14 0933	C. Bingham	11-24-14 0933
C. Bingham WCH	11-24-14 0950	fed ex	
FED EX		P. Dent Patricia Dent	11-25-14 0930

SPECIAL INSTRUCTIONS

(1) ICP Metals - 6010TR (Close-out List) (Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silicon, Silver, Sodium, Vanadium, Zinc); Mercury - 7471 - (CV)
(2) IC Anions - 9056 (Bromide, Chloride, Fluoride, Nitrogen in Nitrate, Nitrogen in Nitrite, Phosphorous in phosphate, Sulfate); NO2/NO3 - 353.2 (Nitrogen in Nitrite and Nitrate); pH (Soil) - 9045 (pH Measurement)

REVIEWED BY K. Wood Vincent DATE 11-24-14

11-24-14 CMD

XP0169/8

FINAL SAMPLE DISPOSITION: Disposal Method | Disposed By | Date/Time

WCH-EE-011

Washington Closure Hanford — CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

RC-107-119 | Page 3 of 3

Collector: Q Stone	Company Contact: Joan Kessner	Telephone No.: 375-4688	Project Coordinator: KESSNER, JH
Price Code: 8B	Data Turnaround: 7days		
Project Designation: 100-H Field Remediation	Sampling Location: 100-H-28 et al, north overburden pile		SAF No.: RC-107
Ice Chest No.: RCC-07-002	Field Logbook No.: EL-1627-08	COA: 01H2832000	Method of Shipment: Commerical Carrier – fed ex
Shipped To: GEL Laboratories Charlston	Offsite Property No.: A131294		Bill of Lading/Air Bill No.: See OSPC

Other Labs Shipped To: Eberline Services Oak Ridge

POSSIBLE SAMPLE HAZARDS/REMARKS: none

Special Handling and/or Storage: none

Preservation	None	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C		
Type of Container	G/P	G/P	G/P	aG	aG	aG	aG	G		
No. of Container(s)	1	1	1	1	1	1	1	1		
Volume	250mL	125mL	250mL	250mL	250mL	250mL	250mL	125mL		
Sample Analysis	See item (1) in Special Instructions	Chromium Hex - 7196	See item (2) in Special Instructions	PCBs - 8082	Pesticides - 8081	PAHs - 8310	Semi-VOA - 8270 (TCL)	TPH-Diesel Range - WTPH-D +		

Sample No.	Matrix	Sample Date	Sample Time									
J1V1M0 (1)	SOIL	11/24/14	0726	✓	✓	✓	✓	✓	✓	✓	✓	
~~J1V1M1~~	~~SOIL~~	DWSHEA										
~~J1V1M2~~	~~SOIL~~	11/20/14										

CHAIN OF POSSESSION

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Quincy Stone	0822 11/24/14	WCH DWSHEA DWSHEA	11/24/14 0822
DWSHEA DWSHEA	11/24/14 0933	C. Bingham	11-24-14 0933
C. Bingham WCH	11-24-14 0950	fed ex	
FED EX		P. Dent PATRICIE DENT	11-25-14 0930

Sign/Print Names

FINAL SAMPLE DISPOSITION: Disposal Method | Disposed By | Date/Time

WCH-EE-011

SPECIAL INSTRUCTIONS

(1) ICP Metals - 6010TR (Close-out List) (Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silicon, Silver, Sodium, Vanadium, Zinc); Mercury - 7471 - (CV)
(2) IC Anions - 9056 (Bromide, Chloride, Fluoride, Nitrogen in Nitrate, Nitrogen in Nitrite, Phosphorous in phosphate, Sulfate); NO2/NO3 - 353.2 (Nitrogen in Nitrite and Nitrate); pH (Soil) - 9045 (pH Measurement)

REVIEWED BY K. Wood Vacmd DATE 11-24-14

11-24-14 CMD

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Appendix 5

Data Validation Supporting Documentation

GENERAL ORGANIC DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E
PROJECT: 100-H-28			DATA PACKAGE: XP0168		
VALIDATOR: ELR		LAB: Gel		DATE: 3/26/15	
			SDG: XP0168		

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

SAMPLES/MATRIX:					
J1V1L0	J1V1L1	J1V1L2	J1V1L3	J1V1L4	J1V1L5
J1V1L6	J1V1L7	J1V1L8	J1V1L9	J1V1M0	J1V1M1
J1V1M2					
					Soil

1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE

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

Comments: /

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

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

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

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

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

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

Comments:

GENERAL ORGANIC DATA VALIDATION CHECKLIST

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

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

Comments: no FB

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

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

Comments: no PAS

GENERAL ORGANIC DATA VALIDATION CHECKLIST

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

Duplicate RPD values acceptable? ..... Yes No N/A

Duplicate results acceptable? ..... Yes No N/A

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

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

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

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

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

Comments:

6. HOLDING TIMES (all levels)

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

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

Comments:

GENERAL ORGANIC DATA VALIDATION CHECKLIST

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

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

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

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

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

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

Comments: _____

9. SAMPLE CLEANUP (Levels D and E)

Fluoricil ® (or other aborbant) cleanup performed? ..... Yes No N/A

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

Check recoveries aceptable? ..... Yes No N/A

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

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

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

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

Comments: _____

Appendix 6

Additional Documentation Requested by Client

GEL LABORATORIES LLC

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

QC Summary

Report Date: December 2, 2014

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

Contact: Joan Kessner

Workorder: 361900 Client SDG: XP0168 Project Description: RC-107 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
HPLC-PAH										
Batch 1439317										
QC1203218128 LCS										
Acenaphthene	1660			1350	ug/kg		81.5	(66%-98%)	CWW	11/28/14 11:40
Acenaphthylene	1660			1250	ug/kg		75.3	(65%-95%)		
Anthracene	1660			1350	ug/kg		80.9	(71%-107%)		
Benzo(a)anthracene	166			133	ug/kg		79.7	(72%-103%)		
Benzo(a)pyrene	166			125	ug/kg		74.9	(68%-98%)		
Benzo(b)fluoranthene	166			131	ug/kg		78.9	(72%-99%)		
Benzo(ghi)perylene	166			121	ug/kg		72.7	(69%-98%)		
Benzo(k)fluoranthene	83.2			71.1	ug/kg		85.5	(62%-103%)		
Chrysene	166			142	ug/kg		85.5	(80%-113%)		
Dibenzo(a,h)anthracene	166			153	ug/kg		91.7	(83%-115%)		
Fluoranthene	166			132	ug/kg		79.3	(68%-98%)		
Fluorene	1660			1310	ug/kg		78.8	(68%-99%)		
Indeno(1,2,3-cd)pyrene	166			137	ug/kg		82.4	(76%-105%)		
Naphthalene	1660			1220	ug/kg		73.6	(62%-93%)		
Phenanthrene	1660			1320	ug/kg		79.4	(70%-98%)		
Pyrene	166			133	ug/kg		79.9	(73%-104%)		
**Decafluorobiphenyl	8320			5630	ug/kg		67.6	(46%-101%)		
QC1203218127 MB										
Acenaphthene			U	5.00	ug/kg					11/28/14 10:57
Acenaphthylene			U	5.00	ug/kg					

QC Summary

Workorder: 361900 **Client SDG:** XP0168 **Project Description:** RC-107 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
HPLC-PAH											
Batch 1439317											
Anthracene				U	1.67	ug/kg					
Benzo(a)anthracene				U	0.533	ug/kg				CWW	11/28/14 10:57
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	0.267	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					
**Decafluorobiphenyl	8330				5620	ug/kg		67.4	(46%-101%)		
QC1203218129 361900010 MS											
Acenaphthene	1760	U	5.27		1390	ug/kg		79.2	(57%-97%)		11/28/14 22:54
Acenaphthylene	1760	U	5.27		1290	ug/kg		73.4	(55%-94%)		
Anthracene	1760	U	1.76		1440	ug/kg		81.9	(65%-103%)		
Benzo(a)anthracene	176		6.13		154	ug/kg		84.2	(53%-110%)		
Benzo(a)pyrene	176		5.48		149	ug/kg		82	(53%-105%)		
Benzo(b)fluoranthene	176		5.13		148	ug/kg		81.1	(52%-110%)		
Benzo(ghi)perylene	176		4.62		134	ug/kg		73.6	(44%-107%)		

GEL LABORATORIES LLC

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

QC Summary

Workorder: 361900 **Client SDG:** XP0168 **Project Description:** RC-107 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
HPLC-PAH										
Batch 1439317										
Benzo(k)fluoranthene	87.8	U	0.281	83.4	ug/kg		94.9	(48%-116%)	CWW	11/28/14 22:54
Chrysene	176		6.05	157	ug/kg		85.8	(61%-118%)		
Dibenzo(a,h)anthracene	176	U	0.562	163	ug/kg		93	(63%-119%)		
Fluoranthene	176		9.28	153	ug/kg		81.6	(56%-100%)		
Fluorene	1760	U	5.27	1350	ug/kg		76.8	(59%-97%)		
Indeno(1,2,3-cd)pyrene	176	U	0.562	150	ug/kg		85.3	(53%-115%)		
Naphthalene	1760	U	5.27	1250	ug/kg		71.2	(54%-88%)		
Phenanthrene	1760	J	6.15	1400	ug/kg		79.5	(60%-99%)		
Pyrene	176		10.4	170	ug/kg		90.8	(54%-112%)		
**Decafluorobiphenyl	8780		4840	5820	ug/kg		66.2	(46%-101%)		
QC1203218130 361900010 MSD										
Acenaphthene	1760	U	5.27	1380	ug/kg	1.13	78.2	(0%-30%)		11/28/14 23:37
Acenaphthylene	1760	U	5.27	1270	ug/kg	1.42	72.3	(0%-30%)		
Anthracene	1760	U	1.76	1430	ug/kg	0.683	81.2	(0%-30%)		
Benzo(a)anthracene	176		6.13	145	ug/kg	5.86	79.1	(0%-30%)		
Benzo(a)pyrene	176		5.48	142	ug/kg	5.15	77.6	(0%-30%)		
Benzo(b)fluoranthene	176		5.13	140	ug/kg	5.33	76.7	(0%-30%)		
Benzo(ghi)perylene	176		4.62	129	ug/kg	3.67	70.8	(0%-30%)		
Benzo(k)fluoranthene	87.9	U	0.281	77.6	ug/kg	7.16	88.3	(0%-30%)		
Chrysene	176		6.05	148	ug/kg	5.55	80.9	(0%-30%)		
Dibenzo(a,h)anthracene	176	U	0.562	160	ug/kg	2.13	91	(0%-30%)		
Fluoranthene	176		9.28	140	ug/kg	8.84	74.2	(0%-30%)		

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QC Summary

Workorder: 361900 **Client SDG:** XP0168 **Project Description:** RC-107 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
HPLC-PAH											
Batch 1439317											
Fluorene	1760	U	5.27		1340	ug/kg	0.873	76.1	(0%-30%)	CWW	11/28/14 23:37
Indeno(1,2,3-cd)pyrene	176	U	0.562		145	ug/kg	3.09	82.6	(0%-30%)		
Naphthalene	1760	U	5.27		1230	ug/kg	2.02	69.7	(0%-30%)		
Phenanthrene	1760	J	6.15		1370	ug/kg	2.39	77.6	(0%-30%)		
Pyrene	176		10.4		148	ug/kg	14.0	78.1	(0%-30%)		
**Decafluorobiphenyl	8790		4840		5660	ug/kg		64.4	(46%-101%)		

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 (0rganics 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: 30 March 2015
To: Washington Closure Hanford Inc. (technical representative)
From: ELR Consulting
Project: 100-H Remaining Sites Burial Grounds – Soil Full Protocol - Waste Site 100-H-28
Subject: Pesticide/PCB - Data Package No. XP0168-GEL

INTRODUCTION

This memo presents the results of data validation on Data Package No. XP0168 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
J1V1L0	11/24/14	Soil	C	See note 1
J1V1L1	11/24/14	Soil	C	See note 1
J1V1L2	11/20/14	Soil	C	See note 1
J1V1L3	11/20/14	Soil	C	See note 1
J1V1L4	11/24/14	Soil	C	See note 1
J1V1L5	11/24/14	Soil	C	See note 1
J1V1L6	11/24/14	Soil	C	See note 1
J1V1L7	11/24/14	Soil	C	See note 1
J1V1L8	11/20/14	Soil	C	See note 1
J1V1L9	11/20/14	Soil	C	See note 1
J1V1M0	11/20/14	Soil	C	See note 1
J1V1M1	11/20/14	Soil	C	See note 1
J1V1M2	11/20/14	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

One set of field duplicates (J1V1L8/J1V1M2) were submitted for analysis. Field duplicates are compared using the same criteria as for laboratory duplicates. All field duplicate results were acceptable.

- **Analytical Detection Levels**

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

- **Completeness**

Data package No. XP0168 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

PCB/PESTICIDE DATA QUALIFICATION SUMMARY*

SDG: XP0168	REVIEWER: ELR	Project: 100-H-28	PAGE_1_OF_1
COMMENTS: No qualifiers assigned			

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

Appendix 3

Annotated Laboratory Reports

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: November 28, 2014

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-107 Soil

Client SDG: XP0168

Client Sample ID: J1V1L2
Sample ID: 361900001
Matrix: Soil
Collect Date: 20-NOV-14 11:02
Receive Date: 25-NOV-14
Collector: Client
Moisture: 2.5%

Project: WCHN00720
Client ID: WCHN001

✓ 3/22/15

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Semi-Volatiles-PCB											
SW846 3541/8082A PCB Solid Automated Soxhlet "Dry Weight Corrected"											
Aroclor-1016	U	1.14	1.14	3.42	ug/kg	1	YS1	11/27/14	2328	1439108	1
Aroclor-1221	U	1.14	1.14	3.42	ug/kg	1					
Aroclor-1232	U	1.14	1.14	3.42	ug/kg	1					
Aroclor-1242	U	1.14	1.14	3.42	ug/kg	1					
Aroclor-1248	U	1.14	1.14	3.42	ug/kg	1					
Aroclor-1254	U	1.14	1.14	3.42	ug/kg	1					
Aroclor-1260	U	1.14	1.14	3.42	ug/kg	1					
Aroclor-1262	U	1.14	1.14	3.42	ug/kg	1					
Aroclor-1268	U	1.14	1.14	3.42	ug/kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	Prep Method 3541 PCB Prep Soil	MXD2	11/26/14	1010	1439105

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 3541/8082A	
2	SW846 3541/8082A	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
4cmx	SW846 3541/8082A PCB Solid Automated Soxhlet "Dry Weight Corrected"	4.86 ug/kg	6.83	71.2	(29%-106%)
Decachlorobiphenyl	SW846 3541/8082A PCB Solid Automated Soxhlet "Dry Weight Corrected"	5.57 ug/kg	6.83	81.6	(25%-131%)

Notes:

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: November 28, 2014

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-107 Soil

Client SDG: XP0168

Client Sample ID: J1V1L3
Sample ID: 361900002
Matrix: Soil
Collect Date: 20-NOV-14 10:51
Receive Date: 25-NOV-14
Collector: Client
Moisture: 1.67%

Project: WCHN00720
Client ID: WCHN001

3/27/15

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Semi-Volatiles-PCB											
SW846 3541/8082A PCB Solid Automated Soxhlet "Dry Weight Corrected"											
Aroclor-1016	U	1.13	1.13	3.38	ug/kg	1	YS1	11/27/14	2343	1439108	1
Aroclor-1221	U	1.13	1.13	3.38	ug/kg	1					
Aroclor-1232	U	1.13	1.13	3.38	ug/kg	1					
Aroclor-1242	U	1.13	1.13	3.38	ug/kg	1					
Aroclor-1248	U	1.13	1.13	3.38	ug/kg	1					
Aroclor-1254	U	1.13	1.13	3.38	ug/kg	1					
Aroclor-1260	U	1.13	1.13	3.38	ug/kg	1					
Aroclor-1262	U	1.13	1.13	3.38	ug/kg	1					
Aroclor-1268	U	1.13	1.13	3.38	ug/kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	Prep Method 3541 PCB Prep Soil	MXD2	11/26/14	1010	1439105

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 3541/8082A	
2	SW846 3541/8082A	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
4cmx	SW846 3541/8082A PCB Solid Automated Soxhlet "Dry Weight Corrected"	4.64 ug/kg	6.76	68.6	(29%-106%)
Decachlorobiphenyl	SW846 3541/8082A PCB Solid Automated Soxhlet "Dry Weight Corrected"	5.49 ug/kg	6.76	81.2	(25%-131%)

Notes:

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: November 28, 2014

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-107 Soil

Client SDG: XP0168

Client Sample ID: J1V1L8
Sample ID: 361900003
Matrix: Soil
Collect Date: 20-NOV-14 10:08
Receive Date: 25-NOV-14
Collector: Client
Moisture: 3.57%

Project: WCHN00720
Client ID: WCHN001

3/27/15

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Semi-Volatiles-PCB											
SW846 3541/8082A PCB Solid Automated Soxhlet "Dry Weight Corrected"											
Aroclor-1016	U	1.15	1.15	3.45	ug/kg	1	YS1	11/27/14	2358	1439108	1
Aroclor-1221	U	1.15	1.15	3.45	ug/kg	1					
Aroclor-1232	U	1.15	1.15	3.45	ug/kg	1					
Aroclor-1242	U	1.15	1.15	3.45	ug/kg	1					
Aroclor-1248	U	1.15	1.15	3.45	ug/kg	1					
Aroclor-1254	U	1.15	1.15	3.45	ug/kg	1					
Aroclor-1260	U	1.15	1.15	3.45	ug/kg	1					
Aroclor-1262	U	1.15	1.15	3.45	ug/kg	1					
Aroclor-1268	U	1.15	1.15	3.45	ug/kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	Prep Method 3541 PCB Prep Soil	MXD2	11/26/14	1010	1439105

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 3541/8082A	
2	SW846 3541/8082A	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
4cmx	SW846 3541/8082A PCB Solid Automated Soxhlet "Dry Weight Corrected"	4.50 ug/kg	6.91	65.2	(29%-106%)
Decachlorobiphenyl	SW846 3541/8082A PCB Solid Automated Soxhlet "Dry Weight Corrected"	4.96 ug/kg	6.91	71.9	(25%-131%)

Notes:

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: November 28, 2014

Company :	WC-Hanford, Inc.		
Address :	2620 Fermi Avenue MSIN H4-21 Richland, Washington 99354		
Contact:	Joan Kessner	Client SDG:	XP0168
Project:	RC-107 Soil		

Client Sample ID:	J1V1L9	Project:	WCHN00720
Sample ID:	361900004	Client ID:	WCHN001
Matrix:	Soil		
Collect Date:	20-NOV-14 10:38		
Receive Date:	25-NOV-14		
Collector:	Client		
Moisture:	4.25%		

3/27/15

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Semi-Volatiles-PCB											
SW846 3541/8082A PCB Solid Automated Soxhlet "Dry Weight Corrected"											
Aroclor-1016	U	1.16	1.16	3.48	ug/kg	1	YS1	11/28/14	0014	1439108	1
Aroclor-1221	U	1.16	1.16	3.48	ug/kg	1					
Aroclor-1232	U	1.16	1.16	3.48	ug/kg	1					
Aroclor-1242	U	1.16	1.16	3.48	ug/kg	1					
Aroclor-1248	U	1.16	1.16	3.48	ug/kg	1					
Aroclor-1254	U	1.16	1.16	3.48	ug/kg	1					
Aroclor-1262	U	1.16	1.16	3.48	ug/kg	1					
Aroclor-1268	U	1.16	1.16	3.48	ug/kg	1					
Aroclor-1260		13.2	1.16	3.48	ug/kg	1	YS1	11/28/14	0014	1439108	2

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	Prep Method 3541 PCB Prep Soil	MXD2	11/26/14	1010	1439105

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 3541/8082A	
2	SW846 3541/8082A	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
4cmx	SW846 3541/8082A PCB Solid Automated Soxhlet "Dry Weight Corrected"	4.24 ug/kg	6.95	61.0	(29%-106%)
Decachlorobiphenyl	SW846 3541/8082A PCB Solid Automated Soxhlet "Dry Weight Corrected"	5.01 ug/kg	6.95	72.0	(25%-131%)

Notes:

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Certificate of Analysis

Report Date: November 28, 2014

Company :	WC-Hanford, Inc.		
Address :	2620 Fermi Avenue MSIN H4-21 Richland, Washington 99354		
Contact:	Joan Kessner	Client SDG:	XP0168
Project:	RC-107 Soil		

Client Sample ID:	J1V1M1	Project:	WCHN00720
Sample ID:	361900005	Client ID:	WCHN001
Matrix:	Soil		
Collect Date:	20-NOV-14 10:26		
Receive Date:	25-NOV-14		
Collector:	Client		
Moisture:	2.94%		

3/27/15

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Semi-Volatiles-PCB											
SW846 3541/8082A PCB Solid Automated Soxhlet "Dry Weight Corrected"											
Aroclor-1016	U	1.14	1.14	3.42	ug/kg	1	YS1	11/28/14	0029	1439108	1
Aroclor-1221	U	1.14	1.14	3.42	ug/kg	1					
Aroclor-1232	U	1.14	1.14	3.42	ug/kg	1					
Aroclor-1242	U	1.14	1.14	3.42	ug/kg	1					
Aroclor-1248	U	1.14	1.14	3.42	ug/kg	1					
Aroclor-1254	U	1.14	1.14	3.42	ug/kg	1					
Aroclor-1260	U	1.14	1.14	3.42	ug/kg	1					
Aroclor-1262	U	1.14	1.14	3.42	ug/kg	1					
Aroclor-1268	U	1.14	1.14	3.42	ug/kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	Prep Method 3541 PCB Prep Soil	MXD2	11/26/14	1010	1439105

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 3541/8082A	
2	SW846 3541/8082A	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
4cmx	SW846 3541/8082A PCB Solid Automated Soxhlet "Dry Weight Corrected"	4.89 ug/kg	6.85	71.4	(29%-106%)
Decachlorobiphenyl	SW846 3541/8082A PCB Solid Automated Soxhlet "Dry Weight Corrected"	5.51 ug/kg	6.85	80.5	(25%-131%)

Notes:

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

Certificate of Analysis

Report Date: November 28, 2014

Company :	WC-Hanford, Inc.
Address :	2620 Fermi Avenue MSIN H4-21 Richland, Washington 99354
Contact:	Joan Kessner
Project:	RC-107 Soil

Client SDG: XP0168

Client Sample ID:	J1V1M2	Project:	WCHN00720
Sample ID:	361900006	Client ID:	WCHN001
Matrix:	Soil		
Collect Date:	20-NOV-14 10:08		
Receive Date:	25-NOV-14		
Collector:	Client		
Moisture:	3.32%		

3/21/15

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Semi-Volatiles-PCB											
SW846 3541/8082A PCB Solid Automated Soxhlet "Dry Weight Corrected"											
Aroclor-1016	U	1.15	1.15	3.45	ug/kg	1	YS1	11/28/14	0045	1439108	1
Aroclor-1221	U	1.15	1.15	3.45	ug/kg	1					
Aroclor-1232	U	1.15	1.15	3.45	ug/kg	1					
Aroclor-1242	U	1.15	1.15	3.45	ug/kg	1					
Aroclor-1248	U	1.15	1.15	3.45	ug/kg	1					
Aroclor-1254	U	1.15	1.15	3.45	ug/kg	1					
Aroclor-1260	U	1.15	1.15	3.45	ug/kg	1					
Aroclor-1262	U	1.15	1.15	3.45	ug/kg	1					
Aroclor-1268	U	1.15	1.15	3.45	ug/kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	Prep Method 3541 PCB Prep Soil	MXD2	11/26/14	1010	1439105

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 3541/8082A	
2	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	6.90	71.8	(29%-106%)
Decachlorobiphenyl	SW846 3541/8082A PCB Solid Automated Soxhlet "Dry Weight Corrected"	5.59 ug/kg	6.90	81.0	(25%-131%)

Notes:

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Certificate of Analysis

Report Date: November 28, 2014

Company :	WC-Hanford, Inc.
Address :	2620 Fermi Avenue MSIN H4-21 Richland, Washington 99354
Contact:	Joan Kessner
Project:	RC-107 Soil

Client SDG: XP0168

Client Sample ID:	J1V1L0	Project:	WCHN00720
Sample ID:	361900007	Client ID:	WCHN001
Matrix:	Soil		
Collect Date:	20-NOV-14 08:11		
Receive Date:	25-NOV-14		
Collector:	Client		
Moisture:	6.64%		

V 3/27/15

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Semi-Volatiles-PCB											
SW846 3541/8082A PCB Solid Automated Soxhlet "Dry Weight Corrected"											
Aroclor-1016	U	1.18	1.18	3.56	ug/kg	1	YS1	11/28/14	0153	1439108	1
Aroclor-1221	U	1.18	1.18	3.56	ug/kg	1					
Aroclor-1232	U	1.18	1.18	3.56	ug/kg	1					
Aroclor-1242	U	1.18	1.18	3.56	ug/kg	1					
Aroclor-1248	U	1.18	1.18	3.56	ug/kg	1					
Aroclor-1254	U	1.18	1.18	3.56	ug/kg	1					
Aroclor-1262	U	1.18	1.18	3.56	ug/kg	1					
Aroclor-1268	U	1.18	1.18	3.56	ug/kg	1					
Aroclor-1260		8.01	1.18	3.56	ug/kg	1	YS1	11/28/14	0153	1439108	2

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	Prep Method 3541 PCB Prep Soil	MXD2	11/26/14	1010	1439105

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 3541/8082A	
2	SW846 3541/8082A	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
4cmx	SW846 3541/8082A PCB Solid Automated Soxhlet "Dry Weight Corrected"	4.73 ug/kg	7.11	66.4	(29%-106%)
Decachlorobiphenyl	SW846 3541/8082A PCB Solid Automated Soxhlet "Dry Weight Corrected"	5.26 ug/kg	7.11	73.9	(25%-131%)

Notes:

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Certificate of Analysis

Report Date: November 28, 2014

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-107 Soil

Client SDG: XP0168

Client Sample ID: J1V1L1
Sample ID: 361900008
Matrix: Soil
Collect Date: 20-NOV-14 08:04
Receive Date: 25-NOV-14
Collector: Client
Moisture: 5.8%

Project: WCHN00720
Client ID: WCHN001

3/27/15

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Semi-Volatiles-PCB											
SW846 3541/8082A PCB Solid Automated Soxhlet "Dry Weight Corrected"											
Aroclor-1016	U	1.18	1.18	3.54	ug/kg	1	YS1	11/28/14	0209	1439108	1
Aroclor-1221	U	1.18	1.18	3.54	ug/kg	1					
Aroclor-1232	U	1.18	1.18	3.54	ug/kg	1					
Aroclor-1242	U	1.18	1.18	3.54	ug/kg	1					
Aroclor-1248	U	1.18	1.18	3.54	ug/kg	1					
Aroclor-1254	U	1.18	1.18	3.54	ug/kg	1					
Aroclor-1262	U	1.18	1.18	3.54	ug/kg	1					
Aroclor-1268	U	1.18	1.18	3.54	ug/kg	1					
Aroclor-1260	J	1.71	1.18	3.54	ug/kg	1	YS1	11/28/14	0209	1439108	2

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	Prep Method 3541 PCB Prep Soil	MXD2	11/26/14	1010	1439105

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 3541/8082A	
2	SW846 3541/8082A	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Decachlorobiphenyl	SW846 3541/8082A PCB Solid Automated Soxhlet "Dry Weight Corrected"	4.19 ug/kg	7.07	59.2	(25%-131%)
4cmx	SW846 3541/8082A PCB Solid Automated Soxhlet "Dry Weight Corrected"	2.43 ug/kg	7.07	34.4	(29%-106%)

Notes:

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Certificate of Analysis

Report Date: November 28, 2014

Company :	WC-Hanford, Inc.		
Address :	2620 Fermi Avenue MSIN H4-21 Richland, Washington 99354		
Contact:	Joan Kessner	Client SDG:	XP0168
Project:	RC-107 Soil		

Client Sample ID:	J1V1L4	Project:	WCHN00720
Sample ID:	361900009	Client ID:	WCHN001
Matrix:	Soil		
Collect Date:	20-NOV-14 07:58		
Receive Date:	25-NOV-14		
Collector:	Client		
Moisture:	5.2%		

3/22/15

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Semi-Volatiles-PCB											
SW846 3541/8082A PCB Solid Automated Soxhlet "Dry Weight Corrected"											
Aroclor-1016	U	1.17	1.17	3.51	ug/kg	1	YS1	11/28/14	0224	1439108	1
Aroclor-1221	U	1.17	1.17	3.51	ug/kg	1					
Aroclor-1232	U	1.17	1.17	3.51	ug/kg	1					
Aroclor-1242	U	1.17	1.17	3.51	ug/kg	1					
Aroclor-1248	U	1.17	1.17	3.51	ug/kg	1					
Aroclor-1254	U	1.17	1.17	3.51	ug/kg	1					
Aroclor-1260	J	1.42	1.17	3.51	ug/kg	1					
Aroclor-1262	U	1.17	1.17	3.51	ug/kg	1					
Aroclor-1268	U	1.17	1.17	3.51	ug/kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	Prep Method 3541 PCB Prep Soil	MXD2	11/26/14	1010	1439105

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 3541/8082A	
2	SW846 3541/8082A	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
4cmx	SW846 3541/8082A PCB Solid Automated Soxhlet "Dry Weight Corrected"	4.25 ug/kg	7.03	60.4	(29%-106%)
Decachlorobiphenyl	SW846 3541/8082A PCB Solid Automated Soxhlet "Dry Weight Corrected"	4.84 ug/kg	7.03	68.8	(25%-131%)

Notes:

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Certificate of Analysis

Report Date: November 28, 2014

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-107 Soil

Client SDG: XP0168

Client Sample ID: J1V1L5
Sample ID: 361900010
Matrix: Soil
Collect Date: 20-NOV-14 07:43
Receive Date: 25-NOV-14
Collector: Client
Moisture: 5.36%

Project: WCHN00720
Client ID: WCHN001

3/22/15

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Semi-Volatiles-PCB											
SW846 3541/8082A PCB Solid Automated Soxhlet "Dry Weight Corrected"											
Aroclor-1016	U	1.17	1.17	3.52	ug/kg	1	YS1	11/28/14	0239	1439108	1
Aroclor-1221	U	1.17	1.17	3.52	ug/kg	1					
Aroclor-1232	U	1.17	1.17	3.52	ug/kg	1					
Aroclor-1242	U	1.17	1.17	3.52	ug/kg	1					
Aroclor-1248	U	1.17	1.17	3.52	ug/kg	1					
Aroclor-1254	U	1.17	1.17	3.52	ug/kg	1					
Aroclor-1260	U	1.17	1.17	3.52	ug/kg	1					
Aroclor-1262	U	1.17	1.17	3.52	ug/kg	1					
Aroclor-1268	U	1.17	1.17	3.52	ug/kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	Prep Method 3541 PCB Prep Soil	MXD2	11/26/14	1010	1439105

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"	4.74 ug/kg	7.04	67.4	(29%-106%)
Decachlorobiphenyl	SW846 3541/8082A PCB Solid Automated Soxhlet "Dry Weight Corrected"	5.45 ug/kg	7.04	77.4	(25%-131%)

Notes:

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Report Date: November 28, 2014

Company :	WC-Hanford, Inc.		
Address :	2620 Fermi Avenue MSIN H4-21 Richland, Washington 99354		
Contact:	Joan Kessner	Client SDG:	XP0168
Project:	RC-107 Soil		

Client Sample ID:	J1V1L6	Project:	WCHN00720
Sample ID:	361900011	Client ID:	WCHN001
Matrix:	Soil		
Collect Date:	20-NOV-14 07:38		
Receive Date:	25-NOV-14		
Collector:	Client		
Moisture:	4.88%		

3/27/15

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Semi-Volatiles-PCB											
SW846 3541/8082A PCB Solid Automated Soxhlet "Dry Weight Corrected"											
Aroclor-1016	U	1.16	1.16	3.49	ug/kg	1	YS1	11/28/14	0255	1439108	1
Aroclor-1221	U	1.16	1.16	3.49	ug/kg	1					
Aroclor-1232	U	1.16	1.16	3.49	ug/kg	1					
Aroclor-1242	U	1.16	1.16	3.49	ug/kg	1					
Aroclor-1248	U	1.16	1.16	3.49	ug/kg	1					
Aroclor-1254	U	1.16	1.16	3.49	ug/kg	1					
Aroclor-1260	U	1.16	1.16	3.49	ug/kg	1					
Aroclor-1262	U	1.16	1.16	3.49	ug/kg	1					
Aroclor-1268	U	1.16	1.16	3.49	ug/kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	Prep Method 3541 PCB Prep Soil	MXD2	11/26/14	1010	1439105

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 3541/8082A	
2	SW846 3541/8082A	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
4cmx	SW846 3541/8082A PCB Solid Automated Soxhlet "Dry Weight Corrected"	4.06 ug/kg	6.98	58.2	(29%-106%)
Decachlorobiphenyl	SW846 3541/8082A PCB Solid Automated Soxhlet "Dry Weight Corrected"	5.12 ug/kg	6.98	73.3	(25%-131%)

Notes:

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Report Date: November 28, 2014

Company :	WC-Hanford, Inc.		
Address :	2620 Fermi Avenue MSIN H4-21 Richland, Washington 99354		
Contact:	Joan Kessner	Client SDG:	XP0168
Project:	RC-107 Soil		

Client Sample ID:	J1V1L7	Project:	WCHN00720
Sample ID:	361900012	Client ID:	WCHN001
Matrix:	Soil		
Collect Date:	20-NOV-14 07:32		
Receive Date:	25-NOV-14		
Collector:	*Client*		
Moisture:	8.22%		

3/22/15

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Semi-Volatiles-PCB											
SW846 3541/8082A PCB Solid Automated Soxhlet "Dry Weight Corrected"											
Aroclor-1016	U	1.21	1.21	3.63	ug/kg	1	YS1	11/28/14	0310	1439108	1
Aroclor-1221	U	1.21	1.21	3.63	ug/kg	1					
Aroclor-1232	U	1.21	1.21	3.63	ug/kg	1					
Aroclor-1242	U	1.21	1.21	3.63	ug/kg	1					
Aroclor-1248	U	1.21	1.21	3.63	ug/kg	1					
Aroclor-1254	U	1.21	1.21	3.63	ug/kg	1					
Aroclor-1260	U	1.21	1.21	3.63	ug/kg	1					
Aroclor-1262	U	1.21	1.21	3.63	ug/kg	1					
Aroclor-1268	U	1.21	1.21	3.63	ug/kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	Prep Method 3541 PCB Prep Soil	MXD2	11/26/14	1010	1439105

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 3541/8082A	
2	SW846 3541/8082A	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
4cmx	SW846 3541/8082A PCB Solid Automated Soxhlet "Dry Weight Corrected"	5.33 ug/kg	7.26	73.4	(29%-106%)
Decachlorobiphenyl	SW846 3541/8082A PCB Solid Automated Soxhlet "Dry Weight Corrected"	6.44 ug/kg	7.26	88.7	(25%-131%)

Notes:

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Certificate of Analysis

Report Date: November 28, 2014

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-107 Soil

Client SDG: XP0168

Client Sample ID: J1V1M0
Sample ID: 361900013
Matrix: Soil
Collect Date: 20-NOV-14 07:26
Receive Date: 25-NOV-14
Collector: Client
Moisture: 5.33%

Project: WCHN00720
Client ID: WCHN001

3/27/15

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Semi-Volatiles-PCB											
SW846 3541/8082A PCB Solid Automated Soxhlet "Dry Weight Corrected"											
Aroclor-1016	U	1.17	1.17	3.52	ug/kg	1	YS1	11/28/14	0326	1439108	1
Aroclor-1221	U	1.17	1.17	3.52	ug/kg	1					
Aroclor-1232	U	1.17	1.17	3.52	ug/kg	1					
Aroclor-1242	U	1.17	1.17	3.52	ug/kg	1					
Aroclor-1248	U	1.17	1.17	3.52	ug/kg	1					
Aroclor-1254	U	1.17	1.17	3.52	ug/kg	1					
Aroclor-1260	U	1.17	1.17	3.52	ug/kg	1					
Aroclor-1262	U	1.17	1.17	3.52	ug/kg	1					
Aroclor-1268	U	1.17	1.17	3.52	ug/kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	Prep Method 3541 PCB Prep Soil	MXD2	11/26/14	1010	1439105

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 3541/8082A	
2	SW846 3541/8082A	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
4cmx	SW846 3541/8082A PCB Solid Automated Soxhlet "Dry Weight Corrected"	4.97 ug/kg	7.04	70.7	(29%-106%)
Decachlorobiphenyl	SW846 3541/8082A PCB Solid Automated Soxhlet "Dry Weight Corrected"	5.88 ug/kg	7.04	83.6	(25%-131%)

Notes:

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Certificate of Analysis

Report Date: November 28, 2014

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-107 Soil

Client SDG: XP0168

Client Sample ID: J1V1L2
Sample ID: 361900001
Matrix: Soil
Collect Date: 20-NOV-14 11:02
Receive Date: 25-NOV-14
Collector: Client
Moisture: 2.5%

Project: WCHN00720
Client ID: WCHN001

3/27/15

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Semi-Volatiles-Pesticide											
8081B/3541 Pesticide Soil Automated Soxhlet "Dry Weight Corrected"											
4,4'-DDD	U	0.342	0.342	1.37	ug/kg	1	LOF	11/26/14	1837	1439094	1
4,4'-DDE	U	0.342	0.342	1.37	ug/kg	1					
4,4'-DDT	U	0.342	0.342	1.37	ug/kg	1					
Aldrin	U	0.171	0.171	0.683	ug/kg	1					
Dieldrin	U	0.342	0.342	1.37	ug/kg	1					
Endosulfan I	U	0.171	0.171	0.683	ug/kg	1					
Endosulfan II	U	0.342	0.342	1.37	ug/kg	1					
Endosulfan sulfate	U	0.342	0.342	1.37	ug/kg	1					
Endrin	U	0.342	0.342	1.37	ug/kg	1					
Endrin aldehyde	U	0.342	0.342	1.37	ug/kg	1					
Endrin ketone	U	0.342	0.342	1.37	ug/kg	1					
Heptachlor	U	0.171	0.171	0.683	ug/kg	1					
Heptachlor epoxide	U	0.171	0.171	0.683	ug/kg	1					
Methoxychlor	U	1.71	1.71	6.83	ug/kg	1					
Toxaphene	U J	5.69	5.69	17.1	ug/kg	1					
alpha-BHC	U	0.171	0.171	0.683	ug/kg	1					
alpha-Chlordane	U	0.171	0.171	0.683	ug/kg	1					
beta-BHC	U	0.171	0.171	0.683	ug/kg	1					
delta-BHC	U	0.171	0.171	0.683	ug/kg	1					
gamma-BHC (Lindane)	U	0.171	0.171	0.683	ug/kg	1					
gamma-Chlordane	U	0.171	0.171	0.683	ug/kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	Prep Method 3541 8081B Prep Soil	SXW3	11/25/14	1818	1439091

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 3541/8081B	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
4cmx	8081B/3541 Pesticide Soil Automated Soxhlet "Dry Weight Corrected"	30.0 ug/kg	34.2	87.8	(27%-124%)
Decachlorobiphenyl	8081B/3541 Pesticide Soil Automated Soxhlet "Dry Weight Corrected"	29.4 ug/kg	34.2	86.1	(31%-131%)

Notes:

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Certificate of Analysis

Report Date: November 28, 2014

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-107 Soil

Client SDG: XP0168

Client Sample ID: J1V1L3
Sample ID: 361900002
Matrix: Soil
Collect Date: 20-NOV-14 10:51
Receive Date: 25-NOV-14
Collector: Client
Moisture: 1.67%

Project: WCHN00720
Client ID: WCHN001

3/29/15

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Semi-Volatiles-Pesticide											
8081B/3541 Pesticide Soil Automated Soxhlet "Dry Weight Corrected"											
4,4'-DDD	U	0.338	0.338	1.35	ug/kg	1	LOF	11/26/14	1853	1439094	1
4,4'-DDE	U	0.338	0.338	1.35	ug/kg	1					
4,4'-DDT	U	0.338	0.338	1.35	ug/kg	1					
Aldrin	U	0.169	0.169	0.676	ug/kg	1					
Dieldrin	U	0.338	0.338	1.35	ug/kg	1					
Endosulfan I	U	0.169	0.169	0.676	ug/kg	1					
Endosulfan II	U	0.338	0.338	1.35	ug/kg	1					
Endosulfan sulfate	U	0.338	0.338	1.35	ug/kg	1					
Endrin	U	0.338	0.338	1.35	ug/kg	1					
Endrin aldehyde	U	0.338	0.338	1.35	ug/kg	1					
Endrin ketone	U	0.338	0.338	1.35	ug/kg	1					
Heptachlor	U	0.169	0.169	0.676	ug/kg	1					
Heptachlor epoxide	U	0.169	0.169	0.676	ug/kg	1					
Methoxychlor	U	1.69	1.69	6.76	ug/kg	1					
Toxaphene	U	5.63	5.63	16.9	ug/kg	1					
alpha-BHC	U	0.169	0.169	0.676	ug/kg	1					
alpha-Chlordane	U	0.169	0.169	0.676	ug/kg	1					
beta-BHC	U	0.169	0.169	0.676	ug/kg	1					
delta-BHC	U	0.169	0.169	0.676	ug/kg	1					
gamma-BHC (Lindane)	U	0.169	0.169	0.676	ug/kg	1					
gamma-Chlordane	U	0.169	0.169	0.676	ug/kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	Prep Method 3541 8081B Prep Soil	SXW3	11/25/14	1818	1439091

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 3541/8081B	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
4cmx	8081B/3541 Pesticide Soil Automated Soxhlet "Dry Weight Corrected"	32.5 ug/kg	33.8	96.1	(27%-124%)
Decachlorobiphenyl	8081B/3541 Pesticide Soil Automated Soxhlet "Dry Weight Corrected"	30.1 ug/kg	33.8	89.1	(31%-131%)

Notes:

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Certificate of Analysis

Report Date: November 28, 2014

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-107 Soil

Client SDG: XP0168

Client Sample ID: J1V1L8
Sample ID: 361900003
Matrix: Soil
Collect Date: 20-NOV-14 10:08
Receive Date: 25-NOV-14
Collector: Client
Moisture: 3.57%

Project: WCHN00720
Client ID: WCHN001

V 3/27/15

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Semi-Volatiles-Pesticide											
8081B/3541 Pesticide Soil Automated Soxhlet "Dry Weight Corrected"											
4,4'-DDD	U	0.345	0.345	1.38	ug/kg	1	LOF	11/26/14	1909	1439094	1
4,4'-DDE	U	0.345	0.345	1.38	ug/kg	1					
4,4'-DDT	U	0.345	0.345	1.38	ug/kg	1					
Aldrin	U	0.172	0.172	0.690	ug/kg	1					
Dieldrin	U	0.345	0.345	1.38	ug/kg	1					
Endosulfan I	U	0.172	0.172	0.690	ug/kg	1					
Endosulfan II	U	0.345	0.345	1.38	ug/kg	1					
Endosulfan sulfate	U	0.345	0.345	1.38	ug/kg	1					
Endrin	U	0.345	0.345	1.38	ug/kg	1					
Endrin aldehyde	U	0.345	0.345	1.38	ug/kg	1					
Endrin ketone	U	0.345	0.345	1.38	ug/kg	1					
Heptachlor	U	0.172	0.172	0.690	ug/kg	1					
Heptachlor epoxide	U	0.172	0.172	0.690	ug/kg	1					
Methoxychlor	U	1.72	1.72	6.90	ug/kg	1					
Toxaphene	U J	5.74	5.74	17.2	ug/kg	1					
alpha-BHC	U	0.172	0.172	0.690	ug/kg	1					
alpha-Chlordane	U	0.172	0.172	0.690	ug/kg	1					
beta-BHC	U	0.172	0.172	0.690	ug/kg	1					
delta-BHC	U	0.172	0.172	0.690	ug/kg	1					
gamma-BHC (Lindane)	U	0.172	0.172	0.690	ug/kg	1					
gamma-Chlordane	U	0.172	0.172	0.690	ug/kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	Prep Method 3541 8081B Prep Soil	SXW3	11/25/14	1818	1439091

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 3541/8081B	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
4cmx	8081B/3541 Pesticide Soil Automated Soxhlet "Dry Weight Corrected"	31.2 ug/kg	34.5	90.6	(27%-124%)
Decachlorobiphenyl	8081B/3541 Pesticide Soil Automated Soxhlet "Dry Weight Corrected"	29.0 ug/kg	34.5	84.0	(31%-131%)

Notes:

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Certificate of Analysis

Report Date: November 28, 2014

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-107 Soil

Client SDG: XP0168

Client Sample ID: J1V1L9
Sample ID: 361900004
Matrix: Soil
Collect Date: 20-NOV-14 10:38
Receive Date: 25-NOV-14
Collector: Client
Moisture: 4.25%

Project: WCHN00720
Client ID: WCHN001

3/22/4

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Semi-Volatiles-Pesticide											
8081B/3541 Pesticide Soil Automated Soxhlet "Dry Weight Corrected"											
4,4'-DDD	U	0.347	0.347	1.39	ug/kg	1	LOF	11/26/14	1958	1439094	1
4,4'-DDE	U	0.347	0.347	1.39	ug/kg	1					
4,4'-DDT	J	0.781	0.347	1.39	ug/kg	1					
Aldrin	U	0.174	0.174	0.695	ug/kg	1					
Dieldrin	U	0.347	0.347	1.39	ug/kg	1					
Endosulfan I	U	0.174	0.174	0.695	ug/kg	1					
Endosulfan II	U	0.347	0.347	1.39	ug/kg	1					
Endosulfan sulfate	U	0.347	0.347	1.39	ug/kg	1					
Endrin	U	0.347	0.347	1.39	ug/kg	1					
Endrin aldehyde	U	0.347	0.347	1.39	ug/kg	1					
Endrin ketone	U	0.347	0.347	1.39	ug/kg	1					
Heptachlor	U	0.174	0.174	0.695	ug/kg	1					
Heptachlor epoxide	U	0.174	0.174	0.695	ug/kg	1					
Methoxychlor	U	1.74	1.74	6.95	ug/kg	1					
Toxaphene	U S	5.78	5.78	17.4	ug/kg	1					
alpha-BHC	U	0.174	0.174	0.695	ug/kg	1					
alpha-Chlordane	U	0.174	0.174	0.695	ug/kg	1					
beta-BHC	U	0.174	0.174	0.695	ug/kg	1					
delta-BHC	U	0.174	0.174	0.695	ug/kg	1					
gamma-BHC (Lindane)	U	0.174	0.174	0.695	ug/kg	1					
gamma-Chlordane	U	0.174	0.174	0.695	ug/kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	Prep Method 3541 8081B Prep Soil	SXW3	11/25/14	1818	1439091

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"	21.2 ug/kg	34.7	61.0	(27%-124%)
Decachlorobiphenyl	8081B/3541 Pesticide Soil Automated Soxhlet "Dry Weight Corrected"	30.8 ug/kg	34.7	88.6	(31%-131%)

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Certificate of Analysis

Report Date: November 28, 2014

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-107 Soil

Client SDG: XP0168

Client Sample ID: J1V1M1
Sample ID: 361900005
Matrix: Soil
Collect Date: 20-NOV-14 10:26
Receive Date: 25-NOV-14
Collector: Client
Moisture: 2.94%

Project: WCHN00720
Client ID: WCHN001

3/27/15

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Semi-Volatiles-Pesticide											
8081B/3541 Pesticide Soil Automated Soxhlet "Dry Weight Corrected"											
4,4'-DDD	U	0.343	0.343	1.37	ug/kg	1	LOF	11/26/14	2014	1439094	1
4,4'-DDE	U	0.343	0.343	1.37	ug/kg	1					
4,4'-DDT	U	0.343	0.343	1.37	ug/kg	1					
Aldrin	U	0.171	0.171	0.685	ug/kg	1					
Dieldrin	U	0.343	0.343	1.37	ug/kg	1					
Endosulfan I	U	0.171	0.171	0.685	ug/kg	1					
Endosulfan II	U	0.343	0.343	1.37	ug/kg	1					
Endosulfan sulfate	U	0.343	0.343	1.37	ug/kg	1					
Endrin	U	0.343	0.343	1.37	ug/kg	1					
Endrin aldehyde	U	0.343	0.343	1.37	ug/kg	1					
Endrin ketone	U	0.343	0.343	1.37	ug/kg	1					
Heptachlor	U	0.171	0.171	0.685	ug/kg	1					
Heptachlor epoxide	U	0.171	0.171	0.685	ug/kg	1					
Methoxychlor	U	1.71	1.71	6.85	ug/kg	1					
Toxaphene	U J	5.70	5.70	17.1	ug/kg	1					
alpha-BHC	U	0.171	0.171	0.685	ug/kg	1					
alpha-Chlordane	U	0.171	0.171	0.685	ug/kg	1					
beta-BHC	U	0.171	0.171	0.685	ug/kg	1					
delta-BHC	U	0.171	0.171	0.685	ug/kg	1					
gamma-BHC (Lindane)	U	0.171	0.171	0.685	ug/kg	1					
gamma-Chlordane	U	0.171	0.171	0.685	ug/kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	Prep Method 3541 8081B Prep Soil	SXW3	11/25/14	1818	1439091

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"	32.1 ug/kg	34.3	93.8	(27%-124%)
Decachlorobiphenyl	8081B/3541 Pesticide Soil Automated Soxhlet "Dry Weight Corrected"	30.1 ug/kg	34.3	88.0	(31%-131%)

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Certificate of Analysis

Report Date: November 28, 2014

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-107 Soil

Client SDG: XP0168

Client Sample ID: J1V1M2
Sample ID: 361900006
Matrix: Soil
Collect Date: 20-NOV-14 10:08
Receive Date: 25-NOV-14
Collector: Client
Moisture: 3.32%

Project: WCHN00720
Client ID: WCHN001

3/27/15

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Semi-Volatiles-Pesticide											
8081B/3541 Pesticide Soil Automated Soxhlet "Dry Weight Corrected"											
4,4'-DDD	U	0.344	0.344	1.38	ug/kg	1	LOF	11/26/14	2030	1439094	1
4,4'-DDE	U	0.344	0.344	1.38	ug/kg	1					
4,4'-DDT	U	0.344	0.344	1.38	ug/kg	1					
Aldrin	U	0.172	0.172	0.688	ug/kg	1					
Dieldrin	U	0.344	0.344	1.38	ug/kg	1					
Endosulfan I	U	0.172	0.172	0.688	ug/kg	1					
Endosulfan II	U	0.344	0.344	1.38	ug/kg	1					
Endosulfan sulfate	U	0.344	0.344	1.38	ug/kg	1					
Endrin	U	0.344	0.344	1.38	ug/kg	1					
Endrin aldehyde	U	0.344	0.344	1.38	ug/kg	1					
Endrin ketone	U	0.344	0.344	1.38	ug/kg	1					
Heptachlor	U	0.172	0.172	0.688	ug/kg	1					
Heptachlor epoxide	U	0.172	0.172	0.688	ug/kg	1					
Methoxychlor	U	1.72	1.72	6.88	ug/kg	1					
Toxaphene	U 5	5.73	5.73	17.2	ug/kg	1					
alpha-BHC	U	0.172	0.172	0.688	ug/kg	1					
alpha-Chlordane	U	0.172	0.172	0.688	ug/kg	1					
beta-BHC	U	0.172	0.172	0.688	ug/kg	1					
delta-BHC	U	0.172	0.172	0.688	ug/kg	1					
gamma-BHC (Lindane)	U	0.172	0.172	0.688	ug/kg	1					
gamma-Chlordane	U	0.172	0.172	0.688	ug/kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	Prep Method 3541 8081B Prep Soil	SXW3	11/25/14	1818	1439091

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 3541/8081B	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
4cmx	8081B/3541 Pesticide Soil Automated Soxhlet "Dry Weight Corrected"	29.8 ug/kg	34.4	86.4	(27%-124%)
Decachlorobiphenyl	8081B/3541 Pesticide Soil Automated Soxhlet "Dry Weight Corrected"	27.4 ug/kg	34.4	79.5	(31%-131%)

Notes:

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Certificate of Analysis

Report Date: November 28, 2014

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-107 Soil

Client SDG: XP0168

Client Sample ID: J1V1L0
Sample ID: 361900007
Matrix: Soil
Collect Date: 20-NOV-14 08:11
Receive Date: 25-NOV-14
Collector: Client
Moisture: 6.64%

Project: WCHN00720
Client ID: WCHN001

3/27/15

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Semi-Volatiles-Pesticide											
8081B/3541 Pesticide Soil Automated Soxhlet "Dry Weight Corrected"											
4,4'-DDD	U	0.357	0.357	1.43	ug/kg	1	LOF	11/26/14	2119	1439094	1
4,4'-DDE	U	0.357	0.357	1.43	ug/kg	1					
4,4'-DDT	U	0.357	0.357	1.43	ug/kg	1					
Aldrin	U	0.178	0.178	0.714	ug/kg	1					
Dieldrin	U	0.357	0.357	1.43	ug/kg	1					
Endosulfan I	U	0.178	0.178	0.714	ug/kg	1					
Endosulfan II	U	0.357	0.357	1.43	ug/kg	1					
Endosulfan sulfate	U	0.357	0.357	1.43	ug/kg	1					
Endrin	U	0.357	0.357	1.43	ug/kg	1					
Endrin aldehyde	U	0.357	0.357	1.43	ug/kg	1					
Endrin ketone	U	0.357	0.357	1.43	ug/kg	1					
Heptachlor	U	0.178	0.178	0.714	ug/kg	1					
Heptachlor epoxide	U	0.178	0.178	0.714	ug/kg	1					
Methoxychlor	U	1.78	1.78	7.14	ug/kg	1					
Toxaphene	U J	5.94	5.94	17.8	ug/kg	1					
alpha-BHC	U	0.178	0.178	0.714	ug/kg	1					
alpha-Chlordane	U	0.178	0.178	0.714	ug/kg	1					
beta-BHC	U	0.178	0.178	0.714	ug/kg	1					
delta-BHC	U	0.178	0.178	0.714	ug/kg	1					
gamma-BHC (Lindane)	U	0.178	0.178	0.714	ug/kg	1					
gamma-Chlordane	U	0.178	0.178	0.714	ug/kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	Prep Method 3541 8081B Prep Soil	SXW3	11/25/14	1818	1439091

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 3541/8081B	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
4cmx	8081B/3541 Pesticide Soil Automated Soxhlet "Dry Weight Corrected"	33.9 ug/kg	35.7	94.9	(27%-124%)
Decachlorobiphenyl	8081B/3541 Pesticide Soil Automated Soxhlet "Dry Weight Corrected"	36.2 ug/kg	35.7	101	(31%-131%)

Notes:

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

Certificate of Analysis

Report Date: November 28, 2014

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-107 Soil

Client SDG: XP0168

Client Sample ID: J1V1L1
Sample ID: 361900008
Matrix: Soil
Collect Date: 20-NOV-14 08:04
Receive Date: 25-NOV-14
Collector: Client
Moisture: 5.8%

Project: WCHN00720
Client ID: WCHN001

✓ 3/27/15

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Semi-Volatiles-Pesticide											
8081B/3541 Pesticide Soil Automated Soxhlet "Dry Weight Corrected"											
4,4'-DDD	U	0.353	0.353	1.41	ug/kg	1	LOF	11/26/14	2135	1439094	1
4,4'-DDE	JP	0.827	0.353	1.41	ug/kg	1					
4,4'-DDT	U	0.353	0.353	1.41	ug/kg	1					
Aldrin	U	0.177	0.177	0.707	ug/kg	1					
Dieldrin	U	0.353	0.353	1.41	ug/kg	1					
Endosulfan I	U	0.177	0.177	0.707	ug/kg	1					
Endosulfan II	U	0.353	0.353	1.41	ug/kg	1					
Endosulfan sulfate	U	0.353	0.353	1.41	ug/kg	1					
Endrin	U	0.353	0.353	1.41	ug/kg	1					
Endrin aldehyde	U	0.353	0.353	1.41	ug/kg	1					
Endrin ketone	U	0.353	0.353	1.41	ug/kg	1					
Heptachlor	U	0.177	0.177	0.707	ug/kg	1					
Heptachlor epoxide	U	0.177	0.177	0.707	ug/kg	1					
Methoxychlor	U	1.77	1.77	7.07	ug/kg	1					
Toxaphene	U J	5.89	5.89	17.7	ug/kg	1					
alpha-BHC	U	0.177	0.177	0.707	ug/kg	1					
alpha-Chlordane	U	0.177	0.177	0.707	ug/kg	1					
beta-BHC	U	0.177	0.177	0.707	ug/kg	1					
delta-BHC	U	0.177	0.177	0.707	ug/kg	1					
gamma-BHC (Lindane)	U	0.177	0.177	0.707	ug/kg	1					
gamma-Chlordane	U	0.177	0.177	0.707	ug/kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	Prep Method 3541 8081B Prep Soil	SXW3	11/25/14	1818	1439091

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"	29.2 ug/kg	35.3	82.6	(27%-124%)
Decachlorobiphenyl	8081B/3541 Pesticide Soil Automated Soxhlet "Dry Weight Corrected"	28.5 ug/kg	35.3	80.6	(31%-131%)

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: November 28, 2014

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-107 Soil

Client SDG: XP0168

Client Sample ID: J1V1L4
Sample ID: 361900009
Matrix: Soil
Collect Date: 20-NOV-14 07:58
Receive Date: 25-NOV-14
Collector: Client
Moisture: 5.2%

Project: WCHN00720
Client ID: WCHN001

3/27/15

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Semi-Volatiles-Pesticide											
8081B/3541 Pesticide Soil Automated Soxhlet "Dry Weight Corrected"											
4,4'-DDD	U	0.351	0.351	1.40	ug/kg	1	LOF	11/26/14	2151	1439094	1
4,4'-DDE	U	0.351	0.351	1.40	ug/kg	1					
4,4'-DDT	U	0.351	0.351	1.40	ug/kg	1					
Aldrin	U	0.175	0.175	0.702	ug/kg	1					
Dieldrin	U	0.351	0.351	1.40	ug/kg	1					
Endosulfan I	U	0.175	0.175	0.702	ug/kg	1					
Endosulfan II	U	0.351	0.351	1.40	ug/kg	1					
Endosulfan sulfate	U	0.351	0.351	1.40	ug/kg	1					
Endrin	U	0.351	0.351	1.40	ug/kg	1					
Endrin aldehyde	U	0.351	0.351	1.40	ug/kg	1					
Endrin ketone	U	0.351	0.351	1.40	ug/kg	1					
Heptachlor	U	0.175	0.175	0.702	ug/kg	1					
Heptachlor epoxide	U	0.175	0.175	0.702	ug/kg	1					
Methoxychlor	U	1.75	1.75	7.02	ug/kg	1					
Toxaphene	U J	5.84	5.84	17.5	ug/kg	1					
alpha-BHC	U	0.175	0.175	0.702	ug/kg	1					
alpha-Chlordane	U	0.175	0.175	0.702	ug/kg	1					
beta-BHC	U	0.175	0.175	0.702	ug/kg	1					
delta-BHC	U	0.175	0.175	0.702	ug/kg	1					
gamma-BHC (Lindane)	U	0.175	0.175	0.702	ug/kg	1					
gamma-Chlordane	U	0.175	0.175	0.702	ug/kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	Prep Method 3541 8081B Prep Soil	SXW3	11/25/14	1818	1439091

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"	28.6 ug/kg	35.1	81.6	(27%-124%)
Decachlorobiphenyl	8081B/3541 Pesticide Soil Automated Soxhlet "Dry Weight Corrected"	30.8 ug/kg	35.1	87.7	(31%-131%)

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: November 28, 2014

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-107 Soil

Client SDG: XP0168

Client Sample ID: J1V1L5
Sample ID: 361900010
Matrix: Soil
Collect Date: 20-NOV-14 07:43
Receive Date: 25-NOV-14
Collector: Client
Moisture: 5.36%

Project: WCHN00720
Client ID: WCHN001

3/27/15

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Semi-Volatiles-Pesticide											
8081B/3541 Pesticide Soil Automated Soxhlet "Dry Weight Corrected"											
4,4'-DDD	U	0.352	0.352	1.41	ug/kg	1	LOF	11/26/14	2207	1439094	1
4,4'-DDE	U	0.352	0.352	1.41	ug/kg	1					
4,4'-DDT	U	0.352	0.352	1.41	ug/kg	1					
Aldrin	U	0.176	0.176	0.704	ug/kg	1					
Dieldrin	U	0.352	0.352	1.41	ug/kg	1					
Endosulfan I	U	0.176	0.176	0.704	ug/kg	1					
Endosulfan II	U	0.352	0.352	1.41	ug/kg	1					
Endosulfan sulfate	U	0.352	0.352	1.41	ug/kg	1					
Endrin	U	0.352	0.352	1.41	ug/kg	1					
Endrin aldehyde	U	0.352	0.352	1.41	ug/kg	1					
Endrin ketone	U	0.352	0.352	1.41	ug/kg	1					
Heptachlor	U	0.176	0.176	0.704	ug/kg	1					
Heptachlor epoxide	U	0.176	0.176	0.704	ug/kg	1					
Methoxychlor	U	1.76	1.76	7.04	ug/kg	1					
Toxaphene	U J	5.86	5.86	17.6	ug/kg	1					
alpha-BHC	U	0.176	0.176	0.704	ug/kg	1					
alpha-Chlordane	U	0.176	0.176	0.704	ug/kg	1					
beta-BHC	U	0.176	0.176	0.704	ug/kg	1					
delta-BHC	U	0.176	0.176	0.704	ug/kg	1					
gamma-BHC (Lindane)	U	0.176	0.176	0.704	ug/kg	1					
gamma-Chlordane	U	0.176	0.176	0.704	ug/kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	Prep Method 3541 8081B Prep Soil	SXW3	11/25/14	1818	1439091

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 3541/8081B	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
4cmx	8081B/3541 Pesticide Soil Automated Soxhlet "Dry Weight Corrected"	28.9 ug/kg	35.2	82.1	(27%-124%)
Decachlorobiphenyl	8081B/3541 Pesticide Soil Automated Soxhlet "Dry Weight Corrected"	31.1 ug/kg	35.2	88.3	(31%-131%)

Notes:

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: November 28, 2014

Company :	WC-Hanford, Inc.		
Address :	2620 Fermi Avenue MSIN H4-21 Richland, Washington 99354		
Contact:	Joan Kessner	Client SDG:	XP0168
Project:	RC-107 Soil		

Client Sample ID:	J1V1L6	Project:	WCHN00720
Sample ID:	361900011	Client ID:	WCHN001
Matrix:	Soil		
Collect Date:	20-NOV-14 07:38		
Receive Date:	25-NOV-14		
Collector:	*Client*		
Moisture:	4.88%		

K 3/27/15

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Semi-Volatiles-Pesticide											
8081B/3541 Pesticide Soil Automated Soxhlet "Dry Weight Corrected"											
4,4'-DDD	U	0.350	0.350	1.40	ug/kg	1	LOF	11/26/14	2223	1439094	1
4,4'-DDE	U	0.350	0.350	1.40	ug/kg	1					
4,4'-DDT	U	0.350	0.350	1.40	ug/kg	1					
Aldrin	U	0.175	0.175	0.699	ug/kg	1					
Dieldrin	U	0.350	0.350	1.40	ug/kg	1					
Endosulfan I	U	0.175	0.175	0.699	ug/kg	1					
Endosulfan II	U	0.350	0.350	1.40	ug/kg	1					
Endosulfan sulfate	U	0.350	0.350	1.40	ug/kg	1					
Endrin	U	0.350	0.350	1.40	ug/kg	1					
Endrin aldehyde	U	0.350	0.350	1.40	ug/kg	1					
Endrin ketone	U	0.350	0.350	1.40	ug/kg	1					
Heptachlor	U	0.175	0.175	0.699	ug/kg	1					
Heptachlor epoxide	U	0.175	0.175	0.699	ug/kg	1					
Methoxychlor	U	1.75	1.75	6.99	ug/kg	1					
Toxaphene	U J	5.82	5.82	17.5	ug/kg	1					
alpha-BHC	U	0.175	0.175	0.699	ug/kg	1					
alpha-Chlordane	U	0.175	0.175	0.699	ug/kg	1					
beta-BHC	U	0.175	0.175	0.699	ug/kg	1					
delta-BHC	U	0.175	0.175	0.699	ug/kg	1					
gamma-BHC (Lindane)	U	0.175	0.175	0.699	ug/kg	1					
gamma-Chlordane	U	0.175	0.175	0.699	ug/kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	Prep Method 3541 8081B Prep Soil	SXW3	11/25/14	1818	1439091

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 3541/8081B	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
4cmx	8081B/3541 Pesticide Soil Automated Soxhlet "Dry Weight Corrected"	31.8 ug/kg	35.0	90.8	(27%-124%)
Decachlorobiphenyl	8081B/3541 Pesticide Soil Automated Soxhlet "Dry Weight Corrected"	31.1 ug/kg	35.0	88.9	(31%-131%)

Notes:

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: November 28, 2014

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-107 Soil

Client SDG: XP0168

Client Sample ID: J1V1L7
Sample ID: 361900012
Matrix: Soil
Collect Date: 20-NOV-14 07:32
Receive Date: 25-NOV-14
Collector: Client
Moisture: 8.22%

Project: WCHN00720
Client ID: WCHN001

3/27/15

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Semi-Volatiles-Pesticide											
8081B/3541 Pesticide Soil Automated Soxhlet "Dry Weight Corrected"											
4,4'-DDD	U	0.363	0.363	1.45	ug/kg	1	LOF	11/26/14	2239	1439094	1
4,4'-DDE	U	0.363	0.363	1.45	ug/kg	1					
4,4'-DDT	U	0.363	0.363	1.45	ug/kg	1					
Aldrin	U	0.182	0.182	0.726	ug/kg	1					
Dieldrin	U	0.363	0.363	1.45	ug/kg	1					
Endosulfan I	U	0.182	0.182	0.726	ug/kg	1					
Endosulfan II	U	0.363	0.363	1.45	ug/kg	1					
Endosulfan sulfate	U	0.363	0.363	1.45	ug/kg	1					
Endrin	U	0.363	0.363	1.45	ug/kg	1					
Endrin aldehyde	U	0.363	0.363	1.45	ug/kg	1					
Endrin ketone	U	0.363	0.363	1.45	ug/kg	1					
Heptachlor	U	0.182	0.182	0.726	ug/kg	1					
Heptachlor epoxide	U	0.182	0.182	0.726	ug/kg	1					
Methoxychlor	U	1.82	1.82	7.26	ug/kg	1					
Toxaphene	U J	6.04	6.04	18.2	ug/kg	1					
alpha-BHC	U	0.182	0.182	0.726	ug/kg	1					
alpha-Chlordane	U	0.182	0.182	0.726	ug/kg	1					
beta-BHC	U	0.182	0.182	0.726	ug/kg	1					
delta-BHC	U	0.182	0.182	0.726	ug/kg	1					
gamma-BHC (Lindane)	U	0.182	0.182	0.726	ug/kg	1					
gamma-Chlordane	U	0.182	0.182	0.726	ug/kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	Prep Method 3541 8081B Prep Soil	SXW3	11/25/14	1818	1439091

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 3541/8081B	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
4cmx	8081B/3541 Pesticide Soil Automated Soxhlet "Dry Weight Corrected"	30.1 ug/kg	36.3	83.0	(27%-124%)
Decachlorobiphenyl	8081B/3541 Pesticide Soil Automated Soxhlet "Dry Weight Corrected"	33.8 ug/kg	36.3	93.1	(31%-131%)

Notes:

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: November 28, 2014

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-107 Soil

Client SDG: XP0168

Client Sample ID: J1V1M0
Sample ID: 361900013
Matrix: Soil
Collect Date: 20-NOV-14 07:26
Receive Date: 25-NOV-14
Collector: Client
Moisture: 5.33%

Project: WCHN00720
Client ID: WCHN001

3/22/15

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Semi-Volatiles-Pesticide											
8081B/3541 Pesticide Soil Automated Soxhlet "Dry Weight Corrected"											
4,4'-DDD	U	0.351	0.351	1.40	ug/kg	1	LOF	11/26/14	2256	1439094	1
4,4'-DDE	U	0.351	0.351	1.40	ug/kg	1					
4,4'-DDT	U	0.351	0.351	1.40	ug/kg	1					
Aldrin	U	0.176	0.176	0.702	ug/kg	1					
Dieldrin	U	0.351	0.351	1.40	ug/kg	1					
Endosulfan I	U	0.176	0.176	0.702	ug/kg	1					
Endosulfan II	U	0.351	0.351	1.40	ug/kg	1					
Endosulfan sulfate	U	0.351	0.351	1.40	ug/kg	1					
Endrin	U	0.351	0.351	1.40	ug/kg	1					
Endrin aldehyde	U	0.351	0.351	1.40	ug/kg	1					
Endrin ketone	U	0.351	0.351	1.40	ug/kg	1					
Heptachlor	U	0.176	0.176	0.702	ug/kg	1					
Heptachlor epoxide	U	0.176	0.176	0.702	ug/kg	1					
Methoxychlor	U J	1.76	1.76	7.02	ug/kg	1					
Toxaphene	U	5.85	5.85	17.6	ug/kg	1					
alpha-BHC	U	0.176	0.176	0.702	ug/kg	1					
alpha-Chlordane	U	0.176	0.176	0.702	ug/kg	1					
beta-BHC	U	0.176	0.176	0.702	ug/kg	1					
delta-BHC	U	0.176	0.176	0.702	ug/kg	1					
gamma-BHC (Lindane)	U	0.176	0.176	0.702	ug/kg	1					
gamma-Chlordane	U	0.176	0.176	0.702	ug/kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	Prep Method 3541-8081B Prep Soil	SXW3	11/25/14	1818	1439091

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	SW846 3541/8081B	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
4cmx	8081B/3541 Pesticide Soil Automated Soxhlet "Dry Weight Corrected"	32.5 ug/kg	35.1	92.4	(27%-124%)
Decachlorobiphenyl	8081B/3541 Pesticide Soil Automated Soxhlet "Dry Weight Corrected"	29.5 ug/kg	35.1	84.0	(31%-131%)

Notes:

Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

PCB Case Narrative
WC-HANFORD, INC. (WCHN)
SDG XP0168

Method/Analysis Information

Procedure:	**Analysis of Polychlorinated Biphenyls by ECD**
Analytical Method:	SW846 3541/8082A
Prep Method:	SW846 3541
Analytical Batch Number:	1439108
Prep Batch Number:	1439105

Sample Analysis

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

Sample ID	Client ID
361900001	J1V1L2
361900002	J1V1L3
361900003	J1V1L8
361900004	J1V1L9
361900005	J1V1M1
361900006	J1V1M2
361900007	J1V1L0
361900008	J1V1L1
361900009	J1V1L4
361900010	J1V1L5
361900011	J1V1L6
361900012	J1V1L7
361900013	J1V1M0
1203217589	MB for batch 1439105
1203217590	Laboratory Control Sample (LCS)
1203217591	361900006(J1V1M2) Matrix Spike (MS)
1203217592	361900006(J1V1M2) 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 361900006 (J1V1M2) 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.

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 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:

Instrument ID	Instrument	System Configuration	Column ID	Column Description
ECD9A.I_1	Agilent 7890A Gas Chromatograph/Dual ECD w/ 7693 Autosampler	7890A GC/ECD	Restek Rtx-CLPest 1	30m x 0.25mm, 0.25um

ECD9A.I_2	Agilent 7890A Gas Chromatograph/Dual ECD w/ 7693 Autosampler	7890A GC/ECD	Restek Rtx-CLPest 2	30m x 0.25mm, 0.20um

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 XP0168

Method/Analysis Information

Procedure:	**Organochlorine Pesticides and Chlorinated Hydrocarbons**
Analytical Method:	SW846 3541/8081B
Prep Method:	SW846 3541
Analytical Batch Number:	1439094
Prep Batch Number:	1439091

Sample Analysis

Sample ID	Client ID
361900001	J1V1L2
361900002	J1V1L3
361900003	J1V1L8
361900004	J1V1L9
361900005	J1V1M1
361900006	J1V1M2
361900007	J1V1L0
361900008	J1V1L1
361900009	J1V1L4
361900010	J1V1L5
361900011	J1V1L6
361900012	J1V1L7
361900013	J1V1M0
1203217576	MB for batch 1439091
1203217577	Laboratory Control Sample (LCS)
1203217578	361900003(J1V1L8) Matrix Spike (MS)
1203217579	361900003(J1V1L8) 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 calibration verification standards (CVS, ICV, or CCV) requirements have not been met for this SDG. Several target analytes failed acceptance criteria with a positive bias on one analytical column in the standards bracketing the samples in this SDG. The positive bias for the analytical data is a result of instrument response increasing after the initial calibration. These target analytes were not detected above the PQL in the samples; therefore, the non-compliance has no adverse effects on the data.

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 361900003 (J1V1L8) 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 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.

Sample Dilutions
The samples in this SDG in this analytical 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.

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 generated to document procedural anomalies that may deviate from referenced SOP or contractual documents. A DER was not required for the samples in this batch for this SDG. 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 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 required for this SDG:

System Configuration

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

Instrument ID	Instrument	System Configuration	Column ID	Column Description
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.

Washington Closure Hanford — CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

RC-107-119 | Page 1 of 3

Collector: Q Stowe	Company Contact: Joan Kessner	Telephone No.: 375-4688	Project Coordinator: KESSNER, JH
Price Code: 8B	Data Turnaround: 7days		
Project Designation: 100-H Field Remediation	Sampling Location: 100-H-28 et al, north overburden pile		SAF No.: RC-107
Ice Chest No.: RCC-07-002	Field Logbook No.: EL-1627-08	COA: 01H2832000	Method of Shipment: Commerical Carrier - fed ex
Shipped To: GEL Laboratories Charlston	Offsite Property No.: A 131294		Bill of Lading/Air Bill No.: See OSPC

Other Labs Shipped To: Eberline Services Oak Ridge

POSSIBLE SAMPLE HAZARDS/REMARKS: none

Special Handling and/or Storage: none

Sample No.	Matrix	Sample Date	Sample Time	Preservation	Type of Container	No. of Container(s)	Volume	Sample Analysis
				None	G/P	1	250mL	See item (1) in Special Instructions
				Cool 4C	G/P	1	125mL	Chromium Hex - 7196
				Cool 4C	G/P	1	250mL	See item (2) in Special Instructions
				Cool 4C	aG	1	250mL	PCBs - 8082
				Cool 4C	aG	1	250mL	Pesticides - 8081
				Cool 4C	aG	1	250mL	PAHs - 8310
				Cool 4C	aG	1	250mL	Semi-VOA - 8270 (TCL)
				Cool 4C	G	1	125mL	TPH-Diesel Range - WTPH-D +
~~J1V1L0~~	~~SOIL~~	DWS 11/20/14						
~~J1V1L1~~	~~SOIL~~	DWS 11/20/14						
J1V1L2	SOIL	11/20/14	1102	✓	✓	✓	✓	✓ ✓ ✓ ✓ ✓
J1V1L3	SOIL	11/20/14	1051	✓	✓	✓	✓	✓ ✓ ✓ ✓
~~J1V1L4~~	~~SOIL~~	DWS 11/20/14						

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Quincy Stowe	11-20-14 1110	DWSHEA DWSHEA 11/20/14	WCH 1110
DWSHEA DWSHEA	11/20/14 1545	C. Bingham	11-20-14 1545
C. Bingham	11-20-14 1550	1060 Battelle, fridge #14	11-20-14 1550
1060 Battelle, fridge #14	11-24-14 0715	C. Bingham	11-24-14 0715
C. Bingham WCH	11-24-14 0730	fed ex	
FED EX		P. Dent Patricia Dent	11-25-14 0930

FINAL SAMPLE DISPOSITION: Disposal Method | Disposed By | Date/Time

SPECIAL INSTRUCTIONS

(1) ICP Metals - 6010TR (Close-out List) (Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silicon, Silver, Sodium, Vanadium, Zinc); Mercury - 7471 - (CV)
(2) IC Anions - 9056 (Bromide, Chloride, Fluoride, Nitrogen in Nitrate, Nitrogen in Nitrite, Phosphorous in phosphate, Sulfate); NO2/NO3 - 353.2 (Nitrogen in Nitrite and Nitrate); pH (Soil) - 9045 (pH Measurement)

REVIEWED BY K. Woodruff DATE 11-24-14

XP0168

WCH-EE-011

Washington Closure Hanford — CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

RC-107-119 | Page 2 of 3

Collector	Q Stowe
Company Contact	Joan Kessner
Telephone No.	375-4688
Project Coordinator	KESSNER, JH
Price Code	8B
Data Turnaround	7 days
Project Designation	100-H Field Remediation
Sampling Location	100-H-28 et al, north overburden pile
SAF No.	RC-107
Ice Chest No.	RCC-07-002
Field Logbook No.	EL-1627-08
COA	01H2832000
Method of Shipment	Commerical Carrier - fed ex
Shipped To	GEL Laboratories Charlston
Offsite Property No.	A131294
Bill of Lading/Air Bill No.	See OSPC
Other Labs Shipped To	Eberline Services Oak Ridge

POSSIBLE SAMPLE HAZARDS/REMARKS
none

Special Handling and/or Storage
none

Preservation	None	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C		
Type of Container	G/P	G/P	G/P	aG	aG	aG	aG	G		
No. of Container(s)	1	1	1	1	1	1	1	1		
Volume	250mL	125mL	250mL	250mL	250mL	250mL	250mL	125mL		
Sample Analysis	See item (1) in Special Instructions	Chromium Hex - 7196	See item (2) in Special Instructions	PCBs - 8082	Pesticides - 8081	PAHs - 8310	Semi-VOA - 8270 (TCL)	TPH-Diesel Range - WTPH-D +		

Sample No.	Matrix	Sample Date	Sample Time										
~~J1V1L5~~	~~SOIL~~	DWSHEA 11/20/14											
~~J1V1L6~~	~~SOIL~~												
~~J1V1L7~~	~~SOIL~~												
J1V1L8	SOIL	11/20/14	1008	✓	✓	✓	✓	✓	✓	✓	✓		
J1V1L9	SOIL	11/20/14	1038	✓	✓	✓	✓	✓	✓	✓	✓		

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Quincy Stowe	11-20-14 1110	WCH DWSHEA	11/20/14 1110
DWSHEA	11/20/14 1545	C. Bingham	11-20-14 1545
C. Bingham	11-20-14 1550	1060 Battelle, fridge #1A	11-20-14 1550
1060 Battelle, fridge #1A	11-24-14 0715	C. Bingham	11-24-14 0715
C. Bingham WCH	11-24-14 0730	fed ex	
FED EX		P. Dent Patricia Dent	11-25-14 0930

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

WCH-EE-011

SPECIAL INSTRUCTIONS

(1) ICP Metals - 6010TR (Close-out List) (Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silicon, Silver, Sodium, Vanadium, Zinc); Mercury - 7471 - (CV)
(2) IC Anions - 9056 (Bromide, Chloride, Fluoride, Nitrogen in Nitrate, Nitrogen in Nitrite, Phosphorous in phosphate, Sulfate); NO2/NO3 - 353.2 (Nitrogen in Nitrite and Nitrate); pH (Soil) - 9045 (pH Measurement)

REVIEWED BY K. Woodworth DATE 11-24-14

XP0168

Washington Closure Hanford

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

RC-107-119

Collector	Q Stowe
Company Contact	Joan Kessner
Telephone No.	375-4688
Project Coordinator	KESSNER, JH
Price Code	8B
Data Turnaround	7 days
Project Designation	100-H Field Remediation
Sampling Location	100-H-28 et al, north overburden pile
SAF No.	RC-107
Ice Chest No.	RCC-07-002
Field Logbook No.	EL-1627-08
COA	01H2832000
Method of Shipment	Commerical Carrier - fed ex
Shipped To	GEL Laboratories Charlston
Offsite Property No.	A131294
Bill of Lading/Air Bill No.	See OSPC
Other Labs Shipped To	Eberline Services Oak Ridge

POSSIBLE SAMPLE HAZARDS/REMARKS
none

Special Handling and/or Storage
none

Sample No.	Matrix	Sample Date	Sample Time	Preservation	None	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C		
				Type of Container	G/P	G/P	G/P	aG	aG	aG	aG	G		
				No. of Container(s)	1	1	1	1	1	1	1	1		
				Volume	250mL	125mL	250mL	250mL	250mL	250mL	250mL	125mL		
				Sample Analysis	See item (1) in Special Instructions	Chromium Hex - 7196	See item (2) in Special Instructions	PCBs - 8082	Pesticides - 8081	PAHs - 8310	Semi-VOA - 8270 (TCL)	TPH-Diesel Range - WTPH-D +		
~~J1V1M0~~	~~SOIL~~	DWS 11/20/14												
J1V1M1	SOIL	11/20/14	1026		✓	✓	✓	✓	✓	✓	✓	✓		
J1V1M2	SOIL	11/20/14	1008		✓	✓	✓	✓	✓	✓	✓	✓		

CHAIN OF POSSESSION

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Quincy Stowe	11-20-14 1110	DWSHEA DWSHEA	11/20/14 1110
DWSHEA DWSHEA	11/20/14 1545	C. Bingham	11-20-14 1545
C. Bingham	11-20-14 1550	1060 Battelle, Fridge #1A	11-20-14 1550
1060 Battelle, Fridge #1A	11-24-14 0715	C. Bingham	11-24-14 0715
C. Bingham WCH	11-24-14 0730	fed ex	
FED EX		P. Dent Patricia Dent	11-25-14 0930

Sign/Print Names

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

SPECIAL INSTRUCTIONS

(1) ICP Metals - 6010TR (Close-out List) (Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silicon, Silver, Sodium, Vanadium, Zinc); Mercury - 7471 - (CV)
(2) IC Anions - 9056 (Bromide, Chloride, Fluoride, Nitrogen in Nitrate, Nitrogen in Nitrite, Phosphorous in phosphate, Sulfate); NO2/NO3 - 353.2 (Nitrogen in Nitrite and Nitrate); pH (Soil) - 9045 (pH Measurement)

REVIEWED BY K. Wood Vincent DATE 11-24-14

XP0168

WCH-EE-011

Washington Closure Hanford — CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

RC-107-119

Collector	Q Stowe
Company Contact	Joan Kessner
Telephone No.	375-4688
Project Coordinator	KESSNER, JH
Price Code	8B
Data Turnaround	7 days
Project Designation	100-H Field Remediation
Sampling Location	100-H-28 et al, north overburden pile
SAF No.	RC-107
Ice Chest No.	RCC-07-002
Field Logbook No.	EL-1627-08
COA	01H2832000
Method of Shipment	Commerical Carrier — Fed ex
Shipped To	GEL Laboratories Charlston
Offsite Property No.	A131294
Bill of Lading/Air Bill No.	See OSPC
Other Labs Shipped To	Eberline Services Oak Ridge

POSSIBLE SAMPLE HAZARDS/REMARKS
none

Special Handling and/or Storage
none

Sample No.	Matrix	Sample Date	Sample Time	Preservation: None	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C		
				Type of Container: G/P	G/P	G/P	aG	aG	aG	aG	G		
				No. of Container(s): 1	1	1	1	1	1	1	1		
				Volume: 250mL	125mL	250mL	250mL	250mL	250mL	250mL	125mL		
				Sample Analysis: See item (1) in Special Instructions	Chromium Hex - 7196	See item (2) in Special Instructions	PCBs - 8082	Pesticides - 8081	PAHs - 8310	Semi-VOA - 8270 (TCL)	TPH-Diesel Range - WTPH-D +		
J1V1L0	SOIL	11/24/14	0801	✓	✓	✓	✓	✓	✓	✓	✓		
J1V1L1	SOIL	11/24/14	0804	✓	✓	✓	✓	✓	✓	✓	✓		
~~J1V1L2~~	~~SOIL~~	DWshea 11/20/14											
~~J1V1L3~~	~~SOIL~~												
J1V1L4	SOIL	11/24/14	0758	✓	✓	✓	✓	✓	✓	✓	✓		

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Quincy Stowe	0822 11/24/14	DWshea DWSHEA WCH	11/24/14 0822
DWshea DWSHEA	11/24/14 0933	C. Bingham	11-24-14 0933
C. Bingham WCH	11-24-14 0950	Fed ex	
FED EX		P. Dent Patricia Dent	11-25-14 0930

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

WCH-EE-011

SPECIAL INSTRUCTIONS

(1) ICP Metals - 6010TR (Close-out List) (Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silicon, Silver, Sodium, Vanadium, Zinc); Mercury - 7471 - (CV)
(2) IC Anions - 9056 (Bromide, Chloride, Fluoride, Nitrogen in Nitrate, Nitrogen in Nitrite, Phosphorous in phosphate, Sulfate); NO2/NO3 - 353.2 (Nitrogen in Nitrite and Nitrate); pH (Soil) - 9045 (pH Measurement)

REVIEWED BY K. Woodworth DATE 11-24-14

11-24-14 CMB

XP0169 8

Washington Closure Hanford — CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

RC-107-119 | Page 2 of 3

Collector	Q Stowe
Company Contact	Joan Kessner
Telephone No.	375-4688
Project Coordinator	KESSNER, JH
Price Code	8B
Data Turnaround	7 days
Project Designation	100-H Field Remediation
Sampling Location	100-H-28 et al, north overburden pile
SAF No.	RC-107
Ice Chest No.	RCC-07-002
Field Logbook No.	EL-1627-08
COA	01H2832000
Method of Shipment	Commerical Carrier fed ex
Shipped To	GEL Laboratories Charlston
Offsite Property No.	A131 294
Bill of Lading/Air Bill No.	See OSPC
Other Labs Shipped To	Eberline Services Oak Ridge

POSSIBLE SAMPLE HAZARDS/REMARKS
none

Special Handling and/or Storage
none

Preservation	None	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C		
Type of Container	G/P	G/P	G/P	aG	aG	aG	aG	G		
No. of Container(s)	1	1	1	1	1	1	1	1		
Volume	250mL	125mL	250mL	250mL	250mL	250mL	250mL	125mL		
Sample Analysis	See item (1) in Special Instructions	Chromium Hex - 7196	See item (2) in Special Instructions	PCBs - 8082	Pesticides - 8081	PAHs - 8310	Semi-VOA - 8270 (TCL)	TPH-Diesel Range - WTPH-D +		

Sample No.	Matrix	Sample Date	Sample Time										
J1V1L5	SOIL	11/24/14	0743	✓	✓	✓	✓	✓	✓	✓	✓		
J1V1L6	SOIL	11/24/14	0738	✓	✓	✓	✓	✓	✓	✓	✓		
J1V1L7	SOIL	11/24/14	0732	✓	✓	✓	✓	✓	✓	✓	✓		
~~J1V1L8~~	~~SOIL~~	DOWSHEA											
~~J1V1L9~~	~~SOIL~~	11/20/14											

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Quincy Stowe	11/24/14 0822	DOWSHEA DOWSHEA WCH	11/24/14 0822
DOWSHEA DOWSHEA	11/24/14 0933	C. Bingham	11-24-14 0933
C. Bingham WCH	11-24-14 0950	fed ex	
FED EX		P. West Patricia West	11-25-14 0930

FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

WCH-EE-011

SPECIAL INSTRUCTIONS

(1) ICP Metals - 6010TR (Close-out List) (Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silicon, Silver, Sodium, Vanadium, Zinc); Mercury - 7471 - (CV)
(2) IC Anions - 9056 (Bromide, Chloride, Fluoride, Nitrogen in Nitrate, Nitrogen in Nitrite, Phosphorous in phosphate, Sulfate); NO2/NO3 - 353.2 (Nitrogen in Nitrite and Nitrate); pH (Soil) - 9045 (pH Measurement)

REVIEWED BY K. Wood Vincent DATE 11-24-14

11-24-14 CMD

XP0169/8

Washington Closure Hanford

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

RC-107-119

Collector: Q Stowe	Company Contact: Joan Kessner	Telephone No.: 375-4688	Project Coordinator: KESSNER, JH
Project Designation: 100-H Field Remediation	Sampling Location: 100-H-28 et al, north overburden pile		SAF No.: RC-107
Ice Chest No.: RCC-07-002	Field Logbook No.: EL-1627-08	COA: 01H2832000	Method of Shipment: Commerical Carrier - fed ex
Shipped To: GEL Laboratories Charlston	Offsite Property No.: A131294		Bill of Lading/Air Bill No.: See OSPC

Price Code: 8B

Data Turnaround: 7days

Other Labs Shipped To: Eberline Services Oak Ridge

POSSIBLE SAMPLE HAZARDS/REMARKS

none

Special Handling and/or Storage

none

Preservation	None	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C		
Type of Container	G/P	G/P	G/P	aG	aG	aG	aG	G		
No. of Container(s)	1	1	1	1	1	1	1	1		
Volume	250mL	125mL	250mL	250mL	250mL	250mL	250mL	125mL		
Sample Analysis	See item (1) in Special Instructions	Chromium Hex - 7196	See item (2) in Special Instructions	PCBs - 8082	Pesticides - 8081	PAHs - 8310	Semi-VOA - 8270 (TCL)	TPH-Diesel Range - WTPH-D +		

Sample No.	Matrix	Sample Date	Sample Time										
J1V1M0	SOIL	11/24/14	0726	✓	✓	✓	✓	✓	✓	✓	✓		
~~J1V1M1~~	~~SOIL~~	DWShea											
~~J1V1M2~~	~~SOIL~~	11/20/14											

CHAIN OF POSSESSION

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Quincy Stowe	11/24/14 0822	WCH DWSHEA	11/24/14 0822
DWSHEA	11/24/14 0933	C. Bingham	11-24-14 0933
C. Bingham WCH	11-24-14 0950	fed ex	
FED EX		P. Dent Patricia Dent	11-25-14 0930

Sign/Print Names

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

WCH-EE-011

SPECIAL INSTRUCTIONS

(1) ICP Metals - 6010TR (Close-out List) (Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silicon, Silver, Sodium, Vanadium, Zinc); Mercury - 7471 - (CV)

(2) IC Anions - 9056 (Bromide, Chloride, Fluoride, Nitrogen in Nitrate, Nitrogen in Nitrite, Phosphorous in phosphate, Sulfate); NO2/NO3 - 353.2 (Nitrogen in Nitrite and Nitrate); pH (Soil) - 9045 (pH Measurement)

REVIEWED BY K. Wood Viacmo DATE 11-24-14

11-24-14 CMD

XP0168

Appendix 5

Data Validation Supporting Documentation

PCB DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E
PROJECT: 100-H-28			DATA PACKAGE: XP0168		
VALIDATOR: ELR		LAB: Ge		DATE: 3/26/15	
			SDG: XP0168		
ANALYSES PERFORMED					
SW-846 8081	SW-846 8081 (TCLP)	SW-846 8082	SW-846 8081 (TCLP)		
SAMPLES/MATRIX					
J1V1L0	J1V1L1	J1V1L2	J1V1L3	J1V1L4	J1V1L5
J1V1L6	J1V1L7	J1V1L8	J1V1L9	J1V1M0	J1V1M1
J1V1M2					
					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:

no DAT

no tax MS/MSD/LCS - J all

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: no tox dup - 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)

Fluoricil ® (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: November 28, 2014

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

Contact: Joan Kessner

Workorder: 361900 **Client SDG:** XP0168 **Project Description:** RC-107 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Semi-Volatiles-PCB										
Batch 1439108										
QC1203217590 LCS										
Aroclor-1016	33.3			23.7	ug/kg		71.2	(44%-97%)	YS1	11/27/14 23:12
Aroclor-1260	33.3			26.3	ug/kg		79.1	(49%-109%)		
**4cmx	6.66			4.79	ug/kg		71.9	(29%-106%)		
**Decachlorobiphenyl	6.66			6.06	ug/kg		91	(25%-131%)		
QC1203217589 MB										
Aroclor-1016			U	1.11	ug/kg					11/27/14 22:57
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	6.66			4.36	ug/kg		65.5	(29%-106%)		
**Decachlorobiphenyl	6.66			5.40	ug/kg		81.2	(25%-131%)		
QC1203217591 361900006 MS										
Aroclor-1016	34.4	U	1.15	23.5	ug/kg		68.4	(22%-127%)		11/28/14 01:00
Aroclor-1260	34.4	U	1.15	28.1	ug/kg		81.6	(18%-130%)		
**4cmx	6.88		4.95	4.83	ug/kg		70.2	(29%-106%)		
**Decachlorobiphenyl	6.88		5.59	5.67	ug/kg		82.4	(25%-131%)		

QC Summary

Workorder: 361900 **Client SDG:** XP0168 **Project Description:** RC-107 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Semi-Volatiles-PCB											
Batch 1439108											
QC1203217592 361900006 MSD											
Aroclor-1016	34.5	U	1.15		24.6	ug/kg	4.42	71.4	(0%-30%)	YS1	11/28/14 01:15
Aroclor-1260	34.5	U	1.15		29.3	ug/kg	4.30	85	(0%-30%)		
**4cmx	6.89		4.95		5.08	ug/kg		73.8	(29%-106%)		
**Decachlorobiphenyl	6.89		5.59		5.86	ug/kg		85.1	(25%-131%)		

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 (0rganics 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: November 28, 2014

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

Contact: Joan Kessner

Workorder: 361900 **Client SDG:** XP0168 **Project Description:** RC-107 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Semi-Volatiles-Pesticide										
Batch 1439094										
QC1203217577 LCS										
4,4'-DDD	41.7			40.0	ug/kg		96	(49%-123%)	LOF	11/26/14 18:21
4,4'-DDE	41.7			37.5	ug/kg		90.1	(46%-118%)		
4,4'-DDT	41.7			39.4	ug/kg		94.5	(48%-126%)		
Aldrin	16.7			14.9	ug/kg		89.2	(42%-114%)		
Dieldrin	41.7			36.2	ug/kg		87	(45%-110%)		
Endosulfan I	16.7			14.2	ug/kg		85.2	(38%-107%)		
Endosulfan II	41.7			43.0	ug/kg		103	(43%-110%)		
Endosulfan sulfate	41.7			41.7	ug/kg		100	(46%-121%)		
Endrin	41.7			40.2	ug/kg		96.5	(53%-135%)		
Endrin aldehyde	41.7			38.8	ug/kg		93.2	(42%-116%)		
Endrin ketone	41.7			37.5	ug/kg		90	(45%-111%)		
Heptachlor	16.7			14.4	ug/kg		86.4	(43%-120%)		
Heptachlor epoxide	16.7			14.1	ug/kg		84.7	(44%-116%)		
Methoxychlor	167			154	ug/kg		92.5	(45%-127%)		
alpha-BHC	16.7			15.1	ug/kg		90.5	(42%-124%)		
alpha-Chlordane	16.7			14.0	ug/kg		84	(43%-116%)		
beta-BHC	16.7			15.3	ug/kg		92.1	(44%-118%)		
delta-BHC	16.7			15.5	ug/kg		93.2	(43%-124%)		
gamma-BHC (Lindane)	16.7			14.6	ug/kg		87.4	(42%-123%)		
gamma-Chlordane	16.7			13.7	ug/kg		82.2	(45%-117%)		

QC Summary

Workorder: 361900 **Client SDG:** XP0168 **Project Description:** RC-107 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Semi-Volatiles-Pesticide										
Batch *1439094*										
**4cmx	33.3			30.3	ug/kg		90.9	(27%-124%)	LOF	11/26/14 18:21
**Decachlorobiphenyl	33.3			28.4	ug/kg		85.3	(31%-131%)		
QC1203217576 MB										
4,4'-DDD			U	0.333	ug/kg					11/26/14 18:05
4,4'-DDE			U	0.333	ug/kg					
4,4'-DDT			U	0.333	ug/kg					
Aldrin			U	0.167	ug/kg					
Dieldrin			U	0.333	ug/kg					
Endosulfan I			U	0.167	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	0.167	ug/kg					
Heptachlor epoxide			U	0.167	ug/kg					
Methoxychlor			U	1.67	ug/kg					
Toxaphene			U	5.55	ug/kg					
alpha-BHC			U	0.167	ug/kg					
alpha-Chlordane			U	0.167	ug/kg					
beta-BHC			U	0.167	ug/kg					
delta-BHC			U	0.167	ug/kg					

QC Summary

Workorder: 361900 **Client SDG:** XP0168 **Project Description:** RC-107 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Semi-Volatiles-Pesticide											
Batch 1439094											
gamma-BHC (Lindane)				U	0.167	ug/kg				LOF	11/26/14 18:05
gamma-Chlordane				U	0.167	ug/kg					
**4cmx	33.3				29.7	ug/kg		89.2	(27%-124%)		
**Decachlorobiphenyl	33.3				28.2	ug/kg		84.7	(31%-131%)		
QC1203217578 361900003 MS											
4,4'-DDD	43.2	U	0.345		44.8	ug/kg		104	(23%-142%)		11/26/14 19:25
4,4'-DDE	43.2	U	0.345		42.8	ug/kg		99.2	(23%-133%)		
4,4'-DDT	43.2	U	0.345		43.2	ug/kg		100	(25%-141%)		
Aldrin	17.3	U	0.172		17.0	ug/kg		98.7	(21%-129%)		
Dieldrin	43.2	U	0.345		40.3	ug/kg		93.4	(19%-131%)		
Endosulfan I	17.3	U	0.172		15.9	ug/kg		91.8	(15%-121%)		
Endosulfan II	43.2	U	0.345		47.1	ug/kg		109	(17%-126%)		
Endosulfan sulfate	43.2	U	0.345		44.3	ug/kg		103	(20%-134%)		
Endrin	43.2	U	0.345		46.1	ug/kg		107	(24%-154%)		
Endrin aldehyde	43.2	U	0.345		41.5	ug/kg		96.2	(18%-124%)		
Endrin ketone	43.2	U	0.345		39.1	ug/kg		90.5	(18%-127%)		
Heptachlor	17.3	U	0.172		16.8	ug/kg		97.5	(19%-137%)		
Heptachlor epoxide	17.3	U	0.172		15.9	ug/kg		92.2	(20%-131%)		
Methoxychlor	173	U	1.72		160	ug/kg		92.4	(18%-147%)		
alpha-BHC	17.3	U	0.172		17.6	ug/kg		102	(21%-133%)		
alpha-Chlordane	17.3	U	0.172		15.6	ug/kg		90.1	(17%-133%)		
beta-BHC	17.3	U	0.172		19.6	ug/kg		113	(22%-135%)		

QC Summary

Workorder: 361900 **Client SDG:** XP0168 **Project Description:** RC-107 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Semi-Volatiles-Pesticide											
Batch 1439094											
delta-BHC	17.3	U	0.172		17.9	ug/kg		104	(20%-139%)	LOF	11/26/14 19:25
gamma-BHC (Lindane)	17.3	U	0.172		17.1	ug/kg		99.1	(20%-134%)		
gamma-Chlordane	17.3	U	0.172		15.4	ug/kg		89.3	(20%-131%)		
**4cmx	34.5		31.2		35.3	ug/kg		102	(27%-124%)		
**Decachlorobiphenyl	34.5		29.0		30.1	ug/kg		87	(31%-131%)		
QC1203217579 361900003 MSD											
4,4'-DDD	43.1	U	0.345		40.6	ug/kg	9.77	94.1	(0%-30%)		11/26/14 19:42
4,4'-DDE	43.1	U	0.345		39.6	ug/kg	7.87	91.7	(0%-30%)		
4,4'-DDT	43.1	U	0.345		38.8	ug/kg	10.8	89.9	(0%-30%)		
Aldrin	17.3	U	0.172		13.9	ug/kg	20.2	80.7	(0%-30%)		
Dieldrin	43.1	U	0.345		36.8	ug/kg	9.10	85.3	(0%-30%)		
Endosulfan I	17.3	U	0.172		14.4	ug/kg	9.75	83.4	(0%-30%)		
Endosulfan II	43.1	U	0.345		43.5	ug/kg	7.81	101	(0%-30%)		
Endosulfan sulfate	43.1	U	0.345		41.0	ug/kg	7.89	95	(0%-30%)		
Endrin	43.1	U	0.345		42.3	ug/kg	8.57	98.1	(0%-30%)		
Endrin aldehyde	43.1	U	0.345		37.3	ug/kg	10.8	86.4	(0%-30%)		
Endrin ketone	43.1	U	0.345		36.3	ug/kg	7.29	84.2	(0%-30%)		
Heptachlor	17.3	U	0.172		13.7	ug/kg	20.6	79.4	(0%-30%)		
Heptachlor epoxide	17.3	U	0.172		13.8	ug/kg	14.3	80	(0%-30%)		
Methoxychlor	173	U	1.72		148	ug/kg	7.30	86	(0%-30%)		
alpha-BHC	17.3	U	0.172		13.7	ug/kg	25.0	79.3	(0%-30%)		
alpha-Chlordane	17.3	U	0.172		14.1	ug/kg	9.52	82	(0%-30%)		

GEL LABORATORIES LLC

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QC Summary

Workorder: 361900 **Client SDG:** XP0168 **Project Description:** RC-107 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Semi-Volatiles-Pesticide											
Batch 1439094											
beta-BHC	17.3	U	0.172		15.7	ug/kg	22.2	90.7	(0%-30%)	LOF	11/26/14 19:42
delta-BHC	17.3	U	0.172		15.5	ug/kg	14.3	90.1	(0%-30%)		
gamma-BHC (Lindane)	17.3	U	0.172		13.9	ug/kg	20.6	80.6	(0%-30%)		
gamma-Chlordane	17.3	U	0.172		13.7	ug/kg	11.7	79.5	(0%-30%)		
**4cmx	34.5		31.2		24.8	ug/kg		71.7	(27%-124%)		
**Decachlorobiphenyl	34.5		29.0		27.5	ug/kg		79.7	(31%-131%)		

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 (0rganics 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: 30 March 2015
To: Washington Closure Hanford Inc. (technical representative)
From: ELR Consulting
Project: 100-H Remaining Sites Burial Grounds – Soil Full Protocol - Waste Site 100-H-28
Subject: Inorganic - Data Package No. XP0168-GEL

INTRODUCTION

This memo presents the results of data validation on Data Package No. XP0168 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
J1V1L0	11/24/14	Soil	C	See note 1
J1V1L1	11/24/14	Soil	C	See note 1
J1V1L2	11/20/14	Soil	C	See note 1
J1V1L3	11/20/14	Soil	C	See note 1
J1V1L4	11/24/14	Soil	C	See note 1
J1V1L5	11/24/14	Soil	C	See note 1
J1V1L6	11/24/14	Soil	C	See note 1
J1V1L7	11/24/14	Soil	C	See note 1
J1V1L8	11/20/14	Soil	C	See note 1
J1V1L9	11/20/14	Soil	C	See note 1
J1V1M0	11/20/14	Soil	C	See note 1
J1V1M1	11/20/14	Soil	C	See note 1
J1V1M2	11/20/14	Soil	C	See note 1

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

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

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

DATA QUALITY PARAMETERS

Holding Times

Analytical holding times for metals are assessed to ascertain whether the holding time requirements were met by the laboratory. The holding time requirements are as follows: Soil samples must be analyzed within 6 months for ICP metals

and 28 days for mercury.

All holding times were acceptable.

- **Preparation (Method) Blanks**

Preparation Blanks

At least one preparation blank, consisting of deionized distilled water processed through each sample preparation and analysis procedure, must be prepared and *analyzed with every sample delivery group. In the case of positive blank results*, samples with digestate concentrations less than five times the preparation blank value have had their associated values qualified as non-detected and flagged "UJ". Samples with concentrations of greater than five times the highest blank concentration do not require qualification.

In the case of negative blank results, if the absolute value exceeds the contract required detection limit (CRDL), all nondetects are rejected and flagged "UR" and all detects that are less than ten times the absolute value of the associated preparation blank result are qualified as estimates and flagged "J". If the absolute value of the negative preparation blank is greater than the instrument detection limit (IDL) and less than or equal to the CRDL, all nondetects are qualified as estimates and flagged "UJ" and all detects less than ten times the absolute value of the blank are qualified as estimates and flagged "J". If the sample results are greater than ten times the absolute value of the preparation blank, no qualification is necessary.

All reparation 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 a matrix spike recovery outside QC limits, all silicon (0%) results were qualified as estimates and flagged "J".

All other accuracy results were acceptable,

- **Precision**

Laboratory Duplicate Samples

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

All laboratory duplicate results were acceptable.

Field Duplicate

One set of field duplicates (J1V1L8/J1V1M2) were submitted for analysis. Field duplicates are compared using the same criteria as for laboratory duplicates. All field duplicate results were acceptable.

- **Analytical Detection Levels**

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

- **Completeness**

Data package No. XP0168 was submitted for validation and verified for completeness. Completeness is based on the percentage of data determined to be valid (i.e., not rejected). The completion percentage was 100%.

MAJOR DEFICIENCIES

None found.

MINOR DEFICIENCIES

The following minor deficiencies were noted:

- Due to a matrix spike recovery outside QC limits, all silicon (0%) 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

INORGANICS DATA QUALIFICATION SUMMARY*

SDG: XP0168	**REVIEWER: ELR**	**Project: 100-H-28**	**PAGE_1_OF_1**
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
Silicon	J	All	MS recovery

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

Appendix 3

Annotated Laboratory Reports

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: December 3, 2014

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-107 Soil

Client SDG: XP0168

Client Sample ID: J1V1L2
Sample ID: 361900001
Matrix: Soil
Collect Date: 20-NOV-14 11:02
Receive Date: 25-NOV-14
Collector: Client
Moisture: 2.5%

Project: WCHN00720
Client ID: WCHN001

R 3/27/15

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Mercury Analysis-CVAA											
SW846 7471B Mercury in Solid "Dry Weight Corrected"											
Mercury	B	0.00417	0.00405	0.0121	mg/kg	1	MTM1	12/01/14	1006	1439275	1
Metals Analysis-ICP											
ICP METALS 6010TR Close-out List "Dry Weight Corrected"											
Aluminum		5020	6.71	19.7	mg/kg	1	JWJ	12/01/14	1516	1439189	2
Arsenic		8.42	0.493	2.96	mg/kg	1					
Barium		39.4	0.0986	0.493	mg/kg	1					
Beryllium		0.983	0.0986	0.493	mg/kg	1					
Boron	U	0.986	0.986	4.93	mg/kg	1					
Cadmium	B	0.216	0.0986	0.493	mg/kg	1					
Calcium		4550	7.89	24.7	mg/kg	1					
Chromium		8.65	0.148	0.493	mg/kg	1					
Cobalt		8.02	0.148	0.493	mg/kg	1					
Copper		10.5	0.296	0.986	mg/kg	1					
Iron		16100	7.89	24.7	mg/kg	1					
Lead		33.8	0.325	0.986	mg/kg	1					
Magnesium		3600	8.38	29.6	mg/kg	1					
Manganese		232	0.197	0.986	mg/kg	1					
Molybdenum	U	0.197	0.197	0.986	mg/kg	1					
Nickel		8.65	0.148	0.493	mg/kg	1					
Potassium		715	6.31	24.7	mg/kg	1					
Silicon	N J	1010	1.48	9.86	mg/kg	1					
Silver	B	0.196	0.0986	0.493	mg/kg	1					
Sodium	*	137	6.90	24.7	mg/kg	1					
Vanadium		43.4	0.0986	0.493	mg/kg	1					
Zinc	CM	29.6	0.394	0.986	mg/kg	1					
Antimony	DU	3.25	3.25	9.86	mg/kg	10	JWJ	12/01/14	1621	1439189	3
Metals Analysis-ICP-MS											
SW846 3050B/6020A Selenium "Dry Weight Corrected"											
Selenium	DU	0.333	0.333	1.01	mg/kg	2	PRB	11/29/14	0104	1439164	4

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	EXF1	11/25/14	1615	1439162
SW846 3050B	SW846 3050B Prep for 6010C	EXF1	11/25/14	1615	1439188
SW846 7471B Prep	SW846 7471B Mercury Prep Soil	AXS5	11/26/14	1244	1439274

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: December 3, 2014

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-107 Soil

Client SDG: XP0168

Client Sample ID: J1V1L3
Sample ID: 361900002
Matrix: Soil
Collect Date: 20-NOV-14 10:51
Receive Date: 25-NOV-14
Collector: Client
Moisture: 1.67%

Project: WCHN00720
Client ID: WCHN001

✓ 3/22/15

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Mercury Analysis-CVAA											
SW846 7471B Mercury in Solid "Dry Weight Corrected"											
Mercury	U	0.00409	0.00409	0.0122	mg/kg	1	MTM1	12/01/14	1018	1439275	1
Metals Analysis-ICP											
ICP METALS 6010TR Close-out List "Dry Weight Corrected"											
Aluminum		4410	6.57	19.3	mg/kg	1	JWJ	12/01/14	1526	1439189	2
Arsenic		4.62	0.483	2.90	mg/kg	1					
Barium		32.1	0.0967	0.483	mg/kg	1					
Beryllium		0.917	0.0967	0.483	mg/kg	1					
Boron	U	0.967	0.967	4.83	mg/kg	1					
Cadmium	B	0.267	0.0967	0.483	mg/kg	1					
Calcium		5110	7.73	24.2	mg/kg	1					
Chromium		9.15	0.145	0.483	mg/kg	1					
Cobalt		7.81	0.145	0.483	mg/kg	1					
Copper		11.1	0.290	0.967	mg/kg	1					
Iron		15600	7.73	24.2	mg/kg	1					
Lead		9.66	0.319	0.967	mg/kg	1					
Magnesium		3770	8.22	29.0	mg/kg	1					
Manganese		234	0.193	0.967	mg/kg	1					
Molybdenum	U	0.193	0.193	0.967	mg/kg	1					
Nickel		9.59	0.145	0.483	mg/kg	1					
Potassium		530	6.19	24.2	mg/kg	1					
Silicon	N J	756	1.45	9.67	mg/kg	1					
Silver	U	0.0967	0.0967	0.483	mg/kg	1					
Sodium	*	123	6.77	24.2	mg/kg	1					
Vanadium		41.5	0.0967	0.483	mg/kg	1					
Zinc	CM	25.8	0.387	0.967	mg/kg	1					
Antimony	DU	3.19	3.19	9.67	mg/kg	10	JWJ	12/01/14	1640	1439189	3
Metals Analysis-ICP-MS											
SW846 3050B/6020A Selenium "Dry Weight Corrected"											
Selenium	BD	0.522	0.336	1.02	mg/kg	2	PRB	11/29/14	0127	1439164	4

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	EXF1	11/25/14	1615	1439162
SW846 3050B	SW846 3050B Prep for 6010C	EXF1	11/25/14	1615	1439188
SW846 7471B Prep	SW846 7471B Mercury Prep Soil	AXS5	11/26/14	1244	1439274

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: December 3, 2014

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-107 Soil

Client SDG: XP0168

Client Sample ID: J1V1L8
Sample ID: 361900003
Matrix: Soil
Collect Date: 20-NOV-14 10:08
Receive Date: 25-NOV-14
Collector: Client
Moisture: 3.57%

Project: WCHN00720
Client ID: WCHN001

3/27/15

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Mercury Analysis-CVAA											
SW846 7471B Mercury in Solid "Dry Weight Corrected"											
Mercury	B	0.0055	0.00388	0.0116	mg/kg	1	MTM1	12/01/14	1019	1439275	1
Metals Analysis-ICP											
ICP METALS 6010TR Close-out List "Dry Weight Corrected"											
Aluminum		5440	7.01	20.6	mg/kg	1	JWJ	12/01/14	1528	1439189	2
Arsenic		5.58	0.515	3.09	mg/kg	1					
Barium		51.6	0.103	0.515	mg/kg	1					
Beryllium		1.07	0.103	0.515	mg/kg	1					
Boron	U	1.03	1.03	5.15	mg/kg	1					
Cadmium	B	0.238	0.103	0.515	mg/kg	1					
Calcium		5430	8.25	25.8	mg/kg	1					
Chromium		9.38	0.155	0.515	mg/kg	1					
Cobalt		8.35	0.155	0.515	mg/kg	1					
Copper		11.6	0.309	1.03	mg/kg	1					
Iron		16800	8.25	25.8	mg/kg	1					
Lead		9.18	0.340	1.03	mg/kg	1					
Magnesium		3950	8.76	30.9	mg/kg	1					
Manganese		232	0.206	1.03	mg/kg	1					
Molybdenum	U	0.206	0.206	1.03	mg/kg	1					
Nickel		10.2	0.155	0.515	mg/kg	1					
Potassium		799	6.60	25.8	mg/kg	1					
Silicon	N J	1070	1.55	10.3	mg/kg	1					
Silver	B	0.251	0.103	0.515	mg/kg	1					
Sodium	*	158	7.22	25.8	mg/kg	1					
Vanadium		45.6	0.103	0.515	mg/kg	1					
Zinc	CM	28.3	0.412	1.03	mg/kg	1					
Antimony	DU	3.40	3.40	10.3	mg/kg	10	JWJ	12/01/14	1643	1439189	3
Metals Analysis-ICP-MS											
SW846 3050B/6020A Selenium "Dry Weight Corrected"											
Selenium	BD	0.333	0.328	1.00	mg/kg	2	PRB	11/29/14	0130	1439164	4

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	EXF1	11/25/14	1615	1439162
SW846 3050B	SW846 3050B Prep for 6010C	EXF1	11/25/14	1615	1439188
SW846 7471B Prep	SW846 7471B Mercury Prep Soil	AXS5	11/26/14	1244	1439274

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Certificate of Analysis

Report Date: December 3, 2014

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-107 Soil

Client SDG: XP0168

Client Sample ID: J1V1L9
Sample ID: 361900004
Matrix: Soil
Collect Date: 20-NOV-14 10:38
Receive Date: 25-NOV-14
Collector: Client
Moisture: 4.25%

Project: WCHN00720
Client ID: WCHN001

3/22/15

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Mercury Analysis-CVAA											
SW846 7471B Mercury in Solid "Dry Weight Corrected"											
Mercury		0.0764	0.0036	0.0107	mg/kg	1	MTM1	12/01/14	1021	1439275	1
Metals Analysis-ICP											
ICP METALS 6010TR Close-out List "Dry Weight Corrected"											
Aluminum		6970	6.67	19.6	mg/kg	1	JWJ	12/01/14	1530	1439189	2
Arsenic		6.03	0.491	2.94	mg/kg	1					
Barium		65.1	0.0982	0.491	mg/kg	1					
Beryllium		1.06	0.0982	0.491	mg/kg	1					
Boron	U	0.982	0.982	4.91	mg/kg	1					
Cadmium	B	0.342	0.0982	0.491	mg/kg	1					
Calcium		5120	7.85	24.5	mg/kg	1					
Chromium		13.7	0.147	0.491	mg/kg	1					
Cobalt		8.54	0.147	0.491	mg/kg	1					
Copper		13.4	0.294	0.982	mg/kg	1					
Iron		18500	7.85	24.5	mg/kg	1					
Lead		12.7	0.324	0.982	mg/kg	1					
Magnesium		5100	8.34	29.4	mg/kg	1					
Manganese		273	0.196	0.982	mg/kg	1					
Molybdenum	U	0.196	0.196	0.982	mg/kg	1					
Nickel		14.4	0.147	0.491	mg/kg	1					
Potassium		1060	6.28	24.5	mg/kg	1					
Silicon	N J	996	1.47	9.82	mg/kg	1					
Silver	B	0.227	0.0982	0.491	mg/kg	1					
Sodium	*	157	6.87	24.5	mg/kg	1					
Vanadium		41.5	0.0982	0.491	mg/kg	1					
Zinc	CM	40.7	0.393	0.982	mg/kg	1					
Antimony	DU	3.24	3.24	9.82	mg/kg	10	JWJ	12/01/14	1655	1439189	3
Metals Analysis-ICP-MS											
SW846 3050B/6020A Selenium "Dry Weight Corrected"											
Selenium	BD	0.321	0.302	1.00	mg/kg	2	PRB	11/29/14	0132	1439164	4

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	EXF1	11/25/14	1615	1439162
SW846 3050B	SW846 3050B Prep for 6010C	EXF1	11/25/14	1615	1439188
SW846 7471B Prep	SW846 7471B Mercury Prep Soil	AXS5	11/26/14	1244	1439274

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Certificate of Analysis

Report Date: December 3, 2014

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-107 Soil

Client SDG: XP0168

Client Sample ID: J1V1M1
Sample ID: 361900005
Matrix: Soil
Collect Date: 20-NOV-14 10:26
Receive Date: 25-NOV-14
Collector: Client
Moisture: 2.94%

Project: WCHN00720
Client ID: WCHN001

V 3/27/15

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Mercury Analysis-CVAA											
SW846 7471B Mercury in Solid "Dry Weight Corrected"											
Mercury	B	0.00627	0.00408	0.0122	mg/kg	1	MTM1	12/01/14	1026	1439275	1
Metals Analysis-ICP											
ICP METALS 6010TR Close-out List "Dry Weight Corrected"											
Aluminum		5270	6.26	18.4	mg/kg	1	JWJ	12/01/14	1538	1439189	2
Arsenic		9.89	0.460	2.76	mg/kg	1					
Barium		50.3	0.092	0.460	mg/kg	1					
Beryllium		1.04	0.092	0.460	mg/kg	1					
Boron	U	0.920	0.920	4.60	mg/kg	1					
Cadmium	B	0.198	0.092	0.460	mg/kg	1					
Calcium		5280	7.36	23.0	mg/kg	1					
Chromium		9.69	0.138	0.460	mg/kg	1					
Cobalt		8.26	0.138	0.460	mg/kg	1					
Copper		11.5	0.276	0.920	mg/kg	1					
Iron		16900	7.36	23.0	mg/kg	1					
Lead		28.0	0.304	0.920	mg/kg	1					
Magnesium		3890	7.82	27.6	mg/kg	1					
Manganese		237	0.184	0.920	mg/kg	1					
Molybdenum	U	0.184	0.184	0.920	mg/kg	1					
Nickel		10.1	0.138	0.460	mg/kg	1					
Potassium		899	5.89	23.0	mg/kg	1					
Silicon	N J	728	1.38	9.20	mg/kg	1					
Silver	B	0.318	0.092	0.460	mg/kg	1					
Sodium	*	137	6.44	23.0	mg/kg	1					
Vanadium		46.3	0.092	0.460	mg/kg	1					
Zinc	CM	26.9	0.368	0.920	mg/kg	1					
Antimony	DU	3.04	3.04	9.20	mg/kg	10	JWJ	12/01/14	1658	1439189	3
Metals Analysis-ICP-MS											
SW846 3050B/6020A Selenium "Dry Weight Corrected"											
Selenium	BD	0.362	0.339	1.03	mg/kg	2	PRB	11/29/14	0135	1439164	4

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	EXF1	11/25/14	1615	1439162
SW846 3050B	SW846 3050B Prep for 6010C	EXF1	11/25/14	1615	1439188
SW846 7471B Prep	SW846 7471B Mercury Prep Soil	AXS5	11/26/14	1244	1439274

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Certificate of Analysis

Report Date: December 3, 2014

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-107 Soil

Client SDG: XP0168

Client Sample ID: J1V1M2
Sample ID: 361900006
Matrix: Soil
Collect Date: 20-NOV-14 10:08
Receive Date: 25-NOV-14
Collector: Client
Moisture: 3.32%

Project: WCHN00720
Client ID: WCHN001

3/22/15

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Mercury Analysis-CVAA											
SW846 7471B Mercury in Solid "Dry Weight Corrected"											
Mercury	B	0.00668	0.00386	0.0115	mg/kg	1	MTM1	12/01/14	1028	1439275	1
Metals Analysis-ICP											
ICP METALS 6010TR Close-out List "Dry Weight Corrected"											
Aluminum		5810	6.99	20.6	mg/kg	1	JWJ	12/01/14	1540	1439189	2
Arsenic		7.02	0.514	3.08	mg/kg	1					
Barium		53.5	0.103	0.514	mg/kg	1					
Beryllium		1.02	0.103	0.514	mg/kg	1					
Boron	U	1.03	1.03	5.14	mg/kg	1					
Cadmium	B	0.203	0.103	0.514	mg/kg	1					
Calcium		5730	8.23	25.7	mg/kg	1					
Chromium		10.9	0.154	0.514	mg/kg	1					
Cobalt		8.46	0.154	0.514	mg/kg	1					
Copper		12.1	0.308	1.03	mg/kg	1					
Iron		17500	8.23	25.7	mg/kg	1					
Lead		11.0	0.339	1.03	mg/kg	1					
Magnesium		4320	8.74	30.8	mg/kg	1					
Manganese		255	0.206	1.03	mg/kg	1					
Molybdenum	U	0.206	0.206	1.03	mg/kg	1					
Nickel		12.1	0.154	0.514	mg/kg	1					
Potassium		896	6.58	25.7	mg/kg	1					
Silicon	N J	753	1.54	10.3	mg/kg	1					
Silver	B	0.283	0.103	0.514	mg/kg	1					
Sodium	*	153	7.20	25.7	mg/kg	1					
Vanadium		44.3	0.103	0.514	mg/kg	1					
Zinc	CM	28.9	0.411	1.03	mg/kg	1					
Antimony	DU	3.39	3.39	10.3	mg/kg	10	JWJ	12/01/14	1701	1439189	3
Metals Analysis-ICP-MS											
SW846 3050B/6020A Selenium "Dry Weight Corrected"											
Selenium	DU	0.341	0.341	1.03	mg/kg	2	PRB	11/29/14	0138	1439164	4

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	EXF1	11/25/14	1615	1439162
SW846 3050B	SW846 3050B Prep for 6010C	EXF1	11/25/14	1615	1439188
SW846 7471B Prep	SW846 7471B Mercury Prep Soil	AXS5	11/26/14	1244	1439274

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Certificate of Analysis

Report Date: December 3, 2014

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-107 Soil

Client SDG: XP0168

Client Sample ID: J1V1L0
Sample ID: 361900007
Matrix: Soil
Collect Date: 20-NOV-14 08:11
Receive Date: 25-NOV-14
Collector: Client
Moisture: 6.64%

Project: WCHN00720
Client ID: WCHN001

3/22/15

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Mercury Analysis-CVAA											
SW846 7471B Mercury in Solid "Dry Weight Corrected"											
Mercury	B	0.00976	0.00382	0.0114	mg/kg	1	MTM1	12/01/14	1029	1439275	1
Metals Analysis-ICP											
ICP METALS 6010TR Close-out List "Dry Weight Corrected"											
Aluminum		6540	7.20	21.2	mg/kg	1	JWJ	12/01/14	1542	1439189	2
Arsenic		9.32	0.529	3.18	mg/kg	1					
Barium		66.2	0.106	0.529	mg/kg	1					
Beryllium		1.13	0.106	0.529	mg/kg	1					
Boron	U	1.06	1.06	5.29	mg/kg	1					
Cadmium	B	0.262	0.106	0.529	mg/kg	1					
Calcium		7620	8.47	26.5	mg/kg	1					
Chromium		11.6	0.159	0.529	mg/kg	1					
Cobalt		9.15	0.159	0.529	mg/kg	1					
Copper		12.9	0.318	1.06	mg/kg	1					
Iron		19000	8.47	26.5	mg/kg	1					
Lead		21.7	0.349	1.06	mg/kg	1					
Magnesium		4900	9.00	31.8	mg/kg	1					
Manganese		284	0.212	1.06	mg/kg	1					
Molybdenum	U	0.212	0.212	1.06	mg/kg	1					
Nickel		11.7	0.159	0.529	mg/kg	1					
Potassium		1160	6.77	26.5	mg/kg	1					
Silicon	N J	895	1.59	10.6	mg/kg	1					
Silver	B	0.347	0.106	0.529	mg/kg	1					
Sodium	*	196	7.41	26.5	mg/kg	1					
Vanadium		45.7	0.106	0.529	mg/kg	1					
Zinc	CM	35.3	0.423	1.06	mg/kg	1					
Antimony	DU	3.49	3.49	10.6	mg/kg	10	JWJ	12/01/14	1704	1439189	3
Metals Analysis-ICP-MS											
SW846 3050B/6020A Selenium "Dry Weight Corrected"											
Selenium	BD	0.508	0.339	1.03	mg/kg	2	PRB	11/29/14	0141	1439164	4

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	EXF1	11/25/14	1615	1439162
SW846 3050B	SW846 3050B Prep for 6010C	EXF1	11/25/14	1615	1439188
SW846 7471B Prep	SW846 7471B Mercury Prep Soil	AXS5	11/26/14	1244	1439274

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: December 3, 2014

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-107 Soil

Client SDG: XP0168

Client Sample ID: J1V1L1
Sample ID: 361900008
Matrix: Soil
Collect Date: 20-NOV-14 08:04
Receive Date: 25-NOV-14
Collector: Client
Moisture: 5.8%

Project: WCHN00720
Client ID: WCHN001

V 3/27/15

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Mercury Analysis-CVAA											
SW846 7471B Mercury in Solid "Dry Weight Corrected"											
Mercury		0.0127	0.00384	0.0115	mg/kg	1	MTM1	12/01/14	1031	1439275	1
Metals Analysis-ICP											
ICP METALS 6010TR Close-out List "Dry Weight Corrected"											
Aluminum		6670	7.22	21.2	mg/kg	1	JWJ	12/01/14	1544	1439189	2
Arsenic		4.70	0.531	3.18	mg/kg	1					
Barium		62.0	0.106	0.531	mg/kg	1					
Beryllium		1.03	0.106	0.531	mg/kg	1					
Boron	U	1.06	1.06	5.31	mg/kg	1					
Cadmium	B	0.204	0.106	0.531	mg/kg	1					
Calcium		6580	8.49	26.5	mg/kg	1					
Chromium		12.5	0.159	0.531	mg/kg	1					
Cobalt		8.43	0.159	0.531	mg/kg	1					
Copper		11.8	0.318	1.06	mg/kg	1					
Iron		17900	8.49	26.5	mg/kg	1					
Lead		6.00	0.350	1.06	mg/kg	1					
Magnesium		4750	9.02	31.8	mg/kg	1					
Manganese		268	0.212	1.06	mg/kg	1					
Molybdenum	U	0.212	0.212	1.06	mg/kg	1					
Nickel		12.2	0.159	0.531	mg/kg	1					
Potassium		1110	6.79	26.5	mg/kg	1					
Silicon	N J	1360	1.59	10.6	mg/kg	1					
Silver	B	0.311	0.106	0.531	mg/kg	1					
Sodium	*	230	7.43	26.5	mg/kg	1					
Vanadium		41.7	0.106	0.531	mg/kg	1					
Zinc	CM	33.1	0.425	1.06	mg/kg	1					
Antimony	DU	3.50	3.50	10.6	mg/kg	10	JWJ	12/01/14	1707	1439189	3
Metals Analysis-ICP-MS											
SW846 3050B/6020A Selenium "Dry Weight Corrected"											
Selenium	BD	0.428	0.326	1.00	mg/kg	2	PRB	11/29/14	0152	1439164	4

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	EXF1	11/25/14	1615	1439162
SW846 3050B	SW846 3050B Prep for 6010C	EXF1	11/25/14	1615	1439188
SW846 7471B Prep	SW846 7471B Mercury Prep Soil	AXS5	11/26/14	1244	1439274

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: December 3, 2014

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-107 Soil

Client SDG: XP0168

Client Sample ID: J1V1L4
Sample ID: 361900009
Matrix: Soil
Collect Date: 20-NOV-14 07:58
Receive Date: 25-NOV-14
Collector: Client
Moisture: 5.2%

Project: WCHN00720
Client ID: WCHN001

3/27/15

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Mercury Analysis-CVAA											
SW846 7471B Mercury in Solid "Dry Weight Corrected"											
Mercury		0.0233	0.00422	0.0126	mg/kg	1	MTM1	12/01/14	1033	1439275	1
Metals Analysis-ICP											
ICP METALS 6010TR Close-out List "Dry Weight Corrected"											
Aluminum		5970	6.67	19.6	mg/kg	1	JWJ	12/01/14	1546	1439189	2
Arsenic		5.47	0.490	2.94	mg/kg	1					
Barium		69.7	0.098	0.490	mg/kg	1					
Beryllium		1.11	0.098	0.490	mg/kg	1					
Boron	B	1.56	0.980	4.90	mg/kg	1					
Cadmium	B	0.204	0.098	0.490	mg/kg	1					
Calcium		5960	7.84	24.5	mg/kg	1					
Chromium		9.42	0.147	0.490	mg/kg	1					
Cobalt		8.72	0.147	0.490	mg/kg	1					
Copper		12.1	0.294	0.980	mg/kg	1					
Iron		17800	7.84	24.5	mg/kg	1					
Lead		9.63	0.324	0.980	mg/kg	1					
Magnesium		4160	8.33	29.4	mg/kg	1					
Manganese		262	0.196	0.980	mg/kg	1					
Molybdenum	U	0.196	0.196	0.980	mg/kg	1					
Nickel		10.6	0.147	0.490	mg/kg	1					
Potassium		1040	6.27	24.5	mg/kg	1					
Silicon	N J	1100	1.47	9.80	mg/kg	1					
Silver	B	0.252	0.098	0.490	mg/kg	1					
Sodium	*	199	6.86	24.5	mg/kg	1					
Vanadium		45.6	0.098	0.490	mg/kg	1					
Zinc	CM	29.9	0.392	0.980	mg/kg	1					
Antimony	DU	3.24	3.24	9.80	mg/kg	10	JWJ	12/01/14	1709	1439189	3
Metals Analysis-ICP-MS											
SW846 3050B/6020A Selenium "Dry Weight Corrected"											
Selenium	BD	0.401	0.333	1.01	mg/kg	2	PRB	11/29/14	0155	1439164	4

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	EXF1	11/25/14	1615	1439162
SW846 3050B	SW846 3050B Prep for 6010C	EXF1	11/25/14	1615	1439188
SW846 7471B Prep	SW846 7471B Mercury Prep Soil	AXS5	11/26/14	1244	1439274

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Certificate of Analysis

Report Date: December 3, 2014

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-107 Soil

Client SDG: XP0168

Client Sample ID: J1V1L5
Sample ID: 361900010
Matrix: Soil
Collect Date: 20-NOV-14 07:43
Receive Date: 25-NOV-14
Collector: Client
Moisture: 5.36%

Project: WCHN00720
Client ID: WCHN001

3/27/15

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Mercury Analysis-CVAA											
SW846 7471B Mercury in Solid "Dry Weight Corrected"											
Mercury	B	0.00505	0.00408	0.0122	mg/kg	1	MTM1	12/01/14	1034	1439275	1
Metals Analysis-ICP											
ICP METALS 6010TR Close-out List "Dry Weight Corrected"											
Aluminum		6180	7.14	21.0	mg/kg	1	JWJ	12/01/14	1548	1439189	2
Arsenic		9.20	0.525	3.15	mg/kg	1					
Barium		59.4	0.105	0.525	mg/kg	1					
Beryllium		1.12	0.105	0.525	mg/kg	1					
Boron	U	1.05	1.05	5.25	mg/kg	1					
Cadmium	B	0.216	0.105	0.525	mg/kg	1					
Calcium		5650	8.40	26.3	mg/kg	1					
Chromium		10.7	0.158	0.525	mg/kg	1					
Cobalt		8.57	0.158	0.525	mg/kg	1					
Copper		11.1	0.315	1.05	mg/kg	1					
Iron		17600	8.40	26.3	mg/kg	1					
Lead		19.8	0.347	1.05	mg/kg	1					
Magnesium		4530	8.93	31.5	mg/kg	1					
Manganese		243	0.210	1.05	mg/kg	1					
Molybdenum	U	0.210	0.210	1.05	mg/kg	1					
Nickel		11.7	0.158	0.525	mg/kg	1					
Potassium		925	6.72	26.3	mg/kg	1					
Silicon	N J	927	1.58	10.5	mg/kg	1					
Silver	B	0.274	0.105	0.525	mg/kg	1					
Sodium	*	163	7.35	26.3	mg/kg	1					
Vanadium		45.2	0.105	0.525	mg/kg	1					
Zinc	CM	31.3	0.420	1.05	mg/kg	1					
Antimony	BD	4.16	3.47	10.5	mg/kg	10	JWJ	12/01/14	1712	1439189	3
Metals Analysis-ICP-MS											
SW846 3050B/6020A Selenium "Dry Weight Corrected"											
Selenium	DU	0.346	0.346	1.05	mg/kg	2	PRB	11/29/14	0158	1439164	4

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	EXF1	11/25/14	1615	1439162
SW846 3050B	SW846 3050B Prep for 6010C	EXF1	11/25/14	1615	1439188
SW846 7471B Prep	SW846 7471B Mercury Prep Soil	AXS5	11/26/14	1244	1439274

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Certificate of Analysis

Report Date: December 3, 2014

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-107 Soil

Client SDG: XP0168

Client Sample ID: J1V1L6
Sample ID: 361900011
Matrix: Soil
Collect Date: 20-NOV-14 07:38
Receive Date: 25-NOV-14
Collector: Client
Moisture: 4.88%

Project: WCHN00720
Client ID: WCHN001

3/27/15

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Mercury Analysis-CVAA											
SW846 7471B Mercury in Solid "Dry Weight Corrected"											
Mercury	B	0.0053	0.00359	0.0107	mg/kg	1	MTM1	12/01/14	1036	1439275	1
Metals Analysis-ICP											
ICP METALS 6010TR Close-out List "Dry Weight Corrected"											
Aluminum		6570	6.90	20.3	mg/kg	1	JWJ	12/01/14	1550	1439189	2
Antimony		1.08	0.335	1.01	mg/kg	1					
Arsenic		5.26	0.507	3.04	mg/kg	1					
Barium		58.3	0.101	0.507	mg/kg	1					
Beryllium		0.984	0.101	0.507	mg/kg	1					
Boron	U	1.01	1.01	5.07	mg/kg	1					
Cadmium	B	0.214	0.101	0.507	mg/kg	1					
Calcium		5770	8.12	25.4	mg/kg	1					
Chromium		12.6	0.152	0.507	mg/kg	1					
Cobalt		8.10	0.152	0.507	mg/kg	1					
Copper		13.1	0.304	1.01	mg/kg	1					
Iron		17700	8.12	25.4	mg/kg	1					
Lead		8.33	0.335	1.01	mg/kg	1					
Magnesium		4800	8.63	30.4	mg/kg	1					
Manganese		259	0.203	1.01	mg/kg	1					
Molybdenum	U	0.203	0.203	1.01	mg/kg	1					
Nickel		13.4	0.152	0.507	mg/kg	1					
Potassium		966	6.49	25.4	mg/kg	1					
Silicon	N J	1020	1.52	10.1	mg/kg	1					
Silver	B	0.360	0.101	0.507	mg/kg	1					
Sodium	*	153	7.10	25.4	mg/kg	1					
Vanadium		42.0	0.101	0.507	mg/kg	1					
Zinc	CM	31.3	0.406	1.01	mg/kg	1					
Metals Analysis-ICP-MS											
SW846 3050B/6020A Selenium "Dry Weight Corrected"											
Selenium	BD	0.461	0.340	1.03	mg/kg	2	PRB	11/29/14	0201	1439164	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	EXF1	11/25/14	1615	1439162
SW846 3050B	SW846 3050B Prep for 6010C	EXF1	11/25/14	1615	1439188
SW846 7471B Prep	SW846 7471B Mercury Prep Soil	AXS5	11/26/14	1244	1439274

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: December 3, 2014

Company :	WC-Hanford, Inc.
Address :	2620 Fermi Avenue MSIN H4-21 Richland, Washington 99354
Contact:	Joan Kessner
Project:	RC-107 Soil

Client SDG: XP0168

Client Sample ID:	J1V1L7	Project:	WCHN00720
Sample ID:	361900012	Client ID:	WCHN001
Matrix:	Soil		
Collect Date:	20-NOV-14 07:32		
Receive Date:	25-NOV-14		
Collector:	Client		
Moisture:	8.22%		

3/27/15

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Mercury Analysis-CVAA											
SW846 7471B Mercury in Solid "Dry Weight Corrected"											
Mercury	B	0.00748	0.00395	0.0118	mg/kg	1	MTM1	12/01/14	1459	1439275	1
Metals Analysis-ICP											
ICP METALS 6010TR Close-out List "Dry Weight Corrected"											
Aluminum		6500	7.28	21.4	mg/kg	1	JWJ	12/01/14	1552	1439189	2
Antimony	B	0.908	0.353	1.07	mg/kg	1					
Arsenic		6.83	0.535	3.21	mg/kg	1					
Barium		57.0	0.107	0.535	mg/kg	1					
Beryllium		0.904	0.107	0.535	mg/kg	1					
Boron	U	1.07	1.07	5.35	mg/kg	1					
Cadmium	B	0.125	0.107	0.535	mg/kg	1					
Calcium		5230	8.56	26.8	mg/kg	1					
Chromium		13.3	0.161	0.535	mg/kg	1					
Cobalt		7.86	0.161	0.535	mg/kg	1					
Copper		12.1	0.321	1.07	mg/kg	1					
Iron		17100	8.56	26.8	mg/kg	1					
Lead		2.94	0.353	1.07	mg/kg	1					
Magnesium		4800	9.10	32.1	mg/kg	1					
Manganese		248	0.214	1.07	mg/kg	1					
Molybdenum	U	0.214	0.214	1.07	mg/kg	1					
Nickel		13.0	0.161	0.535	mg/kg	1					
Potassium		850	6.85	26.8	mg/kg	1					
Silicon	N J	1060	1.61	10.7	mg/kg	1					
Silver	B	0.240	0.107	0.535	mg/kg	1					
Sodium	*	136	7.49	26.8	mg/kg	1					
Vanadium		39.1	0.107	0.535	mg/kg	1					
Zinc	CM	30.3	0.428	1.07	mg/kg	1					
Metals Analysis-ICP-MS											
SW846 3050B/6020A Selenium "Dry Weight Corrected"											
Selenium	BD	0.568	0.326	1.00	mg/kg	2	PRB	11/29/14	0204	1439164	3

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	EXF1	11/25/14	1615	1439162
SW846 3050B	SW846 3050B Prep for 6010C	EXF1	11/25/14	1615	1439188
SW846 7471B Prep	SW846 7471B Mercury Prep Soil	AXS5	11/26/14	1244	1439274

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: December 3, 2014

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-107 Soil

Client SDG: XP0168

Client Sample ID: J1V1M0
Sample ID: 361900013
Matrix: Soil
Collect Date: 20-NOV-14 07:26
Receive Date: 25-NOV-14
Collector: Client
Moisture: 5.33%

Project: WCHN00720
Client ID: WCHN001

3/27/15

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Mercury Analysis-CVAA											
SW846 7471B Mercury in Solid "Dry Weight Corrected"											
Mercury	U	0.00405	0.00405	0.0121	mg/kg	1	MTM1	12/01/14	1039	1439275	1
Metals Analysis-ICP											
ICP METALS 6010TR Close-out List "Dry Weight Corrected"											
Aluminum		6320	6.78	19.9	mg/kg	1	JWJ	12/01/14	1554	1439189	2
Arsenic		7.60	0.498	2.99	mg/kg	1					
Barium		56.7	0.0997	0.498	mg/kg	1					
Beryllium		1.10	0.0997	0.498	mg/kg	1					
Boron	U	0.997	0.997	4.98	mg/kg	1					
Cadmium	B	0.215	0.0997	0.498	mg/kg	1					
Calcium		5670	7.97	24.9	mg/kg	1					
Chromium		12.1	0.149	0.498	mg/kg	1					
Cobalt		8.35	0.149	0.498	mg/kg	1					
Copper		11.5	0.299	0.997	mg/kg	1					
Iron		17900	7.97	24.9	mg/kg	1					
Lead		14.2	0.329	0.997	mg/kg	1					
Magnesium		4710	8.47	29.9	mg/kg	1					
Manganese		251	0.199	0.997	mg/kg	1					
Molybdenum	U	0.199	0.199	0.997	mg/kg	1					
Nickel		12.3	0.149	0.498	mg/kg	1					
Potassium		979	6.38	24.9	mg/kg	1					
Silicon	N J	1110	1.49	9.97	mg/kg	1					
Silver	B	0.334	0.0997	0.498	mg/kg	1					
Sodium	*	176	6.98	24.9	mg/kg	1					
Vanadium		44.3	0.0997	0.498	mg/kg	1					
Zinc	CM	31.1	0.399	0.997	mg/kg	1					
Antimony	DU	3.29	3.29	9.97	mg/kg	10	JWJ	12/01/14	1715	1439189	3
Metals Analysis-ICP-MS											
SW846 3050B/6020A Selenium "Dry Weight Corrected"											
Selenium	BD	0.376	0.344	1.04	mg/kg	2	PRB	11/29/14	0206	1439164	4

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3050B	ICP-MS 3050BS PREP	EXF1	11/25/14	1615	1439162
SW846 3050B	SW846 3050B Prep for 6010C	EXF1	11/25/14	1615	1439188
SW846 7471B Prep	SW846 7471B Mercury Prep Soil	AXS5	11/26/14	1244	1439274

Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

Metals Fractional Narrative
WC-HANFORD, INC. (WCHN)
SDG XP0168

Sample ID	Client ID
361900001	J1V1L2
361900002	J1V1L3
361900003	J1V1L8
361900004	J1V1L9
361900005	J1V1M1
361900006	J1V1M2
361900007	J1V1L0
361900008	J1V1L1
361900009	J1V1L4
361900010	J1V1L5
361900011	J1V1L6
361900012	J1V1L7
361900013	J1V1M0
1203217774	Method Blank (MB)**ICP**
1203217775	Laboratory Control Sample (LCS)
1203217778	361900001(J1V1L2L) Serial Dilution (SD)
1203217776	361900001(J1V1L2D) Sample Duplicate (DUP)
1203217777	361900001(J1V1L2S) Matrix Spike (MS)
1203219998	361900001(J1V1L2PS) Post Spike (PS)
1203217725	Method Blank (MB)**ICP-MS**
1203217726	Laboratory Control Sample (LCS)
1203217729	361900001(J1V1L2L) Serial Dilution (SD)
1203217727	361900001(J1V1L2D) Sample Duplicate (DUP)
1203217728	361900001(J1V1L2S) Matrix Spike (MS)
1203218010	Method Blank (MB)**CVAA**
1203218011	Laboratory Control Sample (LCS)
1203218014	361900001(J1V1L2L) Serial Dilution (SD)
1203218012	361900001(J1V1L2D) Sample Duplicate (DUP)
1203218013	361900001(J1V1L2S) Matrix Spike (MS)

Sample Analysis

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

Method/Analysis Information

Analytical Batch:	1439189, 1439164 and 1439275
Prep Batch :	1439188, 1439162 and 1439274
Standard Operating Procedures:	GL-MA-E-013 REV# 23, GL-MA-E-009 REV# 24, GL-MA-E-014 REV# 25 and GL-MA-E-010 REV# 28
Analytical Method:	SW846 3050B/6010C, SW846 3050B/6020A and SW846 7471B
Prep Method :	SW846 3050B and SW846 7471B Prep

Preparation/Analytical Method Verification

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

System Configuration

The Metals analysis-ICP was performed on a PE 7300 Optima radial/axial-viewing inductively coupled plasma atomic emission spectrometer. The instrument is equipped with 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-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.

The Metals analysis - ICPMS was performed on a PerkinElmer NexION 300X ICPMS. The instrument is equipped with a ESI PFA-ST nebulizer, quadrupole mass spectrometer, dual mode electron multiplier detector, and Kinetic Energy Discrimination (KED) technology. Internal standards of scandium, germanium, indium, tantalum, and/or lutetium were utilized to cover the mass spectrum. Operating conditions are set at 1600W power, 16 L/m for the plasma, and 1.2 L/m auxiliary gases, and 1.12 L/min carrier gas flow.

Calibration Information

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

CRDL/PQL Requirements
The PQL standard recoveries for SW846 6010C met the control limits with the exception of calcium and potassium. Client sample concentrations were less than the MDL or greater than two times the PQL; therefore the data were not adversely affected. 361900001 (J1V1L2), 361900002 (J1V1L3), 361900003 (J1V1L8), 361900004 (J1V1L9), 361900005 (J1V1M1), 361900006 (J1V1M2), 361900007 (J1V1L0), 361900008 (J1V1L1), 361900009 (J1V1L4), 361900010 (J1V1L5), 361900011 (J1V1L6), 361900012 (J1V1L7) and 361900013 (J1V1M0)-ICP.

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 preparation blank analyzed with this SDG contained zinc at concentrations greater than the client required detection limit (CRDL). The failing elements were at a concentration ten times greater than that which was exhibited in the blank. This indicates that any contribution to the concentration of these elements in these samples from potential laboratory contamination would be minimal. 1203217774 (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: 361900001 (J1V1L2)-ICP, ICP-MS and CVAA.

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 silicon. 1203217777 (J1V1L2MS)-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. Sodium did not meet these requirements. 1203217776 (J1V1L2DUP)-ICP.

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

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. Zinc did not meet the established percent difference criteria. 1203217778 (J1V1L2SDILT)-ICP.

Technical Information

Holding Time Specifications
GEL assigns holding times based on the associated methodology. Holding time is measured by comparison of the date and time of sample collection to the date and time of sample preparation and analysis. Those holding times expressed in hours are calculated in the AlphaLIMS system. Those holding times expressed as days expire at midnight on the day of expiration. All samples in this SDG met the specified holding time.

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

Sample Dilutions
Dilutions are performed to minimize matrix interferences resulting from elevated mineral element concentrations present in solid samples and/or to bring over range target analyte concentrations into the linear calibration range of the instrument. Samples were diluted in order to bring raw values for titanium 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. 361900001 (J1V1L2), 361900002 (J1V1L3), 361900003 (J1V1L8), 361900004 (J1V1L9), 361900005 (J1V1M1), 361900006 (J1V1M2), 361900007 (J1V1L0), 361900008 (J1V1L1), 361900009 (J1V1L4), 361900010 (J1V1L5) and 361900013 (J1V1M0)-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: 1360869. 1203217776 (J1V1L2DUP) and 1203217777 (J1V1L2MS)-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:**_____

DATA EXCEPTION REPORT

Mo.Day Yr.	Division:	Quality Criteria:	Type:
01-DEC-14	Industrial	Specifications	Process
Instrument Type:	**Test / Method:**	**Matrix Type:**	**Client Code:**
ICP	SW846 3050B/6010C	Solid	WCHN
Batch ID:	**Sample Numbers:**		
1439189	See Below		

Potentially affected work order(s)(SDG): 361900(XP0168)

Application Issues:

Failed RPD for DUP

Failed Recovery for MS/PS

Specification and Requirements Exception Description:	DER Disposition:
1. Failed Recovery for MS/PS: QC 1203217777MS 2. Failed RPD for DUP: QC 1203217776DUP	1. The matrix spike recovery failed outside of the control limits for silicon. The post spike passed the required control limits for silicon. This verifies the absence of a matrix interference. 2. The sample and sample duplicate % RPD failed outside the control limits for sodium due to possible sample non-homogeneity and/or matrix interference.

Originator's Name:

Jerry Wigfall 01-DEC-14

Data Validator/Group Leader:

Jamie Johnson 05-DEC-14

Washington Closure Hanford

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

RC-107-119

Collector: Q Stowe	Company Contact: Joan Kessner	Telephone No.: 375-4688	Project Coordinator: KESSNER, JH
Project Designation: 100-H Field Remediation	Sampling Location: 100-H-28 et al, north overburden pile		SAF No.: RC-107
Ice Chest No.: RCC-07-002	Field Logbook No.: EL-1627-08	COA: 01H2832000	Method of Shipment: Commerical Carrier - fed ex
Shipped To: GEL Laboratories Charlston	Offsite Property No.: A 131294		Bill of Lading/Air Bill No.: See OSPC

Price Code: 8B

Data Turnaround: 7days

Other Labs Shipped To: Eberline Services Oak Ridge

POSSIBLE SAMPLE HAZARDS/REMARKS

none

Special Handling and/or Storage

none

Preservation	None	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C		
Type of Container	G/P	G/P	G/P	aG	aG	aG	aG	G		
No. of Container(s)	1	1	1	1	1	1	1	1		
Volume	250mL	125mL	250mL	250mL	250mL	250mL	250mL	125mL		
Sample Analysis	See item (1) in Special Instructions	Chromium Hex - 7196	See item (2) in Special Instructions	PCBs - 8082	Pesticides - 8081	PAHs - 8310	Semi-VOA - 8270 (TCL)	TPH-Diesel Range - WTPH-D +		

Sample No.	Matrix	Sample Date	Sample Time										
~~J1V1L0~~	~~SOIL~~	DWS 11/20/14											
~~J1V1L1~~	~~SOIL~~												
J1V1L2	SOIL	11/20/14	1102	✓	✓	✓	✓	✓	✓	✓	✓		
J1V1L3	SOIL	11/20/14	1051	✓	✓	✓	✓	✓	✓	✓	✓		
~~J1V1L4~~	~~SOIL~~	DWS 11/20/14											

CHAIN OF POSSESSION

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Quincy Stowe	11-20-14 1110	DWSHEA 11/20/14 WCH	1110
DWSHEA DWSHEA	11/20/14 1545	C. Bingham	11-20-14 1545
C. Bingham	11-20-14 1550	1060 Battelle, fridge #1A	11-20-14 1550
1060 Battelle, fridge #1A	11-24-14 0715	C. Bingham	11-24-14 0715
C. Bingham WCH	11-24-14 0730	fed ex	
FED EX		P. Dent Patricia Dent	11-25-14 0930

Sign/Print Names

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

SPECIAL INSTRUCTIONS

(1) ICP Metals - 6010TR (Close-out List) {Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silicon, Silver, Sodium, Vanadium, Zinc}; Mercury - 7471 - (CV)

(2) IC Anions - 9056 {Bromide, Chloride, Fluoride, Nitrogen in Nitrate, Nitrogen in Nitrite, Phosphorous in phosphate, Sulfate}; NO2/NO3 - 353.2 {Nitrogen in Nitrite and Nitrate}; pH (Soil) - 9045 {pH Measurement}

REVIEWED BY K. Woodvineman DATE 11-24-14

XP0168

WCH-EE-011

Washington Closure Hanford — CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

RC-107-119

Collector	Q Stowe
Project Designation	100-H Field Remediation
Ice Chest No.	RCC-07-002
Shipped To	GEL Laboratories Charlston
Company Contact	Joan Kessner
Telephone No.	375-4688
Sampling Location	100-H-28 et al, north overburden pile
Field Logbook No.	EL-1627-08
COA	01H2832000
Offsite Property No.	A131294
Project Coordinator	KESSNER, JH
SAF No.	RC-107
Price Code	8B
Data Turnaround	7 days
Method of Shipment	Commerical Carrier - fed ex
Bill of Lading/Air Bill No.	See OSPC

Other Labs Shipped To: Eberline Services Oak Ridge

POSSIBLE SAMPLE HAZARDS/REMARKS: none

Special Handling and/or Storage: none

Sample No.	Matrix	Sample Date	Sample Time	Preservation	None	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C		
				Type of Container	G/P	G/P	G/P	aG	aG	aG	aG	G		
				No. of Container(s)	1	1	1	1	1	1	1	1		
				Volume	250mL	125mL	250mL	250mL	250mL	250mL	250mL	125mL		
				Sample Analysis	See item (1) in Special Instructions	Chromium Hex - 7196	See item (2) in Special Instructions	PCBs - 8082	Pesticides - 8081	PAHs - 8310	Semi-VOA - 8270 (TCL)	TPH-Diesel Range - WTPH-D +		
~~J1V1L5~~	~~SOIL~~	DWShea 11/20/14												
~~J1V1L6~~	~~SOIL~~													
~~J1V1L7~~	~~SOIL~~													
J1V1L8	SOIL	11/20/14	1008		✓	✓	✓	✓	✓	✓	✓	✓		
J1V1L9	SOIL	11/20/14	1038		✓	✓	✓	✓	✓	✓	✓	✓		

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Quincy Stowe	11-20-14 1110	WCH DWSHEA	11/20/14 1110
DWSHEA DWSHEA	11/20/14 1545	C. Bingham	11-20-14 1545
C. Bingham	11-20-14 1550	1060 Battelle, fridge #1A	11-20-14 1550
1060 Battelle, fridge #1A	11-24-14 0715	C. Bingham	11-24-14 0715
C. Bingham WCH	11-24-14 0730	fed ex	
FED EX		P. Lhent Patricia Dent	11-25-14 0930

FINAL SAMPLE DISPOSITION: Disposal Method | Disposed By | Date/Time

SPECIAL INSTRUCTIONS

(1) ICP Metals - 6010TR (Close-out List) {Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silicon, Silver, Sodium, Vanadium, Zinc}; Mercury - 7471 - (CV)
(2) IC Anions - 9056 {Bromide, Chloride, Fluoride, Nitrogen in Nitrate, Nitrogen in Nitrite, Phosphorous in phosphate, Sulfate}; NO2/NO3 - 353.2 {Nitrogen in Nitrite and Nitrate}; pH (Soil) - 9045 {pH Measurement}

REVIEWED BY K. Woodhaemme DATE 11-24-14

XP0168

WCH-EE-011

Washington Closure Hanford — CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

RC-107-119 | Page 3 of 3

Collector	Q Stowe
Company Contact	Joan Kessner
Telephone No.	375-4688
Project Coordinator	KESSNER, JH
Price Code	8B
Data Turnaround	7 days
Project Designation	100-H Field Remediation
Sampling Location	100-H-28 et al, north overburden pile
SAF No.	RC-107
Ice Chest No.	RCC-07-002
Field Logbook No.	EL-1627-08
COA	01H2832000
Method of Shipment	Commerical Carrier - fed ex
Shipped To	GEL Laboratories Charlston
Offsite Property No.	A131294
Bill of Lading/Air Bill No.	See OSPC
Other Labs Shipped To	Eberline Services Oak Ridge

POSSIBLE SAMPLE HAZARDS/REMARKS
none

Special Handling and/or Storage
none

Sample No.	Matrix	Sample Date	Sample Time	See item (1) in Special Instructions	Chromium Hex - 7196	See item (2) in Special Instructions	PCBs - 8082	Pesticides - 8081	PAHs - 8310	Semi-VOA - 8270 (TCL)	TPH-Diesel Range - WTPH-D +		
Preservation				None	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C		
Type of Container				G/P	G/P	G/P	aG	aG	aG	aG	G		
No. of Container(s)				1	1	1	1	1	1	1	1		
Volume				250mL	125mL	250mL	250mL	250mL	250mL	250mL	125mL		
~~J1V1M0~~	~~SOIL~~	DWS 11/20/14											
J1V1M1	SOIL	11/20/14	1026	✓	✓	✓	✓	✓	✓	✓	✓		
J1V1M2	SOIL	11/20/14	1008	✓	✓	✓	✓	✓	✓	✓	✓		

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Quincy Stowe	11-20-14 1110	DWSHEA DWSHEA	11/20/14 1110
DWSHEA DWSHEA	11/20/14 1545	C. Bingham	11-20-14 1545
C. Bingham	11-20-14 1550	1060 Battelle, Fndge #14	11-20-14 1550
1060 Battelle, Fndge #14	11-24-14 0715	C. Bingham	11-24-14 0715
C. Bingham WCH	11-24-14 0730	fed ex	
FED EX		P. Dent Patricia Dent	0930 11-25-14

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

SPECIAL INSTRUCTIONS

(1) ICP Metals - 6010TR (Close-out List) (Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silicon, Silver, Sodium, Vanadium, Zinc); Mercury - 7471 - (CV)
(2) IC Anions - 9056 (Bromide, Chloride, Fluoride, Nitrogen in Nitrate, Nitrogen in Nitrite, Phosphorous in phosphate, Sulfate); NO2/NO3 - 353.2 (Nitrogen in Nitrite and Nitrate); pH (Soil) - 9045 (pH Measurement)

REVIEWED BY K. Wood Vincent DATE 11-24-14

XP0168

WCH-EE-011

Washington Closure Hanford — CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

RC-107-119

Collector	Q Stowe
Company Contact	Joan Kessner
Telephone No.	375-4688
Project Coordinator	KESSNER, JH
Price Code	8B
Data Turnaround	7days
Project Designation	100-H Field Remediation
Sampling Location	100-H-28 et al, north overburden pile
SAF No.	RC-107
Ice Chest No.	RCC-07-002
Field Logbook No.	EL-1627-08
COA	01H2832000
Method of Shipment	Commerical Carrier Fed ex
Shipped To	GEL Laboratories Charlston
Offsite Property No.	A131294
Bill of Lading/Air Bill No.	See OSPC
Other Labs Shipped To	Eberline Services Oak Ridge

POSSIBLE SAMPLE HAZARDS/REMARKS
none

Special Handling and/or Storage
none

Sample No.	Matrix	Sample Date	Sample Time	Preservation	None	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C		
				Type of Container	G/P	G/P	G/P	aG	aG	aG	aG	G		
				No. of Container(s)	1	1	1	1	1	1	1	1		
				Volume	250mL	125mL	250mL	250mL	250mL	250mL	250mL	125mL		
				Sample Analysis	See item (1) in Special Instructions	Chromium Hex - 7196	See item (2) in Special Instructions	PCBs - 8082	Pesticides - 8081	PAHs - 8310	Semi-VOA - 8270 (TCL)	TPH-Diesel Range - WTPH-D +		
J1V1L0	SOIL	11/24/14	0811		✓	✓	✓	✓	✓	✓	✓	✓		
J1V1L1	SOIL	11/24/14	0804		✓	✓	✓	✓	✓	✓	✓	✓		
~~J1V1L2~~	~~SOIL~~	DWSHEA												
~~J1V1L3~~	~~SOIL~~	11/20/14												
J1V1L4	SOIL	11/24/14	0758		✓	✓	✓	✓	✓	✓	✓	✓		

CHAIN OF POSSESSION

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Quincy Stowe	0822 11/24/14	WCH DWSHEA	11/24/14 0822
DWSHEA	11/24/14 0933	C. Bingham	11-24-14 0933
C. Bingham WCH	11-24-14 0950	Fed ex	
FED EX		P. Dent Patricia Dent	11-25-14 0930

Sign/Print Names

FINAL SAMPLE DISPOSITION: Disposal Method | Disposed By | Date/Time

WCH-EE-011

SPECIAL INSTRUCTIONS

(1) ICP Metals - 6010TR (Close-out List) (Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silicon, Silver, Sodium, Vanadium, Zinc); Mercury - 7471 - (CV)
(2) IC Anions - 9056 (Bromide, Chloride, Fluoride, Nitrogen in Nitrate, Nitrogen in Nitrite, Phosphorous in phosphate, Sulfate); NO2/NO3 - 353.2 (Nitrogen in Nitrite and Nitrate); pH (Soil) - 9045 (pH Measurement)

REVIEWED BY K. Woodworth DATE 11-24-14

11-24-14 CMB

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Washington Closure Hanford — CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

RC-107-119 | Page 2 of 3

Collector	Q Stowe
Company Contact	Joan Kessner
Telephone No.	375-4688
Project Coordinator	KESSNER, JH
Price Code	8B
Data Turnaround	7 days
Project Designation	100-H Field Remediation
Sampling Location	100-H-28 et al, north overburden pile
SAF No.	RC-107
Ice Chest No.	RCC-07-002
Field Logbook No.	EL-1627-08
COA	01H2832000
Method of Shipment	Commerical Carrier fed ex
Shipped To	GEL Laboratories Charlston
Offsite Property No.	A131 294
Bill of Lading/Air Bill No.	See OSPC
Other Labs Shipped To	Eberline Services Oak Ridge

POSSIBLE SAMPLE HAZARDS/REMARKS
none

Special Handling and/or Storage
none

Sample No.	Matrix	Sample Date	Sample Time										
Preservation				None	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C		
Type of Container				G/P	G/P	G/P	aG	aG	aG	aG	G		
No. of Container(s)				1	1	1	1	1	1	1	1		
Volume				250mL	125mL	250mL	250mL	250mL	250mL	250mL	125mL		
Sample Analysis				See item (1) in Special Instructions	Chromium Hex - 7196	See item (2) in Special Instructions	PCBs - 8082	Pesticides - 8081	PAHs - 8310	Semi-VOA - 8270 (TCL)	TPH-Diesel Range - WTPH-D +		
J1V1L5	SOIL	11/24/14	0743	✓	✓	✓	✓	✓	✓	✓	✓		
J1V1L6	SOIL	11/24/14	0738	✓	✓	✓	✓	✓	✓	✓	✓		
J1V1L7	SOIL	11/24/14	0732	✓	✓	✓	✓	✓	✓	✓	✓		
~~J1V1L8~~	~~SOIL~~	DWSHEA											
~~J1V1L9~~	~~SOIL~~	11/20/14											

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Quincy Stowe	11/24/14 0822	DWSHEA DWSHEA WCH	11/24/14 0822
DWSHEA DWSHEA	11/24/14 0933	C. Bingham	11-24-14 0933
C. Bingham WCH	11-24-14 0950	fed ex	
FED EX		P. Ward Patricia Dent	11-25-14 0930

FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

SPECIAL INSTRUCTIONS

(1) ICP Metals - 6010TR (Close-out List) (Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silicon, Silver, Sodium, Vanadium, Zinc); Mercury - 7471 - (CV)
(2) IC Anions - 9056 (Bromide, Chloride, Fluoride, Nitrogen in Nitrate, Nitrogen in Nitrite, Phosphorous in phosphate, Sulfate); NO2/NO3 - 353.2 (Nitrogen in Nitrite and Nitrate); pH (Soil) - 9045 (pH Measurement)

REVIEWED BY K. Wood Vincent DATE 11-24-14

11-24-14 CMD

XP0169 8

WCH-EE-011

Washington Closure Hanford

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

RC-107-119

Collector: Q Stowe	Company Contact: Joan Kessner	Telephone No.: 375-4688	Project Coordinator: KESSNER, JH
Project Designation: 100-H Field Remediation	Sampling Location: 100-H-28 et al, north overburden pile		SAF No.: RC-107
Ice Chest No.: RCC-07-002	Field Logbook No.: EL-1627-08	COA: 01H2832000	Method of Shipment: Commerical Carrier – fed ex
Shipped To: GEL Laboratories Charlston	Offsite Property No.: A131294		Bill of Lading/Air Bill No.: See OSPC

Price Code: 8B

Data Turnaround: 7days

Other Labs Shipped To: Eberline Services Oak Ridge

POSSIBLE SAMPLE HAZARDS/REMARKS

none

Special Handling and/or Storage

none

Preservation	None	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C		
Type of Container	G/P	G/P	G/P	aG	aG	aG	aG	G		
No. of Container(s)	1	1	1	1	1	1	1	1		
Volume	250mL	125mL	250mL	250mL	250mL	250mL	250mL	125mL		
Sample Analysis	See item (1) in Special Instructions	Chromium Hex - 7196	See item (2) in Special Instructions	PCBs - 8082	Pesticides - 8081	PAHs - 8310	Semi-VOA - 8270 (TCL)	TPH-Diesel Range - WTPH-D +		

Sample No.	Matrix	Sample Date	Sample Time										
J1V1M0	SOIL	11/24/14	0726	✓	✓	✓	✓	✓	✓	✓	✓		
~~J1V1M1~~	~~SOIL~~	DWShea 11/20/14											
~~J1V1M2~~	~~SOIL~~												

CHAIN OF POSSESSION

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Quincy Stowe	11/24/14 0822	WCH DWSHEA	11/24/14 0822
DWSHEA	11/24/14 0933	C. Bingham	11-24-14 0933
C. Bingham WCH	11-24-14 0950	fed ex	
FED EX		P. Dent Patricia Dent	11-25-14 0930

Sign/Print Names

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

WCH-EE-011

SPECIAL INSTRUCTIONS

(1) ICP Metals - 6010TR (Close-out List) {Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silicon, Silver, Sodium, Vanadium, Zinc}; Mercury - 7471 - (CV)

(2) IC Anions - 9056 {Bromide, Chloride, Fluoride, Nitrogen in Nitrate, Nitrogen in Nitrite, Phosphorous in phosphate, Sulfate}; NO2/NO3 - 353.2 {Nitrogen in Nitrite and Nitrate}; pH (Soil) - 9045 (pH Measurement)

REVIEWED BY K. Wood Vlacmid DATE 11-24-14

11-24-14 CMB

XP0168

Appendix 5

Data Validation Supporting Documentation

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E
PROJECT: 100-H-28			DATA PACKAGE: XP0168		
VALIDATOR: ECK		LAB: Gel		DATE: 3/24/15	
			SDG: XP0168		

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

SAMPLES/MATRIX
J1V1L0 J1V1L1 J1V1L2 J1V1L3 J1L1V4 J1V1L5
J1V1L6 J1V1L7 J1V1L8 J1V1L9 J1V1M0 J1V1M1
J1V1M2
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: 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 - Silica 0% - J all

no PAS

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

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

Duplicate RPD values acceptable? ..... Yes No N/A

Duplicate results acceptable? ..... Yes No N/A

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

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

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

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

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

Comments: _____

6. ICP QUALITY CONTROL (Levels D and E)

ICP serial dilution samples analyzed? ..... Yes No N/A

ICP serial dilution %D values acceptable? ..... Yes No N/A

ICP post digestion spike required? ..... Yes No N/A

ICP post digestion spike values acceptable? ..... Yes No N/A

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

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

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

Comments: _____

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

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

Duplicate injections performed as required? ..... Yes No N/A

Duplicate injection %RSD values acceptable? ..... Yes No N/A

Analytical spikes performed as required? ..... Yes No N/A

Analytical spike recoveries acceptable? ..... Yes No N/A

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

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

MSA performed as required? ..... Yes No N/A

MSA results acceptable? ..... Yes No N/A

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

Comments:

8. HOLDING TIMES (all levels)

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

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

Comments:

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

9. RESULT QUANTITATION AND DETECTION LIMITS (all levels)

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

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

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

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

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

Comments:

Appendix 6

Additional Documentation Requested by Client

GEL LABORATORIES LLC

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

QC Summary

Report Date: December 3, 2014

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

Contact: Joan Kessner

Workorder: 361900 **Client SDG:** XP0168 **Project Description:** RC-107 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis - ICPMS											
Batch 1439164											
QC1203217727 361900001 DUP											
Selenium		DU	0.333	BD	0.493	mg/kg	60.5 ^		(+/-1.00)	PRB	11/29/14 01:07
QC1203217726 LCS											
Selenium	4.88			D	4.76	mg/kg		97.5	(80%-120%)		11/29/14 00:55
QC1203217725 MB											
Selenium				DU	0.318	mg/kg					11/29/14 00:53
QC1203217728 361900001 MS											
Selenium	4.98	DU	0.333	D	5.11	mg/kg		97.4	(75%-125%)		11/29/14 01:10
QC1203217729 361900001 SDILT											
Selenium		DU	1.31	DU	1.67	ug/L	N/A		(0%-10%)		11/29/14 01:15
Metals Analysis-ICP											
Batch 1439189											
QC1203217776 361900001 DUP											
Aluminum			5020		4730	mg/kg	5.86		(0%-20%)	JWJ	12/01/14 15:18
Antimony		DU	3.25	DU	3.32	mg/kg	N/A				12/01/14 16:24
Arsenic			8.42		7.82	mg/kg	7.31 ^		(+/-3.02)		12/01/14 15:18
Barium			39.4		40.9	mg/kg	3.89		(0%-20%)		
Beryllium			0.983		0.937	mg/kg	4.81 ^		(+/-0.504)		
Boron		U	0.986	U	1.01	mg/kg	N/A				
Cadmium		B	0.216	B	0.250	mg/kg	14.8 ^		(+/-0.504)		
Calcium			4550		4950	mg/kg	8.33		(0%-20%)		
Chromium			8.65		8.12	mg/kg	6.27		(0%-20%)		
Cobalt			8.02		7.80	mg/kg	2.88		(0%-20%)		
Copper			10.5		9.82	mg/kg	6.81		(0%-20%)		
Iron			16100		15300	mg/kg	5.44		(0%-20%)		

QC Summary

Workorder: 361900 **Client SDG:** XP0168 **Project Description:** RC-107 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis-ICP										
Batch *1439189*										
Lead		33.8		34.8	mg/kg	2.80		(0%-20%)	JWJ	12/01/14 15:18
Magnesium		3600		3560	mg/kg	1.34		(0%-20%)		
Manganese		232		239	mg/kg	3.00		(0%-20%)		
Molybdenum	U	0.197	U	0.201	mg/kg	N/A				
Nickel		8.65		8.66	mg/kg	0.0766		(0%-20%)		
Potassium		715		661	mg/kg	7.84		(0%-20%)		
Silicon	N	1010		965	mg/kg	4.33		(0%-20%)		
Silver	B	0.196	B	0.193	mg/kg	1.55 ^		(+/-0.504)		
Sodium	*	137	*	111	mg/kg	21.0*^		(+/-25.2)		
Vanadium		43.4		42.3	mg/kg	2.50		(0%-20%)		
Zinc	CM	29.6		25.5	mg/kg	15.0		(0%-20%)		
QC1203217775 LCS										
Aluminum	476			492	mg/kg		103	(80%-120%)		12/01/14 15:13
Antimony	47.6			47.8	mg/kg		100	(80%-120%)		
Arsenic	47.6			47.9	mg/kg		101	(80%-120%)		
Barium	47.6			48.0	mg/kg		101	(80%-120%)		
Beryllium	47.6			49.0	mg/kg		103	(80%-120%)		
Boron	47.6			47.7	mg/kg		100	(80%-120%)		
Cadmium	47.6			48.2	mg/kg		101	(80%-120%)		
Calcium	476			505	mg/kg		106	(80%-120%)		
Chromium	47.6			47.3	mg/kg		99.4	(80%-120%)		
Cobalt	47.6			48.2	mg/kg		101	(80%-120%)		

QC Summary

Workorder: 361900 **Client SDG:** XP0168 **Project Description:** RC-107 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis-ICP										
Batch 1439189										
Copper	47.6			48.3	mg/kg		101	(80%-120%)	JWJ	12/01/14 15:13
Iron	476			496	mg/kg		104	(80%-120%)		
Lead	47.6			47.3	mg/kg		99.3	(80%-120%)		
Magnesium	476			511	mg/kg		107	(80%-120%)		
Manganese	47.6			47.9	mg/kg		101	(80%-120%)		
Molybdenum	47.6			47.0	mg/kg		98.6	(80%-120%)		
Nickel	47.6			47.8	mg/kg		100	(80%-120%)		
Potassium	476			473	mg/kg		99.4	(80%-120%)		
Silicon	476			433	mg/kg		91	(80%-120%)		
Silver	47.6			47.7	mg/kg		100	(80%-120%)		
Sodium	476			494	mg/kg		104	(80%-120%)		
Vanadium	47.6			48.9	mg/kg		103	(80%-120%)		
Zinc	47.6			48.9	mg/kg		103	(80%-120%)		
QC1203217774 MB										
Aluminum			U	6.77	mg/kg					12/01/14 15:10
Antimony			U	0.329	mg/kg					
Arsenic			U	0.498	mg/kg					
Barium			U	0.0996	mg/kg					
Beryllium			U	0.0996	mg/kg					
Boron			U	0.996	mg/kg					
Cadmium			U	0.0996	mg/kg					
Calcium			U	7.97	mg/kg					

QC Summary

Workorder: 361900 **Client SDG:** XP0168 **Project Description:** RC-107 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis-ICP											
Batch 1439189											
Chromium				B	0.201	mg/kg				JWJ	12/01/14 15:10
Cobalt				U	0.149	mg/kg					
Copper				U	0.299	mg/kg					
Iron				U	7.97	mg/kg					
Lead				U	0.329	mg/kg					
Magnesium				U	8.47	mg/kg					
Manganese				U	0.199	mg/kg					
Molybdenum				U	0.199	mg/kg					
Nickel				U	0.149	mg/kg					
Potassium				U	6.37	mg/kg					
Silicon				U	1.49	mg/kg					
Silver				U	0.0996	mg/kg					
Sodium				U	6.97	mg/kg					
Vanadium				U	0.0996	mg/kg					
Zinc					1.35	mg/kg					
QC1203217777 361900001 MS											
Aluminum	501		5020		6530	mg/kg	N/A	(75%-125%)			12/01/14 15:20
Antimony	50.1	DU	3.25	D	44.7	mg/kg	85.1	(75%-125%)			12/01/14 16:27
Arsenic	50.1		8.42		56.4	mg/kg	95.8	(75%-125%)			12/01/14 15:20
Barium	50.1		39.4		92.0	mg/kg	105	(75%-125%)			
Beryllium	50.1		0.983		50.6	mg/kg	99.1	(75%-125%)			
Boron	50.1	U	0.986		48.1	mg/kg	96	(75%-125%)			

QC Summary

Workorder: 361900 **Client SDG:** XP0168 **Project Description:** RC-107 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis-ICP											
Batch 1439189											
Cadmium	50.1	B	0.216		47.8	mg/kg		95	(75%-125%)	JWJ	12/01/14 15:20
Calcium	501		4550		5630	mg/kg		N/A	(75%-125%)		
Chromium	50.1		8.65		56.0	mg/kg		94.5	(75%-125%)		
Cobalt	50.1		8.02		55.8	mg/kg		95.5	(75%-125%)		
Copper	50.1		10.5		61.7	mg/kg		102	(75%-125%)		
Iron	501		16100		17200	mg/kg		N/A	(75%-125%)		
Lead	50.1		33.8		79.4	mg/kg		91	(75%-125%)		
Magnesium	501		3600		4470	mg/kg		N/A	(75%-125%)		
Manganese	50.1		232		296	mg/kg		N/A	(75%-125%)		
Molybdenum	50.1	U	0.197		46.9	mg/kg		93.6	(75%-125%)		
Nickel	50.1		8.65		56.5	mg/kg		95.5	(75%-125%)		
Potassium	501		715		1240	mg/kg		105	(75%-125%)		
Silicon	501	N	1010	N	929	mg/kg		0*	(75%-125%)		
Silver	50.1	B	0.196		49.1	mg/kg		97.6	(75%-125%)		
Sodium	501	*	137		680	mg/kg		109	(75%-125%)		
Vanadium	50.1		43.4		95.1	mg/kg		103	(75%-125%)		
Zinc	50.1	CM	29.6		74.9	mg/kg		90.4	(75%-125%)		
QC1203219998 361900001 PS											
Silicon	5000	N	10200		14700	ug/L		90.5	(80%-120%)		12/01/14 15:24
QC1203217778 361900001 SDILT											
Aluminum			50900	D	10600	ug/L	4.05		(0%-10%)		12/01/14 15:22
Antimony		DU	2.13	DU	16.3	ug/L	N/A		(0%-10%)		12/01/14 16:52
Arsenic			85.3	D	16.7	ug/L	1.92		(0%-10%)		12/01/14 15:22

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QC Summary

Workorder: 361900 **Client SDG:** XP0168 **Project Description:** RC-107 Soil

Parmname	NOM	Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis-ICP										
Batch 1439189										
Barium		399	D	80.8	ug/L	1.22		(0%-10%)	JWJ	12/01/14 15:22
Beryllium		9.97	D	2.17	ug/L	8.94		(0%-10%)		
Boron	U	-7.91	DU	4.93	ug/L	N/A		(0%-10%)		
Cadmium	B	2.19	DU	0.493	ug/L	N/A		(0%-10%)		
Calcium		46200	D	9410	ug/L	1.91		(0%-10%)		
Chromium		87.7	D	16.6	ug/L	5.31		(0%-10%)		
Cobalt		81.4	D	17.2	ug/L	5.94		(0%-10%)		
Copper		107	D	20.9	ug/L	1.83		(0%-10%)		
Iron		163000	D	33600	ug/L	2.71		(0%-10%)		
Lead		343	D	69.7	ug/L	1.57		(0%-10%)		
Magnesium		36500	D	7550	ug/L	3.26		(0%-10%)		
Manganese		2360	D	486	ug/L	3.15		(0%-10%)		
Molybdenum	U	-4.66	DU	0.986	ug/L	N/A		(0%-10%)		
Nickel		87.7	D	18.6	ug/L	5.76		(0%-10%)		
Potassium		7250	D	1490	ug/L	2.98		(0%-10%)		
Silicon	N	10200	D	2030	ug/L	.676		(0%-10%)		
Silver	B	1.99	DU	0.493	ug/L	N/A		(0%-10%)		
Sodium	*	1380	D	289	ug/L	4.5		(0%-10%)		
Vanadium		440	D	87.4	ug/L	.768		(0%-10%)		
Zinc	CM	300	DM	66.6	ug/L	10.9*		(0%-10%)		
Metals Analysis-Mercury										
Batch 1439275										

QC Summary

Workorder: 361900 **Client SDG:** XP0168 **Project Description:** RC-107 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD/D%	REC%	Range	Anlst	Date Time
Metals Analysis-Mercury											
Batch 1439275											
QC1203218012 361900001 DUP											
Mercury		B	0.00417	B	0.00591	mg/kg	34.5 ^		(+/-0.0123)	MTM1	12/01/14 10:11
QC1203218011 LCS											
Mercury	0.117				0.112	mg/kg		95.8	(80%-120%)		12/01/14 10:04
QC1203218010 MB											
Mercury				U	0.00397	mg/kg					12/01/14 10:02
QC1203218013 361900001 MS											
Mercury	0.119	B	0.00417		0.121	mg/kg		98.1	(80%-120%)		12/01/14 10:13
QC1203218014 361900001 SDILT											
Mercury		B	0.069	DU	0.0203	ug/L	N/A		(0%-10%)		12/01/14 10:14

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: 30 March 2015
To: Washington Closure Hanford Inc. (technical representative)
From: ELR Consulting
Project: 100-H Remaining Sites Burial Grounds – Soil Full Protocol - Waste Site 100-H-28
Subject: Diesel Range Organic - Data Package No. XP0168-GEL

INTRODUCTION

This memo presents the results of data validation on Data Package No. XP0168 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
J1V1L0	11/24/14	Soil	C	See note 1
J1V1L1	11/24/14	Soil	C	See note 1
J1V1L2	11/20/14	Soil	C	See note 1
J1V1L3	11/20/14	Soil	C	See note 1
J1V1L4	11/24/14	Soil	C	See note 1
J1V1L5	11/24/14	Soil	C	See note 1
J1V1L6	11/24/14	Soil	C	See note 1
J1V1L7	11/24/14	Soil	C	See note 1
J1V1L8	11/20/14	Soil	C	See note 1
J1V1L9	11/20/14	Soil	C	See note 1
J1V1M0	11/20/14	Soil	C	See note 1
J1V1M1	11/20/14	Soil	C	See note 1
J1V1M2	11/20/14	Soil	C	See note 1

1 – Diesel range organics by NWTPH-d.

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

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

DATA QUALITY OBJECTIVES

Holding Times

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

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

All holding times were acceptable.

Method Blanks

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

All method blank results were acceptable.

Field (equipment) Blanks

No field blanks were submitted for analysis.

Accuracy

Matrix Spike/Matrix Spike Duplicate & Blank Spike Recoveries

Matrix spike/matrix spike duplicate analyses are used to assess the analytical accuracy of the reported data and the effect of the matrix on the ability to accurately quantify sample concentrations. Matrix spike/matrix spike duplicate analyses are performed in

duplicate using five compounds for which percent recoveries must be within a range of 50-150% or within laboratory control limits. If spike recoveries are outside control limits, detected sample results less than five times the spike concentration are qualified as estimates and flagged "J". Undetected sample results with spike recoveries below control limits are qualified as estimates and flagged "UJ". Undetected sample results are not qualified if the spike recovery is above control limits. Sample results greater than five times the spike concentration require no qualification.

All accuracy results were acceptable.

Surrogate Recovery

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

All surrogate results were acceptable.

- **Precision**

Matrix Spike/Matrix Spike Duplicate Samples

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

All duplicate results were acceptable.

Field Duplicate Samples

One set of field duplicates (J1V1L8/J1V1M2) were submitted for analysis. Field duplicates are compared using the same criteria as for laboratory duplicates. All field

duplicate results were acceptable.

- **Analytical Detection Levels**

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

- **Completeness**

Data package No. XP0168 was submitted for validation and verified for completeness. Completeness is based on the percentage of data determined to be valid (i.e., not rejected). The completion percentage was 100%.

MAJOR DEFICIENCIES

None found.

MINOR DEFICIENCIES

None found.

REFERENCES

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

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

Appendix 1

Glossary of Data Reporting Qualifiers

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

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

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

J - Indicates the compound or analyte was analyzed for and detected. Due to a minor QC deficiency identified during the data validation, the associated quantitation limit is an estimate.

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

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

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

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

Appendix 2

Summary of Data Qualification

DIESEL RANGE ORGANIC DATA QUALIFICATION SUMMARY*

SDG: XP0168	REVIEWER: ELR	Project: 100-H-28	PAGE_1_OF_1
COMMENTS: No qualifiers assigned			

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

Appendix 3

Annotated Laboratory Reports

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Certificate of Analysis

Report Date: December 2, 2014

Company :	WC-Hanford, Inc.		
Address :	2620 Fermi Avenue MSIN H4-21 Richland, Washington 99354		
Contact:	Joan Kessner	Client SDG:	XP0168
Project:	RC-107 Soil		

Client Sample ID:	J1V1L2	Project:	WCHN00720
Sample ID:	361900001	Client ID:	WCHN001
Matrix:	Soil		
Collect Date:	20-NOV-14 11:02		
Receive Date:	25-NOV-14		
Collector:	Client		
Moisture:	2.5%		

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	2210	2210	6810	ug/kg	1	BYT1	12/01/14	1845	1439114	1
Motor Oil (C20-C36)	J	3220	2210	6810	ug/kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	3541 DRO IN SOIL PREP	SJW1	11/26/14	1100	1439113

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"	439 ug/kg	681	64.4	(50%-150%)

Notes:

3/27/15

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: December 2, 2014

Company :	WC-Hanford, Inc.
Address :	2620 Fermi Avenue MSIN H4-21 Richland, Washington 99354
Contact:	Joan Kessner
Project:	RC-107 Soil

Client SDG: XP0168

Client Sample ID:	J1V1L3	Project:	WCHN00720
Sample ID:	361900002	Client ID:	WCHN001
Matrix:	Soil		
Collect Date:	20-NOV-14 10:51		
Receive Date:	25-NOV-14		
Collector:	Client		
Moisture:	1.67%		

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	2200	2200	6770	ug/kg	1	BYT1	11/30/14	2246	1439114	1
Motor Oil (C20-C36)	U	2200	2200	6770	ug/kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	3541 DRO IN SOIL PREP	SJW1	11/26/14	1100	1439113

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"	349 ug/kg	677	51.5	(50%-150%)

Notes:

3/27/15

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: December 2, 2014

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-107 Soil

Client SDG: XP0168

Client Sample ID: J1V1L8
Sample ID: 361900003
Matrix: Soil
Collect Date: 20-NOV-14 10:08
Receive Date: 25-NOV-14
Collector: Client
Moisture: 3.57%

Project: WCHN00720
Client ID: WCHN001

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	2240	2240	6900	ug/kg	1	BYT1	12/01/14	1924	1439114	1
Motor Oil (C20-C36)	J	4880	2240	6900	ug/kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	3541 DRO IN SOIL PREP	SJW1	11/26/14	1100	1439113

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"	519 ug/kg	690	75.2	(50%-150%)

Notes:

3/27/15

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: December 2, 2014

Company :	WC-Hanford, Inc.		
Address :	2620 Fermi Avenue MSIN H4-21 Richland, Washington 99354		
Contact:	Joan Kessner	Client SDG:	XP0168
Project:	RC-107 Soil		

Client Sample ID:	J1V1L9	Project:	WCHN00720
Sample ID:	361900004	Client ID:	WCHN001
Matrix:	Soil		
Collect Date:	20-NOV-14 10:38		
Receive Date:	25-NOV-14		
Collector:	Client		
Moisture:	4.25%		

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	2260	2260	6950	ug/kg	1	BYT1	12/01/14	0003	1439114	1
Motor Oil (C20-C36)	J	4620	2260	6950	ug/kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	3541 DRO IN SOIL PREP	SJW1	11/26/14	1100	1439113

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"	376 ug/kg	695	54.1	(50%-150%)

Notes:

3/27/15

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Certificate of Analysis

Report Date: December 2, 2014

Company :	WC-Hanford, Inc.		
Address :	2620 Fermi Avenue MSIN H4-21 Richland, Washington 99354		
Contact:	Joan Kessner	Client SDG:	XP0168
Project:	RC-107 Soil		

Client Sample ID:	J1V1M1	Project:	WCHN00720
Sample ID:	361900005	Client ID:	WCHN001
Matrix:	Soil		
Collect Date:	20-NOV-14 10:26		
Receive Date:	25-NOV-14		
Collector:	Client		
Moisture:	2.94%		

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	2220	2220	6840	ug/kg	1	BYT1	12/01/14	0041	1439114	1
Motor Oil (C20-C36)	J	3910	2220	6840	ug/kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	3541 DRO IN SOIL PREP	SJW1	11/26/14	1100	1439113

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"	476 ug/kg	684	69.5	(50%-150%)

Notes:

3/27/15

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Certificate of Analysis

Report Date: December 2, 2014

Company :	WC-Hanford, Inc.		
Address :	2620 Fermi Avenue MSIN H4-21 Richland, Washington 99354		
Contact:	Joan Kessner	Client SDG:	XP0168
Project:	RC-107 Soil		

Client Sample ID:	JJV1M2	Project:	WCHN00720
Sample ID:	361900006	Client ID:	WCHN001
Matrix:	Soil		
Collect Date:	20-NOV-14 10:08		
Receive Date:	25-NOV-14		
Collector:	Client		
Moisture:	3.32%		

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	2240	2240	6880	ug/kg	1	BYT1	12/01/14	0120	1439114	1
Motor Oil (C20-C36)	J	3020	2240	6880	ug/kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	3541 DRO IN SOIL PREP	SJW1	11/26/14	1100	1439113

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"	467 ug/kg	688	68.0	(50%-150%)

Notes:

3/22/15

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Certificate of Analysis

Report Date: December 2, 2014

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-107 Soil

Client SDG: XP0168

Client Sample ID: J1V1L0
Sample ID: 361900007
Matrix: Soil
Collect Date: 20-NOV-14 08:11
Receive Date: 25-NOV-14
Collector: Client
Moisture: 6.64%

Project: WCHN00720
Client ID: WCHN001

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	2320	2320	7130	ug/kg	1	BYT1	12/01/14	0158	1439114	1
Motor Oil (C20-C36)	J	6370	2320	7130	ug/kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	3541 DRO IN SOIL PREP	SJW1	11/26/14	1100	1439113

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"	486 ug/kg	713	68.2	(50%-150%)

Notes:

3/27/15

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Certificate of Analysis

Report Date: December 2, 2014

Company :	WC-Hanford, Inc.
Address :	2620 Fermi Avenue MSIN H4-21 Richland, Washington 99354
Contact:	Joan Kessner
Project:	RC-107 Soil

Client SDG: XP0168

Client Sample ID:	J1V1L1	Project:	WCHN00720
Sample ID:	361900008	Client ID:	WCHN001
Matrix:	Soil		
Collect Date:	20-NOV-14 08:04		
Receive Date:	25-NOV-14		
Collector:	Client		
Moisture:	5.8%		

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	2300	2300	7070	ug/kg	1	BYT1	12/01/14	1140	1439114	1
Motor Oil (C20-C36)		8300	2300	7070	ug/kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	3541 DRO IN SOIL PREP	SJW1	11/26/14	1100	1439113

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"	592 ug/kg	707	83.7	(50%-150%)

Notes:

3/27/15

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Certificate of Analysis

Report Date: December 2, 2014

Company :	WC-Hanford, Inc.
Address :	2620 Fermi Avenue MSIN H4-21 Richland, Washington 99354
Contact:	Joan Kessner
Project:	RC-107 Soil

Client SDG: XP0168

Client Sample ID:	J1V1L4	Project:	WCHN00720
Sample ID:	361900009	Client ID:	WCHN001
Matrix:	Soil		
Collect Date:	20-NOV-14 07:58		
Receive Date:	25-NOV-14		
Collector:	Client		
Moisture:	5.2%		

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	2280	2280	7030	ug/kg	1	BYT1	12/01/14	1336	1439114	1
Motor Oil (C20-C36)		8580	2280	7030	ug/kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	3541 DRO IN SOIL PREP	SJW1	11/26/14	1100	1439113

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"	535 ug/kg	703	76.1	(50%-150%)

Notes:

3/27/15

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Certificate of Analysis

Report Date: December 2, 2014

Company :	WC-Hanford, Inc.		
Address :	2620 Fermi Avenue MSIN H4-21 Richland, Washington 99354		
Contact:	Joan Kessner	Client SDG:	XP0168
Project:	RC-107 Soil		

Client Sample ID:	J1V1L5	Project:	WCHN00720
Sample ID:	361900010	Client ID:	WCHN001
Matrix:	Soil		
Collect Date:	20-NOV-14 07:43		
Receive Date:	25-NOV-14		
Collector:	Client		
Moisture:	5.36%		

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	2280	2280	7030	ug/kg	1	BYT1	12/01/14	1415	1439114	1
Motor Oil (C20-C36)	J	4090	2280	7030	ug/kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	3541 DRO IN SOIL PREP	SJW1	11/26/14	1100	1439113

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"	458 ug/kg	703	65.2	(50%-150%)

Notes:

K 3/27/15

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: December 2, 2014

Company : WC-Hanford, Inc.
Address : 2620 Fermi Avenue
MSIN H4-21
Richland, Washington 99354
Contact: Joan Kessner
Project: RC-107 Soil

Client SDG: XP0168

Client Sample ID: J1V1L6
Sample ID: 361900011
Matrix: Soil
Collect Date: 20-NOV-14 07:38
Receive Date: 25-NOV-14
Collector: Client
Moisture: 4.88%

Project: WCHN00720
Client ID: WCHN001

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	2270	2270	6990	ug/kg	1	BYT1	12/01/14	1454	1439114	1
Motor Oil (C20-C36)	J	2830	2270	6990	ug/kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	3541 DRO IN SOIL PREP	SJW1	11/26/14	1100	1439113

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"	456 ug/kg	699	65.2	(50%-150%)

Notes:

3/27/15

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: December 2, 2014

Company :	WC-Hanford, Inc.
Address :	2620 Fermi Avenue MSIN H4-21 Richland, Washington 99354
Contact:	Joan Kessner
Project:	RC-107 Soil

Client SDG: XP0168

Client Sample ID:	J1V1L7	Project:	WCHN00720
Sample ID:	361900012	Client ID:	WCHN001
Matrix:	Soil		
Collect Date:	20-NOV-14 07:32		
Receive Date:	25-NOV-14		
Collector:	Client		
Moisture:	8.22%		

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	2360	2360	7250	ug/kg	1	BYT1	12/02/14	1256	1439114	1
Motor Oil (C20-C36)	J	2890	2360	7250	ug/kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	3541 DRO IN SOIL PREP	SJW1	11/26/14	1100	1439113

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"	503 ug/kg	725	69.5	(50%-150%)

Notes:

3/27/15

GEL LABORATORIES LLC

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

Certificate of Analysis

Report Date: December 2, 2014

Company :	WC-Hanford, Inc.
Address :	2620 Fermi Avenue MSIN H4-21 Richland, Washington 99354
Contact:	Joan Kessner
Project:	RC-107 Soil

Client SDG: XP0168

Client Sample ID:	J1V1M0	Project:	WCHN00720
Sample ID:	361900013	Client ID:	WCHN001
Matrix:	Soil		
Collect Date:	20-NOV-14 07:26		
Receive Date:	25-NOV-14		
Collector:	Client		
Moisture:	5.33%		

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	2290	2290	7040	ug/kg	1	BYT1	12/01/14	1611	1439114	1
Motor Oil (C20-C36)	J	2540	2290	7040	ug/kg	1					

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
SW846 3541	3541 DRO IN SOIL PREP	SJW1	11/26/14	1100	1439113

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"	388 ug/kg	704	55.1	(50%-150%)

Notes:

3/27/15

Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

FID Diesel Range Organics
WC-HANFORD, INC. (WCHN)
SDG XP0168

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:	1439114
Prep Batch Number:	1439113

Sample Analysis

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

Sample ID	Client ID
361900001	J1V1L2
361900002	J1V1L3
361900003	J1V1L8
361900004	J1V1L9
361900005	J1V1M1
361900006	J1V1M2
361900007	J1V1L0
361900008	J1V1L1
361900009	J1V1L4
361900010	J1V1L5
361900011	J1V1L6
361900012	J1V1L7
361900013	J1V1M0
1203217603	MB for batch 1439113
1203217604	Laboratory Control Sample (LCS)
1203217605	361900008(J1V1L1) Matrix Spike (MS)
1203217606	361900008(J1V1L1) 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 361900008 (J1V1L1) 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 DER was not required for this SDG in this batch. A data exception report (DER) was not generated for this SDG.

Manual Integrations
Samples required manual integration for surrogates.

Additional Comments
The additional comments field is used to address special issues associated with each analysis, clarify method/contractual issues pertaining to the analysis, and to list any report documents generated as a result of sample analysis or review. The additional comments were not required.

System Configuration

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

Instrument ID	Instrument	System Configuration	Column ID	Column Description
FID7.I	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.

Washington Closure Hanford — CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

RC-107-119 | Page 1 of 3

Collector: Q Stowe	Company Contact: Joan Kessner	Telephone No.: 375-4688	Project Coordinator: KESSNER, JH
Price Code: 8B	Data Turnaround: 7days		
Project Designation: 100-H Field Remediation	Sampling Location: 100-H-28 et al, north overburden pile		SAF No.: RC-107
Ice Chest No.: RCC-07-002	Field Logbook No.: EL-1627-08	COA: 01H2832000	Method of Shipment: Commerical Carrier - fedex
Shipped To: GEL Laboratories Charlston	Offsite Property No.: A131294		Bill of Lading/Air Bill No.: See OSPC

Other Labs Shipped To: Eberline Services Oak Ridge

POSSIBLE SAMPLE HAZARDS/REMARKS: none

Special Handling and/or Storage: none

Sample No.	Matrix	Sample Date	Sample Time	Preservation	None	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C		
				Type of Container	G/P	G/P	G/P	aG	aG	aG	aG	G		
				No. of Container(s)	1	1	1	1	1	1	1	1		
				Volume	250mL	125mL	250mL	250mL	250mL	250mL	250mL	125mL		
				Sample Analysis	See item (1) in Special Instructions	Chromium Hex - 7196	See item (2) in Special Instructions	PCBs - 8082	Pesticides - 8081	PAHs - 8310	Semi-VOA - 8270 (TCL)	TPH-Diesel Range - WTPH-D +		
~~J1V1L0~~	~~SOIL~~	DWS 11/20/14												
~~J1V1L1~~	~~SOIL~~													
J1V1L2	SOIL	11/20/14	1102		✓	✓	✓	✓	✓	✓	✓	✓		
J1V1L3	SOIL	11/20/14	1051		✓	✓	✓	✓	✓	✓	✓	✓		
~~J1V1L4~~	~~SOIL~~	DWS 11/20/14												

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Quincy Stowe	11-20-14 1110	DWSHEA DWSHEA 11/20/14 WCH	1110
DWSHEA DWSHEA	11/20/14 1545	C. Bingham	11-20-14 1545
C. Bingham	11-20-14 1550	1060 Battelle, fridge #14	11-20-14 1550
1060 Battelle, fridge #14	11-24-14 0715	C. Bingham	11-24-14 0715
C. Bingham WCH	11-24-14 0730	fed ex	
FED EX		P. Ward Patricia Dent	11-25-14 0730

FINAL SAMPLE DISPOSITION: Disposal Method | Disposed By | Date/Time

SPECIAL INSTRUCTIONS

(1) ICP Metals - 6010TR (Close-out List) (Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silicon, Silver, Sodium, Vanadium, Zinc); Mercury - 7471 - (CV)
(2) IC Anions - 9056 (Bromide, Chloride, Fluoride, Nitrogen in Nitrate, Nitrogen in Nitrite, Phosphorous in phosphate, Sulfate); NO2/NO3 - 353.2 (Nitrogen in Nitrite and Nitrate); pH (Soil) - 9045 (pH Measurement)

REVIEWED BY K. Woodruff DATE 11-24-14

XP0168

WCH-EE-011

Washington Closure Hanford

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

RC-107-119

Collector: Q Stowe	Company Contact: Joan Kessner	Telephone No.: 375-4688	Project Coordinator: KESSNER, JH
Project Designation: 100-H Field Remediation	Sampling Location: 100-H-28 et al, north overburden pile		SAF No.: RC-107
Ice Chest No.: RCC-07-002	Field Logbook No.: EL-1627-08	COA: 01H2832000	Method of Shipment: Commerical Carrier - fed ex
Shipped To: GEL Laboratories Charlston	Offsite Property No.: A131294		Bill of Lading/Air Bill No.: See OSPC

Price Code: 8B

Data Turnaround: 7 days

Other Labs Shipped To: Eberline Services Oak Ridge

POSSIBLE SAMPLE HAZARDS/REMARKS

none

Special Handling and/or Storage

none

Preservation	None	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C		
Type of Container	G/P	G/P	G/P	aG	aG	aG	aG	G		
No. of Container(s)	1	1	1	1	1	1	1	1		
Volume	250mL	125mL	250mL	250mL	250mL	250mL	250mL	125mL		
Sample Analysis	See item (1) in Special Instructions	Chromium Hex - 7196	See item (2) in Special Instructions	PCBs - 8082	Pesticides - 8081	PAHs - 8310	Semi-VOA - 8270 (TCL)	TPH-Diesel Range - WTPH-D +		

Sample No.	Matrix	Sample Date	Sample Time										
~~J1V1L5~~	~~SOIL~~	DWSHEA 11/20/14											
~~J1V1L6~~	~~SOIL~~												
~~J1V1L7~~	~~SOIL~~												
J1V1L8	SOIL	11/20/14	1008	✓	✓	✓	✓	✓	✓	✓	✓		
J1V1L9	SOIL	11/20/14	1038	✓	✓	✓	✓	✓	✓	✓	✓		

CHAIN OF POSSESSION

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Quincy Stowe	11-20-14 1110	WCH Dwshea DWSHEA	11/20/14 1110
Dwshea DWSHEA	11/20/14 1545	C. Bingham	11-20-14 1545
C. Bingham	11-20-14 1550	1060 Battelle, fridge #1A	11-20-14 1550
1060 Battelle, fridge #1A	11-24-14 0715	C. Bingham	11-24-14 0715
C. Bingham WCH	11-24-14 0730	fed ex	
FED EX		P. Ulent Patricia Dent	11-25-14 0930

Sign/Print Names

SPECIAL INSTRUCTIONS

(1) ICP Metals - 6010TR (Close-out List) (Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silicon, Silver, Sodium, Vanadium, Zinc); Mercury - 7471 - (CV)

(2) IC Anions - 9056 (Bromide, Chloride, Fluoride, Nitrogen in Nitrate, Nitrogen in Nitrite, Phosphorous in phosphate, Sulfate); NO2/NO3 - 353.2 (Nitrogen in Nitrite and Nitrate); pH (Soil) - 9045 (pH Measurement)

REVIEWED BY K. Woodvia email DATE 11-24-14

FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

XP0168

WCH-EE-011

Washington Closure Hanford — CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

RC-107-119 | Page 3 of 3

Collector: Q Stowe	Company Contact: Joan Kessner	Telephone No.: 375-4688	Project Coordinator: KESSNER, JH
Price Code: 8B	Data Turnaround: 7 days		
Project Designation: 100-H Field Remediation	Sampling Location: 100-H-28 et al, north overburden pile		SAF No.: RC-107
Ice Chest No.: RCC-07-002	Field Logbook No.: EL-1627-08	COA: 01H2832000	Method of Shipment: Commerical Carrier - fed ex
Shipped To: GEL Laboratories Charlston	Offsite Property No.: A131294		Bill of Lading/Air Bill No.: See OSPC

Other Labs Shipped To: Eberline Services Oak Ridge

POSSIBLE SAMPLE HAZARDS/REMARKS: none

Special Handling and/or Storage: none

Preservation	None	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C		
Type of Container	G/P	G/P	G/P	aG	aG	aG	aG	G		
No. of Container(s)	1	1	1	1	1	1	1	1		
Volume	250mL	125mL	250mL	250mL	250mL	250mL	250mL	125mL		
Sample Analysis	See item (1) in Special Instructions	Chromium Hex - 7196	See item (2) in Special Instructions	PCBs - 8082	Pesticides - 8081	PAHs - 8310	Semi-VOA - 8270 (TCL)	TPH-Diesel Range - WTPH-D +		

Sample No.	Matrix	Sample Date	Sample Time									
~~J1V0M0~~	~~SOIL~~	DWS 11/20/14										
J1V1M1	SOIL	11/20/14	1026	✓	✓	✓	✓	✓	✓	✓	✓	
J1V1M2	SOIL	11/20/14	1008	✓	✓	✓	✓	✓	✓	✓	✓	

CHAIN OF POSSESSION / Sign/Print Names

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Quincy Stowe	11-20-14 1110	DWSHEA DWSHEA	11/20/14 1110
DWSHEA DWSHEA	11/20/14 1545	C. Bingham	11-20-14 1545
C. Bingham	11-20-14 1550	1060 Battelle, fridge #14	11-20-14 1550
1060 Battelle, fridge #14	11-24-14 0715	C. Bingham	11-24-14 0715
C. Bingham WCH	11-24-14 0730	fed ex	
FED EX		P. Dent Patricia Dent	11-25-14 0930

FINAL SAMPLE DISPOSITION: Disposal Method | Disposed By | Date/Time

SPECIAL INSTRUCTIONS

(1) ICP Metals - 6010TR (Close-out List) (Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silicon, Silver, Sodium, Vanadium, Zinc); Mercury - 7471 - (CV)
(2) IC Anions - 9056 (Bromide, Chloride, Fluoride, Nitrogen in Nitrate, Nitrogen in Nitrite, Phosphorous in phosphate, Sulfate); NO2/NO3 - 353.2 (Nitrogen in Nitrite and Nitrate); pH (Soil) - 9045 (pH Measurement)

REVIEWED BY K. Wood Vincent DATE 11-24-14

XP0168

WCH-EE-011

Washington Closure Hanford — CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

RC-107-119 | Page 1 of 3

Collector: Q Stone	Company Contact: Joan Kessner	Telephone No.: 375-4688	Project Coordinator: KESSNER, JH
Price Code: 8B	Data Turnaround: 7days		
Project Designation: 100-H Field Remediation	Sampling Location: 100-H-28 et al, north overburden pile		SAF No.: RC-107
Ice Chest No.: RCC-07-002	Field Logbook No.: EL-1627-08	COA: 01H2832000	Method of Shipment: Commerical Carrier fed ex
Shipped To: GEL Laboratories Charlston	Offsite Property No.: A131294		Bill of Lading/Air Bill No.: See OSPC

Other Labs Shipped To: Eberline Services Oak Ridge

POSSIBLE SAMPLE HAZARDS/REMARKS: none

Special Handling and/or Storage: none

Sample No.	Matrix	Sample Date	Sample Time	Preservation	Type of Container	No. of Container(s)	Volume	Sample Analysis
				None	G/P	1	250mL	See item (1) in Special Instructions
				Cool 4C	G/P	1	125mL	Chromium Hex - 7196
				Cool 4C	G/P	1	250mL	See item (2) in Special Instructions
				Cool 4C	aG	1	250mL	PCBs - 8082
				Cool 4C	aG	1	250mL	Pesticides - 8081
				Cool 4C	aG	1	250mL	PAHs - 8310
				Cool 4C	aG	1	250mL	Semi-VOA - 8270 (TCL)
				Cool 4C	G	1	125mL	TPH-Diesel Range - WTPH-D +
J1V1L0	SOIL	11/24/14	0801	✓	✓	✓	✓	✓
J1V1L1	SOIL	11/24/14	0804	✓	✓	✓	✓	✓
~~J1V1L2~~	~~SOIL~~	DWSHEA 11/20/14						
~~J1V1L3~~	~~SOIL~~							
J1V1L4	SOIL	11/24/14	0758	✓	✓	✓	✓	✓

CHAIN OF POSSESSION / Sign/Print Names

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Quincy Stone	0822 11/24/14	WCH DWSHEA	11/24/14 0822
DWSHEA	11/24/14 0933	C. Bingham	11-24-14 0933
C. Bingham WCH	11-24-14 0950	fed ex	
FED EX		P. Dent PATRICIA DENT	0930 11-25-14

FINAL SAMPLE DISPOSITION: Disposal Method | Disposed By | Date/Time

SPECIAL INSTRUCTIONS

(1) ICP Metals - 6010TR (Close-out List) (Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silicon, Silver, Sodium, Vanadium, Zinc); Mercury - 7471 - (CV)
(2) IC Anions - 9056 (Bromide, Chloride, Fluoride, Nitrogen in Nitrate, Nitrogen in Nitrite, Phosphorous in phosphate, Sulfate); NO2/NO3 - 353.2 (Nitrogen in Nitrite and Nitrate); pH (Soil) - 9045 (pH Measurement)

REVIEWED BY K. Woodworth DATE 11-24-14

11-24-14 CMB

XP0169 8

WCH-EE-011

Washington Closure Hanford — CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

RC-107-119 | Page 2 of 3

Collector	Q Stowe
Company Contact	Joan Kessner
Telephone No.	375-4688
Project Coordinator	KESSNER, JH
Price Code	8B
Data Turnaround	7 days
Project Designation	100-H Field Remediation
Sampling Location	100-H-28 et al, north overburden pile
SAF No.	RC-107
Ice Chest No.	RCC-07-002
Field Logbook No.	EL-1627-08
COA	01H2832000
Method of Shipment	Commerical Carrier — fed ex
Shipped To	GEL Laboratories Charlston
Offsite Property No.	A131294
Bill of Lading/Air Bill No.	See OSPC
Other Labs Shipped To	Eberline Services Oak Ridge

POSSIBLE SAMPLE HAZARDS/REMARKS
none

Special Handling and/or Storage
none

Sample No.	Matrix	Sample Date	Sample Time	Preservation	None	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C		
				Type of Container	G/P	G/P	G/P	aG	aG	aG	aG	G		
				No. of Container(s)	1	1	1	1	1	1	1	1		
				Volume	250mL	125mL	250mL	250mL	250mL	250mL	250mL	125mL		
				Sample Analysis	See item (1) in Special Instructions	Chromium Hex - 7196	See item (2) in Special Instructions	PCBs - 8082	Pesticides - 8081	PAHs - 8310	Semi-VOA - 8270 (TCL)	TPH-Diesel Range - WTPH-D +		
J1V1L5	SOIL	11/24/14	0743		✓	✓	✓	✓	✓	✓	✓	✓		
J1V1L6	SOIL	11/24/14	0738		✓	✓	✓	✓	✓	✓	✓	✓		
J1V1L7	SOIL	11/24/14	0732		✓	✓	✓	✓	✓	✓	✓	✓		
~~J1V1L8~~	~~SOIL~~	DWShea												
~~J1V1L9~~	~~SOIL~~	11/20/14												

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Quincy Stowe	11/24/14 0822	DWShea DWSHEA WCH	11/24/14 0822
DWShea DWShea	11/24/14 0933	C. Bingham	11-24-14 0933
C. Bingham WCH	11-24-14 0950	fed ex	
FED EX		P. Dent Patricia Dent	11-25-14 0930

FINAL SAMPLE DISPOSITION: Disposal Method | Disposed By | Date/Time

SPECIAL INSTRUCTIONS

(1) ICP Metals - 6010TR (Close-out List) (Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silicon, Silver, Sodium, Vanadium, Zinc); Mercury - 7471 - (CV)
(2) IC Anions - 9056 (Bromide, Chloride, Fluoride, Nitrogen in Nitrate, Nitrogen in Nitrite, Phosphorous in phosphate, Sulfate); NO2/NO3 - 353.2 (Nitrogen in Nitrite and Nitrate); pH (Soil) - 9045 (pH Measurement)

REVIEWED BY K. Wood Vincent DATE 11-24-14

11-24-14 CMO

XP0169/8

WCH-EE-011

Washington Closure Hanford

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

RC-107-119

Collector: Q Stowe	Company Contact: Joan Kessner	Telephone No.: 375-4688	Project Coordinator: KESSNER, JH
Project Designation: 100-H Field Remediation	Sampling Location: 100-H-28 et al, north overburden pile		SAF No.: RC-107
Ice Chest No.: RCC-07-002	Field Logbook No.: EL-1627-08	COA: 01H2832000	Method of Shipment: Commerical Carrier - fed ex
Shipped To: GEL Laboratories Charlston	Offsite Property No.: A131294		Bill of Lading/Air Bill No.: See OSPC

Price Code: 8B

Data Turnaround: 7days

Other Labs Shipped To: Eberline Services Oak Ridge

POSSIBLE SAMPLE HAZARDS/REMARKS

none

Special Handling and/or Storage

none

Preservation	None	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C		
Type of Container	G/P	G/P	G/P	aG	aG	aG	aG	G		
No. of Container(s)	1	1	1	1	1	1	1	1		
Volume	250mL	125mL	250mL	250mL	250mL	250mL	250mL	125mL		
Sample Analysis	See item (1) in Special Instructions	Chromium Hex - 7196	See item (2) in Special Instructions	PCBs - 8082	Pesticides - 8081	PAHs - 8310	Semi-VOA - 8270 (TCL)	TPH-Diesel Range - WTPH-D +		

Sample No.	Matrix	Sample Date	Sample Time										
J1V1M0	SOIL	11/24/14	0726	✓	✓	✓	✓	✓	✓	✓	✓		
~~J1V1M1~~	~~SOIL~~	DWShea											
~~J1V1M2~~	~~SOIL~~	11/20/14											

CHAIN OF POSSESSION

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Quincy Stowe	11/24/14 0822	WCH DWSHEA	11/24/14 0822
DWSHEA	11/24/14 0933	C. Bingham	11-24-14 0933
C. Bingham WCH	11-24-14 0950	fed ex	
FED EX		P. Dent Patricia Dent	11-25-14 0930

Sign/Print Names

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

SPECIAL INSTRUCTIONS

(1) ICP Metals - 6010TR (Close-out List) {Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silicon, Silver, Sodium, Vanadium, Zinc}; Mercury - 7471 - (CV)

(2) IC Anions - 9056 {Bromide, Chloride, Fluoride, Nitrogen in Nitrate, Nitrogen in Nitrite, Phosphorous in phosphate, Sulfate}; NO2/NO3 - 353.2 {Nitrogen in Nitrite and Nitrate}; pH (Soil) - 9045 (pH Measurement)

REVIEWED BY K. Wood Viacmo DATE 11-24-14

11-24-14 CMD

XP0168

WCH-EE-011

Appendix 5

Data Validation Supporting Documentation

GENERAL ORGANIC DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E
PROJECT: 100-H-28			DATA PACKAGE: XP0168		
VALIDATOR: ELR		LAB: GCL		DATE: 3/26/15	
			SDG: XP0168		
ANALYSES PERFORMED					
8015	8021	8141	8151	8315	
		WTPH-HCID	WTPH-G	WTPH-D	
SAMPLES/MATRIX:					
J1VIL0	J1VIL7	J1VIL2	J1VIL3	J1VIL4	J1VIL5
J1VIL6	J1VIL7	J1VIL8	J1VIL9	J1VIM0	J1VIM1
J1VIM2					
					Soil

1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE

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

Comments:

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

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

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

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

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

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

Comments:

GENERAL ORGANIC DATA VALIDATION CHECKLIST

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

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

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

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

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

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

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

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

Comments: No FB

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

Surrogates/system monitoring compounds analyzed? ..... Yes No N/A

Surrogate/system monitoring compound recoveries acceptable? ..... Yes No N/A

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

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

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

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

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

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

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

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

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

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

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

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

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

Comments: No 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)

Fluoricil ® (or other aborbant) cleanup performed? ..... Yes No N/A

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

Check recoveries aceptable? ..... Yes No N/A

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

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

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

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

Comments:

Appendix 6

Additional Documentation Requested by Client

GEL LABORATORIES LLC

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

QC Summary

Report Date: December 2, 2014

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

Contact: Joan Kessner

Workorder: 361900 Client SDG: XP0168 Project Description: RC-107 Soil

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date Time
Diesel Range Organics											
Batch 1439114											
QC1203217604 LCS											
Diesel Range Organics (C10-C20)	66600				49100	ug/kg		73.7	(70%-130%)	BYT1	12/01/14 16:49
Motor Oil (C20-C36)	66600				60100	ug/kg		90.3	(70%-130%)		
**o-Terphenyl	666				538	ug/kg		80.8	(50%-150%)		
QC1203217603 MB											
Diesel Range Organics (C10-C20)				U	2170	ug/kg					11/30/14 20:50
Motor Oil (C20-C36)				U	2170	ug/kg					
**o-Terphenyl	667				480	ug/kg		71.9	(50%-150%)		
QC1203217605 361900008 MS											
Diesel Range Organics (C10-C20)	70700	U	2300		60800	ug/kg		86	(70%-130%)		12/01/14 12:19
Motor Oil (C20-C36)	70700		8300		69500	ug/kg		86.6	(70%-130%)		
**o-Terphenyl	707		592		585	ug/kg		82.7	(50%-150%)		
QC1203217606 361900008 MSD											
Diesel Range Organics (C10-C20)	70600	U	2300		57300	ug/kg	6.03	81.1	(0%-20%)		12/01/14 12:58
Motor Oil (C20-C36)	70600		8300		74100	ug/kg	6.34	93.1	(0%-20%)		
**o-Terphenyl	706		592		582	ug/kg		82.3	(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