

CHPRC - REVIEW COMMENT RECORD (RCR)

1. Date 05/01/2018

2. Review No.

3. Project No.

Page 1 of 1

5. Document Number(s)/Title(s)
VSR18-010

6. Program/Project/Building Number

7. Reviewer
Scot Fitzgerald

8. Organization/Group
Sample Management and Reporting

9. Location/Phone
M0277/373-7495

10. Agreement With Indicated Comment Disposition(s)
11. CLOSED

17. Comment Submittal Approval

05/01/2018 Scot Fitzgerald
Date Organization Manager
(optional)
(print and sign)

05/01/2018 Scot Fitzgerald
Date Author/Organizer (print and sign)

05/01/2018 Scot Fitzgerald
Date Author/Organizer (print and sign)

12. Item	13a. Comments	13b. Basis	13c. Recommendation	14. Reviewer Concurrency Required (Y or N)	15. Disposition (provide justification if NOT accepted)	16. Status
1	No issues noted					



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Data Validation Report for CH2M Hill Plateau Remediation Company

VSR18-010
Project 200-DV-1

Chemical and Radiochemical Validation - Level C

Validation Performed By: *Eyda Hergenreder* Date: 04-30-2018
Eyda Hergenreder

Technical Review By: *Ellen McEntee* Date: 05-01-2018
Ellen McEntee

Quality Review By: *Mary A. Donovan* Date: 05-02-2018
Mary Donovan
Quality Assurance Manager

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Date: 27 April 2018
 To: CH2M Hill (technical representative)
 From: Analytical Quality Associates, Inc.
 Project: 200-DV-1
 Subject: Semivolatile Organics - Sample Data Group (SDG) SL2793

INTRODUCTION

This memorandum presents the results of data validation for SDG SL2793 prepared by TestAmerica Laboratories, Inc. A list of samples validated along with the analytical methods is provided in the following table.

Sample ID	Sample Date	Media	Validation Level	Analytical Methods
B3FMF6	01/16/18	Soil	C	8270D, WTPH
B3FMF3	01/16/18	Soil	C	8270D, WTPH
B3FMF9	01/16/18	Soil	C	8270D, WTPH
B3FMH2	01/16/18	Soil	C	8270D, WTPH
B3FMH5	01/16/18	Soil	C	8270D, WTPH
B3FMJ0	01/16/18	Soil	C	8270D, WTPH

Data validation was conducted in accordance with the CHPRC validation statement of work and the Characterization Sampling and Analysis Plan for the 200-DV-1 Operable Units, DOE/RL-2011-104, Rev. 0; Characterization Sampling and Analysis Plan for the 200-DV-1 Operable Unit Addendum 1: Attenuation Process Characterization, DOE/RL-2011-104-ADD1, Draft A and Characterization Sampling and Analysis Plan for the 200-DV-1 Operable Unit Addendum 2: Supplemental Shallow Soil Risk Characterization Sampling, DOE/RL-2011-104-ADD2, Draft A (SAP). Appendices 1 through 4 provide the following information as indicated below:

- Appendix 1. Glossary of Data Reporting Qualifiers
- Appendix 2. Summary of Data Qualification
- Appendix 3. Data Validation Supporting Documentation
- Appendix 4. Additional Documentation Requested by Client

DATA QUALITY OBJECTIVES

- **Holding Times and Sample Preservation**

Holding times are calculated from Chain-of-Custody forms to determine the validity of the results. The holding time requirements for methods 8270D and WTPH-Kerosene are extraction within 14 days of sample collection and analysis within 40 days of sample extraction. Sample preservation requires chilling to ≤ 6 degrees Celsius.

The samples were extracted and analyzed within the prescribed holding times and properly preserved.

- **Blanks**

The blank data results are reviewed to assess the extent of contamination introduced through sampling, sample preparation, and analysis.

Laboratory Blanks

All laboratory blank results were acceptable.

Trip Blanks

All trip blank results were acceptable.

Field Blanks

No field blanks were submitted for validation.

Equipment Blanks

No equipment blanks were submitted for validation.

- **Accuracy**

Accuracy is evaluated by reviewing surrogate results, matrix spike sample results, and laboratory control sample results. According to the SAP, the laboratory control sample and the matrix spike accuracy limits are the statistical ones established by the analytical laboratory.

Surrogates

All surrogate recoveries were acceptable.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Samples

All MS/MSD recoveries were acceptable.

Laboratory Control Samples (LCSs)

All LCS recoveries were acceptable.

- **Precision**

Precision is evaluated by reviewing MS/MSD results, field duplicate sample results and field split sample results. These QC results provide information on the laboratory reproducibility and whether sampling activities are adequate to acquire consistent sample results. According to the SAP, the relative percent difference (RPD) limits are $\leq 30\%$.

MS/MSD Samples

All MS/MSD relative percent difference values were acceptable.

Field Duplicate Samples

No field duplicates were submitted for validation.

Field Split Samples

No field splits were submitted for validation.

• **Internal Standards**

Internal standard performance criteria ensure that GC/MS sensitivity and response are stable during each analysis. Internal standards are added to all samples, including QC samples, prior to analysis.

Internal standards data was not included in the data package. Sample results should not be qualified based on this.

• **Detection Limits**

Reported MDLs are compared against the contractually required detection limits (CRDLs) to ensure that laboratory detection limits meet the required criteria.

All reported sample MDLs were below the CRDLs.

• **Completeness**

SDG SL2793 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

GRP-GD-003, Rev. 2, Change 0, *Data Validation for Chemical Analyses*, October 2016.

DOE/RL-2011-104, Rev. 0, *Characterization Sampling and Analysis Plan for the 200-DV-1 Operable Unit*, January 2012.

DOE/RL-2011-104-ADD1, Draft A, *Characterization Sampling and Analysis Plan for the 200-DV-1 Operable Unit Addendum 1: Attenuation Process Characterization*, January 2017.

DOE/RL-2011-104-ADD2, Draft A, *Characterization Sampling and Analysis Plan for the 200-DV-1 Operable Unit Addendum2: Supplemental Shallow Soil Risk Characterization Sampling*, January 2017.

Appendix 1

Glossary of Data Reporting Qualifiers

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

- **U** — The constituent was analyzed for, but was not detected. The data should be considered usable for decision-making purposes.
- **UJ** — The constituent was analyzed for and was not detected. Due to a quality control deficiency identified during data validation the value reported may not accurately reflect the RL. The data should be considered usable for decision-making purposes.
- **J** — Indicates the constituent was analyzed for and detected. The associated value is estimated due to a quality control deficiency identified during data validation. The data should be considered usable for decision-making purposes.
- **J+** — Indicates the constituent was analyzed for and detected. The associated value is estimated with a suspected positive bias due to a quality control deficiency identified during data validation. The data should be considered usable for decision-making purposes.
- **J-** — Indicates the constituent was analyzed for and detected. The associated value is estimated with a suspected negative bias due to a quality control deficiency identified during data validation. The data should be considered usable for decision-making purposes.
- **N** — The analysis indicates the presence of an analyte that has been tentatively identified.
- **NJ** — The analysis indicates the presence of an analyte that has been tentatively identified and the associated numerical value represents its approximate concentration.
- **NJ+** — The analysis indicates the presence of an analyte that has been tentatively identified. The associated value is estimated with a suspected positive bias due to a quality control deficiency identified during data validation.
- **NJ-** — The analysis indicates the presence of an analyte that has been tentatively identified. The associated value is estimated with a suspected negative bias due to a quality control deficiency identified during data validation.
- **UR** — Indicates the constituent was analyzed for and not detected; however, due to an identified quality control deficiency the data should be considered unusable for decision-making purposes.
- **R** — Indicates the constituent was analyzed for and detected; however, due to an identified quality control deficiency the data should be considered unusable for decision-making purposes.

Appendix 2
Summary of Data Qualification

Semivolatile Organics Data Qualification Summary			
SDG: SL2793	Reviewer: AQA	Project: 200-DV-1	Page 1 of 1
Analyte(s)	Qualifier	Samples Affected	Reason
8270D & WTPH-Kerosene	None	NA	NA

Comments: None

Appendix 3

Data Validation Supporting Documentation

Data Validation for Chemical Analyses

Published Date: 10/03/16

SGRP-GD-SMP-50117

Effective Date: 10/03/16

Appendix A - Chemical Data Validation Checklist

VALIDATION LEVEL:	A	B	Ⓒ	D	E
PROJECT: 200-DV-1			DATA PACKAGE: VSR18-010		
VALIDATOR: Eyda Hergenreder		LAB: TestAmerica		DATE: 04/27/18	
			SDG: SL2793		
ANALYSES PERFORMED					
SW-846 8260		SW-846 8260 (TCLP)	SW-846 8270 X		SW-846 8270 (TCLP)
SAMPLES/MATRIX Soil					
SDG SL2793: B3FMF6, B3FMF3, B3FMF9, B3FMH2, B3FMH5, B3FMJ0					

1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE

Technical verification documentation present?	<input checked="" type="radio"/> Yes <input type="radio"/> No <input type="radio"/> N/A
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Comments:

Data Validation for Chemical Analyses

Published Date: 10/03/16

SGRP-GD-SMP-50117

Effective Date: 10/03/16

Appendix A - (Cont.) Chemical Data Validation Checklist

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

GC/MS tuning/performance check acceptable?	Yes No <input type="radio"/> N/A
Initial calibrations acceptable?	Yes No <input type="radio"/> N/A
Continuing calibrations acceptable?	Yes No <input type="radio"/> N/A
Standards traceable?	Yes No <input type="radio"/> N/A
Standards expired?	Yes No <input type="radio"/> N/A
Calculation check acceptable?	Yes No <input type="radio"/> N/A

Comments:

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

Calibration blanks analyzed? (Levels D, E)	Yes No <input type="radio"/> N/A
Calibration blank results acceptable? (Levels D, E)	Yes No <input type="radio"/> N/A
Laboratory blanks analyzed?	<input checked="" type="radio"/> Yes No N/A
Laboratory blank results acceptable?	<input checked="" type="radio"/> Yes No N/A
Field/trip blanks analyzed? (Levels C, D, E)	<input checked="" type="radio"/> Yes No N/A
Field/trip blank results acceptable? (Levels C, D, E)	<input checked="" type="radio"/> Yes No N/A
Transcription/calculation errors? (Levels D, E)	Yes No <input type="radio"/> N/A

Comments:

Data Validation for Chemical Analyses

Published Date: 10/03/16

SGRP-GD-SMP-50117

Effective Date: 10/03/16

Appendix A - (Cont.) Chemical Data Validation Checklist

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

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

Comments:

Data Validation for Chemical Analyses

Published Date: 10/03/16

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Effective Date: 10/03/16

Appendix A - (Cont.) Chemical Data Validation Checklist

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

MS/MSD samples analyzed?	<input checked="" type="radio"/> Yes	No	N/A
MS/MSD RPD values acceptable?	<input checked="" type="radio"/> Yes	No	N/A
MS/MSD standards NIST traceable? (Levels D, E)	Yes	No	<input checked="" type="radio"/> N/A
MS/MSD standards expired? (Levels D, E)	Yes	No	<input checked="" type="radio"/> N/A
LCS/LCSD duplicates run due to insufficient sample material?	Yes	<input checked="" type="radio"/> No	N/A
Field duplicate RPD values acceptable?	Yes	No	<input checked="" type="radio"/> N/A
Field split RPD values acceptable?	Yes	No	<input checked="" type="radio"/> N/A
Transcription/calculation errors? (Levels D, E)	Yes	No	<input checked="" type="radio"/> N/A

Comments:

6. SYSTEM PERFORMANCE (Levels D and E)

Internal standards analyzed?	Yes	No	<input checked="" type="radio"/> N/A
Internal standard areas acceptable?	Yes	No	<input checked="" type="radio"/> N/A
Internal standard retention times acceptable?	Yes	No	<input checked="" type="radio"/> N/A
Standards traceable?	Yes	No	<input checked="" type="radio"/> N/A
Standards expired?	Yes	No	<input checked="" type="radio"/> N/A
Transcription/calculation errors?	Yes	No	<input checked="" type="radio"/> N/A

Comments:

Data Validation for Chemical Analyses

Published Date: 10/03/16

SGRP-GD-SMP-50117

Effective Date: 10/03/16

Appendix A - (Cont.) Chemical Data Validation Checklist

7. HOLDING TIMES (all levels)

Samples properly preserved?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> N/A
Sample holding times acceptable?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> N/A

Comments:

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

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

Comments:

Data Validation for Chemical Analyses

Published Date: 10/03/16

SGRP-GD-SMP-50117

Effective Date: 10/03/16

Appendix A - (Cont.) Chemical Data Validation Checklist

VALIDATION LEVEL:	A	B	C	D	E
PROJECT: 200-DV-1			DATA PACKAGE: VSR18-010		
VALIDATOR: Eyda Hergenreder		LAB: TestAmerica		DATE: 04/27/18	
			SDG: SL2793		
ANALYSES PERFORMED					
8015	8021	8141	8151	8315	
		WTPH-HCID	WTPH-G	WTPH-D X	
SAMPLES/MATRIX: Soil					
SDG SL2793: B3FMF6, B3FMF3, B3FMF9, B3FMH2, B3FMH5, B3FMJ0					

1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE

Technical verification documentation present?	Yes No N/A
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Comments:

Data Validation for Chemical Analyses

Published Date: 10/03/16

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Effective Date: 10/03/16

Appendix A - (Cont.) Chemical Data Validation Checklist

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

Initial calibrations acceptable?	Yes No <input checked="" type="radio"/> N/A
Continuing calibrations acceptable?	Yes No <input checked="" type="radio"/> N/A
Standards traceable?	Yes No <input checked="" type="radio"/> N/A
Standards expired?	Yes No <input checked="" type="radio"/> N/A
Calculation check acceptable?	Yes No <input checked="" type="radio"/> N/A

Comments:

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

Calibration blanks analyzed? (Levels D, E)	Yes No <input checked="" type="radio"/> N/A
Calibration blank results acceptable? (Levels D, E)	Yes No <input checked="" type="radio"/> N/A
Laboratory blanks analyzed?	<input checked="" type="radio"/> Yes No N/A
Laboratory blank results acceptable?	<input checked="" type="radio"/> Yes No N/A
Field/trip blanks analyzed? (Levels C, D, E)	<input checked="" type="radio"/> Yes No N/A
Field/trip blank results acceptable? (Levels C, D, E)	<input checked="" type="radio"/> Yes No N/A
Transcription/calculation errors? (Levels D, E)	Yes No <input checked="" type="radio"/> N/A

Comments:

Data Validation for Chemical Analyses

Published Date: 10/03/16

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Effective Date: 10/03/16

Appendix A - (Cont.) Chemical Data Validation Checklist

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

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

Comments:

Data Validation for Chemical Analyses

Published Date: 10/03/16

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Effective Date: 10/03/16

Appendix A - (Cont.) Chemical Data Validation Checklist

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

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

Comments:

6. HOLDING TIMES (all levels)

Samples properly preserved?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> N/A
Sample holding times acceptable?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> N/A

Comments:

Data Validation for Chemical Analyses

Published Date: 10/03/16

SGRP-GD-SMP-50117

Effective Date: 10/03/16

Appendix A - (Cont.) Chemical Data Validation Checklist

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

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

Comments:

8. SAMPLE CLEANUP (Levels D and E)

Fluorisil ® (or other absorbent) cleanup performed?	<input type="radio"/> Yes	<input type="radio"/> No	<input checked="" type="radio"/> N/A
Lot check performed?	<input type="radio"/> Yes	<input type="radio"/> No	<input checked="" type="radio"/> N/A
Check recoveries acceptable?	<input type="radio"/> Yes	<input type="radio"/> No	<input checked="" type="radio"/> N/A
Check materials traceable?	<input type="radio"/> Yes	<input type="radio"/> No	<input checked="" type="radio"/> N/A
Check materials Expired?	<input type="radio"/> Yes	<input type="radio"/> No	<input checked="" type="radio"/> N/A
Analytical batch QC given similar cleanup?	<input type="radio"/> Yes	<input type="radio"/> No	<input checked="" type="radio"/> N/A
Transcription/Calculation Errors?	<input type="radio"/> Yes	<input type="radio"/> No	<input checked="" type="radio"/> N/A

Comments (attach additional sheets as necessary):

Appendix 4

Additional Documentation Requested By Client

QC Sample Results

Client: CH2M Hill Plateau Remediation Company
Project/Site: F17-062TestAmerica Job ID: 160-26413-1
SDG: SL2793

Method: 8270D - Semivolatile Organic Compounds (GC/MS)

Lab Sample ID: MB 160-347338/1-A

Matrix: Solid

Analysis Batch: 348326

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 347338

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Tributyl phosphate	46	U	330	46	ug/Kg		01/22/18 14:09	01/26/18 10:55	1

Tentatively Identified Compound	MB Est. Result	MB Qualifier	Unit	D	RT	CAS No.	Prepared	Analyzed	Dil Fac
Tentatively Identified Compound	None		ug/Kg				01/22/18 14:09	01/26/18 10:55	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
2,4,6-Tribromophenol (Surr)	78		47 - 125	01/22/18 14:09	01/26/18 10:55	1
2-Fluorobiphenyl (Surr)	83		59 - 110	01/22/18 14:09	01/26/18 10:55	1
2-Fluorophenol (Surr)	84		54 - 102	01/22/18 14:09	01/26/18 10:55	1
Nitrobenzene-d5 (Surr)	81		44 - 120	01/22/18 14:09	01/26/18 10:55	1
Phenol-d5 (Surr)	85		51 - 104	01/22/18 14:09	01/26/18 10:55	1
Terphenyl-d14 (Surr)	95		59 - 98	01/22/18 14:09	01/26/18 10:55	1

Lab Sample ID: LCS 160-347338/2-A

Matrix: Solid

Analysis Batch: 348326

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 347338

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Tributyl phosphate	3330	2950		ug/Kg		88	70 - 130

Surrogate	LCS %Recovery	LCS Qualifier	Limits
2,4,6-Tribromophenol (Surr)	83		47 - 125
2-Fluorobiphenyl (Surr)	85		59 - 110
2-Fluorophenol (Surr)	87		54 - 102
Nitrobenzene-d5 (Surr)	81		44 - 120
Phenol-d5 (Surr)	87		51 - 104
Terphenyl-d14 (Surr)	95		59 - 98

Lab Sample ID: 160-26413-2 MS

Matrix: Soil

Analysis Batch: 348326

Client Sample ID: B3FMF6

Prep Type: Total/NA

Prep Batch: 347338

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Tributyl phosphate	47	U	3460	3080		ug/Kg	☼	89	50 - 150

Surrogate	MS %Recovery	MS Qualifier	Limits
2,4,6-Tribromophenol (Surr)	87		47 - 125
2-Fluorobiphenyl (Surr)	85		59 - 110
2-Fluorophenol (Surr)	87		54 - 102
Nitrobenzene-d5 (Surr)	80		44 - 120
Phenol-d5 (Surr)	89		51 - 104
Terphenyl-d14 (Surr)	96		59 - 98

TestAmerica St. Louis

QC Sample Results

Client: CH2M Hill Plateau Remediation Company
 Project/Site: F17-062

TestAmerica Job ID: 160-26413-1
 SDG: SL2793

Method: 8270D - Semivolatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: 160-26413-2 MSD
 Matrix: Soil
 Analysis Batch: 348326

Client Sample ID: B3FMF6
 Prep Type: Total/NA
 Prep Batch: 347338

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Tributyl phosphate	47	U	3440	2970		ug/Kg	☼	86	50 - 150	4	30
Surrogate	%Recovery	MSD Qualifier	MSD	Limits							
2,4,6-Tribromophenol (Surr)	82			47 - 125							
2-Fluorobiphenyl (Surr)	83			59 - 110							
2-Fluorophenol (Surr)	84			54 - 102							
Nitrobenzene-d5 (Surr)	78			44 - 120							
Phenol-d5 (Surr)	84			51 - 104							
Terphenyl-d14 (Surr)	92			59 - 98							

Method: 8015B - Diesel Range Organics (DRO) (GC)

Lab Sample ID: MB 160-347346/1-A
 Matrix: Solid
 Analysis Batch: 347740

Client Sample ID: Method Blank
 Prep Type: Total/NA
 Prep Batch: 347346

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Kerosene (C9-C16)	2.4	U	25	2.4	mg/Kg		01/22/18 16:11	01/24/18 14:05	1
Surrogate	%Recovery	MB Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	68		49 - 133				01/22/18 16:11	01/24/18 14:05	1

Lab Sample ID: LCS 160-347346/2-A
 Matrix: Solid
 Analysis Batch: 347740

Client Sample ID: Lab Control Sample
 Prep Type: Total/NA
 Prep Batch: 347346

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Diesel Range Organics [C10-C28]	83.3	61.5		mg/Kg		74	57 - 105
Surrogate	%Recovery	LCS Qualifier	Limits				
o-Terphenyl	78		49 - 133				

Lab Sample ID: 160-26413-3 MS
 Matrix: Soil
 Analysis Batch: 347740

Client Sample ID: B3FMF3
 Prep Type: Total/NA
 Prep Batch: 347346

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Diesel Range Organics [C10-C28]	2.6	U	88.3	74.3		mg/Kg	☼	84	34 - 150
Surrogate	%Recovery	MS Qualifier	Limits						
o-Terphenyl	95		49 - 133						

Surrogate Summary

Client: CH2M Hill Plateau Remediation Company
Project/Site: F17-062

TestAmerica Job ID: 160-26413-1
SDG: SL2793

Method: 8270D - Semivolatile Organic Compounds (GC/MS)

Matrix: Soil

Prep Type: Total/NA

Lab Sample ID	Client Sample ID	Percent Surrogate Recovery (Acceptance Limits)					
		TBP (47-125)	FBP (59-110)	2FP (54-102)	NBZ (44-120)	PHL (51-104)	TPHL (59-98)
160-26413-2	B3FMF6	75	72	72	68	73	87
160-26413-2 MS	B3FMF6	87	85	87	80	89	96
160-26413-2 MSD	B3FMF6	82	83	84	78	84	92
160-26413-3	B3FMF3	80	81	82	80	84	92
160-26413-4	B3FMF9	80	79	80	76	81	88
160-26413-5	B3FMH2	83	78	77	74	78	95
160-26413-6	B3FMH5	80	80	83	80	83	90
160-26413-7	B3FMJ0	78	77	77	73	77	92

Surrogate Legend

TBP = 2,4,6-Tribromophenol (Surr)
FBP = 2-Fluorobiphenyl (Surr)
2FP = 2-Fluorophenol (Surr)
NBZ = Nitrobenzene-d5 (Surr)
PHL = Phenol-d5 (Surr)
TPHL = Terphenyl-d14 (Surr)

Method: 8270D - Semivolatile Organic Compounds (GC/MS)

Matrix: Solid

Prep Type: Total/NA

Lab Sample ID	Client Sample ID	Percent Surrogate Recovery (Acceptance Limits)					
		TBP (47-125)	FBP (59-110)	2FP (54-102)	NBZ (44-120)	PHL (51-104)	TPHL (59-98)
LCS 160-347338/2-A	Lab Control Sample	83	85	87	81	87	95
MB 160-347338/1-A	Method Blank	78	83	84	81	85	95

Surrogate Legend

TBP = 2,4,6-Tribromophenol (Surr)
FBP = 2-Fluorobiphenyl (Surr)
2FP = 2-Fluorophenol (Surr)
NBZ = Nitrobenzene-d5 (Surr)
PHL = Phenol-d5 (Surr)
TPHL = Terphenyl-d14 (Surr)

Method: 8015B - Diesel Range Organics (DRO) (GC)

Matrix: Soil

Prep Type: Total/NA

Lab Sample ID	Client Sample ID	Percent Surrogate Recovery (Acceptance Limits)
		OTPH1 (49-133)
160-26413-2	B3FMF6	71
160-26413-3	B3FMF3	81
160-26413-3 MS	B3FMF3	95
160-26413-3 MSD	B3FMF3	94
160-26413-4	B3FMF9	87
160-26413-5	B3FMH2	67
160-26413-6	B3FMH5	69
160-26413-7	B3FMJ0	85

Surrogate Legend

TestAmerica St. Louis

QC Sample Results

Client: CH2M Hill Plateau Remediation Company
 Project/Site: F17-062

TestAmerica Job ID: 160-26413-1
 SDG: SL2793

Method: 8270D - Semivolatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: 160-26413-2 MSD
 Matrix: Soil
 Analysis Batch: 348326

Client Sample ID: B3FMF6
 Prep Type: Total/NA
 Prep Batch: 347338

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Tributyl phosphate	47	U	3440	2970		ug/Kg	☼	86	50 - 150	4	30
Surrogate											
	%Recovery	Qualifier	Limits								
2,4,6-Tribromophenol (Surr)	82		47 - 125								
2-Fluorobiphenyl (Surr)	83		59 - 110								
2-Fluorophenol (Surr)	84		54 - 102								
Nitrobenzene-d5 (Surr)	78		44 - 120								
Phenol-d5 (Surr)	84		51 - 104								
Terphenyl-d14 (Surr)	92		59 - 98								

Method: 8015B - Diesel Range Organics (DRO) (GC)

Lab Sample ID: MB 160-347346/1-A
 Matrix: Solid
 Analysis Batch: 347740

Client Sample ID: Method Blank
 Prep Type: Total/NA
 Prep Batch: 347346

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Kerosene (C9-C16)	2.4	U	25	2.4	mg/Kg		01/22/18 16:11	01/24/18 14:05	1
Surrogate									
	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
o-Terphenyl	68		49 - 133				01/22/18 16:11	01/24/18 14:05	1

Lab Sample ID: LCS 160-347346/2-A
 Matrix: Solid
 Analysis Batch: 347740

Client Sample ID: Lab Control Sample
 Prep Type: Total/NA
 Prep Batch: 347346

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Diesel Range Organics [C10-C28]	83.3	61.5		mg/Kg		74	57 - 105
Surrogate							
	%Recovery	Qualifier	Limits				
o-Terphenyl	78		49 - 133				

Lab Sample ID: 160-26413-3 MS
 Matrix: Soil
 Analysis Batch: 347740

Client Sample ID: B3FMF3
 Prep Type: Total/NA
 Prep Batch: 347346

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Diesel Range Organics [C10-C28]	2.6	U	88.3	74.3		mg/Kg	☼	84	34 - 150
Surrogate									
	%Recovery	Qualifier	Limits						
o-Terphenyl	95		49 - 133						

QC Sample Results

Client: CH2M Hill Plateau Remediation Company
 Project/Site: F17-062

TestAmerica Job ID: 160-26413-1
 SDG: SL2793

Method: 8015B - Diesel Range Organics (DRO) (GC) (Continued)

Lab Sample ID: 160-26413-3 MSD
 Matrix: Soil
 Analysis Batch: 347740

Client Sample ID: B3FMF3
 Prep Type: Total/NA
 Prep Batch: 347346

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	RPD Limit
Diesel Range Organics [C10-C28]	2.6	U	87.6	75.8		mg/Kg	☼	87	34 - 150	2	30
Surrogate	MSD %Recovery	MSD Qualifier	Limits								
<i>o</i> -Terphenyl	94		49 - 133								

Method: 6020A - Metals (ICP/MS)

Lab Sample ID: MB 160-347204/1-A
 Matrix: Solid
 Analysis Batch: 348796

Client Sample ID: Method Blank
 Prep Type: Total/NA
 Prep Batch: 347204

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	1.9	U D	4.7	1.9	mg/Kg		01/22/18 08:43	01/30/18 03:27	2
Arsenic	0.38	U D	0.94	0.38	mg/Kg		01/22/18 08:43	01/30/18 03:27	2
Barium	0.47	U D	1.9	0.47	mg/Kg		01/22/18 08:43	01/30/18 03:27	2
Cadmium	0.023	U D	0.047	0.023	mg/Kg		01/22/18 08:43	01/30/18 03:27	2
Chromium	0.42	U D	0.94	0.42	mg/Kg		01/22/18 08:43	01/30/18 03:27	2
Copper	0.38	U D	0.94	0.38	mg/Kg		01/22/18 08:43	01/30/18 03:27	2
Lead	0.12	U D	0.28	0.12	mg/Kg		01/22/18 08:43	01/30/18 03:27	2
Manganese	0.19	U D	0.47	0.19	mg/Kg		01/22/18 08:43	01/30/18 03:27	2
Nickel	0.19	U D	0.47	0.19	mg/Kg		01/22/18 08:43	01/30/18 03:27	2
Silver	0.070	U D	0.19	0.070	mg/Kg		01/22/18 08:43	01/30/18 03:27	2
Uranium	0.038	U D	0.094	0.038	mg/Kg		01/22/18 08:43	01/30/18 03:27	2

Lab Sample ID: MB 160-347204/1-A
 Matrix: Solid
 Analysis Batch: 349938

Client Sample ID: Method Blank
 Prep Type: Total/NA
 Prep Batch: 347204

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Selenium	0.30	U D	0.47	0.30	mg/Kg		01/22/18 08:43	02/06/18 16:30	2

Lab Sample ID: LCS 160-347204/2-A
 Matrix: Solid
 Analysis Batch: 348796

Client Sample ID: Lab Control Sample
 Prep Type: Total/NA
 Prep Batch: 347204

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Uranium	97.0	95.31	D	mg/Kg		98	80 - 120

Lab Sample ID: LCSSRM 160-347204/3-A
 Matrix: Solid
 Analysis Batch: 348796

Client Sample ID: Lab Control Sample
 Prep Type: Total/NA
 Prep Batch: 347204

Analyte	Spike Added	LCSSRM Result	LCSSRM Qualifier	Unit	D	%Rec	Limits
Aluminum	8090	7055	D	mg/Kg		87.2	39.6 - 160.7
Arsenic	100	96.39	D	mg/Kg		96.4	69.6 - 131.0

Surrogate Summary

Client: CH2M Hill Plateau Remediation Company
Project/Site: F17-062

TestAmerica Job ID: 160-26413-1
SDG: SL2793

Method: 8270D - Semivolatile Organic Compounds (GC/MS)

Matrix: Soil

Prep Type: Total/NA

Percent Surrogate Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	Percent Surrogate Recovery (Acceptance Limits)					
		TBP (47-125)	FBP (59-110)	2FP (54-102)	NBZ (44-120)	PHL (51-104)	TPHL (59-98)
160-26413-2	B3FMF6	75	72	72	68	73	87
160-26413-2 MS	B3FMF6	87	85	87	80	89	96
160-26413-2 MSD	B3FMF6	82	83	84	78	84	92
160-26413-3	B3FMF3	80	81	82	80	84	92
160-26413-4	B3FMF9	80	79	80	76	81	88
160-26413-5	B3FMH2	83	78	77	74	78	95
160-26413-6	B3FMH5	80	80	83	80	83	90
160-26413-7	B3FMJ0	78	77	77	73	77	92

Surrogate Legend

TBP = 2,4,6-Tribromophenol (Surr)
FBP = 2-Fluorobiphenyl (Surr)
2FP = 2-Fluorophenol (Surr)
NBZ = Nitrobenzene-d5 (Surr)
PHL = Phenol-d5 (Surr)
TPHL = Terphenyl-d14 (Surr)

Method: 8270D - Semivolatile Organic Compounds (GC/MS)

Matrix: Solid

Prep Type: Total/NA

Percent Surrogate Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	Percent Surrogate Recovery (Acceptance Limits)					
		TBP (47-125)	FBP (59-110)	2FP (54-102)	NBZ (44-120)	PHL (51-104)	TPHL (59-98)
LCS 160-347338/2-A	Lab Control Sample	83	85	87	81	87	95
MB 160-347338/1-A	Method Blank	78	83	84	81	85	95

Surrogate Legend

TBP = 2,4,6-Tribromophenol (Surr)
FBP = 2-Fluorobiphenyl (Surr)
2FP = 2-Fluorophenol (Surr)
NBZ = Nitrobenzene-d5 (Surr)
PHL = Phenol-d5 (Surr)
TPHL = Terphenyl-d14 (Surr)

Method: 8015B - Diesel Range Organics (DRO) (GC)

Matrix: Soil

Prep Type: Total/NA

Percent Surrogate Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	OTPH1 (49-133)
		160-26413-2
160-26413-3	B3FMF3	81
160-26413-3 MS	B3FMF3	95
160-26413-3 MSD	B3FMF3	94
160-26413-4	B3FMF9	87
160-26413-5	B3FMH2	67
160-26413-6	B3FMH5	69
160-26413-7	B3FMJ0	85

Surrogate Legend

TestAmerica St. Louis

Surrogate Summary

Client: CH2M Hill Plateau Remediation Company
Project/Site: F17-062

TestAmerica Job ID: 160-26413-1
SDG: SL2793

OTPH = o-Terphenyl

Method: 8015B - Diesel Range Organics (DRO) (GC)

Matrix: Solid

Prep Type: Total/NA

Percent Surrogate Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	OTPH1 (49-133)
LCS 160-347346/2-A	Lab Control Sample	78
MB 160-347346/1-A	Method Blank	68

Surrogate Legend

OTPH = o-Terphenyl



Date: 27 April 2018
 To: CH2M Hill (technical representative)
 From: Analytical Quality Associates, Inc.
 Project: 200-DV-1
 Subject: Inorganics - Sample Data Group (SDG) SL2793

INTRODUCTION

This memorandum presents the results of data validation for SDG SL2793 prepared by TestAmerica Laboratory, Inc. A list of samples validated along with the analytical methods is provided in the following table.

Sample ID	Sample Date	Media	Validation Level	Analytical Methods
B3FL37	01/15/18	Soil	C	6020A, 7471B
B3FMF6	01/16/18	Soil	C	6020A, 7471B
B3FMF3	01/16/18	Soil	C	6020A, 7471B
B3FMF9	01/16/18	Soil	C	6020A, 7471B
B3FMH2	01/16/18	Soil	C	6020A, 7471B
B3FMH5	01/16/18	Soil	C	6020A, 7471B
B3FMJ0	01/16/18	Soil	C	6020A, 7471B
B3FMD2	01/15/18	Soil	C	6020A, 7471B
B3FLN8	01/11/18	Soil	C	6020A, 7471B
B3FLN2	01/11/18	Soil	C	6020A, 7471B
B3FLM9	01/11/18	Soil	C	6020A, 7471B
B3FLV9	01/15/18	Soil	C	6020A, 7471B
B3FLV3	01/15/18	Soil	C	6020A, 7471B
B3FMC6	01/15/18	Soil	C	6020A, 7471B
B3FMC3	01/15/18	Soil	C	6020A, 7471B
B3FMC9	01/15/18	Soil	C	6020A, 7471B
B3FLV1	01/15/18	Soil	C	6020A, 7471B
B3FLV6	01/15/18	Soil	C	6020A, 7471B

Data validation was conducted in accordance with the CHPRC validation statement of work and the Characterization Sampling and Analysis Plan for the 200-DV-1 Operable Unit, DOE/RL-2011-104, Rev. 0; the Characterization Sampling and Analysis Plan for the 200-DV-1 Operable Unit Addendum 1: Attenuation Process Characterization, DOE/RL-2011-104-ADD1 Draft A and the Characterization Sampling and Analysis Plan for the 200-DV-1 Operable Unit Addendum 2: Supplemental Shallow Soil Risk Characterization Sampling, DOE/RL-2011-104-ADD2 Draft A (SAP). Appendices 1 through 4 provide the following information as indicated below:

- Appendix 1. Glossary of Data Reporting Qualifiers
- Appendix 2. Summary of Data Qualification
- Appendix 3. Data Validation Supporting Documentation
- Appendix 4. Additional Documentation Requested by Client

DATA QUALITY OBJECTIVES

- **Holding Times and Sample Preservation**

Holding times are calculated from Chain-of-Custody forms to determine the validity of the results. The holding time requirement for ICPMS metals are analysis within 180 days of sample collection and the holding time requirement for mercury is analysis within 28 days of sample collection. Sample preservation requires chilling to ≤ 6 degrees Celsius.

The samples were analyzed within the prescribed holding times and properly preserved.

- **Blanks**

The blank data results are reviewed to assess the extent of contamination introduced through sampling, sample preparation, and analysis.

Laboratory Blanks

All laboratory blank results were acceptable.

Trip Blanks

All trip blank results were acceptable with the following exceptions.

For SDG SL2793, Al, Mn and U were detected in trip blank sample B3FMJ0.

Field Blanks

No field blanks were submitted for validation.

Equipment Blanks

No equipment blanks were submitted for validation.

- **Accuracy**

Accuracy is evaluated by reviewing matrix spike sample results, laboratory control sample results, and ICP-AES interference check sample results. According to the SAP, the matrix spike sample and the laboratory control sample accuracy limits are 70% to 130%. The interference check sample limits are ones specified by the DV procedure.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Samples

All MS/MSD recoveries were acceptable with the following exceptions.

For SDG SL2793, the MS and MSD recoveries for Mn and Al were > the upper acceptance limit. The parent sample result for Al was >4X the spike concentration; therefore data should not be qualified. All associated Mn sample results were detects and no PDS was analyzed; therefore all Mn sample results should be qualified as estimates and flagged “J+.”

Laboratory Control Samples (LCSs)

All LCS recoveries were acceptable.

ICP-AES Interference Check Samples (ICSs)

ICS data was not included in the data package. Sample results should not be qualified based on this.

- **Precision**

Precision is evaluated by reviewing MS/MSD results, field duplicate sample results, field split sample results and ICP serial dilution results. These QC results provide information on the laboratory reproducibility and whether sampling activities are adequate to acquire consistent sample results. According to the SAP, the relative percent difference (RPD) limits are $\leq 30\%$. The serial dilution limits are ones specified by the DV procedure.

MS/MSD Samples

All MS/MSD RPD values were acceptable.

Field Duplicate Samples

All field duplicate results were acceptable with the following exception. Primary/replicate samples B3FLV1 and B3FLV3 had a U RPD = 31%.

Field Split Samples

No field splits were submitted for validation.

ICP Serial Dilution Samples

ICS serial dilution data was not included in the data package. Sample results should not be qualified based on this.

- **ICP-MS Internal Standards**

The analysis of ICP-MS internal standards is used to determine the existences and magnitude of instrument drift and physical interferences. The criteria for evaluation of internal standard results apply to all samples (including QC) analyzed during the analytical run, beginning with the calibration.

ICP-MS internal standards data was not included in the data package. Sample results should not be qualified based on this.

- **Detection Limits**

Reported MDLs are compared against the contractually required detection limits (CRDLs) to ensure that laboratory detection limits meet the required criteria.

All reported sample MDLs were below the CRDLs with the exception of Al and Cr. The Cr result for sample B3FMJ0 was a non-detect and all other Cr sample results and all Al sample results were detects > the CRDLs.

- **Completeness**

SDG SL2793 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

A minor deficiency leading to the qualification of Mn sample results was due to high matrix spike recoveries. See the table in Appendix 2 for a listing of all affected sample results.

REFERENCES

GRP-GD-003, Rev. 2, Change 0, *Data Validation for Chemical Analyses*, October 2016.

DOE/RL-2011-104, Rev. 0, *Characterization Sampling and Analysis Plan for the 200-DV-1 Operable Unit*, January 2012.

DOE/RL-2011-104-ADD1 Draft A, *Characterization Sampling and Analysis Plan for the 200-DV-1 Operable Unit Addendum 1: Attenuation Process Characterization*, January 2017.

DOE/RL-2011-104-ADD2 Draft A, *Characterization Sampling and Analysis Plan for the 200-DV-1 Operable Unit Addendum 2: Supplemental Shallow Soil Risk Characterization Sampling*, January 2017.

Appendix 1

Glossary of Data Reporting Qualifiers

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

- **U** — The constituent was analyzed for, but was not detected. The data should be considered usable for decision-making purposes.
- **UJ** — The constituent was analyzed for and was not detected. Due to a quality control deficiency identified during data validation the value reported may not accurately reflect the RL. The data should be considered usable for decision-making purposes.
- **J** — Indicates the constituent was analyzed for and detected. The associated value is estimated due to a quality control deficiency identified during data validation. The data should be considered usable for decision-making purposes.
- **J+** — Indicates the constituent was analyzed for and detected. The associated value is estimated with a suspected positive bias due to a quality control deficiency identified during data validation. The data should be considered usable for decision-making purposes.
- **J-** — Indicates the constituent was analyzed for and detected. The associated value is estimated with a suspected negative bias due to a quality control deficiency identified during data validation. The data should be considered usable for decision-making purposes.
- **N** — The analysis indicates the presence of an analyte that has been tentatively identified.
- **NJ** — The analysis indicates the presence of an analyte that has been tentatively identified and the associated numerical value represents its approximate concentration.
- **NJ+** — The analysis indicates the presence of an analyte that has been tentatively identified. The associated value is estimated with a suspected positive bias due to a quality control deficiency identified during data validation.
- **NJ-** — The analysis indicates the presence of an analyte that has been tentatively identified. The associated value is estimated with a suspected negative bias due to a quality control deficiency identified during data validation.
- **UR** — Indicates the constituent was analyzed for and not detected; however, due to an identified quality control deficiency the data should be considered unusable for decision-making purposes.
- **R** — Indicates the constituent was analyzed for and detected; however, due to an identified quality control deficiency the data should be considered unusable for decision-making purposes.

Appendix 2
Summary of Data Qualification

Inorganic Data Qualification Summary			
SDG: SL2793	Reviewer: AQA	Project: 200-DV-1	Page 1 of 1
Analyte(s)	Qualifier	Samples Affected	Reason
Mn	J+	All	High matrix spike recoveries

Comments: None

Appendix 3

Data Validation Supporting Documentation

Data Validation for Chemical Analyses

Published Date: 10/03/16

SGRP-GD-SMP-50117

Effective Date: 10/03/16

Appendix A - (Cont.) Chemical Data Validation Checklist

VALIDATION LEVEL:	A	B	C	D	E
PROJECT: 200-DV-1			DATA PACKAGE: VSR18-010		
VALIDATOR: Eyda Hergenreder		LAB: TestAmerica		DATE: 04/27/18	
			SDG: SL2793		
ANALYSES PERFORMED					
SW-846/ICP	SW-846/GFAA	SW-846/Hg X	SW-846 Cyanide	SW846/ICPMS X	
SAMPLES/MATRIX Soil					
SDG SL2793: B3FL37, B3FMF6, B3FMF3, B3FMF9, B3FMH2, B3FMH5, B3FMJ0, B3FMD2, B3FLN8, B3FLN2, B3FLM9, B3FLV9, B3FLV3, B3FMC6, B3FMC3, B3FMC9, B3FLV1, B3FLV6					

1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE

Technical verification documentation present?	Yes No N/A
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Comments:

Data Validation for Chemical Analyses

Published Date: 10/03/16

SGRP-GD-SMP-50117

Effective Date: 10/03/16

Appendix A - (Cont.) Chemical Data Validation Checklist

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:

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:

Trip blank B3FMJ0: Al 75.5 mg/kg; Mn 1.3 mg/kg; U 0.054 mg/kg

Data Validation for Chemical Analyses

Published Date: 10/03/16

SGRP-GD-SMP-50117

Effective Date: 10/03/16

Appendix A - (Cont.) Chemical Data Validation Checklist

6. ICP QUALITY CONTROL (Levels D and E)

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

Comments:

7. HOLDING TIMES (all levels)

Samples properly preserved?	<input checked="" type="radio"/> Yes No N/A
Sample holding times acceptable?	<input checked="" type="radio"/> Yes No N/A

Comments:

Appendix 4

Additional Documentation Requested By Client

QC Sample Results

Client: CH2M Hill Plateau Remediation Company
 Project/Site: F17-062

TestAmerica Job ID: 160-26413-1
 SDG: SL2793

Method: 8015B - Diesel Range Organics (DRO) (GC) (Continued)

Lab Sample ID: 160-26413-3 MSD
 Matrix: Soil
 Analysis Batch: 347740

Client Sample ID: B3FMF3
 Prep Type: Total/NA
 Prep Batch: 347346

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	RPD Limit
Diesel Range Organics [C10-C28]	2.6	U	87.6	75.8		mg/Kg	☼	87	34 - 150	2	30
Surrogate	MSD %Recovery	MSD Qualifier	Limits								
<i>o</i> -Terphenyl	94		49 - 133								

Method: 6020A - Metals (ICP/MS)

Lab Sample ID: MB 160-347204/1-A
 Matrix: Solid
 Analysis Batch: 348796

Client Sample ID: Method Blank
 Prep Type: Total/NA
 Prep Batch: 347204

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	1.9	U D	4.7	1.9	mg/Kg		01/22/18 08:43	01/30/18 03:27	2
Arsenic	0.38	U D	0.94	0.38	mg/Kg		01/22/18 08:43	01/30/18 03:27	2
Barium	0.47	U D	1.9	0.47	mg/Kg		01/22/18 08:43	01/30/18 03:27	2
Cadmium	0.023	U D	0.047	0.023	mg/Kg		01/22/18 08:43	01/30/18 03:27	2
Chromium	0.42	U D	0.94	0.42	mg/Kg		01/22/18 08:43	01/30/18 03:27	2
Copper	0.38	U D	0.94	0.38	mg/Kg		01/22/18 08:43	01/30/18 03:27	2
Lead	0.12	U D	0.28	0.12	mg/Kg		01/22/18 08:43	01/30/18 03:27	2
Manganese	0.19	U D	0.47	0.19	mg/Kg		01/22/18 08:43	01/30/18 03:27	2
Nickel	0.19	U D	0.47	0.19	mg/Kg		01/22/18 08:43	01/30/18 03:27	2
Silver	0.070	U D	0.19	0.070	mg/Kg		01/22/18 08:43	01/30/18 03:27	2
Uranium	0.038	U D	0.094	0.038	mg/Kg		01/22/18 08:43	01/30/18 03:27	2

Lab Sample ID: MB 160-347204/1-A
 Matrix: Solid
 Analysis Batch: 349938

Client Sample ID: Method Blank
 Prep Type: Total/NA
 Prep Batch: 347204

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Selenium	0.30	U D	0.47	0.30	mg/Kg		01/22/18 08:43	02/06/18 16:30	2

Lab Sample ID: LCS 160-347204/2-A
 Matrix: Solid
 Analysis Batch: 348796

Client Sample ID: Lab Control Sample
 Prep Type: Total/NA
 Prep Batch: 347204

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Uranium	97.0	95.31	D	mg/Kg		98	80 - 120

Lab Sample ID: LCSSRM 160-347204/3-A
 Matrix: Solid
 Analysis Batch: 348796

Client Sample ID: Lab Control Sample
 Prep Type: Total/NA
 Prep Batch: 347204

Analyte	Spike Added	LCSSRM Result	LCSSRM Qualifier	Unit	D	%Rec	Limits
Aluminum	8090	7055	D	mg/Kg		87.2	39.6 - 160.7
Arsenic	100	96.39	D	mg/Kg		96.4	69.6 - 131.0

TestAmerica St. Louis

QC Sample Results

Client: CH2M Hill Plateau Remediation Company
Project/Site: F17-062TestAmerica Job ID: 160-26413-1
SDG: SL2793

Method: 6020A - Metals (ICP/MS) (Continued)

Lab Sample ID: LCSSRM 160-347204/3-A
Matrix: Solid
Analysis Batch: 348796Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 347204

Analyte	Spike Added	LCSSRM Result	LCSSRM Qualifier	Unit	D	%Rec	%Rec. Limits
Barium	217	202.5	D	mg/Kg		93.3	73.7 - 128.1
Cadmium	83.7	76.67	D	mg/Kg		91.6	73.2 - 131.4
Chromium	107	98.26	D	mg/Kg		91.8	69.4 - 134.6
Copper	166	162.3	D	mg/Kg		97.8	75.3 - 128.3
Lead	88.4	79.96	D	mg/Kg		90.5	69.9 - 130.1
Manganese	311	323.6	D	mg/Kg		104.1	74.9 - 125.4
Nickel	49.8	49.10	D	mg/Kg		98.6	69.1 - 135.1
Silver	41.4	38.99	D	mg/Kg		94.2	65.9 - 133.8

Lab Sample ID: LCSSRM 160-347204/3-A
Matrix: Solid
Analysis Batch: 349938Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 347204

Analyte	Spike Added	LCSSRM Result	LCSSRM Qualifier	Unit	D	%Rec	%Rec. Limits
Selenium	87.7	85.80	D	mg/Kg		97.8	64.1 - 135.7

Lab Sample ID: 160-26413-1 MS
Matrix: Soil
Analysis Batch: 348796Client Sample ID: B3FL37
Prep Type: Total/NA
Prep Batch: 347204

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Aluminum	6060	D	1020	10020	D X	mg/Kg	☼	388	75 - 125
Arsenic	2.8	D	102	102.7	D	mg/Kg	☼	98	75 - 125
Barium	68.4	D	102	169.4	D	mg/Kg	☼	99	75 - 125
Cadmium	0.081	B D	102	97.73	D	mg/Kg	☼	96	75 - 125
Chromium	7.8	D	102	105.7	D	mg/Kg	☼	96	75 - 125
Copper	13.7	D	102	120.0	D	mg/Kg	☼	104	75 - 125
Lead	3.4	D	102	101.4	D	mg/Kg	☼	96	75 - 125
Manganese	293	D N	102	478.5	D N	mg/Kg	☼	181	75 - 125
Nickel	8.0	D	102	111.2	D	mg/Kg	☼	101	75 - 125
Silver	0.19	U D	20.4	20.03	D	mg/Kg	☼	98	75 - 125
Uranium	0.40	D	102	99.33	D	mg/Kg	☼	97	75 - 125

Lab Sample ID: 160-26413-1 MS
Matrix: Soil
Analysis Batch: 349938Client Sample ID: B3FL37
Prep Type: Total/NA
Prep Batch: 347204

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Selenium	0.80	U D	51.1	47.76	D	mg/Kg	☼	94	75 - 125

TestAmerica St. Louis

QC Sample Results

Client: CH2M Hill Plateau Remediation Company
Project/Site: F17-062

TestAmerica Job ID: 160-26413-1
SDG: SL2793

Method: 6020A - Metals (ICP/MS) (Continued)

Lab Sample ID: 160-26413-1 MSD
Matrix: Soil
Analysis Batch: 348796

Client Sample ID: B3FL37
Prep Type: Total/NA
Prep Batch: 347204

Analyte	Sample	Sample	Spike	MSD		Unit	D	%Rec	%Rec.		RPD	Limit
	Result	Qualifier		Result	Qualifier				Limits	RPD		
Aluminum	6060	D	1030	9346	D X	mg/Kg	☼	321	75 - 125	7	30	
Arsenic	2.8	D	103	102.6	D	mg/Kg	☼	97	75 - 125	0	30	
Barium	68.4	D	103	189.3	D	mg/Kg	☼	118	75 - 125	11	30	
Cadmium	0.081	B D	103	97.94	D	mg/Kg	☼	95	75 - 125	0	30	
Chromium	7.8	D	103	108.3	D	mg/Kg	☼	98	75 - 125	2	30	
Copper	13.7	D	103	116.4	D	mg/Kg	☼	100	75 - 125	3	30	
Lead	3.4	D	103	101.9	D	mg/Kg	☼	96	75 - 125	1	30	
Manganese	293	D N	103	485.9	D N	mg/Kg	☼	188	75 - 125	2	30	
Nickel	8.0	D	103	110.8	D	mg/Kg	☼	100	75 - 125	0	30	
Silver	0.19	U D	20.5	19.91	D	mg/Kg	☼	97	75 - 125	1	30	
Uranium	0.40	D	103	98.61	D	mg/Kg	☼	96	75 - 125	1	30	

Lab Sample ID: 160-26413-1 MSD
Matrix: Soil
Analysis Batch: 349938

Client Sample ID: B3FL37
Prep Type: Total/NA
Prep Batch: 347204

Analyte	Sample	Sample	Spike	MSD		Unit	D	%Rec	%Rec.		RPD	Limit
	Result	Qualifier		Result	Qualifier				Limits	RPD		
Selenium	0.80	U D	51.3	49.47	D	mg/Kg	☼	96	75 - 125	4	30	

Lab Sample ID: MB 160-347206/1-A
Matrix: Solid
Analysis Batch: 348776

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 347206

Analyte	MB	MB	RL	MDL	Unit	D	Prepared	Analyzed	Dil	Fac
	Result	Qualifier								
Antimony	0.18	U D	0.44	0.18	mg/Kg		01/22/18 08:45	01/29/18 18:46		2

Lab Sample ID: LCS 160-347206/2-A
Matrix: Solid
Analysis Batch: 348776

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 347206

Analyte	Spike	LCS		Unit	D	%Rec	%Rec.	
		Result	Qualifier				Limits	RPD
Antimony	46.6	43.25	D	mg/Kg		93	21 - 251	

Lab Sample ID: 160-26413-1 MS
Matrix: Soil
Analysis Batch: 348776

Client Sample ID: B3FL37
Prep Type: Total/NA
Prep Batch: 347206

Analyte	Sample	Sample	Spike	MS		Unit	D	%Rec	%Rec.	
	Result	Qualifier		Result	Qualifier				Limits	RPD
Antimony	0.74	B D	50.1	48.43	D	mg/Kg	☼	95	75 - 125	

Lab Sample ID: 160-26413-1 MSD
Matrix: Soil
Analysis Batch: 348776

Client Sample ID: B3FL37
Prep Type: Total/NA
Prep Batch: 347206

Analyte	Sample	Sample	Spike	MSD		Unit	D	%Rec	%Rec.		RPD	Limit
	Result	Qualifier		Result	Qualifier				Limits	RPD		
Antimony	0.74	B D	48.8	48.48	D	mg/Kg	☼	98	75 - 125	0	30	

QC Sample Results

Client: CH2M Hill Plateau Remediation Company
 Project/Site: F17-062

TestAmerica Job ID: 160-26413-1
 SDG: SL2793

Method: 7471B - Mercury (CVAA)

Lab Sample ID: MB 160-347298/1-A
 Matrix: Solid
 Analysis Batch: 347782

Client Sample ID: Method Blank
 Prep Type: Total/NA
 Prep Batch: 347298

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.010	U	0.031	0.010	mg/Kg		01/22/18 10:00	01/24/18 11:58	1

Lab Sample ID: LCSSRM 160-347298/2-A
 Matrix: Solid
 Analysis Batch: 347782

Client Sample ID: Lab Control Sample
 Prep Type: Total/NA
 Prep Batch: 347298

Analyte	Spike Added	LCSSRM Result	LCSSRM Qualifier	Unit	D	%Rec	Limits
Mercury	2.90	3.00	D	mg/Kg		103.4	50.7 - 149.3

Lab Sample ID: 160-26413-1 MS
 Matrix: Soil
 Analysis Batch: 347782

Client Sample ID: B3FL37
 Prep Type: Total/NA
 Prep Batch: 347298

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Mercury	0.011	U	0.837	0.837		mg/Kg	☼	100	80 - 120

Lab Sample ID: 160-26413-1 MSD
 Matrix: Soil
 Analysis Batch: 347782

Client Sample ID: B3FL37
 Prep Type: Total/NA
 Prep Batch: 347298

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Mercury	0.011	U	0.786	0.778		mg/Kg	☼	99	80 - 120	7	30

Method: 350.1 - Nitrogen, Ammonia

Lab Sample ID: MB 160-350289/1-A
 Matrix: Solid
 Analysis Batch: 350474

Client Sample ID: Method Blank
 Prep Type: Total/NA
 Prep Batch: 350289

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia (as N)	0.337	B	0.50	0.22	mg/Kg		02/08/18 15:00	02/09/18 13:03	1

Lab Sample ID: LCS 160-350289/2-A
 Matrix: Solid
 Analysis Batch: 350474

Client Sample ID: Lab Control Sample
 Prep Type: Total/NA
 Prep Batch: 350289

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Ammonia (as N)	5.00	4.88		mg/Kg		98	90 - 110

Lab Sample ID: 160-26413-1 MS
 Matrix: Soil
 Analysis Batch: 350474

Client Sample ID: B3FL37
 Prep Type: Total/NA
 Prep Batch: 350289

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Ammonia (as N)	0.93	C	5.24	6.41		mg/Kg	☼	104	90 - 110

Date: 27 April 2018
 To: CH2M Hill (technical representative)
 From: Analytical Quality Associates, Inc.
 Project: 200-DV-1
 Subject: General Chemistry - Sample Data Groups (SDGs) GEL441510 and SL2793

INTRODUCTION

This memorandum presents the results of data validation for SDG GEL441510 prepared by GEL Laboratories LLC and SDG SL2793 prepared by TestAmerica Laboratories, Inc. A list of samples validated along with the analytical methods is provided in the following table.

Sample ID	Sample Date	Media	Validation Level	Analytical Methods
B3FLD4	01/10/18	Soil	C	SW846 9056A, SW846 7196A
B3FLD7	01/10/18	Soil	C	SW846 9056A, SW846 7196A
B3FLF0	01/10/18	Soil	C	SW846 9056A, SW846 7196A
B3FLH4	01/11/18	Soil	C	SW846 9056A, SW846 7196A
B3FLH7	01/11/18	Soil	C	SW846 9056A, SW846 7196A
B3FLJ0	01/11/18	Soil	C	SW846 9056A, SW846 7196A
B3FLK6	01/11/18	Soil	C	SW846 9056A, SW846 7196A
B3FLK8	01/11/18	Soil	C	SW846 9056A, SW846 7196A
B3FL37	01/15/18	Soil	C	EPA 350.1, SW846 9012B
B3FMF6	01/16/18	Soil	C	EPA 350.1, SW846 9012B
B3FMF3	01/16/18	Soil	C	EPA 350.1, SW846 9012B
B3FMF9	01/16/18	Soil	C	EPA 350.1, SW846 9012B
B3FMH2	01/16/18	Soil	C	EPA 350.1, SW846 9012B
B3FMH5	01/16/18	Soil	C	EPA 350.1, SW846 9012B
B3FMJ0	01/16/18	Soil	C	EPA 350.1, SW846 9012B
B3FMD2	01/15/18	Soil	C	EPA 350.1, SW846 9012B
B3FLN2	01/11/18	Soil	C	SW846 9012B
B3FLM9	01/11/18	Soil	C	EPA 350.1, SW846 9012B
B3FLV9	01/15/18	Soil	C	EPA 350.1, SW846 9012B
B3FLV3	01/15/18	Soil	C	EPA 350.1, SW846 9012B
B3FMC6	01/15/18	Soil	C	EPA 350.1, SW846 9012B
B3FMC3	01/15/18	Soil	C	EPA 350.1, SW846 9012B
B3FMC9	01/15/18	Soil	C	EPA 350.1, SW846 9012B
B3FLV1	01/15/18	Soil	C	EPA 350.1, SW846 9012B
B3FLV6	01/15/18	Soil	C	EPA 350.1, SW846 9012B

Data validation was conducted in accordance with the CHPRC validation statement of work and the Characterization Sampling and Analysis Plan for the 200-DV-1 Operable Units, DOE/RL-2011-104, Rev. 0; the Characterization Sampling and Analysis Plan for the 200-DV-1 Operable Unit Addendum 1: Attenuation Process Characterization, DOE/RL-2011-104-ADD1 Draft A and the Characterization Sampling and Analysis Plan for the 200-DV-1 Operable Unit

Addendum 2: Supplemental Shallow Soil Risk Characterization Sampling, DOE/RL-2011-104-ADD2 Draft A (SAP). Appendices 1 through 4 provide the following information as indicated below:

- Appendix 1. Glossary of Data Reporting Qualifiers
- Appendix 2. Summary of Data Qualification
- Appendix 3. Data Validation Supporting Documentation
- Appendix 4. Additional Documentation Requested by Client

DATA QUALITY OBJECTIVES

- **Holding Times and Sample Preservation**

Holding times are calculated from Chain-of-Custody forms to determine the validity of the results. The holding time requirements are as follows:

- All anions except nitrate, nitrite, and phosphate – analysis within 28 days of sample collection
- Nitrate, nitrite, and phosphate – extraction within 28 days of sample collection and analysis within 48 hours of extraction
- Hexavalent chromium – extraction within 30 days of sample collection and analysis within 7 days of extraction
- Total cyanide – analysis within 14 days of sample collection
- Ammonia – analysis within 28 days of sample collection

Sample preservation requires chilling to ≤ 6 degrees Celsius.

The samples were extracted and analyzed within the prescribed holding times and properly preserved with the following exceptions.

For SDG SL2793, the ammonia analysis for sample B3FLM9 and the total cyanide analysis for samples B3FLM9 and B3FLN2 were performed beyond but within 2X the holding time. The total cyanide sample results were non-detects and should be qualified as unusable and flagged “UR.” The ammonia sample result was a detect and should be qualified as an estimate and would be flagged J-, but was flagged “J” due to blank infraction.

- **Blanks**

The blank data results are reviewed to assess the extent of contamination introduced through sampling, sample preparation, and analysis.

Laboratory Blanks

All laboratory blank results were acceptable with the following exception.

For SDG SL2793, the method blank result for ammonia was a detect > the method detection limit (MDL) but < the practical quantitation limit (PQL). All associated ammonia sample results were detects > the MDL but <20X the blank result; therefore all ammonia sample results except for sample B3FLM9 should be qualified as estimates and flagged “J+.” The ammonia result for sample B3FLM9 would be flagged J+, but should be flagged “J” due to missed holding time.

Trip Blanks

All trip blank results were acceptable with the following exceptions.

For SDG SL2793, ammonia was detected in trip blank sample B3FMJ0.

For SDG GEL441510, chloride was detected in trip blank sample B3FLK8.

Field Blanks

No field blanks were submitted for validation.

Equipment Blanks

No equipment blanks were submitted for validation.

- **Accuracy**

Accuracy is evaluated by reviewing matrix spike sample results and laboratory control sample results. According to the SAP, the matrix spike and laboratory control sample accuracy limits are 70% to 130%. The limits for reported analytes not listed in the SAP are specified by the DV procedure.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Samples

All MS/MSD recoveries were acceptable with the following exceptions.

For SDG GEL441510, the MS analysis for anions was performed on trip blank sample B3FLK8 and the sample and MS sample were analyzed at 5X dilution. All other anion samples were not diluted for the analyses. The MS recovery for phosphorus was < 30%; however due to sample dilution and based on professional judgment all anion sample results should be qualified as estimates. All non-detects should be flagged “UJ” and all detect sample results should be flagged “J” due to lack of matrix-specific accuracy data. See the table in Appendix 2 for a listing of all affected sample results.

Laboratory Control Samples (LCSs)

All LCS recoveries were acceptable.

- **Precision**

Precision is evaluated by reviewing MS/MSD results, laboratory duplicate sample results, field duplicate sample results, and field split sample results. These QC results provide information on the laboratory reproducibility and whether sampling activities are adequate to acquire consistent sample results. According to the SAP, the relative percent difference (RPD) limits are $\leq 30\%$. The RPD limits for reported analytes not listed in the SAP are specified by the DV procedure.

Laboratory Duplicate Samples

All laboratory duplicate results were acceptable.

Field Duplicate Samples

All field duplicate results were acceptable with the following exception.

For SDG SL2793, primary/replicate samples B3FLV1 and B3FLV3 had an ammonia RPD = 60%.

Field Split Samples

No field splits were submitted for validation.

- **Detection Limits**

Reported MDLs are compared against the contractually required detection limits (CRDLs) to ensure that laboratory detection limits meet the required criteria.

All reported sample MDLs were below the CRDLs.

- **Completeness**

SDGs GEL441510 and SL2793 were 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 for total cyanide was 88%. The completion percentage for ammonia, anions and hexavalent chromium were 100%.

MAJOR DEFICIENCIES

Major deficiencies leading to qualification of total cyanide for samples B3FLN2 and B3FLM9 as unusable were due to analysis beyond holding time.

MINOR DEFICIENCIES

The received date and time were not completed on the COC for sample B3FLH7.

Minor deficiencies leading to qualification of ammonia and anions sample results as estimates were due to holding time infraction, laboratory blank contamination and lack of matrix-specific accuracy data. See the table in Appendix 2 for a listing of all affected sample results.

REFERENCES

GRP-GD-003, Rev. 2, Change 0, *Data Validation for Chemical Analyses*, October 2016.

DOE/RL-2011-104, Rev. 0, *Characterization Sampling and Analysis Plan for the 200-DV-1 Operable Unit*, January 2012.

DOE/RL-2011-104-ADD1 Draft A, *Characterization Sampling and Analysis Plan for the 200-DV-1 Operable Unit Addendum 1: Attenuation Process Characterization*, January 2017.

DOE/RL-2011-104-ADD2 Draft A, *Characterization Sampling and Analysis Plan for the 200-DV-1 Operable Unit Addendum 2: Supplemental Shallow Soil Risk Characterization Sampling*, January 2017.

Appendix 1

Glossary of Data Reporting Qualifiers

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

- **U** — The constituent was analyzed for, but was not detected. The data should be considered usable for decision-making purposes.
- **UJ** — The constituent was analyzed for and was not detected. Due to a quality control deficiency identified during data validation the value reported may not accurately reflect the RL. The data should be considered usable for decision-making purposes.
- **J** — Indicates the constituent was analyzed for and detected. The associated value is estimated due to a quality control deficiency identified during data validation. The data should be considered usable for decision-making purposes.
- **J+** — Indicates the constituent was analyzed for and detected. The associated value is estimated with a suspected positive bias due to a quality control deficiency identified during data validation. The data should be considered usable for decision-making purposes.
- **J-** — Indicates the constituent was analyzed for and detected. The associated value is estimated with a suspected negative bias due to a quality control deficiency identified during data validation. The data should be considered usable for decision-making purposes.
- **N** — The analysis indicates the presence of an analyte that has been tentatively identified.
- **NJ** — The analysis indicates the presence of an analyte that has been tentatively identified and the associated numerical value represents its approximate concentration.
- **NJ+** — The analysis indicates the presence of an analyte that has been tentatively identified. The associated value is estimated with a suspected positive bias due to a quality control deficiency identified during data validation.
- **NJ-** — The analysis indicates the presence of an analyte that has been tentatively identified. The associated value is estimated with a suspected negative bias due to a quality control deficiency identified during data validation.
- **UR** — Indicates the constituent was analyzed for and not detected; however, due to an identified quality control deficiency the data should be considered unusable for decision-making purposes.
- **R** — Indicates the constituent was analyzed for and detected; however, due to an identified quality control deficiency the data should be considered unusable for decision-making purposes.

Appendix 2
Summary of Data Qualification

General Chemistry Data Qualification Summary			
SDGs: GEL441510, SL2793	Reviewer: AQA	Project: 200-DV-1	Page 1 of 1
Analyte(s)	Qualifier	Samples Affected	Reason
Total Cyanide	UR	B3FLN2, B3FLM9	Analysis beyond but within 2X the holding time
Ammonia	J	B3FLM9	Analysis beyond but within 2X the holding time and laboratory blank contamination
Ammonia	J+	B3FL37, B3FMF6, B3FMF3, B3FMF9, B3FMH2, B3FMH5, B3FMJ0, B3FMD2, B3FLV9, B3FLV3, B3FMC6, B3FMC3, B3FMC9, B3FLV1, B3FLV6	Laboratory blank contamination
Chloride, Fluoride, Nitrate, Sulfate	J	B3FLD4, B3FLD7, B3FLF0, B3FLH4, B3FLH7, B3FLJ0, B3FLK6	Lack of matrix-specific accuracy data
Chloride	J	B3FLK8	Lack of matrix-specific accuracy data
Fluoride, Nitrate, Sulfate	UJ	B3FLK8	Lack of matrix-specific accuracy data
Nitrite	UJ	B3FLD4, B3FLF0, B3FLH4, B3FLH7, B3FLJ0, B3FLK6, B3FLK8	Lack of matrix-specific accuracy data
Nitrite	J	B3FLD7	Lack of matrix-specific accuracy data
Phosphorus	UJ	B3FLD7, B3FLF0, B3FLH4, B3FLH7, B3FLJ0, B3FLK8	Lack of matrix-specific accuracy data
Phosphorus	J	B3FLD4, B3FLK6	Lack of matrix-specific accuracy data

Comments: None

Appendix 3

Data Validation Supporting Documentation

Data Validation for Chemical Analyses

Published Date: 10/03/16

SGRP-GD-SMP-50117

Effective Date: 10/03/16

Appendix A - (Cont.) Chemical Data Validation Checklist

VALIDATION LEVEL:	A	B	<input checked="" type="radio"/> C	D	E
PROJECT: 200-DV-1			DATA PACKAGE: VSR18-010		
VALIDATOR: Eyda Hergenreder		LAB: GEL, TestAmerica		DATE: 04/27/18	
			SDG: GEL441510, SL2793		
ANALYSES PERFORMED					
Anions/IC <input checked="" type="checkbox"/>	TOC	TOX	TPH-418.1	Oil and Grease	Alkalinity
Ammonia <input checked="" type="checkbox"/>	BOD/COD	Chloride	Chromium-VI <input checked="" type="checkbox"/>	pH	NO ₃ /NO ₂
Sulfate	TDS	TKN	Phosphate	Cyanide <input checked="" type="checkbox"/>	
SAMPLES/MATRIX Soil					
GEL441510: B3FLD4, B3FLD7, B3FLF0, B3FLH4, B3FLH7, B3FLJ0, B3FLK6, B3FLK8					
SL2793: B3FL37, B3FMF6, B3FMF3, B3FMF9, B3FMH2, B3FMH5, B3FMJ0, B3FMD2, B3FLN2, B3FLM9, B3FLV9, B3FLV3, B3FMC6, B3FMC3, B3FMC9, B3FLV1, B3FLV6					

1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE

Technical verification documentation present?	<input checked="" type="radio"/> Yes No N/A
---	---

Comments:

SDG GEL441510: Received date and time were not recorded on COC for sample B3FLH7

Data Validation for Chemical Analyses

Published Date: 10/03/16

SGRP-GD-SMP-50117

Effective Date: 10/03/16

Appendix A - (Cont.) Chemical Data Validation Checklist

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

Initial calibrations performed on all instruments?	Yes No <input checked="" type="radio"/> N/A
Initial calibrations acceptable?	Yes No <input checked="" type="radio"/> N/A
ICV and CCV checks performed on all instruments?	Yes No <input checked="" type="radio"/> N/A
ICV and CCV checks acceptable?	Yes No <input checked="" type="radio"/> N/A
Standards traceable?	Yes No <input checked="" type="radio"/> N/A
Standards expired?	Yes No <input checked="" type="radio"/> N/A
Calculation check acceptable?	Yes No <input checked="" type="radio"/> N/A

Comments:

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

ICB and CCB checks performed for all applicable analyses? (Levels D, E)	Yes No <input checked="" type="radio"/> N/A
ICB and CCB results acceptable? (Levels D, E)	Yes No <input checked="" type="radio"/> N/A
Laboratory blanks analyzed?	<input checked="" type="radio"/> Yes No N/A
Laboratory blank results acceptable?	Yes <input checked="" type="radio"/> No N/A
Field blanks analyzed? (Levels C, D, E)	<input checked="" type="radio"/> Yes No N/A
Field blank results acceptable? (Levels C, D, E)	Yes <input checked="" type="radio"/> No N/A
Transcription/calculation errors? (Levels D, E)	Yes No <input checked="" type="radio"/> N/A

Comments:

SDG SL2793: MB ammonia 0.337 mg/kg; trip blank sample B3FMJ0 ammonia 0.45 mg/kg

SDG GEL441510: trip blank sample B3FLK8 chloride 6320 ug/kg

Data Validation for Chemical Analyses

Published Date: 10/03/16

SGRP-GD-SMP-50117

Effective Date: 10/03/16

Appendix A - (Cont.) Chemical Data Validation Checklist

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

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

Comments:

SDG SL2793: ammonia primary B3FLV1 0.70 mg/kg/replicate B3FLV3 1.3 mg/kg RPD 60%

6. HOLDING TIMES (all levels)

Samples properly preserved?	<input checked="" type="radio"/> Yes No N/A
Sample holding times acceptable?	Yes <input checked="" type="radio"/> No N/A

Comments:

SDG SL2793: CN samples B3FLN2, B3FLM9; ammonia sample B3FLM9

Appendix 4

Additional Documentation Requested By Client

GEL LABORATORIES LLC

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

QC Summary

Report Date: February 12, 2018

Page 1 of 3

CH2MHill Plateau Remediation Company

MSIN R3-50 CHPRC

PO Box 1600

Richland, Washington

Contact: Mr. Scot Fitzgerald

Workorder: 441510

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Ion Chromatography											
Batch	1734069										
QC1203958472	441510008	DUP									
Chloride	BD	6320	BD	8220	ug/Kg	26.1 ^		(+/-11500)	LXA2	02/08/18	23:52
Fluoride	DU	1960	DU	1960	ug/Kg	N/A					
Nitrate-N	DU	1900	DU	1900	ug/Kg	N/A					
Nitrite-N	DU	1900	DU	1900	ug/Kg	N/A					
Phosphorus in phosphate	DNU	3860	DU	3860	ug/Kg	N/A					
Sulfate	DU	7660	DU	7660	ug/Kg	N/A					
QC1203958471	LCS										
Chloride	48900			50800	ug/Kg		104	(80%-120%)		02/08/18	18:12
Fluoride	24400			24300	ug/Kg		99.4	(80%-120%)			
Nitrate-N	24400			24300	ug/Kg		99.4	(80%-120%)			
Nitrite-N	24400			25200	ug/Kg		103	(80%-120%)			
Phosphorus in phosphate	12200			12100	ug/Kg		99.2	(80%-120%)			
Sulfate	97800			98100	ug/Kg		100	(80%-120%)			
QC1203958470	MB										
Chloride			U	720	ug/Kg					02/08/18	17:41

GEL LABORATORIES LLC

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

QC Summary

Workorder: 441510

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Ion Chromatography											
Batch	1734069										
Fluoride			U	340	ug/Kg				LXA2	02/08/18	17:41
Nitrate-N			U	330	ug/Kg						
Nitrite-N			U	330	ug/Kg						
Phosphorus in phosphate			U	670	ug/Kg						
Sulfate			U	1330	ug/Kg						
QC1203958473 441510008 MS											
Chloride	56900	BD	6320	D	57600	ug/Kg	90.2	(75%-125%)		02/09/18	00:23
Fluoride	28500	DU	1960	D	25800	ug/Kg	90.8	(75%-125%)			
Nitrate-N	28500	DU	1900	D	27700	ug/Kg	97.3	(75%-125%)			
Nitrite-N	28500	DU	1900	D	29300	ug/Kg	103	(75%-125%)			
Phosphorus in phosphate	14200	DNU	3860	DNU	3810	ug/Kg	0*	(75%-125%)			
Sulfate	114000	DU	7660	D	112000	ug/Kg	98.2	(75%-125%)			
Spectrometric Analysis											
Batch	1732197										
QC1203953689 441510001 DUP											
Hexavalent Chromium		U	107	U	107	ug/Kg	N/A		VH1	01/22/18	13:12
QC1203953688 ILCS											
Hexavalent Chromium	6200				6570	ug/Kg	106	(80%-120%)		01/22/18	13:12

GEL LABORATORIES LLC

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

QC Summary

Workorder: 441510

Page 3 of 3

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Spectrometric Analysis											
Batch	1732197										
QC1203953687	LCS										
Hexavalent Chromium	2800			2830	ug/Kg		101	(80%-120%)	VH1	01/22/18	13:12
QC1203953686	MB										
Hexavalent Chromium			U	118	ug/Kg					01/22/18	13:12
QC1203953690	441510001	MS									
Hexavalent Chromium	2700	U	107	2190	ug/Kg		80.2	(75%-125%)		01/22/18	13:13

Notes:

The Qualifiers in this report are defined as follows:

- < Sample is below the EPA guidance level for Reactive Releasable Cyanide and/or Reactive Releasable Sulfide
- > Result greater than quantifiable range or greater than upper limit of the analysis range
- B The analyte was detected at a value less than the contract required detection limit (RDL), but greater than or equal to the IDL/MDL (as appropriate).
- C Target analyte was detected in the sample and the associated blank. The associated blank concentration is \geq EQL or is $>$ 5% of the measured concentration and/or decision level for associated samples.
- D Results are reported from a diluted aliquot of sample.
- N Spike 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

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.

QC Sample Results

Client: CH2M Hill Plateau Remediation Company
Project/Site: F17-062

TestAmerica Job ID: 160-26413-1
SDG: SL2793

Method: 7471B - Mercury (CVAA)

Lab Sample ID: MB 160-347298/1-A
Matrix: Solid
Analysis Batch: 347782

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 347298

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.010	U	0.031	0.010	mg/Kg		01/22/18 10:00	01/24/18 11:58	1

Lab Sample ID: LCSSRM 160-347298/2-A
Matrix: Solid
Analysis Batch: 347782

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 347298

Analyte	Spike Added	LCSSRM Result	LCSSRM Qualifier	Unit	D	%Rec	Limits
Mercury	2.90	3.00	D	mg/Kg		103.4	50.7 - 149.3

Lab Sample ID: 160-26413-1 MS
Matrix: Soil
Analysis Batch: 347782

Client Sample ID: B3FL37
Prep Type: Total/NA
Prep Batch: 347298

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Mercury	0.011	U	0.837	0.837		mg/Kg	☼	100	80 - 120

Lab Sample ID: 160-26413-1 MSD
Matrix: Soil
Analysis Batch: 347782

Client Sample ID: B3FL37
Prep Type: Total/NA
Prep Batch: 347298

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	RPD Limit
Mercury	0.011	U	0.786	0.778		mg/Kg	☼	99	80 - 120	7	30

Method: 350.1 - Nitrogen, Ammonia

Lab Sample ID: MB 160-350289/1-A
Matrix: Solid
Analysis Batch: 350474

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 350289

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia (as N)	0.337	B	0.50	0.22	mg/Kg		02/08/18 15:00	02/09/18 13:03	1

Lab Sample ID: LCS 160-350289/2-A
Matrix: Solid
Analysis Batch: 350474

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 350289

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Ammonia (as N)	5.00	4.88		mg/Kg		98	90 - 110

Lab Sample ID: 160-26413-1 MS
Matrix: Soil
Analysis Batch: 350474

Client Sample ID: B3FL37
Prep Type: Total/NA
Prep Batch: 350289

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Ammonia (as N)	0.93	C	5.24	6.41		mg/Kg	☼	104	90 - 110

QC Sample Results

Client: CH2M Hill Plateau Remediation Company
 Project/Site: F17-062

TestAmerica Job ID: 160-26413-1
 SDG: SL2793

Method: 350.1 - Nitrogen, Ammonia (Continued)

Lab Sample ID: 160-26413-11 MS
 Matrix: Soil
 Analysis Batch: 350474

Client Sample ID: B3FLM9
 Prep Type: Total/NA
 Prep Batch: 350289
 %Rec.

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Ammonia (as N)	0.95	Z C	5.38	6.42		mg/Kg	☼	102	90 - 110

Lab Sample ID: 160-26413-1 DU
 Matrix: Soil
 Analysis Batch: 350474

Client Sample ID: B3FL37
 Prep Type: Total/NA
 Prep Batch: 350289

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	Limit
Ammonia (as N)	0.93	C	0.831	C	mg/Kg	☼	11	30

Method: 9012B - Cyanide, Total and/or Amenable

Lab Sample ID: MB 160-348657/1-A
 Matrix: Solid
 Analysis Batch: 348795

Client Sample ID: Method Blank
 Prep Type: Total/NA
 Prep Batch: 348657

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cyanide, Total	0.11	U	0.50	0.11	mg/Kg		01/29/18 19:00	01/29/18 21:39	1

Lab Sample ID: HLCS 160-348657/3-A
 Matrix: Solid
 Analysis Batch: 348795

Client Sample ID: Lab Control Sample
 Prep Type: Total/NA
 Prep Batch: 348657

Analyte	Spike Added	HLCS Result	HLCS Qualifier	Unit	D	%Rec	Limits
Cyanide, Total	4.80	4.69		mg/Kg		98	85 - 115

Lab Sample ID: LCS 160-348657/2-A
 Matrix: Solid
 Analysis Batch: 348795

Client Sample ID: Lab Control Sample
 Prep Type: Total/NA
 Prep Batch: 348657

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Cyanide, Total	2.40	2.34		mg/Kg		98	85 - 115

Lab Sample ID: 160-26413-1 MS
 Matrix: Soil
 Analysis Batch: 348795

Client Sample ID: B3FL37
 Prep Type: Total/NA
 Prep Batch: 348657

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Cyanide, Total	0.12	U	2.53	2.56		mg/Kg	☼	101	60 - 130

Lab Sample ID: 160-26413-11 MS
 Matrix: Soil
 Analysis Batch: 348795

Client Sample ID: B3FLM9
 Prep Type: Total/NA
 Prep Batch: 348657

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Cyanide, Total	0.12	U Z	2.59	2.58		mg/Kg	☼	100	60 - 130

QC Sample Results

Client: CH2M Hill Plateau Remediation Company
 Project/Site: F17-062

TestAmerica Job ID: 160-26413-1
 SDG: SL2793

Method: 9012B - Cyanide, Total andor Amenable (Continued)

Lab Sample ID: 160-26413-1 DU
 Matrix: Soil
 Analysis Batch: 348795

Client Sample ID: B3FL37
 Prep Type: Total/NA
 Prep Batch: 348657

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	Limit
Cyanide, Total	0.12	U	0.12	U	mg/Kg	☼	NC	30

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11

Date: 30 April 2018
 To: CH2M Hill (technical representative)
 From: Analytical Quality Associates, Inc.
 Project: 200-DV-1
 Subject: Radiochemical - Sample Data Groups (SDG) GEL441510

INTRODUCTION

This memorandum presents the results of data validation for SDG GEL441510 prepared by GEL Laboratories, Inc. A list of samples validated along with the analytical methods is provided in the following table.

Sample ID	Sample Date	Media	Validation Level	Analytical Methods
B3FLD4	01/10/18	Soil	C	Am-241, Np-237, Iso-Pu, Iso-U, Total Sr., Gamma, I-129, Tritium, C-14, Tc-99, Ni-63
B3FLD7	01/10/18	Soil	C	Am-241, Np-237, Iso-Pu, Iso-U, Total Sr., Gamma, I-129, Tritium, C-14, Tc-99, Ni-63
B3FLF0	01/10/18	Soil	C	Am-241, Np-237, Iso-Pu, Iso-U, Total Sr., Gamma, I-129, Tritium, C-14, Tc-99, Ni-63
B3FLH4	01/11/18	Soil	C	Am-241, Np-237, Iso-Pu, Iso-U, Total Sr., Gamma, I-129, Tritium, C-14, Tc-99, Ni-63
B3FLH7	01/11/18	Soil	C	Am-241, Np-237, Iso-Pu, Iso-U, Total Sr., Gamma, I-129, Tritium, C-14, Tc-99, Ni-63
B3FLJ0	01/11/18	Soil	C	Am-241, Np-237, Iso-Pu, Iso-U, Total Sr., Gamma, I-129, Tritium, C-14, Tc-99, Ni-63
B3FLK6	01/11/18	Soil	C	Am-241, Np-237, Iso-Pu, Iso-U, Total Sr., Gamma, I-129, Tritium, C-14, Tc-99, Ni-63
B3FLK8	01/11/18	Soil	C	Am-241, Np-237, Iso-Pu, Iso-U, Total Sr., Gamma, I-129, Tritium, C-14, Tc-99, Ni-63

Data validation was conducted in accordance with the CHPRC validation statement of work and the Characterization Sampling and Analysis Plan for the 200-DV-1 Operable Units, DOE/RL-2011-104, Rev. 0, Characterization Sampling and Analysis Plan for the 200-DV-1 Operable Unit Addendum 1: Attenuation Process Characterization, DOE/RL-2011-104-ADD1 Draft A and Characterization Sampling and Analysis Plan for the 200-DV-1 Operable Unit Addendum 2: Supplemental Shallow Soil Risk Characterization Sampling, DOE/RL-2011-104-ADD2 Draft A(SAP). Appendices 1 through 4 provide the following information as indicated below:

- Appendix 1. Glossary of Data Reporting Qualifiers
- Appendix 2. Summary of Data Qualification
- Appendix 3. Data Validation Supporting Documentation
- Appendix 4. Additional Documentation Requested by Client

DATA QUALITY OBJECTIVES

- **Holding Times and Sample Preservation**

Holding times are calculated from Chain-of-Custody forms to determine the validity of the results. The maximum holding time for radiochemical analysis is 180 days. There are no specific preservation requirements for radiochemical analysis of soil.

The samples were analyzed within the prescribed holding time.

- **Blanks**

The blank data results are reviewed to assess the extent of contamination introduced through sampling, sample preparation, and analysis.

Laboratory Blanks

All laboratory blank results were acceptable.

Trip Blanks

All trip blank results were acceptable.

Field Blanks

No field blanks were submitted for validation.

Equipment Blanks

No equipment blanks were submitted for validation.

- **Accuracy**

Accuracy is evaluated by reviewing matrix spike sample results, laboratory control sample results, and chemical recovery factors. Chemical recovery factors are determined through use of a carrier or tracer and provide assessment of the chemical separation process that is affected by the laboratory procedure, sample matrix, and/or interference. Chemical recovery factors are used to correct sample concentration, uncertainty, and MDC results. According to the SAP, the laboratory control sample and matrix spike accuracy limits are 70% to 130%.

Matrix Spike (MS) Samples

All MS recoveries were acceptable.

Laboratory Control Samples (LCSs)

All LCS recoveries were acceptable.

Carrier/Tracer Recovery Factors

All carrier/tracer recovery factors were acceptable with the following exception.

For SDG GEL441510, the Am-243 tracer recovery for sample B3FLH4Dup was > the upper acceptance limit. Since the sample was a QC sample, data should not be qualified as a result.

- **Precision**

Precision is evaluated by reviewing laboratory duplicate, field duplicate, and field split sample results. These QC results provide information on the laboratory reproducibility and whether sampling activities are adequate to acquire consistent sample results. According to the SAP, the relative percent difference (RPD) limits are $\leq 30\%$. When duplicate RPDs exceed the limits and have associated results $< 5X$ the MDCs the precision limits are ones specified by the DV procedure.

Laboratory Duplicate Samples

All laboratory duplicate results were acceptable.

Field Duplicate Samples

No field duplicates were submitted for validation.

Field Split Samples

No field splits were submitted for validation.

- **Detection Limits**

Reported MDCs are compared against the contractually required detection limits (CRDLs) to ensure that laboratory detection limits meet the required criteria.

All reported sample MDCs were below the CRDLs with the exception of Am-241 and total Sr for sample B3FLD4, total Sr for sample B3FLD7, Eu-154 for sample B3FLF0 and total Sr and Eu-154 for samples B3FLH4, B3FLFJ0 and sample B3FLK6.

- **Completeness**

SDG GEL441510 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.

The received date and time were not completed on the COC for sample B3FLH7.

REFERENCES

GRP-GD-002, Rev. 2, Change 0, *Data Validation for Radiochemical Analyses*, September 2016.

DOE/RL-2011-104, Rev. 0, *Characterization Sampling and Analysis Plan for the 200-DV-1 Operable Unit*, January 2012.

DOE/RL-2011-104-ADD1 Draft A, *Characterization Sampling and Analysis Plan for the 200-DV-1 Operable Unit Addendum 1: Attenuation Process Characterization*, January 2017.

DOE/RL-2011-104-ADD2 Draft A, *Characterization Sampling and Analysis Plan for the 200-DV-1 Operable Unit Addendum 2: Supplemental Shallow Soil Risk Characterization Sampling*, January 2017

Appendix 1

Glossary of Data Reporting Qualifiers

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

- **U** — The constituent was analyzed for and was not detected. The data should be considered usable for decision-making purposes.
- **UJ** — The constituent was analyzed for and was not detected. Due to a quality control deficiency identified during data validation the value reported may not accurately reflect the MDC. The data should be considered usable for decision-making purposes.
- **J** — Indicates the constituent was analyzed for and detected. The associated value is estimated due to a quality control deficiency identified during data validation. The data should be considered usable for decision-making purposes.
- **J+** — Indicates the constituent was analyzed for and detected. The associated value is estimated with a suspected positive bias due to a quality control deficiency identified during data validation. The data should be considered usable for decision-making purposes.
- **J-** — Indicates the constituent was analyzed for and detected. The associated value is estimated with a suspected negative bias due to a quality control deficiency identified during data validation. The data should be considered usable for decision-making purposes.
- **UR** — Indicates the constituent was analyzed for and not detected; however, due to an identified quality control deficiency the data should be considered unusable for decision-making purposes.
- **R** — Indicates the constituent was analyzed for and detected; however, due to an identified quality control deficiency the data should be considered unusable for decision-making purposes.

Appendix 2
Summary of Data Qualification

Radiochemical Data Qualification Summary			
SDG: GEL441510	Reviewer: AQA	Project: 200-DV-1	Page 1 of 1
Analyte(s)	Qualifier	Samples Affected	Reason
Radiochemical	None	N/A	N/A

Comments: None

Appendix 3

Data Validation Supporting Documentation

Data Validation for Radiochemical Analyses

Published Date: 09/13/16

SGRP-GD-SMP-50116

Effective Date: 09/13/16

Appendix B - Radiochemical Data Validation Checklist

Validation Level:	A	B	Ⓒ	D	E
Project: 200-DV-1			Data Package: VSR18-010		
Validator: Eyda Hergenreder		Lab: GEL		Date: 04/30/18	
			SDG: GEL441510		
Analyses Performed					
<input type="checkbox"/> Gross Alpha/Beta	<input checked="" type="checkbox"/> Strontium-90	<input checked="" type="checkbox"/> Technetium-99	<input checked="" type="checkbox"/> Alpha Spectroscopy	<input checked="" type="checkbox"/> Gamma Spectroscopy	<input checked="" type="checkbox"/> Tritium
<input type="checkbox"/> Total Uranium	<input type="checkbox"/> Radium-22	<input checked="" type="checkbox"/> Np-237	<input checked="" type="checkbox"/> I-129	<input checked="" type="checkbox"/> C-14	<input checked="" type="checkbox"/> Ni-63
Samples/Matrix Soil					
GEL441510: B3FLD4, B3FLD7, B3FLF0, B3FLH4, B3FLH7, B3FLJ0, B3FLK6, B3FLK8,					

1. Completeness and Case Narrative	<input type="checkbox"/> N/A
Technical verification forms present?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A

Comments:

SDG GEL441510; missing receiving date and time on COC for sample B3FLH7

2. Initial Calibration (Levels D, E)	<input checked="" type="checkbox"/> N/A
Instruments/detectors calibrated?	Yes No <input checked="" type="checkbox"/> N/A
Initial calibration acceptable?	Yes No <input checked="" type="checkbox"/> N/A
Standards NIST traceable?	Yes No <input checked="" type="checkbox"/> N/A
Standards expired?	Yes No <input checked="" type="checkbox"/> N/A
Calculation check acceptable?	Yes No <input checked="" type="checkbox"/> N/A

Comments:

Data Validation for Radiochemical Analyses

Published Date: 09/13/16

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Appendix B - (Cont.) Radiochemical Data Validation Checklist

3. Continuing Calibration (Levels D, E)	<input checked="" type="checkbox"/> N/A
Calibration checked within required frequency?	Yes No <input type="radio"/> N/A
Calibration check acceptable?	Yes No <input type="radio"/> N/A
Calibration check standards traceable?	Yes No <input type="radio"/> N/A
Calibration check standards expired?	Yes No <input type="radio"/> N/A
Calculation check acceptable?	Yes No <input type="radio"/> N/A
Comments:	

4. Background Counts (Levels D, E)	<input checked="" type="checkbox"/> N/A
Background counts checked within required frequency?	Yes No <input type="radio"/> N/A
Background counts acceptable?	Yes No <input type="radio"/> N/A
Calculation check acceptable?	Yes No <input type="radio"/> N/A
Comments:	

Data Validation for Radiochemical Analyses

Published Date: 09/13/16

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Appendix B - (Cont.) Radiochemical Data Validation Checklist

5. Blanks (Levels B, C, D, E)	<input type="checkbox"/> N/A
Method blank analyzed within required frequency?	<input checked="" type="radio"/> Yes No N/A
Method blank results acceptable?	<input checked="" type="radio"/> Yes No N/A
Analytes detected in method blank?	Yes <input checked="" type="radio"/> No N/A
Field blank(s) analyzed?	<input checked="" type="radio"/> Yes No N/A
Field blank results acceptable?	<input checked="" type="radio"/> Yes No N/A
Analytes detected in field blank(s)?	Yes <input checked="" type="radio"/> No N/A
Transcription/Calculation Errors? (Levels D, E)	Yes No <input checked="" type="radio"/> N/A

Comments:

6. Laboratory Control Samples or Blank Spike Samples (Levels C, D, E)	<input type="checkbox"/> N/A
LCS /BSS analyzed within required frequency?	<input checked="" type="radio"/> Yes No N/A
LCS/BSS recoveries acceptable?	<input checked="" type="radio"/> Yes No N/A
LCS/BSS traceable? (Levels D,E)	Yes No <input checked="" type="radio"/> N/A
LCS/BSS expired? (Levels D,E)	Yes No <input checked="" type="radio"/> N/A
LCS/BSS levels correct? (Levels D,E)	Yes No <input checked="" type="radio"/> N/A
Transcription/Calculation errors? (Levels D, E)	Yes No <input checked="" type="radio"/> N/A

Comments:

Data Validation for Radiochemical Analyses

Published Date: 09/13/16

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Appendix B - (Cont.) Radiochemical Data Validation Checklist

7. Chemical Carrier Recovery (Levels C, D, E)	<input type="checkbox"/> N/A
Chemical carrier added?	<input checked="" type="radio"/> Yes No N/A
Chemical recovery acceptable?	<input checked="" type="radio"/> Yes No N/A
Chemical carrier traceable? (Levels D, E)	Yes No <input checked="" type="radio"/> N/A
Chemical carrier expired? (Levels D, E)	Yes No <input checked="" type="radio"/> N/A
Transcription/Calculation errors? (Levels D, E)	Yes No <input checked="" type="radio"/> N/A

Comments:

8. Tracer Recovery (Levels C, D, E)	<input type="checkbox"/> N/A
Tracer added?	<input checked="" type="radio"/> Yes No N/A
Tracer recovery acceptable?	Yes <input checked="" type="radio"/> No N/A
Tracer traceable? (Levels D, E)	Yes No <input checked="" type="radio"/> N/A
Tracer expired? (Levels D, E)	Yes No <input checked="" type="radio"/> N/A
Transcription/Calculation errors? (Levels D, E)	Yes No <input checked="" type="radio"/> N/A

Comments:

SDG GEL441510: Am-243 tracer for sample B3FLH4Dup 106%

Data Validation for Radiochemical Analyses

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Appendix B - (Cont.) Radiochemical Data Validation Checklist

9. Matrix Spikes (Levels C, D, E)	<input type="checkbox"/> N/A
Matrix spike analyzed?	<input checked="" type="radio"/> Yes No N/A
Spike recoveries acceptable?	<input checked="" type="radio"/> Yes No N/A
Spike source traceable? (Levels D, E)	Yes No <input checked="" type="radio"/> N/A
Spike source expired? (Levels D, E)	Yes No <input checked="" type="radio"/> N/A
Transcription/Calculation errors? (Levels D, E)	Yes No <input checked="" type="radio"/> N/A

Comments:

10. Duplicates (Levels C, D, E)	<input type="checkbox"/> N/A
Duplicates analyzed at required frequency?	<input checked="" type="radio"/> Yes No N/A
RPD values acceptable?	<input checked="" type="radio"/> Yes No N/A
Transcription/Calculation errors? (Levels D, E)	Yes No <input checked="" type="radio"/> N/A

Comments:

Data Validation for Radiochemical Analyses

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Appendix B - (Cont.) Radiochemical Data Validation Checklist

11. Field QC Samples (Levels C, D, E)	<input type="checkbox"/> N/A
Field duplicate sample(s) analyzed?	Yes <input checked="" type="radio"/> No N/A
Field duplicate RPD values acceptable?	Yes No <input checked="" type="radio"/> N/A
Field split sample(s) analyzed?	Yes <input checked="" type="radio"/> No N/A
Field split RPD values acceptable?	Yes No <input checked="" type="radio"/> N/A
Performance audit sample(s) analyzed?	Yes No <input checked="" type="radio"/> N/A
Performance audit sample results acceptable?	Yes No <input checked="" type="radio"/> N/A

Comments:

12. Holding Times (All levels)	<input type="checkbox"/> N/A
Are sample holding times acceptable?	<input checked="" type="radio"/> Yes No N/A

Comments:

13. Results and MDCs (All Levels)	<input type="checkbox"/> N/A
Results reported for all required sample analyses?	<input checked="" type="radio"/> Yes No N/A
Results supported in raw data?(Levels D, E)	Yes No <input checked="" type="radio"/> N/A
Results acceptable? (Levels D, E)	Yes No <input checked="" type="radio"/> N/A
MDC's meet required reporting limits?	Yes <input checked="" type="radio"/> No N/A
Transcription/Calculation errors? (Levels D, E)	Yes No <input checked="" type="radio"/> N/A

Comments:

MDCs >RL: sample B3FLD4: Am-241, Total Sr; sample B3FLD7 total Sr; sample B3FLF0 Eu-154;
sample B3FLH4 Tot Sr, Eu-154; sample B3FLJ0 Total Sr, Eu-154; sample B3FLK6 Tot Sr, Eu-154

Appendix 4

Additional Documentation Requested By Client

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QC Summary

Report Date: February 7, 2018
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Client : CH2MHill Plateau Remediation Company
 MSIN R3-50 CHPRC
 PO Box 1600
 Richland, Washington 99352

Contact: Mr. Scot Fitzgerald

Workorder: 441510

Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
Rad Alpha Spec									
Batch	1731827								
QC1203952709	MB								
Americium-241			U	0.119	pCi/g			EXC2	01/19/1809:11
				Uncert: +/-0.233					
				TPU: +/-0.234					
**Americium-243 Tracer	19.1			14.7	pCi/g	REC: 77	(30%-105%)		
				Uncert: +/-2.22					
				TPU: +/-3.39					
QC1203952710	441510001	DUP							
Americium-241		U	0.339	U	0.162	pCi/g			
				Uncert: +/-0.629	+/-0.318	RPD: 0	N/A		
				TPU: +/-0.631	+/-0.319	RER: 0.49	(0-2)		
**Americium-243 Tracer	21.0	14.0		13.7	pCi/g	REC: 65	(30%-105%)		
				Uncert: +/-2.47	+/-2.71				
				TPU: +/-3.72	+/-4.09				
QC1203952711	LCS								
Americium-241				17.9					
				Uncert: +/-2.30	19.9	pCi/g	REC: 111	(80%-120%)	01/19/1809:11
				TPU: +/-3.54					
**Americium-243 Tracer	19.1			15.0	pCi/g	REC: 79	(30%-105%)		
				Uncert: +/-2.23					
				TPU: +/-3.41					
Batch	1731829								
QC1203952715	MB								
Neptunium-237			U	0.135	pCi/g			HAKB	01/20/1816:29
				Uncert: +/-0.470					
				TPU: +/-0.471					
**Americium-243 Tracer	1960			1470	pCi/g	REC: 75	(30%-105%)		
QC1203952716	441510001	DUP							
Neptunium-237		U	-0.0919	U	-0.0494	pCi/g			
				Uncert: +/-0.174	+/-0.213	RPD: 0	N/A		
				TPU: +/-0.174	+/-0.213	RER: 0.303	(0-2)		
**Americium-243 Tracer	2100	1740		2100	pCi/g	REC: 100	(30%-105%)		
QC1203952717	LCS								
Neptunium-237				41.0					
				Uncert: +/-3.10	42.2	pCi/g	REC: 103	(80%-120%)	
				TPU: +/-5.61					
**Americium-243 Tracer	1960			1830	pCi/g	REC: 93	(30%-105%)		
Batch	1731831								
QC1203952723	MB								
Plutonium-238			U	-0.31	pCi/g			EXC2	01/19/1809:11
				Uncert: +/-0.204					
				TPU: +/-0.204					
Plutonium-239/240			U	-0.0832	pCi/g				
				Uncert: +/-0.226					

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QC Summary

Workorder: 441510

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Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
Rad Alpha Spec									
Batch	1731831								
**Plutonium-242 Tracer	17.9	TPU:		+/-0.226					
		Uncert:		13.4	pCi/g	REC: 75	(30%-105%)		
		TPU:		+/-2.24					
				+/-3.33					
QC1203952724 441510001 DUP									
Plutonium-238		U	0.0256	U	0.128				01/19/1809:11
		Uncert:	+/-0.268		+/-0.252	RPD: 0	N/A		
		TPU:	+/-0.268		+/-0.252	RER: 0.546	(0-2)		
Plutonium-239/240		U	0.0695	U	0.0378				
		Uncert:	+/-0.261		+/-0.210	RPD: 0	N/A		
		TPU:	+/-0.261		+/-0.210	RER: 0.185	(0-2)		
**Plutonium-242 Tracer	19.7		12.1		14.9	pCi/g	REC: 76	(30%-105%)	
		Uncert:	+/-2.52		+/-2.36				
		TPU:	+/-3.71		+/-3.52				
QC1203952725 LCS									
Plutonium-238				U	0.239	pCi/g			
		Uncert:			+/-0.354				
		TPU:			+/-0.356				
Plutonium-239/240	18.0				19.5	pCi/g	REC: 109	(80%-120%)	
		Uncert:			+/-2.44				
		TPU:			+/-3.70				
**Plutonium-242 Tracer	17.9				12.7	pCi/g	REC: 71	(30%-105%)	
		Uncert:			+/-2.34				
		TPU:			+/-3.46				
Batch	1732132								
QC1203953510 MB									
Americium-241				U	0.113	pCi/g		HAKB	01/29/1815:25
		Uncert:			+/-0.251				
		TPU:			+/-0.251				
**Americium-243 Tracer	18.7				17.3	pCi/g	REC: 92	(30%-105%)	
		Uncert:			+/-1.98				
		TPU:			+/-3.07				
QC1203953511 441510004 DUP									
Americium-241		U	0.242	U	0.0547	pCi/g			01/20/1811:49
		Uncert:	+/-0.306		+/-0.205	RPD: 0	N/A		
		TPU:	+/-0.308		+/-0.205	RER: 0.99	(0-2)		
**Americium-243 Tracer	19.1		19.4		20.2	pCi/g	REC: 106*	(30%-105%)	
		Uncert:	+/-2.22		+/-2.29				
		TPU:	+/-3.39		+/-3.49				
QC1203953512 LCS									
Americium-241	17.6				18.7	pCi/g	REC: 106	(80%-120%)	01/20/1811:49
		Uncert:			+/-2.30				
		TPU:			+/-3.48				
**Americium-243 Tracer	18.7				17.1	pCi/g	REC: 91	(30%-105%)	
		Uncert:			+/-2.29				
		TPU:			+/-3.48				
Batch	1732133								
QC1203953513 MB									
Neptunium-237				U	-0.0371	pCi/g		HAKB	01/20/1816:29
		Uncert:			+/-0.168				

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QC Summary

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Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
Rad Alpha Spec									
Batch	1732133								
		TPU:		+/-0.168					
**Americium-243 Tracer	1910			1680	pCi/g	REC: 88	(30%-105%)		
QC1203953514	441510004	DUP							
Neptunium-237		U	-0.0956	U	0.00459				
		Uncert:	+/-0.154	+/-0.211		RPD: 0	N/A		
		TPU:	+/-0.154	+/-0.211		RER: 0.752	(0-2)		
**Americium-243 Tracer	2040		1980	1820	pCi/g	REC: 89	(30%-105%)		
QC1203953515	LCS								
Neptunium-237	39.9			42.9	pCi/g	REC: 108	(80%-120%)		
		Uncert:		+/-3.36					
		TPU:		+/-5.83					
**Americium-243 Tracer	1910			1430	pCi/g	REC: 75	(30%-105%)		
Batch	1732137								
QC1203953521	MB								
Plutonium-238				U	0.084	pCi/g		HAKB	01/20/1811:49
		Uncert:		+/-0.287					
		TPU:		+/-0.287					
Plutonium-239/240				U	-0.0388	pCi/g			
		Uncert:		+/-0.171					
		TPU:		+/-0.172					
**Plutonium-242 Tracer	17.6			14.6	pCi/g	REC: 83	(30%-105%)		
		Uncert:		+/-2.35					
		TPU:		+/-3.47					
QC1203953522	441510004	DUP							
Plutonium-238		U	0.256	U	0.0634	pCi/g			01/20/1811:49
		Uncert:	+/-0.324	+/-0.238		RPD: 0	N/A		
		TPU:	+/-0.326	+/-0.238		RER: 0.934	(0-2)		
Plutonium-239/240		U	-0.122	U	-0.04	pCi/g			
		Uncert:	+/-0.172	+/-0.177		RPD: 0	N/A		
		TPU:	+/-0.172	+/-0.177		RER: 0.65	(0-2)		
**Plutonium-242 Tracer	17.9		13.2	16.2	pCi/g	REC: 90	(30%-105%)		
		Uncert:	+/-2.23	+/-2.42					
		TPU:	+/-3.31	+/-3.58					
QC1203953523	LCS								
Plutonium-238				U	0.0874	pCi/g			01/20/1811:49
		Uncert:		+/-0.246					
		TPU:		+/-0.246					
Plutonium-239/240	17.6			18.9	pCi/g	REC: 107	(80%-120%)		
		Uncert:		+/-2.53					
		TPU:		+/-3.79					
**Plutonium-242 Tracer	17.6			13.6	pCi/g	REC: 77	(30%-105%)		
		Uncert:		+/-2.44					
		TPU:		+/-3.59					
Batch	1732138								
QC1203953524	MB								
Uranium-233/234				U	-0.117	pCi/g		HAKB	01/30/1813:53
		Uncert:		+/-0.300					
		TPU:		+/-0.300					
Uranium-235/236				U	0.403	pCi/g			
		Uncert:		+/-0.411					

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Parname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date	Time
Rad Alpha Spec										
Batch		1732138								
Uranium-238		TPU:		+/-0.415						
			U	0.0877	pCi/g					
		Uncert:		+/-0.241						
		TPU:		+/-0.242						
**Uranium-232 Tracer		18.7		18.1	pCi/g	REC: 97	(30%-105%)			
		Uncert:		+/-2.23						
		TPU:		+/-3.45						
QC1203953525	441510004	DUP								
Uranium-233/234			1.45	0.856	pCi/g					01/20/1811:17
		Uncert:	+/-0.638	+/-0.668		RPD: 52	(0% - 100%)			
		TPU:	+/-0.671	+/-0.685		RER: 1.21	(0-2)			
Uranium-235/236		U	0.373	U 0.376	pCi/g					
		Uncert:	+/-0.380	+/-0.495		RPD: 0	N/A			
		TPU:	+/-0.384	+/-0.499		RER: 0.00888	(0-2)			
Uranium-238			0.746	U 0.459	pCi/g					
		Uncert:	+/-0.450	+/-0.494		RPD: 28	(0% - 100%)			
		TPU:	+/-0.462	+/-0.500		RER: 0.829	(0-2)			
**Uranium-232 Tracer		19.0		15.0	pCi/g	REC: 66	(30%-105%)			
		Uncert:	+/-2.16	+/-2.75						
		TPU:	+/-3.35	+/-4.14						
QC1203953526	LCS									
Uranium-233/234				21.3	pCi/g					01/20/1811:17
		Uncert:		+/-2.50						
		TPU:		+/-3.99						
Uranium-235/236				1.96	pCi/g					
		Uncert:		+/-0.857						
		TPU:		+/-0.903						
Uranium-238		24.1		22.8	pCi/g	REC: 95	(80%-120%)			
		Uncert:		+/-2.57						
		TPU:		+/-4.20						
**Uranium-232 Tracer		18.7		16.3	pCi/g	REC: 87	(30%-105%)			
		Uncert:		+/-2.34						
		TPU:		+/-3.59						
Batch		1733669								
QC1203957514	MB									
Uranium-233/234				0.142	pCi/g			EXC2		01/25/1808:35
		Uncert:		+/-0.297						
		TPU:		+/-0.298						
Uranium-235/236				-0.0196	pCi/g					
		Uncert:		+/-0.169						
		TPU:		+/-0.169						
Uranium-238				0.0501	pCi/g					
		Uncert:		+/-0.188						
		TPU:		+/-0.188						
**Uranium-232 Tracer		18.2		16.9	pCi/g	REC: 93	(30%-105%)			
		Uncert:		+/-2.16						
		TPU:		+/-3.34						
QC1203957515	441510001	DUP								
Uranium-233/234		U	0.455	U 0.524	pCi/g					01/25/1808:35
		Uncert:	+/-0.445	+/-0.453		RPD: 0	N/A			

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QC Summary

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Parname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
Rad Alpha Spec									
Batch	1733669								
		TPU:	+/-0.451						
				+/-0.460					
Uranium-235/236	U	0.153	U	0.129	pCi/g	RER: 0.208	(0-2)		
		Uncert:	+/-0.300	+/-0.295		RPD: 0	N/A		
		TPU:	+/-0.301	+/-0.296		RER: 0.111	(0-2)		
Uranium-238		0.701		0.518	pCi/g				
		Uncert:	+/-0.457	+/-0.433		RPD: 30	(0% - 100%)		
		TPU:	+/-0.468	+/-0.439		RER: 0.562	(0-2)		
**Uranium-232 Tracer	19.5	15.8		18.3	pCi/g	REC: 94	(30%-105%)		
		Uncert:	+/-2.24	+/-2.29					
		TPU:	+/-3.45	+/-3.55					
QC1203957516	LCS								
Uranium-233/234				26.1	pCi/g				
		Uncert:		+/-2.48					
		TPU:		+/-4.36					
Uranium-235/236				1.88	pCi/g				
		Uncert:		+/-0.769					
		TPU:		+/-0.811					
Uranium-238	23.5			26.3	pCi/g	REC: 112	(80%-120%)		
		Uncert:		+/-2.48					
		TPU:		+/-4.37					
**Uranium-232 Tracer	18.2			15.1	pCi/g	REC: 83	(30%-105%)		
		Uncert:		+/-2.09					
		TPU:		+/-3.25					
Rad Gamma Spec									
Batch	1731786								
QC1203952618	MB								
Cesium-137			U	0.0069	pCi/g			MXR1	01/16/1812:57
		Uncert:		+/-0.0155					
		TPU:		+/-0.0158					
Cobalt-60			U	0.00794	pCi/g				
		Uncert:		+/-0.0156					
		TPU:		+/-0.016					
Europium-152			U	-0.00266	pCi/g				
		Uncert:		+/-0.0405					
		TPU:		+/-0.0405					
Europium-154			U	0.0386	pCi/g				
		Uncert:		+/-0.048					
		TPU:		+/-0.0511					
Europium-155			U	0.00163	pCi/g				
		Uncert:		+/-0.0281					
		TPU:		+/-0.0281					
QC1203952619	441510001	DUP							
Cesium-137	U	0.0238	U	0.0376	pCi/g				01/17/1806:50
		Uncert:	+/-0.033	+/-0.0561		RPD: 0	N/A		
		TPU:	+/-0.0331	+/-0.0562		RER: 0.414	(0-2)		
Cobalt-60	U	-0.00623	U	-0.0172	pCi/g				
		Uncert:	+/-0.0152	+/-0.0239		RPD: 0	N/A		
		TPU:	+/-0.0155	+/-0.0252		RER: 0.728	(0-2)		

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QC Summary

Workorder: 441510

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Parname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
Rad Gamma Spec									
Batch	1731786								
Europium-152		U	0.00384	U	-0.00259	pCi/g			
	Uncert:		+/-0.038		+/-0.0495		RPD: 0	N/A	
	TPU:		+/-0.0381		+/-0.0495		RER: 0.202	(0-2)	
Europium-154		U	0.0417	U	-0.00603	pCi/g			
	Uncert:		+/-0.0495		+/-0.0646		RPD: 0	N/A	
	TPU:		+/-0.0531		+/-0.0647		RER: 1.12	(0-2)	
Europium-155		UX	0.00	UX	0.00	pCi/g			
	Uncert:		+/-0.0646		+/-0.103		RPD: 0	N/A	
	TPU:		+/-0.0652		+/-0.103		RER: 0	(0-2)	
QC1203952620	LCS								
Americium-241	488				554	pCi/g	REC: 113	(80%-120%)	01/17/1806:35
	Uncert:				+/-14.0				
	TPU:				+/-56.7				
Cesium-137	174				168	pCi/g	REC: 97	(80%-120%)	
	Uncert:				+/-3.21				
	TPU:				+/-14.2				
Cobalt-60	135				134	pCi/g	REC: 99	(80%-120%)	
	Uncert:				+/-3.37				
	TPU:				+/-14.7				
Europium-152				U	0.406	pCi/g			
	Uncert:				+/-1.35				
	TPU:				+/-1.37				
Europium-154				U	0.373	pCi/g			
	Uncert:				+/-0.918				
	TPU:				+/-0.934				
Europium-155				U	-0.406	pCi/g			
	Uncert:				+/-1.26				
	TPU:				+/-1.28				
Batch	1731958								
QC1203953067	MB								
Iodine-129				U	0.0188	pCi/g		BSW1	01/17/1811:19
	Uncert:				+/-0.177				
	TPU:				+/-0.177				
QC1203953068	441510001	DUP							
Iodine-129		U	0.300	U	-0.169	pCi/g			01/17/1811:20
	Uncert:		+/-0.409		+/-0.448		RPD: 0	N/A	
	TPU:		+/-0.432		+/-0.455		RER: 1.46	(0-2)	
QC1203953069	441510001	MS							
Iodine-129	32.0	U	0.300		26.9	pCi/g	REC: 83	(75%-125%)	01/18/1806:04
	Uncert:		+/-0.409		+/-3.44				
	TPU:		+/-0.432		+/-4.37				
QC1203953070	LCS								
Iodine-129	21.9				23.8	pCi/g	REC: 109	(80%-120%)	01/17/1811:21
	Uncert:				+/-2.96				
	TPU:				+/-3.80				
Batch	1732039								
QC1203953270	MB								
Cesium-137				U	0.00745	pCi/g		MXR1	01/18/1815:19
	Uncert:				+/-0.00737				
	TPU:				+/-0.00814				

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Parname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date	Time
Rad Gamma Spec										
Batch	1732039									
Cobalt-60			U	-0.00249	pCi/g					
	Uncert:			+/-0.0093						
	TPU:			+/-0.00937						
Europium-152			U	0.0298	pCi/g					
	Uncert:			+/-0.0483						
	TPU:			+/-0.0502						
Europium-154			U	-0.011	pCi/g					
	Uncert:			+/-0.027						
	TPU:			+/-0.0274						
Europium-155			U	0.000667	pCi/g					
	Uncert:			+/-0.0141						
	TPU:			+/-0.0141						
QC1203953271	441510008	DUP								
Cesium-137		U -0.00815	U	-0.00682	pCi/g					01/18/1815:17
	Uncert:	+/-0.0113		+/-0.018		RPD: 0	N/A			
	TPU:	+/-0.0119		+/-0.0183		RER: 0.119	(0-2)			
Cobalt-60		U 0.0023	U	-0.000816	pCi/g					
	Uncert:	+/-0.0139		+/-0.0182		RPD: 0	N/A			
	TPU:	+/-0.0139		+/-0.0182		RER: 0.267	(0-2)			
Europium-152		U 0.00493	U	-0.0148	pCi/g					
	Uncert:	+/-0.027		+/-0.0413		RPD: 0	N/A			
	TPU:	+/-0.0271		+/-0.0419		RER: 0.775	(0-2)			
Europium-154		U -3.65E-05	U	-0.0209	pCi/g					
	Uncert:	+/-0.0312		+/-0.0492		RPD: 0	N/A			
	TPU:	+/-0.0312		+/-0.0501		RER: 0.694	(0-2)			
Europium-155		U -0.0142	U	0.00814	pCi/g					
	Uncert:	+/-0.031		+/-0.0327		RPD: 0	N/A			
	TPU:	+/-0.0317		+/-0.0329		RER: 0.959	(0-2)			
QC1203953272	LCS									
Americium-241	488			544	pCi/g	REC: 112	(80%-120%)			01/18/1814:21
	Uncert:			+/-6.45						
	TPU:			+/-42.1						
Cesium-137	174			177	pCi/g	REC: 102	(80%-120%)			
	Uncert:			+/-4.25						
	TPU:			+/-15.1						
Cobalt-60	135			133	pCi/g	REC: 98	(80%-120%)			
	Uncert:			+/-4.15						
	TPU:			+/-12.1						
Europium-152			U	0.464	pCi/g					
	Uncert:			+/-1.63						
	TPU:			+/-1.65						
Europium-154			U	0.372	pCi/g					
	Uncert:			+/-1.05						
	TPU:			+/-1.07						
Europium-155			U	-0.374	pCi/g					
	Uncert:			+/-1.12						
	TPU:			+/-1.14						
Rad Gas Flow										
Batch	1732031									
QC1203953251	MB									

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Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
Rad Gas Flow									
Batch	1732031								
Total Strontium			U	-0.515	pCi/g			LXB3	01/25/1815:26
				Uncert: +/-0.472					
				TPU: +/-0.472					
**Strontium Carrier	7.85			8.20	mg	REC: 104 (40%-110%)			
QC1203953252	441510005	DUP							
Total Strontium		U	-0.113	U	-0.417				01/25/1815:26
				Uncert: +/-0.492		RPD: 0 N/A			
				TPU: +/-0.492		RER: 0.818 (0-2)			
**Strontium Carrier	7.85	7.60		8.30	mg	REC: 106 (40%-110%)			
QC1203953253	LCS								
Total Strontium	75.6			62.5	pCi/g	REC: 83 (80%-120%)			01/26/1811:07
				Uncert: +/-3.37					
				TPU: +/-16.2					
**Strontium Carrier	7.85			7.60	mg	REC: 97 (40%-110%)			
Rad Liquid Scintillation									
Batch	1731861								
QC1203952816	MB								
Tritium			U	1.16	pCi/g			BXM4	01/19/1813:30
				Uncert: +/-13.1					
				TPU: +/-13.1					
QC1203952817	441510001	DUP							
Tritium		U	2.44	U	6.01				01/19/1813:46
				Uncert: +/-13.4		RPD: 0 N/A			
				TPU: +/-13.4		RER: 0.365 (0-2)			
QC1203952818	441510001	MS							
Tritium	154	U	2.44		124	pCi/g	REC: 80 (75%-125%)		01/19/1814:02
				Uncert: +/-13.4					
				TPU: +/-13.4					
QC1203952819	LCS								
Tritium	84.1				86.7	pCi/g	REC: 103 (80%-120%)		01/19/1814:19
				Uncert: +/-18.4					
				TPU: +/-26.9					
Batch	1731863								
QC1203952824	MB								
Carbon-14			U	0.203	pCi/g			BXM4	01/19/1817:21
				Uncert: +/-2.15					
				TPU: +/-2.15					
QC1203952825	441510001	DUP							
Carbon-14		U	-1.08	U	-0.0881	pCi/g			01/19/1818:03
				Uncert: +/-2.36		RPD: 0 N/A			
				TPU: +/-2.36		RER: 0.607 (0-2)			
QC1203952826	441510001	MS							
Carbon-14	311	U	-1.08		278	pCi/g	REC: 89 (75%-125%)		01/19/1818:45
				Uncert: +/-2.36					
				TPU: +/-2.36					
QC1203952827	LCS								
Carbon-14	134				120	pCi/g	REC: 89 (80%-120%)		01/19/1819:27
				Uncert: +/-4.11					
				TPU: +/-9.75					
Batch	1731867								

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Parname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date Time
Rad Liquid Scintillation									
Batch	1731867								
QC1203952832	MB								
Technetium-99			U	0.220	pCi/g			CXS7	02/05/1810:03
				Uncert: +/-1.56					
				TPU: +/-1.56					
**Technetium-99m Tracer	37000			35300	CPM	REC: 95 (30%-105%)			
QC1203952833	441510001	DUP							
Technetium-99		U	0.396	U	0.541	pCi/g			02/05/1810:19
				Uncert: +/-1.90	+/-2.24	RPD: 0	N/A		
				TPU: +/-1.90	+/-2.24	RER: 0.0964	(0-2)		
**Technetium-99m Tracer	37000		34900		32700	CPM	REC: 88 (30%-105%)		
QC1203952834	LCS								
Technetium-99				56.1	47.5	pCi/g	REC: 85 (80%-120%)		02/05/1810:36
				Uncert: +/-3.02					
				TPU: +/-6.22					
**Technetium-99m Tracer	37000				35000	CPM	REC: 95 (30%-105%)		
Batch	1732338								
QC1203954062	MB								
Nickel-63			U	0.317	pCi/g			TXJ1	01/30/1822:19
				Uncert: +/-3.99					
				TPU: +/-3.99					
**Nickel Carrier	25.2			17.4	mg	REC: 69 (40%-110%)			
QC1203954063	441510001	DUP							
Nickel-63		U	-2.48	U	0.444	pCi/g			01/30/1822:51
				Uncert: +/-3.73	+/-3.84	RPD: 0	N/A		
				TPU: +/-3.73	+/-3.84	RER: 1.07	(0-2)		
**Nickel Carrier	25.2		18.3		18.5	mg	REC: 73 (40%-110%)		
QC1203954064	LCS								
Nickel-63				258	278	pCi/g	REC: 108 (80%-120%)		01/30/1823:22
				Uncert: +/-9.22					
				TPU: +/-52.1					
**Nickel Carrier	25.2				19.1	mg	REC: 76 (40%-110%)		

Notes:

TPU and Counting Uncertainty are calculated at the 95% confidence level (1.96-sigma).

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).
- B The analyte was detected in the associated method blank >= MDC or >5% sample activity.
- 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.
- N Spike 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.
- UX Gamma Spectroscopy--Uncertain identification
- 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

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Parmname	NOM	Sample	Qual	QC	Units	QC Criteria	Range	Analyst	Date	Time
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.

** Indicates analyte is a surrogate compound.

^ 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.

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.