



# CHPRC - REVIEW COMMENT RECORD (RCR)

1. Date <b>7/10/2018</b>		2. Review No.	
3. Project No.		Page 1 of 1	
5. Document Number(s)/Title(s) VSR18-012 VSR18-012 Rev. 1	6. Program/Project/Building Number	7. Reviewer Jadie Kaas	8. Organization/Group SGRP QA
17. Comment Submittal Approval		9. Location/Phone MO2216 / 376-2949	
 Date <u>7/10/2018</u> Organization Manager (optional) (print and sign) Jadie Kaas		 Date <u>7/11/2018</u> Author/Originator (print and sign) Jadie Kaas	
10. Agreement With Indicated Comment Disposition(s) <b>11. CLOSED</b>			
12. Item		13. Recommendation	
1		13a. Comments No issues noted	
		13b. Basis	
		13c. Recommendation	
		14. Reviewer Concurrence Required (Y or N)	
		15. Disposition (provide justification if NOT accepted)	
		16. Status Closed	



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## Data Validation Report for CH2M Hill Plateau Remediation Company

### VSR18-012 Project ERDF Leachate

### Chemical and Radiochemical Validation - Level C

Validation Performed By: *Eyda Hergenreder* Date: 06-29-2018  
Eyda Hergenreder

Technical Review By: *Ellen McEntee* Date: 07-03-2018  
Ellen McEntee

Quality Review By: *Mary A. Donovan* Date: 07-11-2018  
Mary Donovan  
Quality Assurance Manager

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Date: 29 June 2018  
 To: CH2M Hill (technical representative)  
 From: Analytical Quality Associates, Inc.  
 Project: ERDF Leachate  
 Subject: Volatile Organics - Sample Data Group (SDG) DN0331

## **INTRODUCTION**

This memorandum presents the results of data validation for SDG DN0331 prepared by TestAmerica Laboratories, Inc. A list of samples validated along with the analytical methods is provided in the following table.

<b>Sample ID</b>	<b>Sample Date</b>	<b>Media</b>	<b>Validation Level</b>	<b>Analytical Methods</b>
B3HY79	03/06/18	Water	C	8260B
B3HY83	03/06/18	Water	C	8260B
B3HY80	03/06/18	Water	C	8260B

Data validation was conducted in accordance with the CHPRC validation statement of work and the Environmental Restoration Disposal Facility Leachate Sampling and Analysis Plan, WCH-173, Rev. 2 (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 volatile organics are analysis within 14 days of sample collection. Sample preservation requires chilling to <6 degrees Celsius and acid preservation with hydrochloric or sulfuric acid to pH  $\leq 2$ .

The samples were analyzed within the prescribed holding time 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**

No trip blanks were submitted for validation.

### **Field Blanks**

All field transfer blank results were acceptable.

### **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 matrix spike and laboratory control sample accuracy limits are 70% to 130% as 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  $\leq 20\%$  as specified by the DV procedure.

### **MS/MSD Samples**

All MS/MSD relative percent difference values were acceptable.

### **Field Duplicate Samples**

All field duplicate results were acceptable.

### **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 DN0331 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.

WCH-173, Rev. 2, *Environmental Restoration Disposal Facility Leachate Sampling and Analysis Plan*, November 2015.

## **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**

<b>Volatile Organics Data Qualification Summary</b>			
SDG: DN0331	Reviewer: AQA	Project: ERDF Leachate	Page 1 of 1
<b>Analyte(s)</b>	<b>Qualifier</b>	<b>Samples Affected</b>	<b>Reason</b>
VOCs	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 - Chemical Data Validation Checklist**

VALIDATION LEVEL:	A	B	<input checked="" type="radio"/> C	D	E
PROJECT: ERDF Leachate			DATA PACKAGE: VSR18-012		
VALIDATOR: Eyda Hergenreder		LAB: TestAmerica		DATE: 06/29/18	
			SDG: DN0331		
<b>ANALYSES PERFORMED</b>					
SW-846 8260 X		SW-846 8260 (TCLP)	SW-846 8270		SW-846 8270 (TCLP)
SAMPLES/MATRIX Water					
SDG DN0331 - B3HY79, B3HY83, B3HY80					

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

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

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## 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:

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#### 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:

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## Data Validation for Chemical Analyses

Published Date: 10/03/16

SGRP-GD-SMP-50117

Effective Date: 10/03/16

## Appendix A - (Cont.) Chemical Data Validation Checklist

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

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

Comments:

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## 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?	<input checked="" type="radio"/> Yes No N/A
MS/MSD standards NIST traceable? (Levels D, E)	Yes No <input type="radio"/> N/A
MS/MSD standards 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 N/A
Field duplicate RPD values acceptable?	<input checked="" type="radio"/> Yes No 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:

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

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

Comments:

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## 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?	<input checked="" type="radio"/> Yes No N/A

Comments:

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

Comments:

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## **Appendix 4**

### **Additional Documentation Requested By Client**

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**QC Sample Results**

Client: CH2M Hill Plateau Remediation Company  
 Project/Site: FRC16-03

TestAmerica Job ID: 280-107145-1  
 SDG: DN0331

**Method: 8260B - Volatile Organic Compounds (GC/MS)**

Lab Sample ID: MB 280-407823/7

Matrix: Water

Analysis Batch: 407823

Client Sample ID: Method Blank

Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Carbon tetrachloride	0.19	U	1.0	0.19	ug/L			03/14/18 10:49	1
Trichloroethene	0.16	U	1.0	0.16	ug/L			03/14/18 10:49	1

Tentatively Identified Compound	MB Est. Result	MB Qualifier	Unit	D	RT	CAS No.	Prepared	Analyzed	Dil Fac
Unknown	17.2	N	ug/L		4.03			03/14/18 10:49	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	96		70 - 130		03/14/18 10:49	1
4-Bromofluorobenzene (Surr)	102		70 - 130		03/14/18 10:49	1
Dibromofluoromethane (Surr)	94		70 - 130		03/14/18 10:49	1
Toluene-d8 (Surr)	111		70 - 130		03/14/18 10:49	1

Lab Sample ID: LCS 280-407823/5

Matrix: Water

Analysis Batch: 407823

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Carbon tetrachloride	5.00	5.57		ug/L		111	65 - 135
Trichloroethene	5.00	5.64		ug/L		113	65 - 135

Surrogate	LCS %Recovery	LCS Qualifier	Limits
1,2-Dichloroethane-d4 (Surr)	100		70 - 130
4-Bromofluorobenzene (Surr)	94		70 - 130
Dibromofluoromethane (Surr)	95		70 - 130
Toluene-d8 (Surr)	111		70 - 130

Lab Sample ID: 280-107145-1 MS

Matrix: Water

Analysis Batch: 407823

Client Sample ID: B3HY79

Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Carbon tetrachloride	0.19	U	5.00	5.67		ug/L		113	65 - 135
Trichloroethene	0.16	U	5.00	5.60		ug/L		112	65 - 135

Surrogate	MS %Recovery	MS Qualifier	Limits
1,2-Dichloroethane-d4 (Surr)	99		70 - 130
4-Bromofluorobenzene (Surr)	89		70 - 130
Dibromofluoromethane (Surr)	94		70 - 130
Toluene-d8 (Surr)	110		70 - 130

Lab Sample ID: 280-107145-1 MSD

Matrix: Water

Analysis Batch: 407823

Client Sample ID: B3HY79

Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Carbon tetrachloride	0.19	U	5.00	5.39		ug/L		108	65 - 135	5	21
Trichloroethene	0.16	U	5.00	5.42		ug/L		108	65 - 135	3	20

TestAmerica Denver

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**QC Sample Results**

Client: CH2M Hill Plateau Remediation Company  
 Project/Site: FRC16-03

TestAmerica Job ID: 280-107145-1  
 SDG: DN0331

Surrogate	MSD %Recovery	MSD Qualifier	Limits
1,2-Dichloroethane-d4 (Surr)	102		70 - 130
4-Bromofluorobenzene (Surr)	96		70 - 130
Dibromofluoromethane (Surr)	95		70 - 130
Toluene-d8 (Surr)	110		70 - 130

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

Lab Sample ID: MB 280-407552/1-A  
 Matrix: Water  
 Analysis Batch: 409544

Client Sample ID: Method Blank  
 Prep Type: Total/NA  
 Prep Batch: 407552

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,2-Diphenylhydrazine	0.23	U	10	0.23	ug/L		03/12/18 12:05	03/29/18 17:35	1

Tentatively Identified Compound	MB Est. Result	MB Qualifier	Unit	D	RT	CAS No.	Prepared	Analyzed	Dil Fac
Cyclohexane	9.79	N J	ug/L		1.73	110-82-7	03/12/18 12:05	03/29/18 17:35	1
Unknown	105	N	ug/L		1.81		03/12/18 12:05	03/29/18 17:35	1
Unknown	7.34	N	ug/L		2.91		03/12/18 12:05	03/29/18 17:35	1
Unknown	70.9	N	ug/L		3.17		03/12/18 12:05	03/29/18 17:35	1
Unknown	10.7	N	ug/L		4.06		03/12/18 12:05	03/29/18 17:35	1
1-Propene, 1,2,3-trichloro-, (Z)-	35.2	N J	ug/L		4.12	13116-57-9	03/12/18 12:05	03/29/18 17:35	1
Unknown	5.29	N	ug/L		5.25		03/12/18 12:05	03/29/18 17:35	1
Unknown	6.16	N	ug/L		7.39		03/12/18 12:05	03/29/18 17:35	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
2-Fluorobiphenyl (Surr)	69		48 - 130	03/12/18 12:05	03/29/18 17:35	1
2-Fluorophenol (Surr)	75		41 - 130	03/12/18 12:05	03/29/18 17:35	1
2,4,6-Tribromophenol (Surr)	63		42 - 130	03/12/18 12:05	03/29/18 17:35	1
Nitrobenzene-d5 (Surr)	74		42 - 130	03/12/18 12:05	03/29/18 17:35	1
Phenol-d5 (Surr)	78		45 - 130	03/12/18 12:05	03/29/18 17:35	1
Terphenyl-d14 (Surr)	81		20 - 130	03/12/18 12:05	03/29/18 17:35	1

Lab Sample ID: LCS 280-407552/2-A  
 Matrix: Water  
 Analysis Batch: 409544

Client Sample ID: Lab Control Sample  
 Prep Type: Total/NA  
 Prep Batch: 407552

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
1,2-Diphenylhydrazine	80.9	68.9		ug/L		85	55 - 130

Surrogate	LCS %Recovery	LCS Qualifier	Limits
2-Fluorobiphenyl (Surr)	72		48 - 130
2-Fluorophenol (Surr)	76		41 - 130
2,4,6-Tribromophenol (Surr)	71		42 - 130
Nitrobenzene-d5 (Surr)	76		42 - 130
Phenol-d5 (Surr)	76		45 - 130
Terphenyl-d14 (Surr)	82		20 - 130

Page 20 of 108  
**Surrogate Summary**

Client: CH2M Hill Plateau Remediation Company  
Project/Site: FRC16-03

TestAmerica Job ID: 280-107145-1  
SDG: DN0331

**Method: 8260B - Volatile Organic Compounds (GC/MS)**

Matrix: Water

Prep Type: Total/NA

Percent Surrogate Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	DCA	BFB	DBFM	TOL
		(70-130)	(70-130)	(70-130)	(70-130)
280-107145-1	B3HY79	94	94	92	112
280-107145-1 MS	B3HY79	99	89	94	110
280-107145-1 MSD	B3HY79	102	96	95	110
280-107145-2	B3HY83	99	93	93	112
280-107145-3	B3HY80	97	88	93	109
LCS 280-407823/5	Lab Control Sample	100	94	95	111
MB 280-407823/7	Method Blank	96	102	94	111

**Surrogate Legend**

DCA = 1,2-Dichloroethane-d4 (Surr)  
BFB = 4-Bromofluorobenzene (Surr)  
DBFM = Dibromofluoromethane (Surr)  
TOL = Toluene-d8 (Surr)

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

Matrix: Water

Prep Type: Total/NA

Percent Surrogate Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	FBP	2FP	TBP	NBZ	PHL	TPHL
		(48-130)	(41-130)	(42-130)	(42-130)	(45-130)	(20-130)
280-107145-1	B3HY79	75	70	66	75	72	57
280-107145-1 MS	B3HY79	77	75	74	79	76	75
280-107145-1 MSD	B3HY79	80	81	76	84	80	61
280-107145-2	B3HY83	76	82	73	82	84	60
LCS 280-407552/2-A	Lab Control Sample	72	76	71	76	76	82
MB 280-407552/1-A	Method Blank	69	75	63	74	78	81

**Surrogate Legend**

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

Date: 29 June 2018  
 To: CH2M Hill (technical representative)  
 From: Analytical Quality Associates, Inc.  
 Project: ERDF Leachate  
 Subject: Semivolatile Organics - Sample Data Group (SDG) DN0331

## **INTRODUCTION**

This memorandum presents the results of data validation for SDG DN0331 prepared by TestAmerica Laboratories, Inc. A list of samples validated along with the analytical methods is provided in the following table.

<b>Sample ID</b>	<b>Sample Date</b>	<b>Media</b>	<b>Validation Level</b>	<b>Analytical Methods</b>
B3HY79	3/06/18	Water	C	8270D
B3HY83	3/06/18	Water	C	8270D

Data validation was conducted in accordance with the CHPRC validation statement of work and the Environmental Restoration Disposal Facility Leachate Sampling and Analysis Plan, WCH-173, Rev. 2 (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 water are extraction within 7 days of sample collection and analysis within 40 days of sample extraction. Sample preservation requires chilling to  $\leq 6$  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**

No trip blanks were submitted for validation.

### **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 70% to 130% and the matrix spike sample accuracy limits are ones established by the analytical laboratory as specified by the DV procedure.

### **Surrogates**

All surrogate recoveries were acceptable with the following exceptions.

For SDG DN0331, the terphenyl-d14 surrogate recoveries for samples B3HY79, B3HY83 and B3HY79MSD and the 2-fluorobiphenyl for the MB were below the lower acceptance limits but  $\geq 20\%$ . The 1,2-diphenylhydrazine results for samples B3HY79 and B3HY83 were non-detects and should be qualified as estimates and flagged "UJ." Since samples B3HY79MSD and the MB are QC samples, data should not be qualified as a result.

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

All MS/MSD recoveries were acceptable.

### **Laboratory Control Samples (LCSs)**

The LCS recovery was acceptable.

- **Precision**

Precision is evaluated by reviewing MS/MSD results, field duplicate sample results and field split sample results. These QC results provide information on the laboratory reproducibility and

whether sampling activities are adequate to acquire consistent sample results. According to the SAP, the relative percent difference (RPD) limits are  $\leq 20\%$  as specified by the DV procedure.

### **MS/MSD Samples**

All MS/MSD RPD values were acceptable.

### **Field Duplicate Samples**

All field duplicate results were acceptable.

### **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 DN0331 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 low surrogate recoveries. See the table in Appendix 2 for a listing of all affected sample results.

**REFERENCES**

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

WCH-173, Rev. 2, *Environmental Restoration Disposal Facility Leachate Sampling and Analysis Plan*, November 2015.

## **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**

<b>Semivolatile Organics Data Qualification Summary</b>			
SDG: DN0331	Reviewer: AQA	Project: ERDF Leachate	Page 1 of 1
<b>Analyte(s)</b>	<b>Qualifier</b>	<b>Samples Affected</b>	<b>Reason</b>
1,2- diphenylhydrazine	UJ	B3HY79, B3HY83	Low surrogate recoveries

Comments: None

## **Appendix 3**

### **Data Validation Supporting Documentation**

**Data Validation for Chemical Analyses**

Published Date: 10/03/16

SGRP-GD-SMP-50117

Effective Date: 10/03/16

**Appendix A - Chemical Data Validation Checklist**

VALIDATION LEVEL:	A	B	<input checked="" type="radio"/> C	D	E
PROJECT: ERDF Leachate			DATA PACKAGE: VSR18-012		
VALIDATOR: Eyda Hergenreder		LAB: TestAmerica		DATE: 06/29/18	
			SDG: DN0331		
ANALYSES PERFORMED					
SW-846 8260		SW-846 8260 (TCLP)	SW-846 8270 X		SW-846 8270 (TCLP)
SAMPLES/MATRIX Water					
SDG DN0331 - B3HY79, B3HY83					

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

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

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## 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:

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

Comments:

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## 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?	Yes <input type="radio"/> No <input checked="" 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:

Surrogates: terphenyl-d14 sample B3HY79 57%; B3HY79MSD 61%; B3HY83 60%  
2-fluorobiphenyl MB 69%

## 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?	<input checked="" type="radio"/> Yes No N/A
MS/MSD standards NIST traceable? (Levels D, E)	Yes No <input type="radio"/> N/A
MS/MSD standards 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 N/A
Field duplicate RPD values acceptable?	<input checked="" type="radio"/> Yes No 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:

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

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

Comments:

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## 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?	<input checked="" type="radio"/> Yes No N/A

Comments:

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#### 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
Laboratory properly identified and coded all TIC? (Levels D, E)	Yes No <input checked="" type="radio"/> N/A
Detection limits meet RDL?	<input checked="" type="radio"/> Yes No N/A
Transcription/calculation errors? (Levels D, E)	Yes No <input checked="" type="radio"/> N/A

Comments:

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## **Appendix 4**

### **Additional Documentation Requested By Client**

Page 37 of 108  
**QC Sample Results**

Client: CH2M Hill Plateau Remediation Company  
 Project/Site: FRC16-03

TestAmerica Job ID: 280-107145-1  
 SDG: DN0331

Surrogate	MSD		Limits
	%Recovery	Qualifier	
1,2-Dichloroethane-d4 (Surr)	102		70 - 130
4-Bromofluorobenzene (Surr)	96		70 - 130
Dibromofluoromethane (Surr)	95		70 - 130
Toluene-d8 (Surr)	110		70 - 130

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

Lab Sample ID: MB 280-407552/1-A  
 Matrix: Water  
 Analysis Batch: 409544

Client Sample ID: Method Blank  
 Prep Type: Total/NA  
 Prep Batch: 407552

Analyte	MB		RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
1,2-Diphenylhydrazine	0.23	U	10	0.23	ug/L		03/12/18 12:05	03/29/18 17:35	1

Tentatively Identified Compound	MB		Unit	D	RT	CAS No.	Prepared	Analyzed	Dil Fac
	Est. Result	Qualifier							
Cyclohexane	9.79	N J	ug/L		1.73	110-82-7	03/12/18 12:05	03/29/18 17:35	1
Unknown	105	N	ug/L		1.81		03/12/18 12:05	03/29/18 17:35	1
Unknown	7.34	N	ug/L		2.91		03/12/18 12:05	03/29/18 17:35	1
Unknown	70.9	N	ug/L		3.17		03/12/18 12:05	03/29/18 17:35	1
Unknown	10.7	N	ug/L		4.06		03/12/18 12:05	03/29/18 17:35	1
1-Propene, 1,2,3-trichloro-, (Z)-	35.2	N J	ug/L		4.12	13116-57-9	03/12/18 12:05	03/29/18 17:35	1
Unknown	5.29	N	ug/L		5.25		03/12/18 12:05	03/29/18 17:35	1
Unknown	6.16	N	ug/L		7.39		03/12/18 12:05	03/29/18 17:35	1

Surrogate	MB		Limits	Prepared	Analyzed	Dil Fac
	%Recovery	Qualifier				
2-Fluorobiphenyl (Surr)	69		48 - 130	03/12/18 12:05	03/29/18 17:35	1
2-Fluorophenol (Surr)	75		41 - 130	03/12/18 12:05	03/29/18 17:35	1
2,4,6-Tribromophenol (Surr)	63		42 - 130	03/12/18 12:05	03/29/18 17:35	1
Nitrobenzene-d5 (Surr)	74		42 - 130	03/12/18 12:05	03/29/18 17:35	1
Phenol-d5 (Surr)	78		45 - 130	03/12/18 12:05	03/29/18 17:35	1
Terphenyl-d14 (Surr)	81		20 - 130	03/12/18 12:05	03/29/18 17:35	1

Lab Sample ID: LCS 280-407552/2-A  
 Matrix: Water  
 Analysis Batch: 409544

Client Sample ID: Lab Control Sample  
 Prep Type: Total/NA  
 Prep Batch: 407552

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits

Surrogate	LCS		Limits
	%Recovery	Qualifier	
2-Fluorobiphenyl (Surr)	72		48 - 130
2-Fluorophenol (Surr)	76		41 - 130
2,4,6-Tribromophenol (Surr)	71		42 - 130
Nitrobenzene-d5 (Surr)	76		42 - 130
Phenol-d5 (Surr)	76		45 - 130
Terphenyl-d14 (Surr)	82		20 - 130

Page 38 of 108  
**QC Sample Results**

Client: CH2M Hill Plateau Remediation Company  
Project/Site: FRC16-03

TestAmerica Job ID: 280-107145-1  
SDG: DN0331

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

**Lab Sample ID: 280-107145-1 MS**

**Matrix: Water**

**Analysis Batch: 409544**

**Client Sample ID: B3HY79**

**Prep Type: Total/NA**

**Prep Batch: 407552**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
1,2-Diphenylhydrazine	0.23	U	81.8	76.3		ug/L		93	55 - 120

Surrogate	MS %Recovery	MS Qualifier	Limits
2-Fluorobiphenyl (Surr)	77		48 - 130
2-Fluorophenol (Surr)	75		41 - 130
2,4,6-Tribromophenol (Surr)	74		42 - 130
Nitrobenzene-d5 (Surr)	79		42 - 130
Phenol-d5 (Surr)	76		45 - 130
Terphenyl-d14 (Surr)	75		20 - 130

**Lab Sample ID: 280-107145-1 MSD**

**Matrix: Water**

**Analysis Batch: 409544**

**Client Sample ID: B3HY79**

**Prep Type: Total/NA**

**Prep Batch: 407552**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
1,2-Diphenylhydrazine	0.23	U	82.1	77.2		ug/L		94	55 - 120	1	30

Surrogate	MSD %Recovery	MSD Qualifier	Limits
2-Fluorobiphenyl (Surr)	80		48 - 130
2-Fluorophenol (Surr)	81		41 - 130
2,4,6-Tribromophenol (Surr)	76		42 - 130
Nitrobenzene-d5 (Surr)	84		42 - 130
Phenol-d5 (Surr)	80		45 - 130
Terphenyl-d14 (Surr)	61		20 - 130

**Method: 6010D - Metals (ICP)**

**Lab Sample ID: MB 280-407795/1-A**

**Matrix: Water**

**Analysis Batch: 408691**

**Client Sample ID: Method Blank**

**Prep Type: Total/NA**

**Prep Batch: 407795**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Potassium	237	U	3000	237	ug/L		03/19/18 07:10	03/22/18 02:04	1

**Lab Sample ID: LCS 280-407795/2-A**

**Matrix: Water**

**Analysis Batch: 408691**

**Client Sample ID: Lab Control Sample**

**Prep Type: Total/NA**

**Prep Batch: 407795**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Potassium	50000	44410		ug/L		89	80 - 120

**Lab Sample ID: LCSD 280-407795/3-A**

**Matrix: Water**

**Analysis Batch: 408691**

**Client Sample ID: Lab Control Sample Dup**

**Prep Type: Total/NA**

**Prep Batch: 407795**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Potassium	50000	46700		ug/L		93	80 - 120	5	20

TestAmerica Denver

Page 39 of 108  
**Surrogate Summary**

Client: CH2M Hill Plateau Remediation Company  
Project/Site: FRC16-03

TestAmerica Job ID: 280-107145-1  
SDG: DN0331

**Method: 8260B - Volatile Organic Compounds (GC/MS)**

Matrix: Water

Prep Type: Total/NA

Percent Surrogate Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	DCA	BFB	DBFM	TOL
		(70-130)	(70-130)	(70-130)	(70-130)
280-107145-1	B3HY79	94	94	92	112
280-107145-1 MS	B3HY79	99	89	94	110
280-107145-1 MSD	B3HY79	102	96	95	110
280-107145-2	B3HY83	99	93	93	112
280-107145-3	B3HY80	97	88	93	109
LCS 280-407823/5	Lab Control Sample	100	94	95	111
MB 280-407823/7	Method Blank	96	102	94	111

**Surrogate Legend**

DCA = 1,2-Dichloroethane-d4 (Surr)  
BFB = 4-Bromofluorobenzene (Surr)  
DBFM = Dibromofluoromethane (Surr)  
TOL = Toluene-d8 (Surr)

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

Matrix: Water

Prep Type: Total/NA

Percent Surrogate Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	FBP	2FP	TBP	NBZ	PHL	TPHL
		(48-130)	(41-130)	(42-130)	(42-130)	(45-130)	(20-130)
280-107145-1	B3HY79	75	70	66	75	72	57
280-107145-1 MS	B3HY79	77	75	74	79	76	75
280-107145-1 MSD	B3HY79	80	81	76	84	80	61
280-107145-2	B3HY83	76	82	73	82	84	60
LCS 280-407552/2-A	Lab Control Sample	72	76	71	76	76	82
MB 280-407552/1-A	Method Blank	69	75	63	74	78	81

**Surrogate Legend**

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

Date: 29 June 2018  
 To: CH2M Hill (technical representative)  
 From: Analytical Quality Associates, Inc.  
 Project: ERDL Leachate  
 Subject: Inorganics - Sample Data Group (SDG) DN0331

## **INTRODUCTION**

This memorandum presents the results of data validation for SDG DN0331 prepared by TestAmerica Laboratories, Inc. A list of samples validated along with the analytical methods is provided in the following table.

<b>Sample ID</b>	<b>Sample Date</b>	<b>Media</b>	<b>Validation Level</b>	<b>Analytical Methods</b>
B3HY79	03/06/18	Water	C	6010D, 6020B
B3HY83	03/06/18	Water	C	6010D, 6020B

Data validation was conducted in accordance with the CHPRC validation statement of work and the Environmental Restoration Disposal Facility Leachate Sampling and Analysis Plan, WCH-173, Rev. 2 (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. Sample preservation requires acid preservation with nitric acid to pH <2.

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 DN0331, the calcium and tungsten laboratory blank results were detects > the method detection limits (MDLs) but < the practical quantitation limits (PQLs). All calcium sample results were detects well above the PQL and should not be qualified. All tungsten sample results were detects  $\geq$  the MDL but  $\leq$  the PQL and should be qualified as estimates and flagged “J+.”

### **Trip Blanks**

No trip blanks were submitted for validation.

### **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 laboratory control sample accuracy limits are 80% to 120% and the matrix spike sample accuracy limits are 75% to 125% as specified by the DV procedure.

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

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

For SDG DN0331, the MS recovery for uranium was < the lower acceptance limit but  $\geq 30\%$  and the MSD recovery was <30%. In addition the MS and MSD recoveries for calcium and sodium were > 125%. The parent sample results for these analytes were >4X the spike concentration and data should not be qualified as a result.

### **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, laboratory duplicate sample results, field duplicate sample results, field split sample results, and ICP serial dilution results. These QC

results provide information on the laboratory reproducibility and whether sampling activities are adequate to acquire consistent sample results. According to the SAP, the relative percent difference (RPD) limits are  $\leq 20\%$  as specified in the DV procedure.

### **MS/MSD Samples**

All MS/MSD RPDs were acceptable.

### **Field Duplicate Samples**

No field duplicates were submitted for validation.

### **Field Split Samples**

No field splits were submitted for validation.

### **ICP Serial Dilution Samples**

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

- **ICP-MS Internal Standards**

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

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

- **Detection Limits**

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

All reported sample MDLs were below the CRDLs with the exception of silicon.

- **Completeness**

SDG DN0331 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 tungsten sample results as estimates was due to a laboratory blank infraction. 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.

WCH-173, Rev. 2, *Environmental Restoration Disposal Facility Leachate Sampling and Analysis Plan*, November 2015.

## **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**

<b>Inorganic Data Qualification Summary</b>			
SDG: DN0331	Reviewer: AQA	Project: ERDF Leachate	Page 1 of 1
<b>Analyte(s)</b>	<b>Qualifier</b>	<b>Samples Affected</b>	<b>Reason</b>
Tungsten	J+	B3HY79, B3HY83	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: ERDF Leachate			DATA PACKAGE: VSR18-012		
VALIDATOR: Eyda Hergenreder		LAB: TestAmerica		DATE: 06/29/18	
			SDG: DN0331		
ANALYSES PERFORMED					
SW-846/ICP X	SW-846/GFAA	SW-846/Hg	SW-846 Cyanide	SW846/ICPMS X	
SAMPLES/MATRIX Water					
DN0331 - B3HY79, B3HY83					

## 1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE

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

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## 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:

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#### 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)	Yes <input checked="" type="radio"/> No N/A
Field blank results acceptable? (Levels C, 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:

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MB - calcium 39.82 ug/L, tungsten 0.353 ug/L

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## 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:

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#### 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:

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## **Appendix 4**

### **Additional Documentation Requested By Client**

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**QC Sample Results**

Client: CH2M Hill Plateau Remediation Company  
Project/Site: FRC16-03

TestAmerica Job ID: 280-107145-1  
SDG: DN0331

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

Lab Sample ID: 280-107145-1 MS

Matrix: Water  
Analysis Batch: 409544

Client Sample ID: B3HY79

Prep Type: Total/NA  
Prep Batch: 407552

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits	
1,2-Diphenylhydrazine	0.23	U	81.8	76.3		ug/L		93	55 - 120	
Surrogate	MS %Recovery	MS Qualifier	MS Limits							
2-Fluorobiphenyl (Surr)	77		48 - 130							
2-Fluorophenol (Surr)	75		41 - 130							
2,4,6-Tribromophenol (Surr)	74		42 - 130							
Nitrobenzene-d5 (Surr)	79		42 - 130							
Phenol-d5 (Surr)	76		45 - 130							
Terphenyl-d14 (Surr)	75		20 - 130							

Lab Sample ID: 280-107145-1 MSD

Matrix: Water  
Analysis Batch: 409544

Client Sample ID: B3HY79

Prep Type: Total/NA  
Prep Batch: 407552

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
1,2-Diphenylhydrazine	0.23	U	82.1	77.2		ug/L		94	55 - 120	1	30
Surrogate	MSD %Recovery	MSD Qualifier	MSD Limits								
2-Fluorobiphenyl (Surr)	80		48 - 130								
2-Fluorophenol (Surr)	81		41 - 130								
2,4,6-Tribromophenol (Surr)	76		42 - 130								
Nitrobenzene-d5 (Surr)	84		42 - 130								
Phenol-d5 (Surr)	80		45 - 130								
Terphenyl-d14 (Surr)	61		20 - 130								

**Method: 6010D - Metals (ICP)**

Lab Sample ID: MB 280-407795/1-A

Matrix: Water  
Analysis Batch: 408691

Client Sample ID: Method Blank

Prep Type: Total/NA  
Prep Batch: 407795

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Potassium	237	U	3000	237	ug/L		03/19/18 07:10	03/22/18 02:04	1

Lab Sample ID: LCS 280-407795/2-A

Matrix: Water  
Analysis Batch: 408691

Client Sample ID: Lab Control Sample

Prep Type: Total/NA  
Prep Batch: 407795

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Potassium	50000	44410		ug/L		89	80 - 120

Lab Sample ID: LCSD 280-407795/3-A

Matrix: Water  
Analysis Batch: 408691

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA  
Prep Batch: 407795

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Potassium	50000	46700		ug/L		93	80 - 120	5	20

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**QC Sample Results**

Client: CH2M Hill Plateau Remediation Company  
Project/Site: FRC16-03

TestAmerica Job ID: 280-107145-1  
SDG: DN0331

**Method: 6010D - Metals (ICP) (Continued)**

**Lab Sample ID: 280-107145-1 MS**

**Matrix: Water**

**Analysis Batch: 408691**

**Client Sample ID: B3HY79**

**Prep Type: Total/NA**

**Prep Batch: 407795**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Potassium	20200		50000	75690		ug/L		111	75 - 125

**Lab Sample ID: 280-107145-1 MSD**

**Matrix: Water**

**Analysis Batch: 408691**

**Client Sample ID: B3HY79**

**Prep Type: Total/NA**

**Prep Batch: 407795**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Potassium	20200		50000	70560		ug/L		101	75 - 125	7	20

**Lab Sample ID: MB 280-407862/1-A**

**Matrix: Water**

**Analysis Batch: 408303**

**Client Sample ID: Method Blank**

**Prep Type: Total/NA**

**Prep Batch: 407862**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Calcium	39.82	B	200	34.5	ug/L		03/14/18 10:25	03/17/18 03:10	1
Silicon	34.7	U	500	34.7	ug/L		03/14/18 10:25	03/17/18 03:10	1
Sodium	117	U	1000	117	ug/L		03/14/18 10:25	03/17/18 03:10	1

**Lab Sample ID: LCS 280-407862/2-A**

**Matrix: Water**

**Analysis Batch: 408303**

**Client Sample ID: Lab Control Sample**

**Prep Type: Total/NA**

**Prep Batch: 407862**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Calcium	50000	48560		ug/L		97	80 - 120
Silicon	10000	9796		ug/L		98	80 - 120
Sodium	50000	51520		ug/L		103	80 - 120

**Lab Sample ID: LCSD 280-407862/3-A**

**Matrix: Water**

**Analysis Batch: 408303**

**Client Sample ID: Lab Control Sample Dup**

**Prep Type: Total/NA**

**Prep Batch: 407862**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Calcium	50000	52040		ug/L		104	80 - 120	7	20
Silicon	10000	10240		ug/L		102	80 - 120	4	20
Sodium	50000	55040		ug/L		110	80 - 120	7	20

**Lab Sample ID: 280-107145-1 MS**

**Matrix: Water**

**Analysis Batch: 408303**

**Client Sample ID: B3HY79**

**Prep Type: Total/NA**

**Prep Batch: 407862**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Calcium	327000		50000	402600	X	ug/L		152	75 - 125
Silicon	20600		10000	32510		ug/L		119	75 - 125
Sodium	219000		50000	301000	X	ug/L		164	75 - 125

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**QC Sample Results**

Client: CH2M Hill Plateau Remediation Company  
Project/Site: FRC16-03

TestAmerica Job ID: 280-107145-1  
SDG: DN0331

**Method: 6010D - Metals (ICP) (Continued)**

Lab Sample ID: 280-107145-1 MSD  
Matrix: Water  
Analysis Batch: 408303

Client Sample ID: B3HY79  
Prep Type: Total/NA  
Prep Batch: 407862

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	RPD Limit
Calcium	327000		50000	389700	X	ug/L		126	75 - 125	3	20
Silicon	20600		10000	31270		ug/L		107	75 - 125	4	20
Sodium	219000		50000	292200	X	ug/L		147	75 - 125	3	20

**Method: 6020B - Metals (ICP/MS)**

Lab Sample ID: MB 280-407424/1-A  
Matrix: Water  
Analysis Batch: 407804

Client Sample ID: Method Blank  
Prep Type: Total/NA  
Prep Batch: 407424

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.33	U	5.0	0.33	ug/L		03/09/18 14:24	03/13/18 12:26	1
Barium	0.29	U	1.0	0.29	ug/L		03/09/18 14:24	03/13/18 12:26	1
Beryllium	0.080	U	1.0	0.080	ug/L		03/09/18 14:24	03/13/18 12:26	1
Chromium	0.50	U	2.0	0.50	ug/L		03/09/18 14:24	03/13/18 12:26	1
Lead	0.18	U	1.0	0.18	ug/L		03/09/18 14:24	03/13/18 12:26	1
Selenium	0.70	U	5.0	0.70	ug/L		03/09/18 14:24	03/13/18 12:26	1
Thallium	0.050	U	1.0	0.050	ug/L		03/09/18 14:24	03/13/18 12:26	1
Tin	0.77	U	10.0	0.77	ug/L		03/09/18 14:24	03/13/18 12:26	1
Uranium	0.050	U	1.0	0.050	ug/L		03/09/18 14:24	03/13/18 12:26	1
Vanadium	0.50	U	5.0	0.50	ug/L		03/09/18 14:24	03/13/18 12:26	1
Zinc	2.0	U	10.0	2.0	ug/L		03/09/18 14:24	03/13/18 12:26	1
Tungsten	0.353	B	5.0	0.20	ug/L		03/09/18 14:24	03/13/18 12:26	1

Lab Sample ID: LCS 280-407424/2-A  
Matrix: Water  
Analysis Batch: 407804

Client Sample ID: Lab Control Sample  
Prep Type: Total/NA  
Prep Batch: 407424

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Arsenic	40.0	35.67		ug/L		89	80 - 120
Barium	40.0	40.40		ug/L		101	80 - 120
Beryllium	40.0	37.66		ug/L		94	80 - 120
Chromium	40.0	38.13		ug/L		95	80 - 120
Lead	40.0	41.87		ug/L		105	80 - 120
Selenium	40.0	36.79		ug/L		92	80 - 120
Thallium	40.0	42.49		ug/L		106	80 - 120
Tin	40.0	40.66		ug/L		102	80 - 120
Uranium	40.0	42.39		ug/L		106	80 - 120
Vanadium	40.0	39.74		ug/L		99	80 - 120
Zinc	40.0	39.14		ug/L		98	80 - 120
Tungsten	40.0	34.78		ug/L		87	80 - 120

Lab Sample ID: LCSD 280-407424/3-A  
Matrix: Water  
Analysis Batch: 407804

Client Sample ID: Lab Control Sample Dup  
Prep Type: Total/NA  
Prep Batch: 407424

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	RPD Limit
Arsenic	40.0	35.93		ug/L		90	80 - 120	1	10

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**QC Sample Results**

Client: CH2M Hill Plateau Remediation Company  
 Project/Site: FRC16-03

TestAmerica Job ID: 280-107145-1  
 SDG: DN0331

**Method: 6020B - Metals (ICP/MS) (Continued)**

Lab Sample ID: LCSD 280-407424/3-A  
 Matrix: Water  
 Analysis Batch: 407804

Client Sample ID: Lab Control Sample Dup  
 Prep Type: Total/NA  
 Prep Batch: 407424

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Barium	40.0	42.03		ug/L		105	80 - 120	4	11
Beryllium	40.0	39.38		ug/L		98	80 - 120	4	22
Chromium	40.0	38.89		ug/L		97	80 - 120	2	8
Lead	40.0	42.52		ug/L		106	80 - 120	2	7
Selenium	40.0	37.46		ug/L		94	80 - 120	2	9
Thallium	40.0	42.38		ug/L		106	80 - 120	0	5
Tin	40.0	39.45		ug/L		99	80 - 120	3	6
Uranium	40.0	42.05		ug/L		105	80 - 120	1	6
Vanadium	40.0	40.10		ug/L		100	80 - 120	1	8
Zinc	40.0	38.77		ug/L		97	80 - 120	1	12
Tungsten	40.0	33.93		ug/L		85	80 - 120	2	5

Lab Sample ID: 280-107145-1 MS  
 Matrix: Water  
 Analysis Batch: 407804

Client Sample ID: B3HY79  
 Prep Type: Total/NA  
 Prep Batch: 407424

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	5.0		40.0	41.97		ug/L		92	75 - 125
Barium	87.5		40.0	129.4		ug/L		105	75 - 125
Beryllium	0.080	U	40.0	40.72		ug/L		102	75 - 125
Chromium	162		40.0	201.4	X	ug/L		99	75 - 125
Lead	0.18	U	40.0	39.90		ug/L		100	75 - 125
Selenium	1.5	B	40.0	37.58		ug/L		90	75 - 125
Thallium	0.050	U	40.0	39.72		ug/L		99	75 - 125
Tin	0.77	U	40.0	41.22		ug/L		103	75 - 125
Uranium	1390		40.0	1415	X	ug/L		56	75 - 125
Vanadium	15.0		40.0	54.23		ug/L		98	75 - 125
Zinc	2.0	U	40.0	37.19		ug/L		93	75 - 125
Tungsten	1.1	B C	40.0	34.99		ug/L		85	75 - 125

Lab Sample ID: 280-107145-1 MSD  
 Matrix: Water  
 Analysis Batch: 407804

Client Sample ID: B3HY79  
 Prep Type: Total/NA  
 Prep Batch: 407424

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	5.0		40.0	41.64		ug/L		92	75 - 125	1	20
Barium	87.5		40.0	121.9		ug/L		86	75 - 125	6	20
Beryllium	0.080	U	40.0	39.85		ug/L		100	75 - 125	2	20
Chromium	162		40.0	195.2	X	ug/L		83	75 - 125	3	20
Lead	0.18	U	40.0	38.99		ug/L		97	75 - 125	2	20
Selenium	1.5	B	40.0	38.33		ug/L		92	75 - 125	2	20
Thallium	0.050	U	40.0	39.07		ug/L		98	75 - 125	2	20
Tin	0.77	U	40.0	38.71		ug/L		97	75 - 125	6	20
Uranium	1390		40.0	1362	X	ug/L		-75	75 - 125	4	20
Vanadium	15.0		40.0	52.03		ug/L		93	75 - 125	4	20
Zinc	2.0	U	40.0	36.03		ug/L		90	75 - 125	3	20
Tungsten	1.1	B C	40.0	33.82		ug/L		82	75 - 125	3	30

TestAmerica Denver

Date: 29 June 2018  
 To: CH2M Hill (technical representative)  
 From: Analytical Quality Associates, Inc.  
 Project: ERDF Leachate  
 Subject: General Chemistry - Sample Data Groups (SDGs) DN0331 & WC2753

## **INTRODUCTION**

This memorandum presents the results of data validation for SDGs DN0331 and WC2753 prepared by TestAmerica Laboratories, Inc. A list of samples validated along with the analytical methods is provided in the following table.

<b>Sample ID</b>	<b>Sample Date</b>	<b>Media</b>	<b>Validation Level</b>	<b>Analytical Methods</b>
B3HY79	03/06/18	Water	C	EPA 350.1, 353.2, 410.4, SW846 9020B, 9040C, 9050A SM2320B, 2540C, 2540D
B3HY83	03/06/18	Water	C	EPA 350.1, 353.2, 410.4, SW846 9020B, 9040C, 9050A SM2320B, 2540C, 2540D
B3HY77	03/06/18	Water	C	EPA 300.0, SW846 7196A
B3HY81	03/06/18	Water	C	EPA 300.0, SW846 7196A

Data validation was conducted in accordance with the CHPRC validation statement of work and the Environmental Restoration Disposal Facility Leachate Sampling and Analysis Plan, WCH-173, Rev. 2 (SAP). Appendices 1 through 4 provide the following information as indicated below:

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

## **DATA QUALITY OBJECTIVES**

### **• Holding Times and Sample Preservation**

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

- All anions except nitrate, nitrite, and phosphate – analysis within 28 days of sample collection
- Nitrate, nitrite, and phosphate – analysis within 48 hours of sample collection
- Hexavalent chromium – analysis within 24 hours of sample collection
- Ammonia, nitrate/nitrite as N, chemical oxygen demand (COD), specific conductance, total organic halogens (TOX) – analysis within 28 days of sample collection
- pH – analysis as soon as possible (24 hours is a reasonable holding time)

- Alkalinity – analysis within 14 days of sample collection
- Total dissolved solids (TDS), total suspended solids (TSS) – analysis within 7 days of sample collection.

Sample preservation for the above analyses requires chilling to <6 degrees Celsius. In addition, ammonia, nitrate/nitrite, COD and TOX are brought to pH<2 with sulfuric acid,

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

For SDG DN0331, samples B3HY79 and B3HY83 were analyzed for pH three days after sample collection. Based on professional judgment, the pH results should be qualified as estimates and flagged “J.”

For SDG WC2753, the cooler temperature was >6°C upon receipt at the laboratory. The samples were received within six hours of sample collection; therefore data should not be qualified as a result. In addition the samples were analyzed for nitrate as N six days after sample collection. The nitrate as N results for samples B3HY77 and B3HY81 were detects and should be qualified as unusable and flagged “R.”

- **Blanks**

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

**Laboratory Blanks**

All laboratory blank results were acceptable with the following exception.

For SDG DN0331, the nitrate/nitrite laboratory blank result was a detect  $\geq$  the method detection limit (MDL) but  $\leq$  the practical quantitation limit (PQL). The nitrate/nitrite results for samples B3HY79 and B3HY83 were detects >20X the blank value and should not be qualified.

**Trip Blanks**

No trip blanks were submitted for validation.

**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 laboratory control sample accuracy limits are 80% to 120% and the matrix spike accuracy limits are 75% to 125% as specified by the DV procedure.

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

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

For SDG DN0331, the MS and MSD recoveries for nitrate/nitrite as N were < 30%. The nitrate/nitrite results for samples B3HY79 and B3HY83 were detects and should be qualified as estimates and flagged “J-.”

For SDG WC2753, the MS recoveries for nitrite as N and orthophosphate as P were < the lower acceptance limit but  $\geq 30\%$ . The nitrite as N and orthophosphate as P results for samples B3HY77 and B3HY81 were non-detects and should be qualified as estimates and flagged “UJ.” The MS recovery for nitrate was <30%; however, the parent sample result was >4X the spike concentration; therefore data should not be qualified as a result.

### **Laboratory Control Samples (LCSs)**

All LCS recoveries were acceptable.

- **Precision**

Precision is evaluated by reviewing MS/MSD results, laboratory duplicate sample results, field duplicate sample results, and field split sample results. These QC results provide information on the laboratory reproducibility and whether sampling activities are adequate to acquire consistent sample results. According to the SAP, the relative percent difference (RPD) limits are  $\leq 20\%$  as specified by the DV procedure.

### **MS/MSD Samples**

All MS/MSD RPDs were acceptable.

### **Laboratory Duplicate Samples**

All laboratory duplicate results were acceptable.

### **Field Duplicate Samples**

All field duplicate results were acceptable with the following exception.

For SDG WC2753, field sample B3HY77 and its associated replicate sample B3HY81 had chloride and nitrate as N RPDs >20%.

### **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 with associated non-detected sample results were below the CRDLs.

- **Completeness**

SDGs DN0331 and WC2753 were submitted for validation and verified for completeness. Completeness is based on the percentage of data determined to be valid (i.e., not rejected). The completion percentage was 91%.

### **MAJOR DEFICIENCIES**

Major deficiencies leading to qualification of nitrate as N sample results as unusable were due to holding time infractions. See the table in Appendix 2 for a listing of all affected sample results.

### **MINOR DEFICIENCIES**

Minor deficiencies leading to qualification of pH, nitrate/nitrite as N, nitrite as N and orthophosphate as P sample results as estimates were due to holding time infraction and low matrix spike recoveries. See the table in Appendix 2 for a listing of all affected sample results.

### **REFERENCES**

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

WCH-173, Rev. 2, *Environmental Restoration Disposal Facility Leachate Sampling and Analysis Plan*, November 2015.

## **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**

<b>General Chemistry Data Qualification Summary</b>			
SDG: DN0331, WC2753	Reviewer: AQA	Project: ERDF Leachate	Page 1 of 1
<b>Analyte(s)</b>	<b>Qualifier</b>	<b>Samples Affected</b>	<b>Reason</b>
pH	J	B3HY79, B3HY83	Analysis beyond the holding time.
Nitrate	R	B3HY77, B3HY81	Analysis beyond 2X the holding time
Nitrate/nitrite	J-	B3HY79, B3HY83	Very low matrix spike recoveries.
Nitrite as N, Orthophosphate as P	UJ	B3HY77, B3HY81	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: ERDF Leachate			DATA PACKAGE: VSR18-012		
VALIDATOR: Eyda Hergenreder		LAB: TestAmerica		DATE: 06/29/18	
			SDG: DN0331, WC2753		
ANALYSES PERFORMED					
Anions/IC <input checked="" type="checkbox"/>	TOC	TOX <input checked="" type="checkbox"/>	TPH-418.1	Oil and Grease	Alkalinity <input checked="" type="checkbox"/>
Ammonia <input checked="" type="checkbox"/>	<del>BOD</del> /COD <input checked="" type="checkbox"/>	Chloride	Chromium-VI <input checked="" type="checkbox"/>	pH <input checked="" type="checkbox"/>	NO <sub>3</sub> /NO <sub>2</sub> <input checked="" type="checkbox"/>
Sulfate	TDS <input checked="" type="checkbox"/>	TKN	Phosphate	Specific Cond <input checked="" type="checkbox"/>	TSS <input checked="" type="checkbox"/>
SAMPLES/MATRIX Water					
SDG DN0331 - B3HY79, B3HY83					
SDG WC2753 - B3HY77, B3HY81					

## 1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE

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

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## 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:

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#### 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)	Yes <input checked="" type="radio"/> No N/A
Field blank results acceptable? (Levels C, 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:

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SDG DN0331 - NO3/NO2 - 25.23 ug/L

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## 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)

Spike samples analyzed?	<input checked="" type="radio"/> Yes No <input type="radio"/> N/A
Spike recoveries acceptable?	Yes <input checked="" type="radio"/> No <input type="radio"/> N/A
Spike standards NIST traceable? (Levels D, E)	Yes No <input checked="" type="radio"/> N/A
Spike standards expired? (Levels D, E)	Yes No <input checked="" 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 checked="" type="radio"/> N/A
Standards expired? (Levels D, E)	Yes No <input checked="" type="radio"/> N/A
Transcription/calculation errors? (Levels D, E)	Yes No <input checked="" type="radio"/> N/A
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 DN0331 - MS%/MSD% NO3/NO2 - 7%/29%

SDG WC2753 - MS%R NO2 69%, O-PO4 59%: NO3 2% (parent sample &gt;4X spike)

## 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?	<input checked="" type="radio"/> Yes No N/A
Field duplicate RPD values acceptable?	Yes <input checked="" type="radio"/> No N/A
Field split RPD values acceptable?	Yes No <input checked="" type="radio"/> N/A
Transcription/calculation errors? (Levels D, E)	Yes No <input checked="" type="radio"/> N/A

Comments:

WC2753 - sample B3HY77/duplicate sample B3HY81: chloride 36%, nitrate 35%

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

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

Comments:

SDG DN0331 - pH analyzed 3 days after collection, 2 days after receipt at laboratory.

SDG WC2753 - cooler temperature was 7.9 degree C when received at laboratory.  
NO3 analyzed 6 days after collection.



## **Appendix 4**

### **Additional Documentation Requested By Client**

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**QC Sample Results**

Client: CH2M Hill Plateau Remediation Company  
 Project/Site: FRC16-03

TestAmerica Job ID: 280-107145-1  
 SDG: DN0331

**Method: 350.1 - Nitrogen, Ammonia**

**Lab Sample ID: MB 280-409550/20**  
**Matrix: Water**  
**Analysis Batch: 409550**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia as N	22.0	U	100	22.0	ug/L			03/29/18 09:04	1

**Lab Sample ID: LCS 280-409550/18**  
**Matrix: Water**  
**Analysis Batch: 409550**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Ammonia as N	2500	2533		ug/L		101	80 - 120

**Lab Sample ID: LCSD 280-409550/19**  
**Matrix: Water**  
**Analysis Batch: 409550**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Ammonia as N	2500	2559		ug/L		102	80 - 120	1	20

**Lab Sample ID: 280-107145-1 MS**  
**Matrix: Water**  
**Analysis Batch: 409550**

**Client Sample ID: B3HY79**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Ammonia as N	22.0	U	1000	1073		ug/L		107	75 - 125

**Lab Sample ID: 280-107145-1 MSD**  
**Matrix: Water**  
**Analysis Batch: 409550**

**Client Sample ID: B3HY79**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Ammonia as N	22.0	U	1000	1066		ug/L		107	75 - 125	1	20

**Method: 353.2 - Nitrogen, Nitrate-Nitrite**

**Lab Sample ID: MB 280-409758/22**  
**Matrix: Water**  
**Analysis Batch: 409758**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate Nitrite as N	25.23	B	100	19.0	ug/L			03/30/18 19:24	1

**Lab Sample ID: LCS 280-409758/21**  
**Matrix: Water**  
**Analysis Batch: 409758**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Nitrate Nitrite as N	5000	4950		ug/L		99	80 - 120

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**QC Sample Results**

Client: CH2M Hill Plateau Remediation Company  
 Project/Site: FRC16-03

TestAmerica Job ID: 280-107145-1  
 SDG: DN0331

**Method: 353.2 - Nitrogen, Nitrate-Nitrite (Continued)**

Lab Sample ID: 280-107145-1 MS  
 Matrix: Water  
 Analysis Batch: 409758

Client Sample ID: B3HY79  
 Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Nitrate Nitrite as N	72800	N D	40000	75730	N D	ug/L		7	75 - 125

Lab Sample ID: 280-107145-1 MSD  
 Matrix: Water  
 Analysis Batch: 409758

Client Sample ID: B3HY79  
 Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Nitrate Nitrite as N	72800	N D	40000	84460	N D	ug/L		29	75 - 125	11	20

**Method: 410.4 - COD**

Lab Sample ID: MB 280-409619/5  
 Matrix: Water  
 Analysis Batch: 409619

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chemical Oxygen Demand	4060	U	20000	4060	ug/L			03/30/18 08:25	1

Lab Sample ID: LCS 280-409619/3  
 Matrix: Water  
 Analysis Batch: 409619

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chemical Oxygen Demand	100000	102000		ug/L		102	80 - 120

Lab Sample ID: LCSD 280-409619/4  
 Matrix: Water  
 Analysis Batch: 409619

Client Sample ID: Lab Control Sample Dup  
 Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chemical Oxygen Demand	100000	101000		ug/L		101	80 - 120	1	20

Lab Sample ID: 280-107145-1 MS  
 Matrix: Water  
 Analysis Batch: 409619

Client Sample ID: B3HY79  
 Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chemical Oxygen Demand	35600		50000	81510		ug/L		92	75 - 125

Lab Sample ID: 280-107145-1 MSD  
 Matrix: Water  
 Analysis Batch: 409619

Client Sample ID: B3HY79  
 Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chemical Oxygen Demand	35600		50000	77820		ug/L		85	75 - 125	5	20

TestAmerica Denver

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**QC Sample Results**

Client: CH2M Hill Plateau Remediation Company  
 Project/Site: FRC16-03

TestAmerica Job ID: 280-107145-1  
 SDG: DN0331

**Method: 9020B - Organic Halides, Total (TOX)**

Lab Sample ID: MB 280-407735/2  
 Matrix: Water  
 Analysis Batch: 407735

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Organic Halogens - Dup	7.7	U	30.0	7.7	ug/L			03/12/18 05:55	1

Lab Sample ID: LCS 280-407735/4  
 Matrix: Water  
 Analysis Batch: 407735

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Organic Halogens - Dup	100	99.16		ug/L		99	80 - 120

Lab Sample ID: LCSD 280-407735/5  
 Matrix: Water  
 Analysis Batch: 407735

Client Sample ID: Lab Control Sample Dup  
 Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Total Organic Halogens - Dup	100	91.65		ug/L		92	80 - 120	8	23

Lab Sample ID: 280-107145-1 MS  
 Matrix: Water  
 Analysis Batch: 407735

Client Sample ID: B3HY79  
 Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Organic Halogens - Dup	60.2		100	156.0		ug/L		96	75 - 125

Lab Sample ID: 280-107145-1 MSD  
 Matrix: Water  
 Analysis Batch: 407735

Client Sample ID: B3HY79  
 Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Total Organic Halogens - Dup	60.2		100	151.3		ug/L		91	75 - 125	3	23

**Method: 9040C - pH**

Lab Sample ID: LCS 280-407456/4  
 Matrix: Water  
 Analysis Batch: 407456

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
pH	7.00	7.040		SU		101	99 - 101

Lab Sample ID: 280-107145-1 DU  
 Matrix: Water  
 Analysis Batch: 407456

Client Sample ID: B3HY79  
 Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
pH	7.91		7.910		SU		0	5

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**QC Sample Results**

Client: CH2M Hill Plateau Remediation Company  
 Project/Site: FRC16-03

TestAmerica Job ID: 280-107145-1  
 SDG: DN0331

**Method: 9050A - Specific Conductance**

Lab Sample ID: MB 280-407797/5  
 Matrix: Water  
 Analysis Batch: 407797

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Specific Conductance	2.00	U	2.00	2.00	umhos/cm			03/13/18 23:54	1

Lab Sample ID: LCS 280-407797/3  
 Matrix: Water  
 Analysis Batch: 407797

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Specific Conductance	1410	1377		umhos/cm		98	90 - 110

Lab Sample ID: LCSD 280-407797/4  
 Matrix: Water  
 Analysis Batch: 407797

Client Sample ID: Lab Control Sample Dup  
 Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Specific Conductance	1410	1381		umhos/cm		98	90 - 110	0	10

Lab Sample ID: 280-107145-1 DU  
 Matrix: Water  
 Analysis Batch: 407797

Client Sample ID: B3HY79  
 Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Specific Conductance	2860		2865		umhos/cm		0.1	10

**Method: SM 2320B - Alkalinity**

Lab Sample ID: MB 280-407877/6  
 Matrix: Water  
 Analysis Batch: 407877

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity as CaCO3	1070	U	5000	1070	ug/L			03/13/18 22:50	1

Lab Sample ID: LCS 280-407877/4  
 Matrix: Water  
 Analysis Batch: 407877

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Alkalinity as CaCO3	200000	200300		ug/L		100	80 - 120

Lab Sample ID: LCSD 280-407877/5  
 Matrix: Water  
 Analysis Batch: 407877

Client Sample ID: Lab Control Sample Dup  
 Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Alkalinity as CaCO3	200000	200800		ug/L		100	80 - 120	0	20

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**QC Sample Results**

Client: CH2M Hill Plateau Remediation Company  
Project/Site: FRC16-03

TestAmerica Job ID: 280-107145-1  
SDG: DN0331

**Method: SM 2320B - Alkalinity (Continued)**

Lab Sample ID: 280-107145-1 DU  
Matrix: Water  
Analysis Batch: 407877

Client Sample ID: B3HY79  
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	Limit
Alkalinity as CaCO3	304000		289400		ug/L		5	20

**Method: SM 2540C - Solids, Total Dissolved (TDS)**

Lab Sample ID: MB 280-407668/1  
Matrix: Water  
Analysis Batch: 407668

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	4700	U	10000	4700	ug/L			03/13/18 08:27	1

Lab Sample ID: LCS 280-407668/2  
Matrix: Water  
Analysis Batch: 407668

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Dissolved Solids	500000	488000		ug/L		98	80 - 120

Lab Sample ID: LCSD 280-407668/3  
Matrix: Water  
Analysis Batch: 407668

Client Sample ID: Lab Control Sample Dup  
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	Limit
Total Dissolved Solids	500000	491000		ug/L		98	80 - 120	1	20

Lab Sample ID: 280-107145-1 DU  
Matrix: Water  
Analysis Batch: 407668

Client Sample ID: B3HY79  
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	Limit
Total Dissolved Solids	2180000		2202000		ug/L		0.8	20

**Method: SM 2540D - Solids, Total Suspended (TSS)**

Lab Sample ID: MB 280-407554/1  
Matrix: Water  
Analysis Batch: 407554

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids	1100	U	4000	1100	ug/L			03/12/18 10:32	1

Lab Sample ID: LCS 280-407554/2  
Matrix: Water  
Analysis Batch: 407554

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Suspended Solids	100000	91600		ug/L		92	80 - 120

TestAmerica Denver

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**QC Sample Results**

Client: CH2M Hill Plateau Remediation Company  
 Project/Site: FRC16-03

TestAmerica Job ID: 280-107145-1  
 SDG: DN0331

**Method: SM 2540D - Solids, Total Suspended (TSS) (Continued)**

**Lab Sample ID: LCSD 280-407554/3**  
**Matrix: Water**  
**Analysis Batch: 407554**

**Client Sample ID: Lab Control Sample Dup**  
**Prep Type: Total/NA**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Total Suspended Solids	100000	98000		ug/L		98	80 - 120	7	20

**Lab Sample ID: 280-107145-1 DU**  
**Matrix: Water**  
**Analysis Batch: 407554**

**Client Sample ID: B3HY79**  
**Prep Type: Total/NA**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Total Suspended Solids	1100	U	1200	B	ug/L		NC	20

Client: CH2M Hill Plateau Remediation Company  
 Project/Site: FRC16-03

TestAmerica Job ID: 300-6848-1  
 SDG: WC2753

**Method: 300.0 - Anions, Ion Chromatography**

Lab Sample ID: MB 300-10565/18  
 Matrix: Water  
 Analysis Batch: 10565

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	0.014	U	0.028	0.014	mg/L			03/07/18 14:47	1
Nitrite as N	0.019	U	0.038	0.019	mg/L			03/07/18 14:47	1
Orthophosphate as P	0.041	U	0.082	0.041	mg/L			03/07/18 14:47	1

Lab Sample ID: LCS 300-10565/19  
 Matrix: Water  
 Analysis Batch: 10565

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Nitrate as N	2.26	2.11		mg/L		94	80 - 120
Nitrite as N	3.04	3.05		mg/L		100	80 - 120
Orthophosphate as P	6.53	6.07		mg/L		93	80 - 120

Lab Sample ID: 300-6846-A-8 MS  
 Matrix: Water  
 Analysis Batch: 10565

Client Sample ID: Matrix Spike  
 Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Nitrate as N	4.2	D	0.452	4.61	D	mg/L		89	75 - 125
Nitrite as N	0.068	B D N	0.609	0.489	D N	mg/L		69	75 - 125
Orthophosphate as P	0.082	U D N	1.31	0.765	D N	mg/L		59	75 - 125

Lab Sample ID: 300-6846-A-8 DU  
 Matrix: Water  
 Analysis Batch: 10565

Client Sample ID: Duplicate  
 Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Nitrate as N	4.2	D	4.21	D	mg/L		0.1	20
Nitrite as N	0.068	B D N	0.0666	B D	mg/L		3	20
Orthophosphate as P	0.082	U D N	0.082	U D	mg/L		NC	20

Lab Sample ID: MB 300-10566/18  
 Matrix: Water  
 Analysis Batch: 10566

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	0.10	U	0.20	0.10	mg/L			03/07/18 14:47	1
Fluoride	0.025	U	0.050	0.025	mg/L			03/07/18 14:47	1
Sulfate	0.13	U	0.25	0.13	mg/L			03/07/18 14:47	1
Bromide	0.063	U	0.13	0.063	mg/L			03/07/18 14:47	1

Lab Sample ID: LCS 300-10566/19  
 Matrix: Water  
 Analysis Batch: 10566

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	16.0	15.9		mg/L		99	80 - 120
Fluoride	4.00	4.08		mg/L		102	80 - 120
Sulfate	20.0	19.5		mg/L		98	80 - 120

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Page 82 of 108  
**QC Sample Results**

Client: CH2M Hill Plateau Remediation Company  
 Project/Site: FRC16-03

TestAmerica Job ID: 300-6848-1  
 SDG: WC2753

**Method: 300.0 - Anions, Ion Chromatography (Continued)**

Lab Sample ID: LCS 300-10566/19  
 Matrix: Water  
 Analysis Batch: 10566

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Bromide	10.0	9.44		mg/L		94	80 - 120

Lab Sample ID: 300-6846-A-8 MS  
 Matrix: Water  
 Analysis Batch: 10566

Client Sample ID: Matrix Spike  
 Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	5.5	D	3.20	8.46	D	mg/L		91	75 - 125
Fluoride	0.42	D	0.800	1.16	D	mg/L		92	75 - 125
Sulfate	15	D	4.00	18.8	D	mg/L		94	75 - 125
Bromide	0.13	U D	2.00	1.67	D	mg/L		83	75 - 125

Lab Sample ID: 300-6846-A-8 DU  
 Matrix: Water  
 Analysis Batch: 10566

Client Sample ID: Duplicate  
 Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Chloride	5.5	D	5.55	D	mg/L		0.1	20
Fluoride	0.42	D	0.426	D	mg/L		0.4	20
Sulfate	15	D	15.1	D	mg/L		0.3	20
Bromide	0.13	U D	0.13	U D	mg/L		NC	20

Lab Sample ID: MB 300-10593/5  
 Matrix: Water  
 Analysis Batch: 10593

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	0.10	U	0.20	0.10	mg/L			03/09/18 13:54	1
Fluoride	0.025	U	0.050	0.025	mg/L			03/09/18 13:54	1
Sulfate	0.13	U	0.25	0.13	mg/L			03/09/18 13:54	1
Bromide	0.063	U	0.13	0.063	mg/L			03/09/18 13:54	1

Lab Sample ID: LCS 300-10593/6  
 Matrix: Water  
 Analysis Batch: 10593

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	16.0	16.0		mg/L		100	80 - 120
Fluoride	4.00	4.02		mg/L		101	80 - 120
Sulfate	20.0	20.0		mg/L		100	80 - 120
Bromide	10.0	10.1		mg/L		101	80 - 120

Lab Sample ID: 300-6847-A-1 MS  
 Matrix: Water  
 Analysis Batch: 10593

Client Sample ID: Matrix Spike  
 Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	11	D	3.20	14.6	D	mg/L		97	75 - 125
Fluoride	0.36	D	0.800	1.13	D	mg/L		96	75 - 125

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Client: CH2M Hill Plateau Remediation Company  
 Project/Site: FRC16-03

TestAmerica Job ID: 300-6848-1  
 SDG: WC2753

**Method: 300.0 - Anions, Ion Chromatography (Continued)**

**Lab Sample ID: 300-6847-A-1 MS**  
**Matrix: Water**  
**Analysis Batch: 10593**

**Client Sample ID: Matrix Spike**  
**Prep Type: Total/NA**

Analyte	Sample	Sample	Spike	MS	MS	Unit	D	%Rec	%Rec.
	Result	Qualifier		Result	Qualifier				
Sulfate	27	D	4.00	30.8	D	mg/L		100	75 - 125
Bromide	0.14	B D	2.00	1.84	D	mg/L		85	75 - 125

**Lab Sample ID: 300-6847-A-1 DU**  
**Matrix: Water**  
**Analysis Batch: 10593**

**Client Sample ID: Duplicate**  
**Prep Type: Total/NA**

Analyte	Sample	Sample	DU		Unit	D	RPD	RPD	Limit
	Result	Qualifier	Result	Qualifier					
Chloride	11	D	11.2	D	mg/L		3	20	
Fluoride	0.36	D	0.346	D	mg/L		5	20	
Sulfate	27	D	26.2	D	mg/L		2	20	
Bromide	0.14	B D	0.13	U D	mg/L		NC	20	

**Lab Sample ID: MB 300-10597/5**  
**Matrix: Water**  
**Analysis Batch: 10597**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**

Analyte	MB	MB	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Nitrate as N	0.014	U	0.028	0.014	mg/L			03/12/18 16:19	1
Nitrite as N	0.019	U	0.038	0.019	mg/L			03/12/18 16:19	1
Orthophosphate as P	0.041	U	0.082	0.041	mg/L			03/12/18 16:19	1

**Lab Sample ID: LCS 300-10597/6**  
**Matrix: Water**  
**Analysis Batch: 10597**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**

Analyte	Spike	LCS	LCS	Unit	D	%Rec	%Rec.
Nitrate as N	2.26	2.20		mg/L		97	80 - 120
Nitrite as N	3.04	3.05		mg/L		100	80 - 120
Orthophosphate as P	6.53	6.27		mg/L		96	80 - 120

**Lab Sample ID: 300-6848-1 MS**  
**Matrix: Water**  
**Analysis Batch: 10597**

**Client Sample ID: B3HY77**  
**Prep Type: Total/NA**

Analyte	Sample	Sample	Spike	MS	MS	Unit	D	%Rec	%Rec.
	Result	Qualifier		Result	Qualifier				
Nitrate as N	62	D Z	4.52	62.5	D X	mg/L		2	75 - 125

**Lab Sample ID: 300-6848-1 DU**  
**Matrix: Water**  
**Analysis Batch: 10597**

**Client Sample ID: B3HY77**  
**Prep Type: Total/NA**

Analyte	Sample	Sample	DU		Unit	D	RPD	RPD	Limit
	Result	Qualifier	Result	Qualifier					
Nitrate as N	62	D Z	59.1	D	mg/L		5	20	

Client: CH2M Hill Plateau Remediation Company  
 Project/Site: FRC16-03

TestAmerica Job ID: 300-6848-1  
 SDG: WC2753

**Method: 300.0 - Anions, Ion Chromatography (Continued)**

Lab Sample ID: MB 300-10598/5  
 Matrix: Water  
 Analysis Batch: 10598

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	0.10	U	0.20	0.10	mg/L			03/12/18 16:19	1
Fluoride	0.025	U	0.050	0.025	mg/L			03/12/18 16:19	1
Sulfate	0.13	U	0.25	0.13	mg/L			03/12/18 16:19	1
Bromide	0.063	U	0.13	0.063	mg/L			03/12/18 16:19	1

Lab Sample ID: LCS 300-10598/6  
 Matrix: Water  
 Analysis Batch: 10598

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	16.0	15.7		mg/L		98	80 - 120
Fluoride	4.00	3.96		mg/L		99	80 - 120
Sulfate	20.0	19.7		mg/L		98	80 - 120
Bromide	10.0	9.95		mg/L		99	80 - 120

**Method: 7196A - Chromium, Hexavalent**

Lab Sample ID: MB 300-10562/3  
 Matrix: Water  
 Analysis Batch: 10562

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cr (VI)	0.0015	U	0.0040	0.0015	mg/L			03/06/18 15:54	1

Lab Sample ID: LCS 300-10562/4  
 Matrix: Water  
 Analysis Batch: 10562

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Cr (VI)	0.250	0.260		mg/L		104	80 - 120

Lab Sample ID: 300-6848-1 MS  
 Matrix: Water  
 Analysis Batch: 10562

Client Sample ID: B3HY77  
 Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Cr (VI)	0.17		0.0501	0.221		mg/L		98	75 - 125

Lab Sample ID: 300-6848-1 DU  
 Matrix: Water  
 Analysis Batch: 10562

Client Sample ID: B3HY77  
 Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Cr (VI)	0.17		0.173		mg/L		0.7	20

Date: 29 June 2018  
 To: CH2M Hill (technical representative)  
 From: Analytical Quality Associates, Inc.  
 Project: ERDF Leachate  
 Subject: Radiochemical - Sample Data Group (SDG) W08027

## **INTRODUCTION**

This memorandum presents the results of data validation for SDG W08027 prepared by TestAmerica Laboratories, Inc. A list of samples validated along with the analytical methods is provided in the following table.

<b>Sample ID</b>	<b>Sample Date</b>	<b>Media</b>	<b>Validation Level</b>	<b>Analytical Methods</b>
B3HY78	03/06/18	Water	C	Tc-99, Sr, Total alpha radium, I-129, Gamma, C-14, alpha, beta, tritium
B3HY82	03/06/18	Water	C	Tc-99, Sr, Total alpha radium, I-129, Gamma, C-14, alpha, beta, tritium

Data validation was conducted in accordance with the CHPRC validation statement of work and the Environmental Restoration Disposal Facility Leachate Sampling and Analysis Plan, WCH-173, Rev. 2 (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. Sample preservation for water samples for all analyses except tritium, C-14 and I-129 requires acid preservation with nitric acid to pH <2.

The samples were analyzed within the prescribed holding time 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**

No trip blanks were submitted for validation.

### **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 80% to 120% and the matrix spike sample accuracy limits are 75% to 125% as specified by the DV procedure.

### **Matrix Spike (MS) Samples**

All MS recoveries were acceptable with the following exception.

For SDG W08027, according to the case narrative, the sample was not spiked for tritium. The parent sample concentration would be >4X the spike concentration; therefore based on professional judgment, data should not be qualified.

### **Laboratory Control Samples (LCSs)**

All LCS recoveries were acceptable.

### **Carrier/Tracer Recovery Factors**

All carrier/tracer recovery factors were acceptable.

- **Precision**

Precision is evaluated by reviewing laboratory duplicate, field duplicate, and field split sample results. These QC results provide information on the laboratory reproducibility and whether sampling activities are adequate to acquire consistent sample results. According to the SAP, the relative percent difference (RPD) limits are  $\leq 20\%$  as specified by the DV procedure.

**Laboratory Duplicate Samples**

All laboratory duplicate results were acceptable.

**Field Duplicate Samples**

All field duplicate results were acceptable.

**Field Split Samples**

No field splits were submitted for validation.

- **Detection Limits**

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

All reported sample MDCs were below the CRDLs with the exception of U-235, alpha, beta and tritium for samples B3HY78 and B3HY82.

- **Completeness**

SDG W08027 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.

WCH-173, Rev. 2, *Environmental Restoration Disposal Facility Leachate Sampling and Analysis Plan*, November 2015.

## **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**

<b>Radiochemical Data Qualification Summary</b>			
SDGs: W08027	Reviewer: AQA	Project: ERDF Leachate	Page 1 of 1
<b>Analyte(s)</b>	<b>Qualifier</b>	<b>Samples Affected</b>	<b>Reason</b>
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	<b>C</b>	D	E
Project: ERDF Leachate			Data Package: VSR18-012		
Validator: Eyda Hergenreder		Lab: TestAmerica		Date: 06/29/18	
			SDG: W08027		
Analyses Performed					
<input checked="" type="checkbox"/> Gross Alpha/Beta	<input checked="" type="checkbox"/> Strontium-90	<input checked="" type="checkbox"/> Technetium-99	<input type="checkbox"/> Alpha Spectroscopy	<input checked="" type="checkbox"/> Gamma Spectroscopy	<input checked="" type="checkbox"/> Tritium
<input type="checkbox"/> Total Uranium	<input type="checkbox"/> Radium-22	<input checked="" type="checkbox"/> I-129	<input checked="" type="checkbox"/> C-14	<input checked="" type="checkbox"/> T-alpha Radium	
Samples/Matrix Water					
SDG W08027 - B3HY78, B3HY82					

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

**Comments:**


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

**Comments:**


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## Data Validation for Radiochemical Analyses

Published Date: 09/13/16

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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
<b>Comments:</b>	

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?	Yes <input checked="" type="radio"/> No N/A
Field blank results acceptable?	Yes No <input checked="" type="radio"/> N/A
Analytes detected in field blank(s)?	Yes No <input checked="" type="radio"/> N/A
Transcription/Calculation Errors? (Levels D, E)	Yes No <input checked="" type="radio"/> N/A

**Comments:**


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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:**


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

**Comments:**


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

**Comments:**


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

**Comments:**

SDG W08027 - according to the case narrative and no spike recovery, the sample was inadvertently not spiked for tritium. Sample concentration would be 4X > the spike concentration.

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

**Comments:**

## Data Validation for Radiochemical Analyses

Published Date: 09/13/16

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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?	<input checked="" type="radio"/> Yes No 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:**


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

**Comments:**


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

**Comments:**

W08027 - MDC > CRDL: B3HY78 U-235, alpha, beta, tritium: sample B3HY82, U-235, alpha, beta, tritium

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## **Appendix 4**

### **Additional Documentation Requested By Client**

## FORM II

Date: 18-May-18

## DUPLICATE RESULTS

Lab Name: TestAmerica Inc

SDG: W08027

Collection Date: 3/6/2018 8:15:00 AM

Lot-Sample No.: J8C060405-1

Report No. : 72693

Received Date: 3/6/2018 2:05:00 PM

Client Sample ID: B3HY78 DUP

COC No. : FRC16-03-039

Matrix: WATER

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: 8073028	RATOT_AEAGEA				Work Order: NANXM1AL	Report DB ID: NANXM1LR			Orig Sa DB ID: 9NANXM1f			
TOTAL ALPHA RA	-1.27E-01	U	1.7E-01	1.7E-01	5.51E-01	pCi/L	89%	-0.23	3/29/18 02:21 p		0.50358	GPC24B
	7.38E-02	U			RPD -754.6	1.00E+00		-(1.5)			L	
Batch: 8073029	I129LL_SEP_LEPS_GS				Work Order: NANXM1AM	Report DB ID: NANXM1MR			Orig Sa DB ID: 9NANXM1f			
I129	1.02E-01	U	3.3E-01	3.3E-01	6.27E-01	pCi/L	85%	0.16	3/23/18 08:27 a		1.99973	LEP5\$1
	2.92E-01	U			RPD 96.4	1.00E+00		0.63			L	
Batch: 8073031	C14_LSC				Work Order: NANXM1AP	Report DB ID: NANXM1PR			Orig Sa DB ID: 9NANXM1f			
C-14	2.43E+02		1.3E+01	2.0E+01	1.80E+01	pCi/L	100%	(13.5)	3/29/18 07:48 p		0.075	LSC4
	2.15E+02				RPD 12.4	5.00E+01		(24.3)			L	
Batch: 8081013	9310_ALPHABETA_GPC				Work Order: NANXM1AT	Report DB ID: NANXM1TR			Orig Sa DB ID: 9NANXM20			
Alpha	4.53E+02		2.9E+01	1.2E+02	1.17E+01	pCi/L	100%	(38.6)	3/27/18 01:56 p		0.02487	GPC22A
	4.55E+02				RPD 0.4	3.00E+00		(7.9)			L	
Batch: 8081014	9310_ALPHABETA_GPC				Work Order: NANXM1AU	Report DB ID: NANXM1UR			Orig Sa DB ID: 9NANXM20			
Beta	4.72E+02		1.5E+01	6.0E+01	7.27E+00	pCi/L	100%	(64.9)	3/27/18 04:52 p		0.04999	GPC26B
	4.80E+02				RPD 1.8	4.00E+00		(15.8)			L	

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: 18-May-18

## DUPLICATE RESULTS

Lab Name: TestAmerica Inc

SDG: W08027

Collection Date: 3/6/2018 8:15:00 AM

Lot-Sample No.: J8C060405-2

Report No. : 72693

Received Date: 3/6/2018 2:05:00 PM

Client Sample ID: B3HY82 DUP

COC No. : FRC16-03-043

Matrix: WATER

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
<b>Batch:</b> 8073026	TC99_ETVDSK_LSC				<b>Work Order:</b> NANXN1AP			<b>Report DB ID:</b> NANXN1PR		<b>Orig Sa DB ID:</b> 9NANXN10		
Tc-99	2.16E+02		1.1E+01	1.8E+01	1.13E+01	pCi/L	100%	(19.1)	3/19/18 12:55 p		0.12558	LSC4
	2.25E+02		<b>RPD 4.2</b>			5.00E+01		(24.4)			L	
<b>Batch:</b> 8073027	SRTOT_SEP_PRECIP_GPC				<b>Work Order:</b> NANXN1AQ			<b>Report DB ID:</b> NANXN1QR		<b>Orig Sa DB ID:</b> 9NANXN10		
STRONTIUM	1.77E+01		2.4E+00	4.8E+00	2.03E+00	pCi/L	56%	(8.8)	3/20/18 08:53 a		0.49581	GPC32D
	1.82E+01		<b>RPD 2.3</b>			2.00E+00		(7.3)			L	
<b>Batch:</b> 8073030	GAMMA_GS				<b>Work Order:</b> NANXN1AR			<b>Report DB ID:</b> NANXN1RR		<b>Orig Sa DB ID:</b> 9NANXN10		
AMERICIUM 241	-6.54E+01	U	4.2E+01	4.2E+01	4.56E+01	pCi/L		-(1.4)	3/22/18 09:23 a		2.00509	\$GER12
	4.46E-01	U	<b>RPD -202.7</b>			1.00E+00		-(3.1)			L	
CO-60	-2.62E+00	U	7.5E+00	7.5E+00	6.32E+00	pCi/L		-0.42	3/22/18 09:23 a		2.00509	\$GER12
	2.18E+00	U	<b>RPD -2149.7</b>			2.50E+01		-0.7			L	
CS-137	1.30E-01	U	5.4E+00	5.4E+00	5.53E+00	pCi/L		0.02	3/22/18 09:23 a		2.00509	\$GER12
	-4.49E+00	U	<b>RPD -211.9</b>			1.50E+01		0.05			L	
EU-152	-3.32E+00	U	1.4E+01	1.4E+01	1.24E+01	pCi/L		-0.27	3/22/18 09:23 a		2.00509	\$GER12
	-1.03E+00	U	<b>RPD -105.2</b>			5.00E+01		-0.46			L	
EU-154	-3.80E+00	U	1.7E+01	1.7E+01	8.75E+00	pCi/L		-0.43	3/22/18 09:23 a		2.00509	\$GER12
	-6.04E+00	U	<b>RPD -45.5</b>			5.00E+01		-0.45			L	
EU-155	-1.71E+00	U	1.3E+01	1.3E+01	1.66E+01	pCi/L		-0.1	3/22/18 09:23 a		2.00509	\$GER12
	2.52E+00	U	<b>RPD 1036.8</b>			5.00E+01		-0.25			L	
TH-234	2.43E+02		7.6E+01	7.6E+01	8.78E+01	pCi/L		(2.8)	3/22/18 09:23 a		2.00509	\$GER12
	2.72E+02		<b>RPD 11.1</b>			1.00E+00		(6.4)			L	

TestAmerica Inc RPD - Relative Percent Difference.

rptSTLRchDupV5.  
8.5 A2002

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

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: 18-May-18

## DUPLICATE RESULTS

Lab Name: TestAmerica Inc

SDG: W08027

Collection Date: 3/6/2018 8:15:00 AM

Lot-Sample No.: J8C060405-2

Report No. : 72693

Received Date: 3/6/2018 2:05:00 PM

Client Sample ID: B3HY82 DUP

COC No. : FRC16-03-043

Matrix: WATER

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
U-235	2.06E+01		4.8E+00	4.8E+00	5.51E+00	pCi/L		(3.7)	3/22/18 09:23 a		2.00509	\$GER12
	2.15E+01		RPD 4.0			1.00E+00		(8.7)			L	

No. of Results: 10 Comments:

TestAmerica Inc RPD - Relative Percent Difference.

rptSTLRchDupV5.8.5 A2002 MDC|MDA,Lc - Detection, Decision Level based on instrument background or blank, adjusted by the sample Efficiency, Yield, and Volume.

## FORM II

Date: 18-May-18

## BLANK RESULTS

Lab Name: TestAmerica Inc

SDG: W08027

Matrix: WATER

Report No. : 72693

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
<b>Batch:</b> 8073031	C14_LSC											
	C-14	U	7.6E+00	8.9E+00	1.82E+01	pCi/L	100%	0.02	3/29/18 10:00 p		0.075	LSC4
					8.73E+00	5.00E+01		0.09			L	
<b>Batch:</b> 8094017	TRITIUM_DIST_LSC											
	H-3	U	2.6E+02	3.0E+02	6.20E+02	pCi/L	100%	0.24	4/6/18 09:50 p		0.00501	LSC4
					2.92E+02	7.00E+02		0.99			L	
<b>Batch:</b> 8136011	TRITIUM_DIST_LSC											
	H-3	U	2.0E+02	2.4E+02	5.10E+02	pCi/L	100%	0.04	5/17/18 04:51 p		0.00503	LSC6
					2.38E+02	4.00E+02		0.15			L	
<b>Batch:</b> 8073030	GAMMA_GS											
	AMERICIUM 241	U	1.0E+00	1.0E+00	1.92E+00	pCi/L		0.23	3/22/18 09:23 a		2.00106	\$GER18
					8.43E-01			0.85			L	
	CO-60	U	3.3E+00	3.3E+00	3.37E+00	pCi/L		0.1	3/22/18 09:23 a		2.00106	\$GER18
					1.47E+00	2.50E+01		0.2			L	
	CS-137	U	2.7E+00	2.7E+00	3.20E+00	pCi/L		0.27	3/22/18 09:23 a		2.00106	\$GER18
					1.43E+00	1.50E+01		0.66			L	
	EU-152	U	5.8E+00	5.8E+00	3.88E+00	pCi/L		-0.25	3/22/18 09:23 a		2.00106	\$GER18
					1.72E+00	5.00E+01		-0.33			L	
	EU-154	U	9.6E+00	9.6E+00	2.41E+00	pCi/L		-0.12	3/22/18 09:23 a		2.00106	\$GER18
					1.07E+00	5.00E+01		-0.06			L	
	EU-155	U	2.1E+00	2.1E+00	2.68E+00	pCi/L		-0.25	3/22/18 09:23 a		2.00106	\$GER18
					1.20E+00	5.00E+01		-0.66			L	
<b>Batch:</b> 8081013	9310_ALPHABETA_GPC											

TestAmerica Inc  
rptSTLRchBlank  
V5.8.5 A2002MDC|MDA,Lc - Detection, Decision Level based on instrument background or blank, adjusted by the sample Efficiency, Yield, and Volume.  
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: 18-May-18

## BLANK RESULTS

Lab Name: TestAmerica Inc

SDG: W08027

Matrix: WATER

Report No. : 72693

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
Alpha	1.79E-01	U	3.8E-01	3.8E-01	6.59E-01 2.85E-01	pCi/L 3.00E+00	100%	0.27 0.95	3/27/18 01:56 p		0.20012 L	GPC22D
<b>Batch:</b> 8081014	9310_ALPHABETA_GPC			<b>Work Order:</b> NAPLK1AA		<b>Report DB ID:</b> NAPLK1AB						
Beta	9.70E-01	U	8.8E-01	8.9E-01	1.43E+00 6.78E-01	pCi/L 4.00E+00	100%	0.68 (2.2)	3/27/18 04:52 p		0.201 L	GPC27A
<b>Batch:</b> 8073029	I129LL_SEP_LEPS_GS			<b>Work Order:</b> NAN9V1AA		<b>Report DB ID:</b> NAN9V1AB						
I129	1.34E-02	U	2.5E-01	2.5E-01	4.66E-01 1.00E+00	pCi/L 1.00E+00	94%	0.03 0.11	3/23/18 10:10 a		2.00025 L	LEP5\$1
<b>Batch:</b> 8073028	RATOT_AEAGEA			<b>Work Order:</b> NAN9T1AA		<b>Report DB ID:</b> NAN9T1AB						
TOTAL ALPHA RA	-1.70E-01	U	1.4E-01	1.4E-01	5.66E-01 1.98E-01	pCi/L 1.00E+00	85%	-0.3 -(2.4)	3/29/18 02:21 p		0.50016 L	GPC24D
<b>Batch:</b> 8073027	SRTOT_SEP_PRECIP_GPC			<b>Work Order:</b> NAN9R1AA		<b>Report DB ID:</b> NAN9R1AB						
STRONTIUM	-2.99E-01	U	6.9E-01	6.9E-01	1.32E+00 5.96E-01	pCi/L 2.00E+00	83%	-0.23 -0.86	3/20/18 09:58 a		0.5002 L	GPC32A
<b>Batch:</b> 8073026	TC99_ETVDSK_LSC			<b>Work Order:</b> NAN9Q1AA		<b>Report DB ID:</b> NAN9Q1AB						
Tc-99	3.36E+00	U	4.6E+00	5.9E+00	1.11E+01 5.22E+00	pCi/L 5.00E+01	100%	0.3 (1.1)	3/19/18 01:40 p		0.12742 L	LSC4

No. of Results: 15      Comments:

**FORM II**  
**LCS RESULTS**

Date: 18-May-18

Lab Name: TestAmerica Inc

SDG: W08027

Matrix: WATER

Report No. : 72693

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: 8073031	C14_LSC					Work Order: NAN9X1AC		Report DB ID: NAN9X1CS					
C-14	4.76E+02		1.7E+01	3.2E+01	1.82E+01	pCi/L	100%	4.81E+02	9.65E+00	99%	3/29/18 11:05 p	0.075	LSC4
							Rec Limits:	80	120	0.0		L	
Batch: 8094017	TRITIUM_DIST_LSC					Work Order: NAP121AC		Report DB ID: NAP121CS					
H-3	2.87E+03		3.7E+02	4.3E+02	6.24E+02	pCi/L	100%	2.76E+03	8.27E+01	104%	4/6/18 10:36 p	0.00502	LSC4
							Rec Limits:	80	120	0.0		L	
Batch: 8136011	TRITIUM_DIST_LSC					Work Order: NARFF1AC		Report DB ID: NARFF1CS					
H-3	2.68E+03		3.2E+02	3.7E+02	5.19E+02	pCi/L	100%	2.77E+03	8.32E+01	97%	5/17/18 05:35 p	0.00502	LSC6
							Rec Limits:	80	120	0.0		L	
Batch: 8073030	GAMMA_GS					Work Order: NAN9W1AC		Report DB ID: NAN9W1CS					
CO-60	3.67E+01		4.2E+00	4.2E+00	4.47E+00	pCi/L		3.68E+01		100%	3/22/18 09:24 a	2.00549	\$GER19
							Rec Limits:	80	120	0.0		L	
CS-137	5.04E+01		7.6E+00	7.6E+00	4.10E+00	pCi/L		4.87E+01		104%	3/22/18 09:24 a	2.00549	\$GER19
							Rec Limits:	80	120	0.0		L	
EU-152	7.93E+01		8.8E+00	8.8E+00	8.67E+00	pCi/L		7.54E+01		105%	3/22/18 09:24 a	2.00549	\$GER19
							Rec Limits:	80	120	0.1		L	
Batch: 8081013	9310_ALPHABETA_GPC					Work Order: NAPLJ1AC		Report DB ID: NAPLJ1CS					
Alpha	2.10E+01		1.6E+00	5.6E+00	6.72E-01	pCi/L	100%	2.25E+01	2.26E-01	93%	3/27/18 01:56 p	0.20038	GPC23A
							Rec Limits:	80	120	-0.1		L	
Batch: 8081014	9310_ALPHABETA_GPC					Work Order: NAPLK1AC		Report DB ID: NAPLK1CS					
Beta	2.24E+01		1.7E+00	3.3E+00	1.57E+00	pCi/L	100%	2.25E+01	1.61E-01	99%	3/27/18 04:52 p	0.20071	GPC27B
							Rec Limits:	80	120	0.0		L	
Batch: 8073029	I129LL_SEP_LEPS_GS					Work Order: NAN9V1AC		Report DB ID: NAN9V1CS					

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

rptSTLRchLcs  
V5.8.5 A2002

## FORM II

Date: 18-May-18

## LCS RESULTS

Lab Name: TestAmerica Inc

SDG: W08027

Matrix: WATER

Report No. : 72693

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
1129	2.27E+01		3.0E+00	3.0E+00	8.91E-01	pCi/L	96%	1.91E+01		119%	3/23/18 11:52 a	2.00254	LEP4\$1
							<b>Rec Limits:</b>	80	120	0.2		L	
<b>Batch:</b> 8073028	RATOT_AEAGEA			<b>Work Order:</b> NAN9T1AC			<b>Report DB ID:</b> NAN9T1CS						
TOTAL ALPHA RA	6.94E+00		1.3E+00	2.3E+00	7.08E-01	pCi/L	77%	6.13E+00	6.26E-02	113%	3/29/18 03:14 p	0.51502	GPC21A
							<b>Rec Limits:</b>	80	120	0.1		L	
<b>Batch:</b> 8073027	SRTOT_SEP_PRECIP_GPC			<b>Work Order:</b> NAN9R1AC			<b>Report DB ID:</b> NAN9R1CS						
STRONTIUM	1.48E+01		1.7E+00	3.8E+00	1.25E+00	pCi/L	83%	1.35E+01	9.59E-02	110%	3/20/18 09:58 a	0.50007	GPC32B
							<b>Rec Limits:</b>	80	120	0.1		L	
<b>Batch:</b> 8073026	TC99_ETVDSK_LSC			<b>Work Order:</b> NAN9Q1AC			<b>Report DB ID:</b> NAN9Q1CS						
Tc-99	1.06E+02		8.1E+00	1.2E+01	1.13E+01	pCi/L	100%	1.08E+02	6.18E-01	98%	3/19/18 02:26 p	0.12502	LSC4
							<b>Rec Limits:</b>	80	120	0.0		L	
<b>No. of Results:</b> 12	<b>Comments:</b>												

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

rptSTLRchLcs  
V5.8.5 A2002

## FORM II

Date: 18-May-18

## MATRIX SPIKE RESULTS

Lab Name: TestAmerica Inc

SDG: W08027

Lot-Sample No.: J8C060405-1, B3HY78

Report No. : 72693

Matrix: WATER

Parameter	SpikeResult, Orig Rst	Qual	Count Error (2 s)	CSU (2 s)	MDC MDA	Rpt Unit	Yield	Rec- overy	Expected, Uncert	Analysis, Prep Date	Aliquot Size	Analy Method, Primary Detector
Batch: 8073031	Work Order: NANXM1AN		Report DB ID: NANXM1NW	Orig Sa DB ID: 9NANXM10								
C-14	4.34E+02		1.9E+01	4.5E+01	1.81E+01	pCi/L	100%	90.37%	4.81E+02	3/29/18 06:42 p	0.075	C14_LSC
	2.15E+02								9.65E+00		L	LSC4
Batch: 8094017	Work Order: NANXM1AV		Report DB ID: NANXM1VW	Orig Sa DB ID: 9NANXM20								
H-3	-1.22E+04	U	1.4E+03	5.1E+03	6.12E+02	pCi/L	100%			4/6/18 07:34 p	0.00503	TRITIUM_DIST_LSC
	9.22E+04										L	LSC4

Number of Results: 2

Comments:

TestAmerica Inc RER - Replicate Error Ratio = (S-D)/[sqrt(sq(TPUs)+sq(TPUd))] as defined by ICPT BOA.  
 rptSTLRchMs Bias - (Result/Expected)-1 as defined by ANSI N13.30.  
 V5.8.5 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: 18-May-18

MATRIX SPIKE RESULTS

Lab Name: TestAmerica Inc

SDG: W08027

Lot-Sample No.: J8C060405-2, B3HY82

Report No. : 72693

Matrix: WATER

Parameter	SpikeResult, Orig Rst	Qual	Count Error (2 s)	CSU (2 s)	MDC MDA	Rpt Unit	Yield	Rec- overy	Expected, Uncert	Analysis, Prep Date	Aliquot Size	Analy Method, Primary Detector
Batch: 8073026	Work Order: NANXN1AN			Report DB ID: NANXN1NW		Orig Sa DB ID: 9NANXN10						
Tc-99	4.88E+02		1.8E+01	4.8E+01	1.12E+01	pCi/L	100%	90.71%	5.38E+02	3/19/18 12:09 p	0.12585	TC99_ETVDSK_LSC
	2.25E+02								3.08E+00		L	LSC4

Number of Results: 1

Comments:

TestAmerica Inc RER - Replicate Error Ratio = (S-D)/[sqrt(sq(TPUs)+sq(TPUd))] as defined by ICPT BOA.  
 rptSTLRchMs Bias - (Result/Expected)-1 as defined by ANSI N13.30.  
 V5.8.5 A2002