

CHPRC - REVIEW COMMENT RECORD (RCR)

1. Date: 08/28/2017
 2. Review No.:
 3. Project No.:
 Page 1 of 1

5. Document Number(s)/Title(s): VSR17-011
 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:
 Scot Fitzgerald (optional) (print and sign)
 Date: 08/28/2017
 Reviewer/Point of Contact (print and sign): Scot Fitzgerald
 Date: 08/28/2017
 Author/Organizer (print and sign): Scot Fitzgerald

12. Item	13a. Comments	13b. Basis	13c. Recommendation	14. Reviewer Concurrence 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

VSR17-011
Project 100K Rad Chara

Chemical and Radiochemical Validation - Level C

Validation Performed By: *Eyda Hergenreder* Date: 08-22-2017
Eyda Hergenreder

Technical Review By: *Ellen McEntee* Date: 08-22-2017
Ellen McEntee

Quality Review By: *Mary A. Donovan* Date: 08-23-2017
Mary Donovan
Quality Assurance Manager

TABLE OF CONTENTS

Semi-Volatile Organics

Memorandum	3
Appendix 1 – Glossary of Data Reporting Qualifiers	7
Appendix 2 – Summary of Data Qualification	9
Appendix 3 – Data Validation Supporting Documentation	11
Appendix 4 – Additional Documentation Requested By Client	18

Pesticides

Memorandum	23
Appendix 1 – Glossary of Data Reporting Qualifiers	27
Appendix 2 – Summary of Data Qualification	30
Appendix 3 – Data Validation Supporting Documentation	32
Appendix 4 – Additional Documentation Requested By Client	39

Metals

Memorandum	45
Appendix 1 – Glossary of Data Reporting Qualifiers	49
Appendix 2 – Summary of Data Qualification	51
Appendix 3 – Data Validation Supporting Documentation	53
Appendix 4 – Additional Documentation Requested By Client	60

General Chemistry

Memorandum	64
Appendix 1 – Glossary of Data Reporting Qualifiers	68
Appendix 2 – Summary of Data Qualification	70
Appendix 3 – Data Validation Supporting Documentation	72
Appendix 4 – Additional Documentation Requested By Client	78

Radiochemistry

Memorandum	81
Appendix 1 – Glossary of Data Reporting Qualifiers	84
Appendix 2 – Summary of Data Qualification	86
Appendix 3 – Data Validation Supporting Documentation	88
Appendix 4 – Additional Documentation Requested By Client	95

Date: 21 August 2017
 To: CH2M Hill (technical representative)
 From: Analytical Quality Associates, Inc.
 Project: 100K Rad Chara.
 Subject: Semivolatile Organics - Sample Data Group (SDG) DN0181

INTRODUCTION

This memorandum presents the results of data validation for SDG DN0181 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
B3BMY7	7/18/17	Soil	C	8270D SIM
B3BMY1	7/18/17	Soil	C	8270D SIM
B3BMX7	7/18/17	Soil	C	8270D SIM
B3BMX9	7/18/17	Soil	C	8270D SIM
B3BMX5	7/18/17	Soil	C	8270D SIM
B3BMY3	7/18/17	Soil	C	8270D SIM
B3BMY5	7/18/17	Soil	C	8270D SIM

Data validation was conducted in accordance with the CHPRC validation statement of work and the 100 Area Remedial Action Sampling and Analysis Plan, DOE/RL-96-22, Rev. 5 (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 semivolatile organics in soil 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 accuracy limits are 50% to 150% at a minimum, and the limits established by the analytical laboratory are used if more stringent. The matrix spike sample accuracy limits are the ones specified by the DV procedure.

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 $\pm 30\%$.

MS/MSD Samples

All reported MS/MSD RPD values were acceptable with the following exceptions.

For SDG DN0181, the acenaphthene, acenaphthylene and naphthalene RPDs were above the upper acceptance limits. All associated sample results should be qualified as estimates; therefore, all non-detect sample results should be flagged “UJ” and all detect sample results should be flagged “J.” See the table in Appendix 2 for a listing of all affected sample results.

Field Duplicate Samples

For SDG DN0181, primary sample B3BMX9 and replicate sample B3BMY1 were submitted. The benzo(b)fluoranthene, chrysene and fluoranthene results for sample B3BMY1 were > PQLs, all other sample results were < the PQLs. RPDs were not required since samples were soil samples.

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 DN0181 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

Minor deficiencies leading to qualification of sample results as estimates were due to poor MS/MSD precision. 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-96-22, Rev. 5, *100 Area Remedial Action Sampling and Analysis Plan*, September 2009.

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: DN0181	Reviewer: AQA	Project: 100K Rad Chara.	Page 1 of 1
Analyte(s)	Qualifier	Samples Affected	Reason
Acenaphthylene	UJ	B3BMY7, B3BMY3	Poor MS/MSD precision
Acenaphthene Naphthalene	UJ	B3BMY7, B3BMY1, B3BMX7, B3BMX9, B3BMX5, B3BMY3, B3BMY5	Poor MS/MSD precision
Acenaphthylene	J	B3BMY1, B3BMX7, B3BMX9, B3BMX5, B3BMY5	Poor MS/MSD precision

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	<input checked="" type="radio"/> C	D	E
PROJECT: 100K Rad Chara.			DATA PACKAGE: VSR17-011		
VALIDATOR: Eyda Hergenreder		LAB: TestAmerica		DATE: 08/21/17	
			SDG: DN0181		
ANALYSES PERFORMED					
SW-846 8260		SW-846 8260 (TCLP)	SW-846 8270 X		SW-846 8270 (TCLP)
SAMPLES/MATRIX Soil					
SDG DN0181: B3BMY7, B3BMY1, B3BMX7, B3BMX9, B3BMX5, B3BMY3, B3BMY5					

1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE

Technical verification documentation present?	Yes <input checked="" 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 <input type="radio"/> N/A
Surrogate/system monitoring compound recoveries acceptable?	<input checked="" type="radio"/> Yes No <input type="radio"/> 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 <input type="radio"/> N/A
MS/MSD results acceptable?	<input checked="" type="radio"/> Yes No <input type="radio"/> 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 <input type="radio"/> N/A
LCS/BSS results acceptable?	<input checked="" type="radio"/> Yes No <input type="radio"/> 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

SGRP-GD-SMP-50117

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?	Yes <input checked="" type="radio"/> 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:

SDG DN0181

MS/MSD RPD: acenaphthene 36%, acenaphthylene 35%, naphthalene 36%

Field Duplicates: primary sample B3BMX9/replicate sample B3BMY1: RPDs not calculated samples are soil matrix

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

Comments:

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

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

Comments:

Appendix 4

Additional Documentation Requested By Client

QC Sample Results

Client: CH2M Hill Plateau Remediation Company
 Project/Site: F17-051

TestAmerica Job ID: 280-99505-1
 SDG: DN0181

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

Lab Sample ID: MB 280-381905/1-A
Matrix: Solid
Analysis Batch: 382292

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 381905

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acenaphthene	0.16	U	4.9	0.16	ug/Kg		07/25/17 11:40	07/27/17 15:56	1
Acenaphthylene	0.17	U	4.9	0.17	ug/Kg		07/25/17 11:40	07/27/17 15:56	1
Anthracene	0.71	U	4.9	0.71	ug/Kg		07/25/17 11:40	07/27/17 15:56	1
Benzo[a]anthracene	0.89	U	4.9	0.89	ug/Kg		07/25/17 11:40	07/27/17 15:56	1
Benzo[a]pyrene	0.73	U	4.9	0.73	ug/Kg		07/25/17 11:40	07/27/17 15:56	1
Benzo[b]fluoranthene	1.2	U	4.9	1.2	ug/Kg		07/25/17 11:40	07/27/17 15:56	1
Benzo[g,h,i]perylene	1.1	U	4.9	1.1	ug/Kg		07/25/17 11:40	07/27/17 15:56	1
Benzo[k]fluoranthene	0.98	U	4.9	0.98	ug/Kg		07/25/17 11:40	07/27/17 15:56	1
Chrysene	0.98	U	4.9	0.98	ug/Kg		07/25/17 11:40	07/27/17 15:56	1
Dibenz[a,h]anthracene	1.3	U	4.9	1.3	ug/Kg		07/25/17 11:40	07/27/17 15:56	1
Fluoranthene	0.98	U	4.9	0.98	ug/Kg		07/25/17 11:40	07/27/17 15:56	1
Fluorene	0.46	U	4.9	0.46	ug/Kg		07/25/17 11:40	07/27/17 15:56	1
Indeno[1,2,3-cd]pyrene	1.1	U	4.9	1.1	ug/Kg		07/25/17 11:40	07/27/17 15:56	1
Naphthalene	0.32	U	4.9	0.32	ug/Kg		07/25/17 11:40	07/27/17 15:56	1
Phenanthrene	1.1	U	4.9	1.1	ug/Kg		07/25/17 11:40	07/27/17 15:56	1
Pyrene	1.1	U	4.9	1.1	ug/Kg		07/25/17 11:40	07/27/17 15:56	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
2-Fluorobiphenyl	80		39 - 120	07/25/17 11:40	07/27/17 15:56	1
Nitrobenzene-d5	81		42 - 120	07/25/17 11:40	07/27/17 15:56	1
Terphenyl-d14	93		35 - 124	07/25/17 11:40	07/27/17 15:56	1

Lab Sample ID: LCS 280-381905/2-A
Matrix: Solid
Analysis Batch: 382292

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 381905

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Acenaphthene	27.8	20.0		ug/Kg		72	35 - 130
Acenaphthylene	27.8	19.3		ug/Kg		69	41 - 130
Anthracene	27.8	21.0		ug/Kg		76	43 - 130
Benzo[a]anthracene	27.8	22.0		ug/Kg		79	36 - 130
Benzo[a]pyrene	27.8	20.0		ug/Kg		72	20 - 130
Benzo[b]fluoranthene	27.8	20.8		ug/Kg		75	37 - 130
Benzo[g,h,i]perylene	27.8	20.1		ug/Kg		72	20 - 130
Benzo[k]fluoranthene	27.8	20.7		ug/Kg		74	46 - 130
Chrysene	27.8	22.7		ug/Kg		82	34 - 130
Dibenz[a,h]anthracene	27.8	21.1		ug/Kg		76	20 - 130
Fluoranthene	27.8	22.3		ug/Kg		80	45 - 130
Fluorene	27.8	20.9		ug/Kg		75	44 - 130
Indeno[1,2,3-cd]pyrene	27.8	20.5		ug/Kg		74	20 - 130
Naphthalene	27.8	23.0		ug/Kg		83	44 - 130
Phenanthrene	27.8	20.8		ug/Kg		75	44 - 130
Pyrene	27.8	22.4		ug/Kg		80	43 - 130

Surrogate	LCS %Recovery	LCS Qualifier	Limits
2-Fluorobiphenyl	73		39 - 120
Nitrobenzene-d5	79		42 - 120

TestAmerica Denver

Page 2 of 2
QC Sample Results

Client: CH2M Hill Plateau Remediation Company
 Project/Site: F17-051

TestAmerica Job ID: 280-99505-1
 SDG: DN0181

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

Lab Sample ID: LCS 280-381905/2-A
Matrix: Solid
Analysis Batch: 382292

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 381905

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Terphenyl-d14	89		35 - 124

Lab Sample ID: 280-99505-1 MS
Matrix: Soil
Analysis Batch: 382292

Client Sample ID: B3BMY7
Prep Type: Total/NA
Prep Batch: 381905

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Acenaphthene	0.15	U	28.5	15.5		ug/Kg	☼	54	35 - 120
Acenaphthylene	0.16	U	28.5	15.5		ug/Kg	☼	54	41 - 120
Anthracene	0.69	U	28.5	20.4		ug/Kg	☼	72	43 - 120
Benzo[a]anthracene	0.86	U	28.5	20.9		ug/Kg	☼	73	36 - 120
Benzo[a]pyrene	0.71	U	28.5	18.9		ug/Kg	☼	66	20 - 120
Benzo[b]fluoranthene	1.1	U	28.5	19.5		ug/Kg	☼	68	37 - 120
Benzo[g,h,i]perylene	1.1	U	28.5	18.8		ug/Kg	☼	66	20 - 123
Benzo[k]fluoranthene	0.96	U	28.5	19.2		ug/Kg	☼	67	46 - 120
Chrysene	0.96	U	28.5	21.0		ug/Kg	☼	74	34 - 120
Dibenz[a,h]anthracene	1.2	U	28.5	19.4		ug/Kg	☼	68	20 - 120
Fluoranthene	0.96	U	28.5	20.5		ug/Kg	☼	72	45 - 120
Fluorene	0.45	U	28.5	17.4		ug/Kg	☼	61	44 - 120
Indeno[1,2,3-cd]pyrene	1.1	U	28.5	19.2		ug/Kg	☼	68	20 - 127
Naphthalene	0.31	U	28.5	15.2		ug/Kg	☼	53	44 - 120
Phenanthrene	1.1	U	28.5	20.0		ug/Kg	☼	70	44 - 120
Pyrene	1.1	U	28.5	20.6		ug/Kg	☼	72	43 - 120

Surrogate	MS %Recovery	MS Qualifier	Limits
2-Fluorobiphenyl	57		39 - 120
Nitrobenzene-d5	63		42 - 120
Terphenyl-d14	84		35 - 124

Lab Sample ID: 280-99505-1 MSD
Matrix: Soil
Analysis Batch: 382292

Client Sample ID: B3BMY7
Prep Type: Total/NA
Prep Batch: 381905

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Acenaphthene	0.15	U	30.0	22.3		ug/Kg	☼	74	35 - 120	36	50
Acenaphthylene	0.16	U	30.0	22.1		ug/Kg	☼	74	41 - 120	35	50
Anthracene	0.69	U	30.0	24.2		ug/Kg	☼	81	43 - 120	17	50
Benzo[a]anthracene	0.86	U	30.0	24.3		ug/Kg	☼	81	36 - 120	15	40
Benzo[a]pyrene	0.71	U	30.0	22.3		ug/Kg	☼	74	20 - 120	16	30
Benzo[b]fluoranthene	1.1	U	30.0	23.0		ug/Kg	☼	77	37 - 120	17	30
Benzo[g,h,i]perylene	1.1	U	30.0	22.2		ug/Kg	☼	74	20 - 123	17	30
Benzo[k]fluoranthene	0.96	U	30.0	22.5		ug/Kg	☼	75	46 - 120	16	30
Chrysene	0.96	U	30.0	24.3		ug/Kg	☼	81	34 - 120	15	41
Dibenz[a,h]anthracene	1.2	U	30.0	23.0		ug/Kg	☼	76	20 - 120	17	30
Fluoranthene	0.96	U	30.0	23.2		ug/Kg	☼	77	45 - 120	12	30
Fluorene	0.45	U	30.0	23.3		ug/Kg	☼	78	44 - 120	29	50
Indeno[1,2,3-cd]pyrene	1.1	U	30.0	22.7		ug/Kg	☼	76	20 - 127	17	50
Naphthalene	0.31	U	30.0	21.9		ug/Kg	☼	73	44 - 120	36	50

TestAmerica Denver

Page 7 of 22
QC Sample Results

Client: CH2M Hill Plateau Remediation Company
 Project/Site: F17-051

TestAmerica Job ID: 280-99505-1
 SDG: DN0181

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

Lab Sample ID: 280-99505-1 MSD
 Matrix: Soil
 Analysis Batch: 382292

Client Sample ID: B3BMY7
 Prep Type: Total/NA
 Prep Batch: 381905

Analyte	Sample	Sample	Spike	MSD	MSD	Unit	D	%Rec	%Rec.	RPD	Limit
	Result	Qualifier	Added	Result	Qualifier				Limits	RPD	
Phenanthrene	1.1	U	30.0	23.1		ug/Kg	☒	77	44 - 120	15	42
Pyrene	1.1	U	30.0	23.3		ug/Kg	☒	78	43 - 120	12	30
Surrogate	MSD	MSD	Limits								
	%Recovery	Qualifier	Limits								
2-Fluorobiphenyl	76		39 - 120								
Nitrobenzene-d5	86		42 - 120								
Terphenyl-d14	87		35 - 124								

Method: 8081B - Organochlorine Pesticides (GC)

Lab Sample ID: MB 280-382055/1-A
 Matrix: Solid
 Analysis Batch: 382413

Client Sample ID: Method Blank
 Prep Type: Total/NA
 Prep Batch: 382055

Analyte	MB	MB	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
4,4'-DDD	0.53	U	1.7	0.53	ug/Kg		07/26/17 13:30	07/28/17 22:25	1
4,4'-DDE	0.23	U	1.7	0.23	ug/Kg		07/26/17 13:30	07/28/17 22:25	1
4,4'-DDT	0.57	U	1.7	0.57	ug/Kg		07/26/17 13:30	07/28/17 22:25	1
Aldrin	0.24	U	1.7	0.24	ug/Kg		07/26/17 13:30	07/28/17 22:25	1
alpha-BHC	0.21	U	1.7	0.21	ug/Kg		07/26/17 13:30	07/28/17 22:25	1
beta-BHC	0.64	U	1.7	0.64	ug/Kg		07/26/17 13:30	07/28/17 22:25	1
delta-BHC	0.39	U	1.7	0.39	ug/Kg		07/26/17 13:30	07/28/17 22:25	1
Dieldrin	0.20	U	1.7	0.20	ug/Kg		07/26/17 13:30	07/28/17 22:25	1
Endosulfan I	0.17	U	1.7	0.17	ug/Kg		07/26/17 13:30	07/28/17 22:25	1
Endosulfan II	0.28	U	1.7	0.28	ug/Kg		07/26/17 13:30	07/28/17 22:25	1
Endosulfan sulfate	0.27	U	1.7	0.27	ug/Kg		07/26/17 13:30	07/28/17 22:25	1
Endrin	0.30	U	1.7	0.30	ug/Kg		07/26/17 13:30	07/28/17 22:25	1
Endrin aldehyde	0.17	U	1.7	0.17	ug/Kg		07/26/17 13:30	07/28/17 22:25	1
gamma-BHC (Lindane)	0.45	U	1.7	0.45	ug/Kg		07/26/17 13:30	07/28/17 22:25	1
Heptachlor epoxide	0.41	U	1.7	0.41	ug/Kg		07/26/17 13:30	07/28/17 22:25	1
Methoxychlor	0.44	U	3.2	0.44	ug/Kg		07/26/17 13:30	07/28/17 22:25	1
Toxaphene	15	U	65	15	ug/Kg		07/26/17 13:30	07/28/17 22:25	1
Surrogate	MB	MB	Limits			Prepared	Analyzed	Dil Fac	
	%Recovery	Qualifier	Limits						
Decachlorobiphenyl	98		63 - 124			07/26/17 13:30	07/28/17 22:25	1	
Tetrachloro-m-xylene	95		59 - 115			07/26/17 13:30	07/28/17 22:25	1	

Lab Sample ID: LCS 280-382055/2-A
 Matrix: Solid
 Analysis Batch: 382413

Client Sample ID: Lab Control Sample
 Prep Type: Total/NA
 Prep Batch: 382055

Analyte	Spike	LCS	LCS	Unit	D	%Rec	%Rec.
		Added	Result				Qualifier
4,4'-DDD	16.3	14.4		ug/Kg		88	69 - 130
4,4'-DDE	16.3	15.3		ug/Kg		94	70 - 130
4,4'-DDT	16.3	17.4		ug/Kg		107	67 - 130
Aldrin	16.3	14.1		ug/Kg		86	69 - 130
alpha-BHC	16.3	14.6		ug/Kg		90	65 - 130

TestAmerica Denver

Surrogate Summary

Client: CH2M Hill Plateau Remediation Company
 Project/Site: F17-051

TestAmerica Job ID: 280-99505-1
 SDG: DN0181

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

Matrix: Soil

Prep Type: Total/NA

Percent Surrogate Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	Percent Surrogate Recovery (Acceptance Limits)		
		FBP (39-120)	NBZ (42-120)	TPH (35-124)
280-99505-1	B3BMY7	72	82	91
280-99505-1 MS	B3BMY7	57	63	84
280-99505-1 MSD	B3BMY7	76	86	87
280-99505-2	B3BMY1	69	74	77
280-99505-3	B3BMX7	74	80	78
280-99505-4	B3BMX9	69	74	78
280-99505-5	B3BMX5	75	83	80
280-99505-6	B3BMY3	69	75	79
280-99505-7	B3BMY5	75	83	78

Surrogate Legend

FBP = 2-Fluorobiphenyl
 NBZ = Nitrobenzene-d5
 TPH = Terphenyl-d14

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

Matrix: Solid

Prep Type: Total/NA

Percent Surrogate Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	Percent Surrogate Recovery (Acceptance Limits)		
		FBP (39-120)	NBZ (42-120)	TPH (35-124)
LCS 280-381905/2-A	Lab Control Sample	73	79	89
MB 280-381905/1-A	Method Blank	80	81	93

Surrogate Legend

FBP = 2-Fluorobiphenyl
 NBZ = Nitrobenzene-d5
 TPH = Terphenyl-d14

Method: 8081B - Organochlorine Pesticides (GC)

Matrix: Soil

Prep Type: Total/NA

Percent Surrogate Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	Percent Surrogate Recovery (Acceptance Limits)	
		DCB1 (63-124)	TCX1 (59-115)
280-99505-1	B3BMY7	97	98
280-99505-1 MS	B3BMY7	93	92
280-99505-1 MSD	B3BMY7	83	75
280-99505-2	B3BMY1	82	90
280-99505-3	B3BMX7	87	91
280-99505-4	B3BMX9	70	73
280-99505-5	B3BMX5	81	84
280-99505-6	B3BMY3	94	92
280-99505-7	B3BMY5	84	90

Surrogate Legend

DCB = Decachlorobiphenyl
 TCX = Tetrachloro-m-xylene

Date: 21 August 2017
 To: CH2M Hill (technical representative)
 From: Analytical Quality Associates, Inc.
 Project: 100K Rad Chara.
 Subject: Pesticides - Sample Data Group (SDG) DN0181

INTRODUCTION

This memorandum presents the results of data validation for SDG DN0181 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 Method
B3BMY7	7/18/17	Soil	C	8081B
B3BMY1	7/18/17	Soil	C	8081B
B3BMX7	7/18/17	Soil	C	8081B
B3BMX9	7/18/17	Soil	C	8081B
B3BMX5	7/18/17	Soil	C	8081B
B3BMY3	7/18/17	Soil	C	8081B
B3BMY5	7/18/17	Soil	C	8081B

Data validation was conducted in accordance with the CHPRC validation statement of work and the 100 Area Remedial Action Sampling and Analysis Plan, DOE/RL-96-22, Rev. 5 (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 pesticides in soil 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 with the following exception.

SDG DN0181, the endosulfan I result for trip blank sample B3BMY7 was a detect > the method detection limit (MDL) but < the practical quantitation limit (PQL). All associated sample results were non-detects and should not be qualified as a result.

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 accuracy limits are 50% to 150% and the matrix spike sample accuracy limits are ones specified by the DV procedure.

Surrogates

All surrogate recoveries were acceptable.

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

All MS/MSD recoveries were acceptable.

It should be mentioned that MS/MSD analyses was not performed for multi-component analyte toxaphene. No sample data are qualified as a result.

Laboratory Control Samples (LCSs)

All LCS recoveries were acceptable.

It should be mentioned that LCS analysis was not performed for multi-component analyte toxaphene. No sample data are qualified as a result.

- **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 $\pm 30\%$.

MS/MSD Samples

All MS/MSD relative percent difference values were acceptable.

Field Duplicate Samples

For SDG DN0181, primary sample B3BMX9 and replicate sample B3BMY1 were submitted. The 4,4'-DDE and dieldrin results for both samples were $>$ the PQLs. Samples were soil samples, therefore RPDs were not evaluated.

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 with the exception of 4,4'-DDD, 4,4'-DDT, and beta-BHC for all samples. Data should not be qualified as a result.

- **Completeness**

SDG DN0181 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-96-22, Rev. 5, *100 Area Remedial Action Sampling and Analysis*, September 2009.

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.
- **C** — This qualifier applies to pesticide and Aroclor results when the identification has been confirmed by Gas Chromatograph/Mass Spectrometer (GC/MS).
- **X** — This qualifier applies to pesticide and Aroclor results when GC/MS analysis was attempted but was unsuccessful. The data should be considered unusable 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

Pesticides Data Qualification Summary			
SDG: DN0181	Reviewer: AQA	Project: 100K Rad Chara.	Page 1 of 1
Analyte(s)	Qualifier	Samples Affected	Reason
Pesticides	None	N/A	N/A

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: 100K Rad Chara.			DATA PACKAGE: VSR17-011		
VALIDATOR: Eyda Hergenreder		LAB: TestAmerica		DATE: 08/21/17	
			SDG: DN0181		
ANALYSES PERFORMED					
SW-846 8081 X	SW-846 8081 (TCLP)	SW-846 8082	SW-846 8082 (TCLP)		
SAMPLES/MATRIX Soil					
SDG DN0181: B3BMY7, B3BMY1, B3BMX7, B3BMX9, B3BMX5, B3BMY3, B3BMY5					

1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE

Technical verification documentation present?	Yes <input type="radio"/> No <input checked="" 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 PERFORMANCE AND CALIBRATIONS (Levels D and E)

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
DDT and endrin breakdowns 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)	Yes <input checked="" type="radio"/> No N/A
Transcription/calculation errors? (Levels D, E)	Yes No <input type="radio"/> N/A

Comments:

SDG DN0181: Trip blank sample B3BMY7 endosulfan I 0.22 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

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

Surrogates analyzed?	<input checked="" type="radio"/> Yes No <input type="radio"/> N/A
Surrogate recoveries acceptable?	<input checked="" type="radio"/> Yes No <input type="radio"/> 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 <input type="radio"/> N/A
MS/MSD results acceptable?	<input checked="" type="radio"/> Yes No <input type="radio"/> N/A
MS/MSD standards NIST traceable? (Levels D, E)	Yes No <input type="radio"/> N/A
MS/MSD standards expired? (Levels D, E)	Yes No <input type="radio"/> N/A
LCS/BSS samples analyzed?	<input checked="" type="radio"/> Yes No <input type="radio"/> N/A
LCS/BSS results acceptable?	<input checked="" type="radio"/> Yes No <input type="radio"/> 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

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

Comments:

DN0181: Field duplicate: primary sample B3BMX9/replicate sample B3BMY1, RPDs not calculated, soil samples

6. SYSTEM PERFORMANCE (Levels D and E)

Chromatographic performance acceptable?	Yes No <input type="radio"/> N/A
Positive results resolved acceptably?	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

7. 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:

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

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

Comments: MDLs were >CRDLs for 4,4'-DDD, 4,4'-DDT, and beta-BHC.

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

9. SAMPLE CLEANUP (Levels D and E)

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

Comments (attach additional sheets as necessary):

Appendix 4

Additional Documentation Requested By Client

Page 41 of 50
QC Sample Results

Client: CH2M Hill Plateau Remediation Company
Project/Site: F17-051

TestAmerica Job ID: 280-99505-1
SDG: DN0181

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

Lab Sample ID: 280-99505-1 MSD
Matrix: Soil
Analysis Batch: 382292

Client Sample ID: B3BMY7
Prep Type: Total/NA
Prep Batch: 381905

Analyte	Sample		Spike Added	MSD		Unit	D	%Rec	%Rec.		RPD	Limit
	Result	Qualifier		Result	Qualifier				Limits	RPD		
Phenanthrene	1.1	U	30.0	23.1		ug/Kg	*	77	44 - 120	15	42	
Pyrene	1.1	U	30.0	23.3		ug/Kg	*	78	43 - 120	12	30	
Surrogate	MSD		Limits	MSD								
	%Recovery	Qualifier		Result	Qualifier							
2-Fluorobiphenyl	76		39 - 120									
Nitrobenzene-d5	86		42 - 120									
Terphenyl-d14	87		35 - 124									

Method: 8081B - Organochlorine Pesticides (GC)

Lab Sample ID: MB 280-382055/1-A
Matrix: Solid
Analysis Batch: 382413

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 382055

Analyte	MB		RL	MDL	Unit	D	Prepared		Analyzed		Dil Fac
	Result	Qualifier					Prepared	Analyzed			
4,4'-DDD	0.53	U	1.7	0.53	ug/Kg		07/26/17 13:30	07/28/17 22:25		1	
4,4'-DDE	0.23	U	1.7	0.23	ug/Kg		07/26/17 13:30	07/28/17 22:25		1	
4,4'-DDT	0.57	U	1.7	0.57	ug/Kg		07/26/17 13:30	07/28/17 22:25		1	
Aldrin	0.24	U	1.7	0.24	ug/Kg		07/26/17 13:30	07/28/17 22:25		1	
alpha-BHC	0.21	U	1.7	0.21	ug/Kg		07/26/17 13:30	07/28/17 22:25		1	
beta-BHC	0.64	U	1.7	0.64	ug/Kg		07/26/17 13:30	07/28/17 22:25		1	
delta-BHC	0.39	U	1.7	0.39	ug/Kg		07/26/17 13:30	07/28/17 22:25		1	
Dieldrin	0.20	U	1.7	0.20	ug/Kg		07/26/17 13:30	07/28/17 22:25		1	
Endosulfan I	0.17	U	1.7	0.17	ug/Kg		07/26/17 13:30	07/28/17 22:25		1	
Endosulfan II	0.28	U	1.7	0.28	ug/Kg		07/26/17 13:30	07/28/17 22:25		1	
Endosulfan sulfate	0.27	U	1.7	0.27	ug/Kg		07/26/17 13:30	07/28/17 22:25		1	
Endrin	0.30	U	1.7	0.30	ug/Kg		07/26/17 13:30	07/28/17 22:25		1	
Endrin aldehyde	0.17	U	1.7	0.17	ug/Kg		07/26/17 13:30	07/28/17 22:25		1	
gamma-BHC (Lindane)	0.45	U	1.7	0.45	ug/Kg		07/26/17 13:30	07/28/17 22:25		1	
Heptachlor epoxide	0.41	U	1.7	0.41	ug/Kg		07/26/17 13:30	07/28/17 22:25		1	
Methoxychlor	0.44	U	3.2	0.44	ug/Kg		07/26/17 13:30	07/28/17 22:25		1	
Toxaphene	15	U	65	15	ug/Kg		07/26/17 13:30	07/28/17 22:25		1	
Surrogate	MB		Limits	MB		Prepared		Analyzed		Dil Fac	
	%Recovery	Qualifier		Result	Qualifier	Prepared	Analyzed				
Decachlorobiphenyl	98		63 - 124			07/26/17 13:30	07/28/17 22:25		1		
Tetrachloro-m-xylene	95		59 - 115			07/26/17 13:30	07/28/17 22:25		1		

Lab Sample ID: LCS 280-382055/2-A
Matrix: Solid
Analysis Batch: 382413

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 382055

Analyte	Spike Added	LCS		Unit	D	%Rec	%Rec.	
		Result	Qualifier				Limits	RPD
4,4'-DDD	16.3	14.4		ug/Kg		88	69 - 130	
4,4'-DDE	16.3	15.3		ug/Kg		94	70 - 130	
4,4'-DDT	16.3	17.4		ug/Kg		107	67 - 130	
Aldrin	16.3	14.1		ug/Kg		86	69 - 130	
alpha-BHC	16.3	14.6		ug/Kg		90	65 - 130	

TestAmerica Denver

Page 41 of 88
QC Sample Results

Client: CH2M Hill Plateau Remediation Company
 Project/Site: F17-051

TestAmerica Job ID: 280-99505-1
 SDG: DN0181

Method: 8081B - Organochlorine Pesticides (GC) (Continued)

Lab Sample ID: LCS 280-382055/2-A
Matrix: Solid
Analysis Batch: 382413

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 382055

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
beta-BHC	16.3	14.9		ug/Kg		92	62 - 130
delta-BHC	16.3	15.0		ug/Kg		92	67 - 130
Dieldrin	16.3	15.2		ug/Kg		94	70 - 130
Endosulfan I	16.3	14.7		ug/Kg		90	67 - 130
Endosulfan II	16.3	14.7		ug/Kg		90	69 - 130
Endosulfan sulfate	16.3	15.3		ug/Kg		94	69 - 130
Endrin	16.3	15.2		ug/Kg		93	69 - 130
Endrin aldehyde	16.3	12.1		ug/Kg		74	41 - 130
gamma-BHC (Lindane)	16.3	14.6		ug/Kg		90	66 - 130
Heptachlor epoxide	16.3	14.8		ug/Kg		91	70 - 130
Methoxychlor	16.3	17.6		ug/Kg		108	65 - 130

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Decachlorobiphenyl	102		63 - 124
Tetrachloro-m-xylene	96		59 - 115

Lab Sample ID: 280-99505-1 MS
Matrix: Soil
Analysis Batch: 382413

Client Sample ID: B3BMY7
Prep Type: Total/NA
Prep Batch: 382055

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
4,4'-DDD	0.54	U	16.1	13.6		ug/Kg	☼	84	69 - 126
4,4'-DDE	0.23	U	16.1	14.4		ug/Kg	☼	90	71 - 116
4,4'-DDT	0.58	U	16.1	16.2		ug/Kg	☼	100	67 - 132
Aldrin	0.25	U	16.1	13.7		ug/Kg	☼	85	69 - 116
alpha-BHC	0.21	U	16.1	14.0		ug/Kg	☼	87	65 - 122
beta-BHC	0.65	U	16.1	14.3		ug/Kg	☼	89	62 - 121
delta-BHC	0.39	U	16.1	14.3		ug/Kg	☼	89	67 - 122
Dieldrin	0.21	U	16.1	14.3		ug/Kg	☼	89	71 - 120
Endosulfan I	0.22	J	16.1	14.4		ug/Kg	☼	88	67 - 115
Endosulfan II	0.28	U	16.1	13.4		ug/Kg	☼	83	69 - 120
Endosulfan sulfate	0.27	U	16.1	14.3		ug/Kg	☼	88	69 - 126
Endrin	0.30	U	16.1	14.9		ug/Kg	☼	93	69 - 129
Endrin aldehyde	0.17	U	16.1	11.7		ug/Kg	☼	72	41 - 128
gamma-BHC (Lindane)	0.46	U	16.1	13.6		ug/Kg	☼	84	66 - 120
Heptachlor epoxide	0.42	U	16.1	14.3		ug/Kg	☼	89	71 - 119
Methoxychlor	0.44	U	16.1	17.0		ug/Kg	☼	106	65 - 139

Surrogate	MS %Recovery	MS Qualifier	Limits
Decachlorobiphenyl	93		63 - 124
Tetrachloro-m-xylene	92		59 - 115

Lab Sample ID: 280-99505-1 MSD
Matrix: Soil
Analysis Batch: 382413

Client Sample ID: B3BMY7
Prep Type: Total/NA
Prep Batch: 382055

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	RPD Limit
4,4'-DDD	0.54	U	16.3	11.9		ug/Kg	☼	73	69 - 126	13	30

TestAmerica Denver

Page 43 of 50
QC Sample Results

Client: CH2M Hill Plateau Remediation Company
 Project/Site: F17-051

TestAmerica Job ID: 280-99505-1
 SDG: DN0181

Method: 8081B - Organochlorine Pesticides (GC) (Continued)

Lab Sample ID: 280-99505-1 MSD
 Matrix: Soil
 Analysis Batch: 382413

Client Sample ID: B3BMY7
 Prep Type: Total/NA
 Prep Batch: 382055

Analyte	Sample	Sample	Spike	MSD	MSD	Unit	D	%Rec	%Rec.	RPD	Limit	
	Result	Qualifier		Result	Qualifier							Limits
4,4'-DDE	0.23	U	16.3	12.6		ug/Kg	*	77	71 - 116	14	30	
4,4'-DDT	0.58	U	16.3	14.0		ug/Kg	*	86	67 - 132	15	30	
Aldrin	0.25	U	16.3	12.2		ug/Kg	*	75	69 - 116	12	50	
alpha-BHC	0.21	U	16.3	12.5		ug/Kg	*	76	65 - 122	12	30	
beta-BHC	0.65	U	16.3	13.1		ug/Kg	*	80	62 - 121	9	30	
delta-BHC	0.39	U	16.3	12.7		ug/Kg	*	78	67 - 122	12	30	
Dieldrin	0.21	U	16.3	12.8		ug/Kg	*	78	71 - 120	11	30	
Endosulfan I	0.22	J	16.3	13.0		ug/Kg	*	78	67 - 115	11	30	
Endosulfan II	0.28	U	16.3	12.0		ug/Kg	*	74	69 - 120	11	30	
Endosulfan sulfate	0.27	U	16.3	12.9		ug/Kg	*	79	69 - 126	10	30	
Endrin	0.30	U	16.3	13.3		ug/Kg	*	82	69 - 129	11	30	
Endrin aldehyde	0.17	U	16.3	10.6		ug/Kg	*	65	41 - 128	10	30	
gamma-BHC (Lindane)	0.46	U	16.3	12.1		ug/Kg	*	74	66 - 120	12	30	
Heptachlor epoxide	0.42	U	16.3	12.8		ug/Kg	*	79	71 - 119	11	30	
Methoxychlor	0.44	U	16.3	15.7		ug/Kg	*	96	65 - 139	8	30	
Surrogate	MSD	MSD	Limits									
	%Recovery	Qualifier	Limits									
Decachlorobiphenyl	83		63 - 124									
Tetrachloro-m-xylene	75		59 - 115									

Method: 6010C - Metals (ICP)

Lab Sample ID: MB 280-381733/1-A
 Matrix: Solid
 Analysis Batch: 382012

Client Sample ID: Method Blank
 Prep Type: Total/NA
 Prep Batch: 381733

Analyte	MB	MB	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Antimony	733	U	1500	733	ug/Kg		07/25/17 08:15	07/25/17 15:58	1
Arsenic	665	U	2000	665	ug/Kg		07/25/17 08:15	07/25/17 15:58	1
Barium	104	U	1000	104	ug/Kg		07/25/17 08:15	07/25/17 15:58	1
Beryllium	33.0	U	500	33.0	ug/Kg		07/25/17 08:15	07/25/17 15:58	1
Boron	980	U	10000	980	ug/Kg		07/25/17 08:15	07/25/17 15:58	1
Cadmium	41.0	U	500	41.0	ug/Kg		07/25/17 08:15	07/25/17 15:58	1
Chromium	58.0	U	1500	58.0	ug/Kg		07/25/17 08:15	07/25/17 15:58	1
Cobalt	100	U	1000	100	ug/Kg		07/25/17 08:15	07/25/17 15:58	1
Copper	217	U	2000	217	ug/Kg		07/25/17 08:15	07/25/17 15:58	1
Lead	310	U	900	310	ug/Kg		07/25/17 08:15	07/25/17 15:58	1
Manganese	127.6	B	1000	100	ug/Kg		07/25/17 08:15	07/25/17 15:58	1
Molybdenum	260	U	2000	260	ug/Kg		07/25/17 08:15	07/25/17 15:58	1
Nickel	182.3	B	4000	132	ug/Kg		07/25/17 08:15	07/25/17 15:58	1
Selenium	860	U	1500	860	ug/Kg		07/25/17 08:15	07/25/17 15:58	1
Silver	160	U	1000	160	ug/Kg		07/25/17 08:15	07/25/17 15:58	1
Vanadium	94.0	U	2000	94.0	ug/Kg		07/25/17 08:15	07/25/17 15:58	1
Zinc	422.9	B	3000	398	ug/Kg		07/25/17 08:15	07/25/17 15:58	1

TestAmerica Denver

Surrogate Summary

Client: CH2M Hill Plateau Remediation Company
 Project/Site: F17-051

TestAmerica Job ID: 280-99505-1
 SDG: DN0181

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

Matrix: Soil

Prep Type: Total/NA

Percent Surrogate Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	Percent Surrogate Recovery (Acceptance Limits)		
		FBP (39-120)	NBZ (42-120)	TPH (35-124)
280-99505-1	B3BMY7	72	82	91
280-99505-1 MS	B3BMY7	57	63	84
280-99505-1 MSD	B3BMY7	76	86	87
280-99505-2	B3BMY1	69	74	77
280-99505-3	B3BMX7	74	80	78
280-99505-4	B3BMX9	69	74	78
280-99505-5	B3BMX5	75	83	80
280-99505-6	B3BMY3	69	75	79
280-99505-7	B3BMY5	75	83	78

Surrogate Legend

FBP = 2-Fluorobiphenyl
 NBZ = Nitrobenzene-d5
 TPH = Terphenyl-d14

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

Matrix: Solid

Prep Type: Total/NA

Percent Surrogate Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	Percent Surrogate Recovery (Acceptance Limits)		
		FBP (39-120)	NBZ (42-120)	TPH (35-124)
LCS 280-381905/2-A	Lab Control Sample	73	79	89
MB 280-381905/1-A	Method Blank	80	81	93

Surrogate Legend

FBP = 2-Fluorobiphenyl
 NBZ = Nitrobenzene-d5
 TPH = Terphenyl-d14

Method: 8081B - Organochlorine Pesticides (GC)

Matrix: Soil

Prep Type: Total/NA

Percent Surrogate Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	Percent Surrogate Recovery (Acceptance Limits)	
		DCB1 (63-124)	TCX1 (59-115)
280-99505-1	B3BMY7	97	98
280-99505-1 MS	B3BMY7	93	92
280-99505-1 MSD	B3BMY7	83	75
280-99505-2	B3BMY1	82	90
280-99505-3	B3BMX7	87	91
280-99505-4	B3BMX9	70	73
280-99505-5	B3BMX5	81	84
280-99505-6	B3BMY3	94	92
280-99505-7	B3BMY5	84	90

Surrogate Legend

DCB = Decachlorobiphenyl
 TCX = Tetrachloro-m-xylene

Surrogate Summary

Client: CH2M Hill Plateau Remediation Company
Project/Site: F17-051

TestAmerica Job ID: 280-99505-1
SDG: DN0181

Method: 8081B - Organochlorine Pesticides (GC)

Matrix: Solid

Prep Type: Total/NA

Percent Surrogate Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	DCB1 (63-124)	TCX1 (59-115)
LCS 280-382055/2-A	Lab Control Sample	102	96
MB 280-382055/1-A	Method Blank	98	95

Surrogate Legend

DCB = Decachlorobiphenyl

TCX = Tetrachloro-m-xylene

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

Date: 21 August 2017
 To: CH2M Hill (technical representative)
 From: Analytical Quality Associates, Inc.
 Project: 100K Rad Chara.
 Subject: Inorganics - Sample Data Group (SDG) DN0181

INTRODUCTION

This memorandum presents the results of data validation for SDG DN0181 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
B3BMY7	7/18/17	Soil	C	6010C & 7471B
B3BMY1	7/18/17	Soil	C	6010C & 7471B
B3BMX7	7/18/17	Soil	C	6010C & 7471B
B3BMX9	7/18/17	Soil	C	6010C & 7471B
B3BMX5	7/18/17	Soil	C	6010C & 7471B
B3BMY3	7/18/17	Soil	C	6010C & 7471B
B3BMY5	7/18/17	Soil	C	6010C & 7471B

Data validation was conducted in accordance with the CHPRC validation statement of work and the 100 Area Remedial Action Sampling and Analysis Plan, DOE/RL-96-22, Rev. 5 (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 ICP 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 for all analytes 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 with the following exceptions.

For SDG DN0181, the Mn, Ni and Zn laboratory blank results were > the method detection limits (MDLs) but < the practical quantitation limits (PQLs). The Ni result for sample B3BMY7 was a detect > the MDL but \leq the PQL and should be qualified as an estimate and flagged “J+.” The Zn result for sample B3BMY7 was a non-detect sample results and all other associated sample results were >20X the blank values and should not be qualified.

Trip Blanks

All trip blank results were acceptable with the following exceptions.

For SDG DN0181, the Ba, Cr, Cu, Ni and V results for trip blank sample B3BMY7 were detects > the MDLs but < the PQLs and the Mn result was > the PQL. Data should not be qualified as a result.

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

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 $\pm 30\%$. The limits for reported analytes not listed in the SAP are specified by the DV procedure.

MS/MSD Samples

All MS/MSD RPD values were acceptable.

Field Duplicate Samples

For SDG DN0181, primary sample B3BMX9 and duplicate sample B3BMY1 were submitted. All results except for Sb, B, Cd, Mo, Se and Ag for both samples were detects > the PQLs. Samples were soil samples, therefore RPDs were not evaluated.

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.

- **Completeness**

SDG DN0181 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 qualification of Ni result for sample B3BMY7 was due to a laboratory blank infraction.

REFERENCES

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

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

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: DN0181	Reviewer: AQA	Project: 100K Rad Chara	Page 1 of 1
Analyte(s)	Qualifier	Samples Affected	Reason
Ni	J+	B3BMY7	Laboratory blank contamination

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: 100K Rad Chara			DATA PACKAGE: VSR17-011		
VALIDATOR: Eyda Hergenreder		LAB: TestAmerica		DATE: 8/21/17	
			SDG: DN0181		
ANALYSES PERFORMED					
SW-846/ICP X	SW-846/GFAA	SW-846/Hg X	SW-846 Cyanide		
SAMPLES/MATRIX Soil					
SDG DN0181: B3BMY7, B3BMY1, B3BMX7, B3BMX9, B3BMX5, B3BMY3, B3BMY5					

1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE

Technical verification documentation present?	Yes <input checked="" type="radio"/> 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 <input checked="" type="radio"/> N/A
Initial calibrations acceptable?	Yes No <input checked="" type="radio"/> N/A
ICP interference checks 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 DN0181: MB Mn 127.6 ug/Kg, Ni 182.3 ug/Kg, Zn 422.9 mg/Kg

Trip blank sample B3BMY7: Ba 300 ug/Kg, Cr 580 ug/Kg, Cu 261 ug/Kg, Mn 3920 ug/Kg, Ni 288 ug/Kg,
V 158 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

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

Page 9 of 28
QC Sample Results

Client: CH2M Hill Plateau Remediation Company
Project/Site: F17-051

TestAmerica Job ID: 280-99505-1
SDG: DN0181

Method: 8081B - Organochlorine Pesticides (GC) (Continued)

Lab Sample ID: 280-99505-1 MSD
Matrix: Soil
Analysis Batch: 382413

Client Sample ID: B3BMY7
Prep Type: Total/NA
Prep Batch: 382055

Analyte	Sample	Sample	Spike	MSD	MSD	Unit	D	%Rec	%Rec.	RPD	Limit
	Result	Qualifier		Result	Qualifier				Limits		
4,4'-DDE	0.23	U	16.3	12.6		ug/Kg	*	77	71 - 116	14	30
4,4'-DDT	0.58	U	16.3	14.0		ug/Kg	*	86	67 - 132	15	30
Aldrin	0.25	U	16.3	12.2		ug/Kg	*	75	69 - 116	12	50
alpha-BHC	0.21	U	16.3	12.5		ug/Kg	*	76	65 - 122	12	30
beta-BHC	0.65	U	16.3	13.1		ug/Kg	*	80	62 - 121	9	30
delta-BHC	0.39	U	16.3	12.7		ug/Kg	*	78	67 - 122	12	30
Dieldrin	0.21	U	16.3	12.8		ug/Kg	*	78	71 - 120	11	30
Endosulfan I	0.22	J	16.3	13.0		ug/Kg	*	78	67 - 115	11	30
Endosulfan II	0.28	U	16.3	12.0		ug/Kg	*	74	69 - 120	11	30
Endosulfan sulfate	0.27	U	16.3	12.9		ug/Kg	*	79	69 - 126	10	30
Endrin	0.30	U	16.3	13.3		ug/Kg	*	82	69 - 129	11	30
Endrin aldehyde	0.17	U	16.3	10.6		ug/Kg	*	65	41 - 128	10	30
gamma-BHC (Lindane)	0.46	U	16.3	12.1		ug/Kg	*	74	66 - 120	12	30
Heptachlor epoxide	0.42	U	16.3	12.8		ug/Kg	*	79	71 - 119	11	30
Methoxychlor	0.44	U	16.3	15.7		ug/Kg	*	96	65 - 139	8	30
	MSD	MSD									
Surrogate	%Recovery	Qualifier	Limits								
Decachlorobiphenyl	83		63 - 124								
Tetrachloro-m-xylene	75		59 - 115								

Method: 6010C - Metals (ICP)

Lab Sample ID: MB 280-381733/1-A
Matrix: Solid
Analysis Batch: 382012

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 381733

Analyte	MB	MB	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Antimony	733	U	1500	733	ug/Kg		07/25/17 08:15	07/25/17 15:58	1
Arsenic	665	U	2000	665	ug/Kg		07/25/17 08:15	07/25/17 15:58	1
Barium	104	U	1000	104	ug/Kg		07/25/17 08:15	07/25/17 15:58	1
Beryllium	33.0	U	500	33.0	ug/Kg		07/25/17 08:15	07/25/17 15:58	1
Boron	980	U	10000	980	ug/Kg		07/25/17 08:15	07/25/17 15:58	1
Cadmium	41.0	U	500	41.0	ug/Kg		07/25/17 08:15	07/25/17 15:58	1
Chromium	58.0	U	1500	58.0	ug/Kg		07/25/17 08:15	07/25/17 15:58	1
Cobalt	100	U	1000	100	ug/Kg		07/25/17 08:15	07/25/17 15:58	1
Copper	217	U	2000	217	ug/Kg		07/25/17 08:15	07/25/17 15:58	1
Lead	310	U	900	310	ug/Kg		07/25/17 08:15	07/25/17 15:58	1
Manganese	127.6	B	1000	100	ug/Kg		07/25/17 08:15	07/25/17 15:58	1
Molybdenum	260	U	2000	260	ug/Kg		07/25/17 08:15	07/25/17 15:58	1
Nickel	182.3	B	4000	132	ug/Kg		07/25/17 08:15	07/25/17 15:58	1
Selenium	860	U	1500	860	ug/Kg		07/25/17 08:15	07/25/17 15:58	1
Silver	160	U	1000	160	ug/Kg		07/25/17 08:15	07/25/17 15:58	1
Vanadium	94.0	U	2000	94.0	ug/Kg		07/25/17 08:15	07/25/17 15:58	1
Zinc	422.9	B	3000	398	ug/Kg		07/25/17 08:15	07/25/17 15:58	1

TestAmerica Denver

QC Sample Results

Client: CH2M Hill Plateau Remediation Company
 Project/Site: F17-051

TestAmerica Job ID: 280-99505-1
 SDG: DN0181

Method: 6010C - Metals (ICP) (Continued)

Lab Sample ID: LCS 280-381733/2-A
Matrix: Solid
Analysis Batch: 382012

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 381733

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Antimony	50000	50430		ug/Kg		101	80 - 120
Arsenic	100000	99650		ug/Kg		100	80 - 120
Barium	200000	202000		ug/Kg		101	80 - 120
Beryllium	5000	4909		ug/Kg		98	80 - 120
Boron	100000	95710		ug/Kg		96	80 - 120
Cadmium	10000	9889		ug/Kg		99	80 - 120
Chromium	20000	20260		ug/Kg		101	80 - 120
Cobalt	50000	48620		ug/Kg		97	80 - 120
Copper	25000	24670		ug/Kg		99	80 - 120
Lead	50000	50230		ug/Kg		100	80 - 120
Manganese	50000	50300		ug/Kg		101	80 - 120
Molybdenum	100000	97480		ug/Kg		97	80 - 120
Nickel	50000	48360		ug/Kg		97	80 - 120
Selenium	200000	186900		ug/Kg		93	80 - 120
Silver	5000	5067		ug/Kg		101	80 - 120
Vanadium	50000	50210		ug/Kg		100	80 - 120
Zinc	50000	48840		ug/Kg		98	80 - 120

Lab Sample ID: 280-99505-1 MS
Matrix: Soil
Analysis Batch: 382012

Client Sample ID: B3BMY7
Prep Type: Total/NA
Prep Batch: 381733

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Antimony	621	U	45700	43520		ug/Kg	☼	95	75 - 125
Arsenic	563	U	91500	85490		ug/Kg	☼	93	75 - 125
Barium	300	B	183000	170800		ug/Kg	☼	93	75 - 125
Beryllium	27.9	U	4570	4225		ug/Kg	☼	92	75 - 125
Boron	830	U	91500	82590		ug/Kg	☼	90	75 - 125
Cadmium	34.7	U	9150	8504		ug/Kg	☼	93	75 - 125
Chromium	580	B	18300	17580		ug/Kg	☼	93	75 - 125
Cobalt	84.7	U	45700	41720		ug/Kg	☼	91	75 - 125
Copper	261	B	22900	21400		ug/Kg	☼	92	75 - 125
Lead	262	U	45700	43130		ug/Kg	☼	94	75 - 125
Manganese	3920		45700	43480		ug/Kg	☼	86	75 - 125
Molybdenum	220	U	91500	83740		ug/Kg	☼	92	75 - 125
Nickel	288	B C	45700	41600		ug/Kg	☼	90	75 - 125
Selenium	728	U	183000	160100		ug/Kg	☼	88	75 - 125
Silver	135	U	4570	4354		ug/Kg	☼	95	75 - 125
Vanadium	158	B	45700	43220		ug/Kg	☼	94	75 - 125
Zinc	337	U	45700	41910		ug/Kg	☼	92	75 - 125

Lab Sample ID: 280-99505-1 MSD
Matrix: Soil
Analysis Batch: 382012

Client Sample ID: B3BMY7
Prep Type: Total/NA
Prep Batch: 381733

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	RPD Limit
Antimony	621	U	49100	47270		ug/Kg	☼	96	75 - 125	8	35
Arsenic	563	U	98300	93110		ug/Kg	☼	95	75 - 125	9	35

TestAmerica Denver

QC Sample Results

Client: CH2M Hill Plateau Remediation Company
Project/Site: F17-051

TestAmerica Job ID: 280-99505-1
SDG: DN0181

Method: 6010C - Metals (ICP) (Continued)

Lab Sample ID: 280-99505-1 MSD
Matrix: Soil
Analysis Batch: 382012

Client Sample ID: B3BMY7
Prep Type: Total/NA
Prep Batch: 381733

Analyte	Sample	Sample	Spike	MSD	MSD	Unit	D	%Rec	%Rec.	RPD	Limit
	Result	Qualifier	Added	Result	Qualifier				Limits		
Barium	300	B	197000	185700		ug/Kg	☼	94	75 - 125	8	35
Beryllium	27.9	U	4910	4593		ug/Kg	☼	93	75 - 125	8	35
Boron	830	U	98300	89690		ug/Kg	☼	91	75 - 125	8	35
Cadmium	34.7	U	9830	9226		ug/Kg	☼	94	75 - 125	8	35
Chromium	580	B	19700	19000		ug/Kg	☼	94	75 - 125	8	35
Cobalt	84.7	U	49100	45310		ug/Kg	☼	92	75 - 125	8	35
Copper	261	B	24600	23560		ug/Kg	☼	95	75 - 125	10	35
Lead	262	U	49100	46760		ug/Kg	☼	95	75 - 125	8	35
Manganese	3920		49100	47440		ug/Kg	☼	89	75 - 125	9	35
Molybdenum	220	U	98300	90690		ug/Kg	☼	92	75 - 125	8	35
Nickel	288	B C	49100	44950		ug/Kg	☼	91	75 - 125	8	35
Selenium	728	U	197000	175000		ug/Kg	☼	89	75 - 125	9	35
Silver	135	U	4910	4688		ug/Kg	☼	95	75 - 125	7	35
Vanadium	158	B	49100	46810		ug/Kg	☼	95	75 - 125	8	35
Zinc	337	U	49100	45720		ug/Kg	☼	93	75 - 125	9	35

Method: 7471B - Mercury (CVAA)

Lab Sample ID: MB 280-381909/1-A
Matrix: Solid
Analysis Batch: 382036

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 381909

Analyte	MB	MB	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Mercury	5.5	U	17.0	5.5	ug/Kg		07/25/17 12:51	07/25/17 17:40	1

Lab Sample ID: LCS 280-381909/2-A
Matrix: Solid
Analysis Batch: 382036

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 381909

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Mercury	333	336.2		ug/Kg		101	80 - 120

Lab Sample ID: 280-99505-1 MS
Matrix: Soil
Analysis Batch: 382036

Client Sample ID: B3BMY7
Prep Type: Total/NA
Prep Batch: 381909

Analyte	Sample	Sample	Spike	MS	MS	Unit	D	%Rec	%Rec.	Limits
	Result	Qualifier	Added	Result	Qualifier				Limits	
Mercury	6.1	U	378	370.7		ug/Kg	☼	98	75 - 125	

Lab Sample ID: 280-99505-1 MSD
Matrix: Soil
Analysis Batch: 382036

Client Sample ID: B3BMY7
Prep Type: Total/NA
Prep Batch: 381909

Analyte	Sample	Sample	Spike	MSD	MSD	Unit	D	%Rec	%Rec.	RPD	Limit
	Result	Qualifier	Added	Result	Qualifier				Limits		
Mercury	6.1	U	339	340.0		ug/Kg	☼	100	75 - 125	9	35

TestAmerica Denver

Date: 21 August 2017
 To: CH2M Hill (technical representative)
 From: Analytical Quality Associates, Inc.
 Project: 100K Rad Chara.
 Subject: General Chemistry - Sample Data Group (SDG) WC2173

INTRODUCTION

This memorandum presents the results of data validation for SDG WC2173 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
B3BMX6	7/18/17	Soil	C	300.0 & 7196A
B3BMX8	7/18/17	Soil	C	300.0 & 7196A
B3BMY0	7/18/17	Soil	C	300.0 & 7196A
B3BMY2	7/18/17	Soil	C	300.0 & 7196A
B3BMY4	7/18/17	Soil	C	300.0 & 7196A
B3BMY6	7/18/17	Soil	C	300.0 & 7196A
B3BMY8	7/18/17	Soil	C	300.0 & 7196A

Data validation was conducted in accordance with the CHPRC validation statement of work and the 100 Area Remedial Action Sampling and Analysis Plan, DOE/RL-96-22, Rev. 5 (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:

- Chloride, fluoride and sulfate – extraction and analysis within 28 days of sample collection
- Nitrate and nitrite – 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

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 exception.

For SDG WC2173, the temperature of the cooler was 6.8°C upon receipt at the laboratory. The samples were received 24 hours after sample collection; therefore based on professional judgment data should not be qualified as a result.

- **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 exception.

For SDG WC2173, the chloride, nitrate, fluoride and sulfate results were detected in trip blank sample B3BMY8. Data should not be qualified as a result.

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 accuracy limits are 70% to 130%. The laboratory control sample accuracy limits are ones specified by the DV procedure. The limits for reported analytes not listed in the SAP are specified by the DV procedure. The interference check sample limits are ones specified by the DV procedure.

Matrix Spike (MS) Samples

All MS recoveries were acceptable with the following exceptions.

For SDG WC2173, the MS recovery for hexavalent chromium was < the lower acceptance limit but $\geq 30\%$. All associated sample results were non-detects and should be qualified as estimates

and flagged “UJ.” The MS recovery for fluoride was $< 75\%$ (the DV limit) but $\geq 30\%$. All associated sample results were detects and should be qualified as estimates and flagged “J-.”

Laboratory Control Samples (LCSs)

All LCS recoveries were acceptable.

- **Precision**

Precision is evaluated by reviewing 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 $\pm 30\%$.

Laboratory Duplicate Samples

All laboratory duplicate results were acceptable.

Field Duplicate Samples

For SDG WC2173, primary sample B3BMY0 and replicate sample B3BMY2 were submitted. All results for both samples except for nitrite were $>$ the PQLs. Samples were soil samples, therefore RPDs were not evaluated.

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**

SDG WC2173 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

Minor deficiencies leading to qualification of all hexavalent chromium and fluoride sample results as estimates were due to low matrix spike recoveries.

REFERENCES

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

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

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			
SDG: WC2173	Reviewer: AQA	Project: 100K Rad Chara.	Page 1 of 1
Analyte(s)	Qualifier	Samples Affected	Reason
Cr(VI)	UJ	B3BMX6, B3BMX8, B3BMY0, B3BMY2, B3BMY4, B3BMY6, B3BMY8	Low matrix spike recovery
Fluoride	J-	B3BMX6, B3BMX8, B3BMY0, B3BMY2, B3BMY4, B3BMY6, B3BMY8	Low matrix spike recovery

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: 100K Rad Chara.			DATA PACKAGE: VSR17-011		
VALIDATOR: Eyda Hergenreder		LAB: TestAmerica		DATE: 08/21/17	
			SDG: WC2173		
ANALYSES PERFORMED					
Anions/IC <input checked="" type="checkbox"/>	TOC	TOX	TPH-418.1	Oil and Grease	Alkalinity
Ammonia	BOD/COD	Chloride	Chromium-VI <input checked="" type="checkbox"/>	pH	NO ₃ /NO ₂
Sulfate	TDS	TKN	Phosphate		
SAMPLES/MATRIX Soil					
SDG WC2173: B3BMX6, B3BMX8, B3BMY0, B3BMY2, B3BMY4, B3BMY6, B3BMY8					

1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE

Technical verification documentation present?	Yes <input type="radio"/> No <input checked="" 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 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?	<input checked="" type="radio"/> Yes 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 WC2173: trip blank sample B3BMY8, Cl 2.7 mg/kg, nitrate 0.23 mg/kg, fluoride 0.30 mg/kg, sulfate 2.7 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

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 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:

SDG WC2173, primary sample B3BMY0/duplicate sample B3BMY2, RPD not calculated, soil samples

6. HOLDING TIMES (all levels)

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

Comments:

SDG WC2173: sample temperature was 6.8 degree C.

Appendix 4

Additional Documentation Requested By Client

Page 7 of 28
QC Sample Results

Client: CH2M Hill Plateau Remediation Company
 Project/Site: F17-051

TestAmerica Job ID: 300-5788-1
 SDG: WC2173

Method: 300.0 - Anions, Ion Chromatography

Lab Sample ID: MB 300-8678/1-A
Matrix: Solid
Analysis Batch: 8672

Client Sample ID: Method Blank
Prep Type: Soluble

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	0.14	U	0.28	0.14	mg/Kg			07/24/17 14:03	1
Nitrite as N	0.19	U	0.38	0.19	mg/Kg			07/24/17 14:03	1

Lab Sample ID: LCS 300-8678/2-A
Matrix: Solid
Analysis Batch: 8672

Client Sample ID: Lab Control Sample
Prep Type: Soluble

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Nitrate as N	22.6	22.6		mg/Kg		100	80 - 120
Nitrite as N	30.4	30.7		mg/Kg		101	80 - 120

Lab Sample ID: 300-5788-1 MS
Matrix: Solid
Analysis Batch: 8672

Client Sample ID: B3BMX6
Prep Type: Soluble

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Nitrate as N	6.1		22.3	29.0		mg/Kg		103	75 - 125
Nitrite as N	0.19	U	30.1	30.5		mg/Kg		101	75 - 125

Lab Sample ID: 300-5788-1 DU
Matrix: Solid
Analysis Batch: 8672

Client Sample ID: B3BMX6
Prep Type: Soluble

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Nitrate as N	6.1		6.01		mg/Kg		1	30
Nitrite as N	0.19	U	0.19	U	mg/Kg		NC	30

Lab Sample ID: MB 300-8678/1-A
Matrix: Solid
Analysis Batch: 8673

Client Sample ID: Method Blank
Prep Type: Soluble

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	1.0	U	2.0	1.0	mg/Kg			07/24/17 14:03	1
Fluoride	0.25	U	0.50	0.25	mg/Kg			07/24/17 14:03	1
Sulfate	1.2	U	2.5	1.2	mg/Kg			07/24/17 14:03	1

Lab Sample ID: LCS 300-8678/2-A
Matrix: Solid
Analysis Batch: 8673

Client Sample ID: Lab Control Sample
Prep Type: Soluble

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	160	158		mg/Kg		99	80 - 120
Fluoride	40.0	39.8		mg/Kg		99	80 - 120
Sulfate	200	202		mg/Kg		101	80 - 120

Page 9 of 22
QC Sample Results

Client: CH2M Hill Plateau Remediation Company
Project/Site: F17-051

TestAmerica Job ID: 300-5788-1
SDG: WC2173

Method: 300.0 - Anions, Ion Chromatography (Continued)

Lab Sample ID: 300-5788-1 MS
Matrix: Solid
Analysis Batch: 8673

Client Sample ID: B3BMX6
Prep Type: Soluble

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	4.0		158	162		mg/Kg		100	75 - 125
Fluoride	1.8	N	39.5	29.4	N	mg/Kg		70	75 - 125
Sulfate	25		198	226		mg/Kg		102	75 - 125

Lab Sample ID: 300-5788-1 DU
Matrix: Solid
Analysis Batch: 8673

Client Sample ID: B3BMX6
Prep Type: Soluble

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Chloride	4.0		3.91		mg/Kg		1	30
Fluoride	1.8	N	1.75		mg/Kg		3	30
Sulfate	25		24.7		mg/Kg		0.3	30

Method: 7196A - Chromium, Hexavalent

Lab Sample ID: MB 300-8728/1-A
Matrix: Solid
Analysis Batch: 8781

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 8728

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cr (VI)	0.15	U	2.0	0.15	mg/Kg		07/27/17 07:47	07/27/17 12:15	1

Lab Sample ID: LCS 300-8728/2-A
Matrix: Solid
Analysis Batch: 8781

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 8728

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Cr (VI)	20.0	18.00		mg/Kg		90	85 - 115

Lab Sample ID: 300-5788-1 MS
Matrix: Solid
Analysis Batch: 8781

Client Sample ID: B3BMX6
Prep Type: Total/NA
Prep Batch: 8728

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Cr (VI)	0.15	U N	29.9	16.39	N	mg/Kg		55	75 - 125

Lab Sample ID: 300-5788-1 MSI
Matrix: Solid
Analysis Batch: 8781

Client Sample ID: B3BMX6
Prep Type: Total/NA
Prep Batch: 8728

Analyte	Sample Result	Sample Qualifier	Spike Added	MSI Result	MSI Qualifier	Unit	D	%Rec	%Rec. Limits
Cr (VI)	0.15	U N	609	615.7	D	mg/Kg		101	75 - 125

Lab Sample ID: 300-5788-1 DU
Matrix: Solid
Analysis Batch: 8781

Client Sample ID: B3BMX6
Prep Type: Total/NA
Prep Batch: 8728

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Cr (VI)	0.15	U N	0.15	U	mg/Kg		NC	35

TestAmerica Richland

Date: 21 August 2017
 To: CH2M Hill (technical representative)
 From: Analytical Quality Associates, Inc.
 Project: 100K Rad Chara.
 Subject: Radiochemical - Sample Data Group (SDG) W07880

INTRODUCTION

This memorandum presents the results of data validation for SDG W07880 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
B3BMX6	7/18/17	Soil	C	Gamma
B3BMX8	7/18/17	Soil	C	Gamma
B3BMY0	7/18/17	Soil	C	Gamma
B3BMY2	7/18/17	Soil	C	Gamma
B3BMY4	7/18/17	Soil	C	Gamma
B3BMY6	7/18/17	Soil	C	Gamma
B3BMY8	7/18/17	Soil	C	Gamma

Data validation was conducted in accordance with the CHPRC validation statement of work and the 100 Area Remedial Action Sampling and Analysis Plan, DOE/RL-96-22, Rev. 5 (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 soil/solid analysis.

The samples were analyzed within the prescribed holding times.

- **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 accuracy limits are 70% to 130%.

Matrix Spike (MS) Samples

MS analyses are not required for gamma spectrometry.

Laboratory Control Samples (LCSs)

All LCS recoveries were acceptable.

Carrier/Tracer Recovery Factors

Carrier/tracer analyses are not required for gamma spectrometry.

- **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 $\pm 30\%$.

Laboratory Duplicate Samples

All laboratory duplicate results were acceptable.

Field Duplicate Samples

For SDG W07880, primary sample B3BMY0 and replicate sample B3BMY2 were submitted. The Cs-137 results for both samples were > PQL, however samples were soil samples, therefore RPD was not evaluated.

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.

- **Completeness**

SDG W07880 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-002, Rev. 2, Change 0, *Data Validation for Radiochemical Analyses*, September 2016.

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

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			
SDGs: W07880	Reviewer: AQA	Project: 100K Rad Chara.	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	C	D	E
Project: 100K Rad Chara.			Data Package: VSR17-011		
Validator: Eyda Hergenreder		Lab: TestAmerica		Date: 08/21/17	
			SDG: W07880		
Analyses Performed					
<input type="checkbox"/> Gross Alpha/Beta	<input type="checkbox"/> Strontium-90	<input type="checkbox"/> Technetium-99	<input type="checkbox"/> Alpha Spectroscopy	<input checked="" type="checkbox"/> Gamma Spectroscopy	<input type="checkbox"/> Tritium
<input type="checkbox"/> Total Uranium	<input type="checkbox"/> Radium-22				
Samples/Matrix Soil					
SDG W07880: B3BMX6, B3BMX8, B3BMY0, B3BMY2, B3BMY4, B3BMY6, B3BMY8					

1. Completeness and Case Narrative

 N/A

Technical verification forms present?

Yes No N/A**Comments:**

2. Initial Calibration (Levels D, E)

 N/A

Instruments/detectors calibrated?

Yes No N/A

Initial calibration acceptable?

Yes No N/A

Standards NIST traceable?

Yes No N/A

Standards expired?

Yes No N/A

Calculation check acceptable?

Yes No N/A**Comments:**

Data Validation for Radiochemical Analyses

Published Date: 09/13/16

SGRP-GD-SMP-50116

Effective Date: 09/13/16

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

SGRP-GD-SMP-50116

Effective Date: 09/13/16

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

SGRP-GD-SMP-50116

Effective Date: 09/13/16

Appendix B - (Cont.) Radiochemical Data Validation Checklist

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

Comments:

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

Comments:

Data Validation for Radiochemical Analyses

Published Date: 09/13/16

SGRP-GD-SMP-50116

Effective Date: 09/13/16

Appendix B - (Cont.) Radiochemical Data Validation Checklist

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

Comments:

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

Comments:

Data Validation for Radiochemical Analyses

Published Date: 09/13/16

SGRP-GD-SMP-50116

Effective Date: 09/13/16

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?	<input checked="" type="radio"/> Yes 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:

SDG W07880: primary sample B3BMY0/replicate sample B3BMY2, RPD not evaluated, soil samples

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?	<input checked="" type="radio"/> Yes No N/A
Transcription/Calculation errors? (Levels D, E)	Yes No <input checked="" type="radio"/> N/A

Comments:

Appendix 4

Additional Documentation Requested By Client

FORM II

Date: 09-Aug-17

DUPLICATE RESULTS

Lab Name: TestAmerica Inc

SDG: W07880

Collection Date: 7/18/2017 10:17:00 AM

Lot-Sample No.: J7G190402-1

Report No. : 71471

Received Date: 7/19/2017 10:30:00 AM

Client Sample ID: B3BMX6 DUP

COC No. : F17-051-002

Matrix: SOIL

Parameter	Result, Orig Rst	Qual	Count Error (2 s)	CSU (2 s)	MDL, Action Lev	Rpt Unit, CRDL	Yield	Rst/MDL, Rst/TotUcert	Analysis, Prep Date	Total Sa Size	Aliquot Size	Primary Detector
Batch: 7206012	GAMMA_GS		Work Order: NAAH91AC		Report DB ID: NAAH91CR		Orig Sa DB ID: 9naah910					
CO-60	-5.19E-03	U	2.7E-02	2.7E-02	3.32E-02	pCi/g		-0.16	8/3/17 02:00 p		362.3	\$GER17
	-3.91E-03	U	RPD -28.2			1.00E-01		-0.39			g	
CS-137	2.69E-02		6.3E-03	6.3E-03	1.77E-02	pCi/g		(1.5)	8/3/17 02:00 p		362.3	\$GER17
	2.18E-02		RPD 20.9			1.00E-01		(8.6)			g	
EU-152	1.81E-02	U	4.2E-02	4.2E-02	4.68E-02	pCi/g		0.39	8/3/17 02:00 p		362.3	\$GER17
	-3.28E-02	U	RPD -688.2			1.00E-01		0.85			g	
EU-154	-7.27E-02	U	9.2E-02	9.2E-02	2.93E-02	pCi/g		-(2.5)	8/3/17 02:00 p		362.3	\$GER17
	-5.29E-02	U	RPD -31.5			1.00E-01		-(1.6)			g	
EU-155	3.80E-02	U	2.0E-02	2.0E-02	2.91E-02	pCi/g		(1.3)	8/3/17 02:00 p		362.3	\$GER17
	5.16E-02	U	RPD 30.5			1.00E-01		(3.8)			g	

No. of Results: 5 Comments:

TestAmerica Inc RPD - Relative Percent Difference.

rptSTLRchDupV5. MDC|MDA,Lc - Detection, Decision Level based on instrument background or blank, adjusted by the sample Efficiency, Yield, and Volume.

8.5 A2002 U Qual - Analyzed for but not detected above limiting criteria, Mdc/Mda/Mdl, Total Uncert, RDL or not identified by gamma scan software.

FORM II

Date: 09-Aug-17

BLANK RESULTS

Lab Name: TestAmerica Inc

SDG: W07880

Matrix: SOIL

Report No. : 71471

Parameter	Result	Qual	Count Error (2 s)	CSU (2 s)	MDL, Lc	Rpt Unit, CRDL	Yield	Rst/MDL, Rst/TotUcert	Analysis, Prep Date	Total Sa Size	Aliquot Size	Primary Detector
Batch: 7206012	GAMMA_GS			Work Order: NAAQ51AA		Report DB ID: NAAQ51AB						
CO-60	1.48E-03	U	3.6E-03	3.6E-03	6.50E-03	pCi/g		0.23	8/7/17 01:26 p		348.0	GER18\$1
					3.24E-03	1.00E-01		0.83			g	
CS-137	3.15E-04	U	3.4E-03	3.4E-03	5.80E-03	pCi/g		0.05	8/7/17 01:26 p		348.0	GER18\$1
					2.90E-03	1.00E-01		0.19			g	
EU-152	-2.27E-03	U	1.1E-02	1.1E-02	1.32E-02	pCi/g		-0.17	8/7/17 01:26 p		348.0	GER18\$1
					6.62E-03	1.00E-01		-0.4			g	
EU-154	-5.80E-03	U	9.5E-03	9.5E-03	1.60E-02	pCi/g		-0.36	8/7/17 01:26 p		348.0	GER18\$1
					8.02E-03	1.00E-01		-(1.2)			g	
EU-155	-2.44E-04	U	5.5E-03	5.5E-03	9.44E-03	pCi/g		-0.03	8/7/17 01:26 p		348.0	GER18\$1
					4.70E-03	1.00E-01		-0.09			g	
No. of Results: 5	Comments:											

FORM II
LCS RESULTS

Date: 09-Aug-17

Lab Name: TestAmerica Inc

SDG: W07880

Matrix: SOIL

Report No. : 71471

Parameter	Result	Qual	Count Error (2 s)	CSU (2 s)	MDL	Report Unit	Yield	Expected	Expected Uncert	Recovery, Bias	Analysis, Prep Date	Aliquot Size	Primary Detector
Batch: 7206012	GAMMA_GS		Work Order: NAAQ51AC			Report DB ID: NAAQ51CS							
CS-137	9.13E-01		1.2E-01	1.2E-01	1.08E-02	pCi/g		9.38E-01		97%	8/7/17 01:27 p	350.1	GER19\$1
								Rec Limits:	80	120	0.0	g	
RA-228	4.12E-01		6.6E-02	6.6E-02	3.34E-02	pCi/g		4.37E-01		94%	8/7/17 01:27 p	350.1	GER19\$1
								Rec Limits:	80	120	-0.1	g	
No. of Results:	2		Comments:										

TestAmerica Inc Bias - (Result/Expected)-1 as defined by ANSI N13.30.
rptSTLRchLcs
V5.8.5 A2002