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## Data Validation Report for CH2M Hill Plateau Remediation Company

**VSR17-009**  
**Project 100-K**

### Chemical Validation - Level C

Validation Performed By:

*Eyda Hergenreder*  
Eyda Hergenreder

Date: 08-04-2017

Technical Review By:

*Ellen McEntee*  
Ellen McEntee

Date: 08-04-2017

Quality Review By:

*Mary A. Donovan*  
Mary Donovan  
Quality Assurance Manager

Date: 08-10-2017

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Date: 03 August 2017  
 To: CH2M Hill (technical representative)  
 From: Analytical Quality Associates, Inc.  
 Project: 100-K  
 Subject: Semivolatile Organics - Sample Data Group (SDG) DN0171

## **INTRODUCTION**

This memorandum presents the results of data validation for SDG DN0171 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>
B3BLR7	7/05/17	Soil	C	8270D SIM, WTPH-D
B3BLP9	7/05/17	Soil	C	8270D SIM, WTPH-D
B3BLP7	7/05/17	Soil	C	8270D SIM, WTPH-D
B3BLR5	7/05/17	Soil	C	8270D SIM, WTPH-D
B3BLT3	7/05/17	Soil	C	8270D SIM, WTPH-D
B3BLR9	7/05/17	Soil	C	8270D SIM, WTPH-D
B3BLT1	7/05/17	Soil	C	8270D SIM, WTPH-D
B3BLP3	7/05/17	Soil	C	8270D SIM, WTPH-D
B3BLR3	7/05/17	Soil	C	8270D SIM, WTPH-D
B3BLR1	7/05/17	Soil	C	8270D SIM, WTPH-D
B3BLP1	7/05/17	Soil	C	8270D SIM, WTPH-D
B3BLN9	7/05/17	Soil	C	8270D SIM, WTPH-D
B3BLN7	7/05/17	Soil	C	8270D SIM, WTPH-D
B3BLP5	7/05/17	Soil	C	8270D SIM, WTPH-D

Data validation was conducted in accordance with the CHPRC validation statement of work and the 100 Area Remedial Action Sampling and Analysis Plan, DOE/RL-96-22, Rev. 5, (SAP). Appendices 1 through 4 provide the following information as indicated below:

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

## **DATA QUALITY OBJECTIVES**

- **Holding Times and Sample Preservation**

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

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

- **Blanks**

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

### **Laboratory Blanks**

All laboratory blank results were acceptable with the following exception.

For SDG DN0171, the method blank result for diesel was a detect > method detection limit (MDL) but < the reporting limit (RL). All associated diesel sample results were detects > the MDL but < the RL and <20X the blank value; and except for sample B3BLR1 should be qualified as estimates and flagged “J+.”

### **Trip Blanks**

The diesel and kerosene results for trip blank sample B3BLR3 were detects > the RL. The diesel and kerosene results for associated sample B3BLR1 were detects > the MDLs but < the RLs and <20X the blank values. The results should qualified as non-detect and unusable at the sample result (diesel 2300U and kerosene 1600U) and flagged “R.”

### **Field Blanks**

No field blanks were submitted for validation.

### **Equipment Blanks**

No equipment blanks were submitted for validation.

- **Accuracy**

Accuracy is evaluated by reviewing surrogate results, matrix spike sample results, and laboratory control sample results. According to the SAP, the laboratory control sample accuracy limits are 50% to 150% and the matrix spike sample accuracy limits are ones specified by the DV procedure. The limits for reported analytes not listed in the SAP are 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 with the following exceptions.

For SDG DN0171, the MSD recoveries for fluoranthene and pyrene were above the upper acceptance limit. The fluoranthene and pyrene results for samples B3BLR7, B3BLT1, B3BLP3 and B3BLP1 were detects and should be qualified as estimates and flagged "J." All other associated sample results were non-detects and 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, field duplicate sample results and field split sample results. These QC results provide information on the laboratory reproducibility and whether sampling activities are adequate to acquire consistent sample results. According to the SAP, the relative percent difference (RPD) limits are  $\pm 30\%$ .

### **MS/MSD Samples**

All MS/MSD RPD values were acceptable.

### **Field Duplicate Samples**

No field duplicates were submitted for validation.

### **Field Split Samples**

No field splits were submitted for validation.

- **Internal Standards**

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

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

- **Detection Limits**

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

All reported sample MDLs were below the CRDLs.

- **Completeness**

SDG DN0171 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 for 8270D was 100%. The completion percentage for WTPH-D was 92.9%.

### **MAJOR DEFICIENCIES**

A major deficiency leading to qualification of diesel and kerosene for sample B3BLR1 as unusable was due to high trip blank contamination.

### **MINOR DEFICIENCIES**

Minor deficiencies leading to qualification of sample results as estimates were due to high matrix spike recovery and laboratory blank infractions. See the table in Appendix 2 for a listing of all affected sample results.

### **REFERENCES**

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

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

## **Appendix 1**

### **Glossary of Data Reporting Qualifiers**

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

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

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

<b>Semivolatile Organics Data Qualification Summary</b>			
SDG: DN0171	Reviewer: AQA	Project: 100-K	Page 1 of 1
<b>Analyte(s)</b>	<b>Qualifier</b>	<b>Samples Affected</b>	<b>Reason</b>
Fluoranthene, Pyrene	J	B3BLR7, B3BLT1, B3BLP3, B3BLP1,	High matrix spike recovery
Diesel	J+	B3BLR7, B3BLP9, B3BLP7, B3BLR5, B3BLT3, B3BLR9, B3BLT1, B3BLP3, B3BLR3, B3BLP1, B3BLN9, B3BLN7, B3BLP5	Laboratory blank contamination
Diesel	2300UR	B3BLR1	Trip blank contamination >RL
Kerosene	1600UR	B3BLR1	Trip blank contamination >RL

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	<b>C</b>	D	E
PROJECT: 100-K			DATA PACKAGE: VSR17-009		
VALIDATOR: Eyda Hergenreder		LAB: TestAmerica		DATE: 08/03/17	
			SDG: DN0171		
ANALYSES PERFORMED					
SW-846 8260		SW-846 8260 (TCLP)	SW-846 8270 X		SW-846 8270 (TCLP)
SAMPLES/MATRIX Soil					
SDG DN0171: B3BLR7, B3BLP9, B3BLP7, B3BLR5, B3BLT3, B3BLR9, B3BLT1, B3BLP3, B3BLR3, B3BLR1, B3BLP1, B3BLN9, B3BLN7, B3BLP5					

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

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

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## Data Validation for Chemical Analyses

Published Date: 10/03/16

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Effective Date: 10/03/16

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

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

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

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

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

Surrogates/system monitoring compounds analyzed?	<input checked="" type="radio"/> Yes No <input type="radio"/> N/A
Surrogate/system monitoring compound recoveries acceptable?	<input checked="" type="radio"/> Yes No <input type="radio"/> N/A
Surrogates traceable? (Levels D, E)	Yes No <input type="radio"/> N/A
Surrogates expired? (Levels D, E)	Yes No <input type="radio"/> N/A
MS/MSD samples analyzed?	<input checked="" type="radio"/> Yes No <input type="radio"/> N/A
MS/MSD results acceptable?	Yes <input type="radio"/> 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:

SDG DN0171: MSD %R: fluoranthene 151%, pyrene 169%

## Data Validation for Chemical Analyses

Published Date: 10/03/16

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

Comments:

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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

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### 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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**Data Validation for Chemical Analyses**

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

VALIDATION LEVEL:	A	B	<input checked="" type="radio"/> C	D	E
PROJECT: 100-K			DATA PACKAGE: VSR17-009		
VALIDATOR: Eyda Hergenreder		LAB: TestAmerica		DATE: 08/03/17	
			SDG: DN0171		
ANALYSES PERFORMED					
8015	8021	8141	8151	8315	
		WTPH-HCID	WTPH-G	WTPH-D X	
SAMPLES/MATRIX: Soil					
SDG DN0171: B3BLR7, B3BLP9, B3BLP7, B3BLR5, B3BLT3, B3BLR9, B3BLT1, B3BLP3, B3BLR3, B3BLR1, B3BLP1, B3BLN9, B3BLN7, B3BLP5					

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

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

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## Data Validation for Chemical Analyses

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

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

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

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

Comments:

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 MB Diesel 1110 ug/Kg
 

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 Trip Blank sample B3BLR3: diesel 5200 ug/Kg, kerosene 3800 ug/Kg
 

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## Data Validation for Chemical Analyses

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

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

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

Comments:

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**Data Validation for Chemical Analyses**

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

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

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

Comments:

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**6. 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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## Data Validation for Chemical Analyses

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

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

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

Comments:

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#### 8. SAMPLE CLEANUP (Levels D and E)

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

Comments (attach additional sheets as necessary):

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## **Appendix 4**

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

Page 24 of 94  
**QC Sample Results**

Client: CH2M Hill Plateau Remediation Company  
 Project/Site: F17-049

TestAmerica Job ID: 280-98955-1  
 SDG: DN0171

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

**Lab Sample ID: MB 280-380235/1-A**  
**Matrix: Solid**  
**Analysis Batch: 380687**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 380235**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acenaphthene	0.15	U	4.8	0.15	ug/Kg		07/10/17 12:16	07/13/17 13:05	1
Acenaphthylene	0.16	U	4.8	0.16	ug/Kg		07/10/17 12:16	07/13/17 13:05	1
Anthracene	0.69	U	4.8	0.69	ug/Kg		07/10/17 12:16	07/13/17 13:05	1
Benzo[a]anthracene	0.86	U	4.8	0.86	ug/Kg		07/10/17 12:16	07/13/17 13:05	1
Benzo[a]pyrene	0.70	U	4.8	0.70	ug/Kg		07/10/17 12:16	07/13/17 13:05	1
Benzo[b]fluoranthene	1.1	U	4.8	1.1	ug/Kg		07/10/17 12:16	07/13/17 13:05	1
Benzo[g,h,i]perylene	1.0	U	4.8	1.0	ug/Kg		07/10/17 12:16	07/13/17 13:05	1
Benzo[k]fluoranthene	0.95	U	4.8	0.95	ug/Kg		07/10/17 12:16	07/13/17 13:05	1
Chrysene	0.95	U	4.8	0.95	ug/Kg		07/10/17 12:16	07/13/17 13:05	1
Dibenz[a,h]anthracene	1.2	U	4.8	1.2	ug/Kg		07/10/17 12:16	07/13/17 13:05	1
Fluoranthene	0.95	U	4.8	0.95	ug/Kg		07/10/17 12:16	07/13/17 13:05	1
Fluorene	0.45	U	4.8	0.45	ug/Kg		07/10/17 12:16	07/13/17 13:05	1
Indeno[1,2,3-cd]pyrene	1.0	U	4.8	1.0	ug/Kg		07/10/17 12:16	07/13/17 13:05	1
Naphthalene	0.31	U	4.8	0.31	ug/Kg		07/10/17 12:16	07/13/17 13:05	1
Phenanthrene	1.0	U	4.8	1.0	ug/Kg		07/10/17 12:16	07/13/17 13:05	1
Pyrene	1.0	U	4.8	1.0	ug/Kg		07/10/17 12:16	07/13/17 13:05	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
2-Fluorobiphenyl	77		39 - 120	07/10/17 12:16	07/13/17 13:05	1
Nitrobenzene-d5	65		42 - 120	07/10/17 12:16	07/13/17 13:05	1
Terphenyl-d14	83		35 - 124	07/10/17 12:16	07/13/17 13:05	1

**Lab Sample ID: LCS 280-380235/2-A**  
**Matrix: Solid**  
**Analysis Batch: 380687**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 380235**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Acenaphthene	29.5	23.0		ug/Kg		78	35 - 130
Acenaphthylene	29.5	21.4		ug/Kg		72	41 - 130
Anthracene	29.5	23.2		ug/Kg		79	43 - 130
Benzo[a]anthracene	29.5	24.2		ug/Kg		82	36 - 130
Benzo[a]pyrene	29.5	25.0		ug/Kg		85	20 - 130
Benzo[b]fluoranthene	29.5	25.3		ug/Kg		86	37 - 130
Benzo[g,h,i]perylene	29.5	27.1		ug/Kg		92	20 - 130
Benzo[k]fluoranthene	29.5	26.9		ug/Kg		91	46 - 130
Chrysene	29.5	26.8		ug/Kg		91	34 - 130
Dibenz[a,h]anthracene	29.5	27.7		ug/Kg		94	20 - 130
Fluoranthene	29.5	21.8		ug/Kg		74	45 - 130
Fluorene	29.5	20.9		ug/Kg		71	44 - 130
Indeno[1,2,3-cd]pyrene	29.5	26.0		ug/Kg		88	20 - 130
Naphthalene	29.5	27.2		ug/Kg		92	44 - 130
Phenanthrene	29.5	24.6		ug/Kg		83	44 - 130
Pyrene	29.5	23.4		ug/Kg		79	43 - 130

Surrogate	LCS %Recovery	LCS Qualifier	Limits
2-Fluorobiphenyl	78		39 - 120
Nitrobenzene-d5	66		42 - 120

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**QC Sample Results**

Client: CH2M Hill Plateau Remediation Company  
 Project/Site: F17-049

TestAmerica Job ID: 280-98955-1  
 SDG: DN0171

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

Lab Sample ID: LCS 280-380235/2-A  
 Matrix: Solid  
 Analysis Batch: 380687

Client Sample ID: Lab Control Sample  
 Prep Type: Total/NA  
 Prep Batch: 380235

Surrogate	LCS %Recovery	LCS Qualifier	Limits
Terphenyl-d14	78		35 - 124

Lab Sample ID: 280-98955-1 MS  
 Matrix: Soil  
 Analysis Batch: 380687

Client Sample ID: B3BLR7  
 Prep Type: Total/NA  
 Prep Batch: 380235

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Acenaphthene	0.16	U	30.1	22.4		ug/Kg	☼	74	35 - 120
Acenaphthylene	0.17	U	30.1	20.0		ug/Kg	☼	66	41 - 120
Anthracene	1.0	J	30.1	25.4		ug/Kg	☼	81	43 - 120
Benzo[a]anthracene	12	T	30.1	39.7		ug/Kg	☼	91	36 - 120
Benzo[a]pyrene	11		30.1	38.7		ug/Kg	☼	93	20 - 120
Benzo[b]fluoranthene	19		30.1	43.2		ug/Kg	☼	81	37 - 120
Benzo[g,h,i]perylene	10		30.1	33.2		ug/Kg	☼	77	20 - 123
Benzo[k]fluoranthene	8.1		30.1	36.5		ug/Kg	☼	94	46 - 120
Chrysene	21	T	30.1	49.9		ug/Kg	☼	97	34 - 120
Dibenz[a,h]anthracene	3.5	J	30.1	29.1		ug/Kg	☼	85	20 - 120
Fluoranthene	20	T	30.1	53.9		ug/Kg	☼	111	45 - 120
Fluorene	0.46	U	30.1	20.8		ug/Kg	☼	69	44 - 120
Indeno[1,2,3-cd]pyrene	11		30.1	32.6		ug/Kg	☼	72	20 - 127
Naphthalene	0.32	U	30.1	25.7		ug/Kg	☼	85	44 - 120
Phenanthrene	8.0	T	30.1	46.5	T	ug/Kg	☼	128	44 - 120
Pyrene	21	T	30.1	53.9		ug/Kg	☼	110	43 - 120

Surrogate	MS %Recovery	MS Qualifier	Limits
2-Fluorobiphenyl	73		39 - 120
Nitrobenzene-d5	60		42 - 120
Terphenyl-d14	76		35 - 124

Lab Sample ID: 280-98955-1 MSD  
 Matrix: Soil  
 Analysis Batch: 380687

Client Sample ID: B3BLR7  
 Prep Type: Total/NA  
 Prep Batch: 380235

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	RPD Limit
Acenaphthene	0.16	U	29.5	21.5		ug/Kg	☼	73	35 - 120	4	50
Acenaphthylene	0.17	U	29.5	19.6		ug/Kg	☼	67	41 - 120	2	50
Anthracene	1.0	J	29.5	24.0		ug/Kg	☼	78	43 - 120	6	50
Benzo[a]anthracene	12	T	29.5	50.4	T	ug/Kg	☼	129	36 - 120	24	40
Benzo[a]pyrene	11		29.5	45.7		ug/Kg	☼	118	20 - 120	17	30
Benzo[b]fluoranthene	19		29.5	49.2		ug/Kg	☼	103	37 - 120	13	30
Benzo[g,h,i]perylene	10		29.5	31.9		ug/Kg	☼	74	20 - 123	4	30
Benzo[k]fluoranthene	8.1		29.5	41.1		ug/Kg	☼	112	46 - 120	12	30
Chrysene	21	T	29.5	61.5	T	ug/Kg	☼	138	34 - 120	21	41
Dibenz[a,h]anthracene	3.5	J	29.5	27.4		ug/Kg	☼	81	20 - 120	6	30
Fluoranthene	20	T	29.5	64.9	T	ug/Kg	☼	151	45 - 120	19	30
Fluorene	0.46	U	29.5	19.9		ug/Kg	☼	68	44 - 120	4	50
Indeno[1,2,3-cd]pyrene	11		29.5	41.0		ug/Kg	☼	101	20 - 127	23	50
Naphthalene	0.32	U	29.5	25.9		ug/Kg	☼	88	44 - 120	1	50

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**QC Sample Results**

Client: CH2M Hill Plateau Remediation Company  
 Project/Site: F17-049

TestAmerica Job ID: 280-98955-1  
 SDG: DN0171

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

Lab Sample ID: 280-98955-1 MSD  
 Matrix: Soil  
 Analysis Batch: 380687

Client Sample ID: B3BLR7  
 Prep Type: Total/NA  
 Prep Batch: 380235

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Phenanthrene	8.0	T	29.5	38.0		ug/Kg	*	102	44 - 120	20	42
Pyrene	21	T	29.5	70.8	T	ug/Kg	*	169	43 - 120	27	30
Surrogate	MSD %Recovery	MSD Qualifier	Limits								
2-Fluorobiphenyl	70		39 - 120								
Nitrobenzene-d5	60		42 - 120								
Terphenyl-d14	74		35 - 124								

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

Lab Sample ID: MB 280-380348/1-A  
 Matrix: Solid  
 Analysis Batch: 380695

Client Sample ID: Method Blank  
 Prep Type: Total/NA  
 Prep Batch: 380348

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
4,4'-DDD	0.52	U	1.6	0.52	ug/Kg		07/11/17 10:57	07/13/17 16:29	1
4,4'-DDE	0.22	U	1.6	0.22	ug/Kg		07/11/17 10:57	07/13/17 16:29	1
4,4'-DDT	0.56	U	1.6	0.56	ug/Kg		07/11/17 10:57	07/13/17 16:29	1
Aldrin	0.24	U	1.6	0.24	ug/Kg		07/11/17 10:57	07/13/17 16:29	1
alpha-BHC	0.20	U	1.6	0.20	ug/Kg		07/11/17 10:57	07/13/17 16:29	1
beta-BHC	0.63	U	1.6	0.63	ug/Kg		07/11/17 10:57	07/13/17 16:29	1
delta-BHC	0.38	U	1.6	0.38	ug/Kg		07/11/17 10:57	07/13/17 16:29	1
Dieldrin	0.20	U	1.6	0.20	ug/Kg		07/11/17 10:57	07/13/17 16:29	1
Endosulfan I	0.17	U	1.6	0.17	ug/Kg		07/11/17 10:57	07/13/17 16:29	1
Endosulfan II	0.27	U	1.6	0.27	ug/Kg		07/11/17 10:57	07/13/17 16:29	1
Endosulfan sulfate	0.26	U	1.6	0.26	ug/Kg		07/11/17 10:57	07/13/17 16:29	1
Endrin	0.29	U	1.6	0.29	ug/Kg		07/11/17 10:57	07/13/17 16:29	1
Endrin aldehyde	0.16	U	1.6	0.16	ug/Kg		07/11/17 10:57	07/13/17 16:29	1
gamma-BHC (Lindane)	0.44	U	1.6	0.44	ug/Kg		07/11/17 10:57	07/13/17 16:29	1
Heptachlor epoxide	0.40	U	1.6	0.40	ug/Kg		07/11/17 10:57	07/13/17 16:29	1
Methoxychlor	0.42	U	3.1	0.42	ug/Kg		07/11/17 10:57	07/13/17 16:29	1
Toxaphene	15	U	63	15	ug/Kg		07/11/17 10:57	07/13/17 16:29	1
Surrogate	MB %Recovery	MB Qualifier	Limits			Prepared	Analyzed	Dil Fac	
Decachlorobiphenyl	101		63 - 124			07/11/17 10:57	07/13/17 16:29	1	
Tetrachloro-m-xylene	102		59 - 115			07/11/17 10:57	07/13/17 16:29	1	

Lab Sample ID: LCS 280-380348/2-A  
 Matrix: Solid  
 Analysis Batch: 380695

Client Sample ID: Lab Control Sample  
 Prep Type: Total/NA  
 Prep Batch: 380348

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
4,4'-DDD	16.3	15.8		ug/Kg		97	69 - 130
4,4'-DDE	16.3	15.3		ug/Kg		94	70 - 130
4,4'-DDT	16.3	15.1		ug/Kg		93	67 - 130
Aldrin	16.3	15.0		ug/Kg		92	69 - 130
alpha-BHC	16.3	15.2		ug/Kg		93	65 - 130

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**Surrogate Summary**

Client: CH2M Hill Plateau Remediation Company  
Project/Site: F17-049

TestAmerica Job ID: 280-98955-1  
SDG: DN0171

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

Matrix: Soil

Prep Type: Total/NA

Lab Sample ID	Client Sample ID	Percent Surrogate Recovery (Acceptance Limits)		
		FBP (39-120)	NBZ (42-120)	TPH (35-124)
280-98955-1	B3BLR7	64	49	73
280-98955-1 MS	B3BLR7	73	60	76
280-98955-1 MSD	B3BLR7	70	60	74
280-98955-2	B3BLP9	65	55	62
280-98955-3	B3BLP7	60	52	54
280-98955-4	B3BLR5	65	54	64
280-98955-5	B3BLT3	58	50	63
280-98955-6	B3BLR9	74	60	90
280-98955-7	B3BLT1	56	48	56
280-98955-8	B3BLP3	63	53	71
280-98955-9	B3BLR3	82	70	106
280-98955-10	B3BLR1	61	50	66
280-98955-11	B3BLP1	57	49	62
280-98955-12	B3BLN9	62	52	61
280-98955-13	B3BLN7	59	49	67
280-98955-14	B3BLP5	58	45	68

**Surrogate Legend**

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

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

Matrix: Solid

Prep Type: Total/NA

Lab Sample ID	Client Sample ID	Percent Surrogate Recovery (Acceptance Limits)		
		FBP (39-120)	NBZ (42-120)	TPH (35-124)
LCS 280-380235/2-A	Lab Control Sample	78	66	78
MB 280-380235/1-A	Method Blank	77	65	83

**Surrogate Legend**

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

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

Matrix: Soil

Prep Type: Total/NA

Lab Sample ID	Client Sample ID	Percent Surrogate Recovery (Acceptance Limits)	
		DCB1 (63-124)	TCX1 (59-115)
280-98955-1	B3BLR7	84	95
280-98955-2	B3BLP9	130 X	97
280-98955-3	B3BLP7	87	90
280-98955-3 MS	B3BLP7	89	91
280-98955-3 MSD	B3BLP7	88	91
280-98955-4	B3BLR5	95	95
280-98955-5	B3BLT3	93	94
280-98955-6	B3BLR9	96	96

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**QC Sample Results**

Client: CH2M Hill Plateau Remediation Company  
Project/Site: F17-049

TestAmerica Job ID: 280-98955-1  
SDG: DN0171

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

Lab Sample ID: 280-98955-3 MSD  
Matrix: Soil  
Analysis Batch: 380695

Client Sample ID: B3BLP7  
Prep Type: Total/NA  
Prep Batch: 380348

Analyte	Sample	Sample	Spike	MSD	MSD	Unit	D	%Rec	%Rec.	RPD	Limit
	Result	Qualifier	Added	Result	Qualifier				Limits		
4,4'-DDE	0.24	U	16.4	14.3		ug/Kg	*	88	71 - 116	4	30
4,4'-DDT	0.59	U	16.4	15.2		ug/Kg	*	93	67 - 132	3	30
Aldrin	0.25	U	16.4	14.1		ug/Kg	*	86	69 - 116	5	50
alpha-BHC	0.21	U	16.4	14.2		ug/Kg	*	87	65 - 122	5	30
beta-BHC	0.66	U	16.4	14.5		ug/Kg	*	89	62 - 121	6	30
delta-BHC	0.40	U	16.4	14.2		ug/Kg	*	87	67 - 122	5	30
Dieldrin	0.21	U	16.4	14.7		ug/Kg	*	90	71 - 120	4	30
Endosulfan I	0.18	U	16.4	14.3		ug/Kg	*	87	67 - 115	5	30
Endosulfan II	0.29	U	16.4	13.6		ug/Kg	*	83	69 - 120	3	30
Endosulfan sulfate	0.28	U	16.4	13.7		ug/Kg	*	84	69 - 126	0	30
Endrin	0.31	U	16.4	14.6		ug/Kg	*	89	69 - 129	4	30
Endrin aldehyde	0.17	U	16.4	12.6		ug/Kg	*	77	41 - 128	0	30
gamma-BHC (Lindane)	0.46	U	16.4	14.5		ug/Kg	*	88	66 - 120	5	30
Heptachlor epoxide	0.43	U	16.4	14.6		ug/Kg	*	89	71 - 119	4	30
Methoxychlor	0.45	U	16.4	13.7		ug/Kg	*	84	65 - 139	5	30
<b>Surrogate</b>	<b>MSD</b>	<b>MSD</b>	<b>Limits</b>								
	<b>%Recovery</b>	<b>Qualifier</b>									
Decachlorobiphenyl	88		63 - 124								
Tetrachloro-m-xylene	91		59 - 115								

**Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)**

Lab Sample ID: MB 280-380234/1-A  
Matrix: Solid  
Analysis Batch: 380574

Client Sample ID: Method Blank  
Prep Type: Total/NA  
Prep Batch: 380234

Analyte	MB	MB	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac	
	Result	Qualifier								
Diesel (C10-C28)	1110	J	3700	630	ug/Kg		07/10/17 12:15	07/12/17 17:20	1	
Kerosene (C8-C12)	920	U	3700	920	ug/Kg		07/10/17 12:15	07/12/17 17:20	1	
<b>Surrogate</b>	<b>MB</b>	<b>MB</b>	<b>Limits</b>							
	<b>%Recovery</b>	<b>Qualifier</b>								
o-Terphenyl	82		49 - 140							
				<b>Prepared</b>	<b>Analyzed</b>	<b>Dil Fac</b>				
				07/10/17 12:15	07/12/17 17:20	1				

Lab Sample ID: LCS 280-380234/2-A  
Matrix: Solid  
Analysis Batch: 380574

Client Sample ID: Lab Control Sample  
Prep Type: Total/NA  
Prep Batch: 380234

Analyte	Spike	LCS	LCS	Unit	D	%Rec	%Rec.
		Result	Qualifier				Limits
Diesel (C10-C28)	62500	56700		ug/Kg		91	53 - 130
<b>Surrogate</b>	<b>LCS</b>	<b>LCS</b>	<b>Limits</b>				
	<b>%Recovery</b>	<b>Qualifier</b>					
o-Terphenyl	100		49 - 140				

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**QC Sample Results**

Client: CH2M Hill Plateau Remediation Company  
 Project/Site: F17-049

TestAmerica Job ID: 280-98955-1  
 SDG: DN0171

**Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC) (Continued)**

**Lab Sample ID: LCS 280-380234/3-A**  
**Matrix: Solid**  
**Analysis Batch: 380574**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 380234**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Kerosene (C8-C12)	30500	20600		ug/Kg		68	56 - 130
<b>Surrogate</b>	<b>%Recovery</b>	<b>LCS Qualifier</b>	<b>Limits</b>				
<i>o</i> -Terphenyl	93		49 - 140				

**Lab Sample ID: 280-98955-2 MS**  
**Matrix: Soil**  
**Analysis Batch: 380574**

**Client Sample ID: B3BLP9**  
**Prep Type: Total/NA**  
**Prep Batch: 380234**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Diesel (C10-C28)	2700	J B	61800	52900		ug/Kg	☒	81	56 - 130
<b>Surrogate</b>	<b>%Recovery</b>	<b>MS Qualifier</b>	<b>Limits</b>						
<i>o</i> -Terphenyl	96		49 - 140						

**Lab Sample ID: 280-98955-2 MS**  
**Matrix: Soil**  
**Analysis Batch: 380574**

**Client Sample ID: B3BLP9**  
**Prep Type: Total/NA**  
**Prep Batch: 380234**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Kerosene (C8-C12)	1400	J	33800	23900		ug/Kg	☒	67	56 - 130
<b>Surrogate</b>	<b>%Recovery</b>	<b>MS Qualifier</b>	<b>Limits</b>						
<i>o</i> -Terphenyl	103		49 - 140						

**Lab Sample ID: 280-98955-2 MSD**  
**Matrix: Soil**  
**Analysis Batch: 380574**

**Client Sample ID: B3BLP9**  
**Prep Type: Total/NA**  
**Prep Batch: 380234**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Diesel (C10-C28)	2700	J B	65200	53200		ug/Kg	☒	78	56 - 130	1	30
<b>Surrogate</b>	<b>%Recovery</b>	<b>MSD Qualifier</b>	<b>Limits</b>								
<i>o</i> -Terphenyl	98		49 - 140								

**Lab Sample ID: 280-98955-2 MSD**  
**Matrix: Soil**  
**Analysis Batch: 380574**

**Client Sample ID: B3BLP9**  
**Prep Type: Total/NA**  
**Prep Batch: 380234**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Kerosene (C8-C12)	1400	J	32600	25500		ug/Kg	☒	74	56 - 130	6	30
<b>Surrogate</b>	<b>%Recovery</b>	<b>MSD Qualifier</b>	<b>Limits</b>								
<i>o</i> -Terphenyl	97		49 - 140								

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**Surrogate Summary**

Client: CH2M Hill Plateau Remediation Company  
Project/Site: F17-049

TestAmerica Job ID: 280-98955-1  
SDG: DN0171

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

**Matrix: Soil**

**Prep Type: Total/NA**

Percent Surrogate Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	DCB1 (63-124)	TCX1 (59-115)
280-98955-7	B3BLT1	96	91
280-98955-8	B3BLP3	101	96
280-98955-9	B3BLR3	96	100
280-98955-10	B3BLR1	91	94
280-98955-11	B3BLP1	94	96
280-98955-12	B3BLN9	92	93
280-98955-13	B3BLN7	95	96
280-98955-14	B3BLP5	92	93

**Surrogate Legend**

DCB = Decachlorobiphenyl  
TCX = Tetrachloro-m-xylene

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

**Matrix: Solid**

**Prep Type: Total/NA**

Percent Surrogate Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	DCB1 (63-124)	TCX1 (59-115)
LCS 280-380348/2-A	Lab Control Sample	97	100
MB 280-380348/1-A	Method Blank	101	102

**Surrogate Legend**

DCB = Decachlorobiphenyl  
TCX = Tetrachloro-m-xylene

**Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)**

**Matrix: Soil**

**Prep Type: Total/NA**

Percent Surrogate Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	OTPH (49-140)
280-98955-1	B3BLR7	85
280-98955-2	B3BLP9	96
280-98955-2 MS	B3BLP9	96
280-98955-2 MS	B3BLP9	103
280-98955-2 MSD	B3BLP9	98
280-98955-2 MSD	B3BLP9	97
280-98955-3	B3BLP7	94
280-98955-4	B3BLR5	94
280-98955-5	B3BLT3	96
280-98955-6	B3BLR9	93
280-98955-7	B3BLT1	98
280-98955-8	B3BLP3	98
280-98955-9	B3BLR3	94
280-98955-10	B3BLR1	92
280-98955-11	B3BLP1	96
280-98955-12	B3BLN9	95
280-98955-13	B3BLN7	96
280-98955-14	B3BLP5	99

TestAmerica Denver

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**Surrogate Summary**

Client: CH2M Hill Plateau Remediation Company  
Project/Site: F17-049

TestAmerica Job ID: 280-98955-1  
SDG: DN0171

**Surrogate Legend**  
OTPH = o-Terphenyl

**Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)**  
**Matrix: Solid**

**Prep Type: Total/NA**

**Percent Surrogate Recovery (Acceptance Limits)**

Lab Sample ID	Client Sample ID	OTPH (49-140)
LCS 280-380234/2-A	Lab Control Sample	100
LCS 280-380234/3-A	Lab Control Sample	93
MB 280-380234/1-A	Method Blank	82

**Surrogate Legend**  
OTPH = o-Terphenyl



Date: 03 August 2017  
 To: CH2M Hill (technical representative)  
 From: Analytical Quality Associates, Inc.  
 Project: 100-K  
 Subject: Pesticides - Sample Data Group (SDG) DN0171

## **INTRODUCTION**

This memorandum presents the results of data validation for SDG DN0171 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 Method</b>
B3BLR7	7/05/17	Soil	C	8081B
B3BLP9	7/05/17	Soil	C	8081B
B3BLP7	7/05/17	Soil	C	8081B
B3BLR5	7/05/17	Soil	C	8081B
B3BLT3	7/05/17	Soil	C	8081B
B3BLR9	7/05/17	Soil	C	8081B
B3BLT1	7/05/17	Soil	C	8081B
B3BLP3	7/05/17	Soil	C	8081B
B3BLR3	7/05/17	Soil	C	8081B
B3BLR1	7/05/17	Soil	C	8081B
B3BLP1	7/05/17	Soil	C	8081B
B3BLN9	7/05/17	Soil	C	8081B
B3BLN7	7/05/17	Soil	C	8081B
B3BLP5	7/05/17	Soil	C	8081B

Data validation was conducted in accordance with the CHPRC validation statement of work and the 100 Area Remedial Action Sampling and Analysis Plan, DOE/RL-96-22, Rev. 5 (SAP). Appendices 1 through 4 provide the following information as indicated below:

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

## **DATA QUALITY OBJECTIVES**

- **Holding Times and Sample Preservation**

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

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

- **Blanks**

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

**Laboratory Blanks**

All laboratory blank results were acceptable.

**Trip Blanks**

All trip blank results were acceptable.

**Field Blanks**

No field blanks were submitted for validation.

**Equipment Blanks**

No equipment blanks were submitted for validation.

- **Accuracy**

Accuracy is evaluated by reviewing surrogate results, matrix spike sample results, and laboratory control sample results. According to the SAP, the laboratory control sample accuracy limits are 50% to 150% and the matrix spike sample accuracy limits are ones specified by the DV procedure. The limits for reported analytes not listed in the SAP are specified by the DV procedure.

**Surrogates**

All surrogate recoveries were acceptable with the following exception.

For SDG DN0171, the decachlorobiphenyl surrogate recovery for sample B3BLP9 was above the upper acceptance limit. All sample results were non-detects and should not be qualified as a result.

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

All MS/MSD recoveries were acceptable.

It should be noted that MS/MSD analyses was not performed for multi-component analyte toxaphene. Sample data was not qualified as a result.

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

All LCS recoveries were acceptable.

It should be noted that LCS analysis was not performed for multi-component analyte toxaphene. Sample data was not qualified as a result.

- **Precision**

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

### **MS/MSD Samples**

All MS/MSD RPD were acceptable.

### **Field Duplicate Samples**

No field duplicates were submitted for validation.

### **Field Split Samples**

No field splits were submitted for validation.

- **Detection Limits**

Reported 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 DN0171 was submitted for validation and verified for completeness. Completeness is based on the percentage of data determined to be valid (i.e., not rejected). The completion percentage was 100%.

### **MAJOR DEFICIENCIES**

None found.

### **MINOR DEFICIENCIES**

None found.

**REFERENCES**

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

DOE/RL-96-22, Rev. 1, *100 Area Remedial Action Sampling and Analysis Plan*, September 2009.

## **Appendix 1**

### **Glossary of Data Reporting Qualifiers**

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

- **U** — The constituent was analyzed for, but was not detected. The data should be considered usable for decision-making purposes.
- **UJ** — The constituent was analyzed for and was not detected. Due to a quality control deficiency identified during data validation the value reported may not accurately reflect the RL. The data should be considered usable for decision-making purposes.
- **J** — Indicates the constituent was analyzed for and detected. The associated value is estimated due to a quality control deficiency identified during data validation. The data should be considered usable for decision-making purposes.
- **J+** — Indicates the constituent was analyzed for and detected. The associated value is estimated with a suspected positive bias due to a quality control deficiency identified during data validation. The data should be considered usable for decision-making purposes.
- **J-** — Indicates the constituent was analyzed for and detected. The associated value is estimated with a suspected negative bias due to a quality control deficiency identified during data validation. The data should be considered usable for decision-making purposes.
- **N** — The analysis indicates the presence of an analyte that has been tentatively identified.
- **NJ** — The analysis indicates the presence of an analyte that has been tentatively identified and the associated numerical value represents its approximate concentration.
- **NJ+** — The analysis indicates the presence of an analyte that has been tentatively identified. The associated value is estimated with a suspected positive bias due to a quality control deficiency identified during data validation.
- **NJ-** — The analysis indicates the presence of an analyte that has been tentatively identified. The associated value is estimated with a suspected negative bias due to a quality control deficiency identified during data validation.
- **C** — This qualifier applies to pesticide and Aroclor results when the identification has been confirmed by Gas Chromatograph/Mass Spectrometer (GC/MS).
- **X** — This qualifier applies to pesticide and Aroclor results when GC/MS analysis was attempted but was unsuccessful. The data should be considered unusable for decision-making purposes.
- **UR** — Indicates the constituent was analyzed for and not detected; however, due to an identified quality control deficiency the data should be considered unusable for decision-making purposes.

- **R** — Indicates the constituent was analyzed for and detected; however, due to an identified quality control deficiency the data should be considered unusable for decision-making purposes.

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

<b>Pesticides Data Qualification Summary</b>			
SDG: DN0171	Reviewer: AQA	Project: 100-K	Page 1 of 1
<b>Analyte(s)</b>	<b>Qualifier</b>	<b>Samples Affected</b>	<b>Reason</b>
Pesticides	None	N/A	N/A

Comments: None

## **Appendix 3**

### **Data Validation Supporting Documentation**

**Data Validation for Chemical Analyses**

Published Date: 10/03/16

SGRP-GD-SMP-50117

Effective Date: 10/03/16

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

VALIDATION LEVEL:	A	B	<b>C</b>	D	E
PROJECT: 100-K			DATA PACKAGE: VSR17-009		
VALIDATOR: Eyda Hergenreder		LAB: TestAmerica		DATE: 08/03/17	
			SDG: DN0171		
ANALYSES PERFORMED					
SW-846 8081 X	SW-846 8081 (TCLP)	SW-846 8082	SW-846 8082 (TCLP)		
SAMPLES/MATRIX Soil					
SDG DN0171: B3BLR7, B3BLP9, B3BLP7, B3BLR5, B3BLT3, B3BLR9, B3BLT1, B3BLP3, B3BLR3, B3BLR1, B3BLP1, B3BLN9, B3BLN7, B3BLP5,					

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

Technical verification documentation present?	Yes <input type="radio"/> <b>No</b> <input checked="" type="radio"/> 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 acceptable?	Yes No <input type="radio"/> N/A
Continuing calibrations acceptable?	Yes No <input type="radio"/> N/A
Standards traceable?	Yes No <input type="radio"/> N/A
Standards expired?	Yes No <input type="radio"/> N/A
Calculation check acceptable?	Yes No <input type="radio"/> N/A
DDT and endrin breakdowns acceptable?	Yes No <input type="radio"/> N/A

Comments:

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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 analyzed?	<input checked="" type="radio"/> Yes No <input type="radio"/> N/A
Surrogate recoveries acceptable?	Yes <input type="radio"/> No <input checked="" type="radio"/> N/A
Surrogates traceable? (Levels D, E)	Yes No <input checked="" type="radio"/> N/A
Surrogates expired? (Levels D, E)	Yes No <input checked="" 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 checked="" type="radio"/> N/A
MS/MSD 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 DN0171: Sample B3BLP9 surrogate DCB1 130%

## Data Validation for Chemical Analyses

Published Date: 10/03/16

SGRP-GD-SMP-50117

Effective Date: 10/03/16

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

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

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

Comments:

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

Chromatographic performance acceptable?	Yes No <input checked="" type="radio"/> N/A
Positive results resolved acceptably?	Yes No <input checked="" 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
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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**Data Validation for Chemical Analyses**

Published Date: 10/03/16

SGRP-GD-SMP-50117

Effective Date: 10/03/16

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

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

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

Comments (attach additional sheets as necessary):

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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: F17-049

TestAmerica Job ID: 280-98955-1  
 SDG: DN0171

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

Lab Sample ID: 280-98955-1 MSD  
 Matrix: Soil  
 Analysis Batch: 380687

Client Sample ID: B3BLR7  
 Prep Type: Total/NA  
 Prep Batch: 380235

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Phenanthrene	8.0	T	29.5	38.0		ug/Kg	*	102	44 - 120	20	42
Pyrene	21	T	29.5	70.8	T	ug/Kg	*	169	43 - 120	27	30
<b>Surrogate</b>	<b>%Recovery</b>	<b>MSD Qualifier</b>	<b>Limits</b>								
2-Fluorobiphenyl	70		39 - 120								
Nitrobenzene-d5	60		42 - 120								
Terphenyl-d14	74		35 - 124								

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

Lab Sample ID: MB 280-380348/1-A  
 Matrix: Solid  
 Analysis Batch: 380695

Client Sample ID: Method Blank  
 Prep Type: Total/NA  
 Prep Batch: 380348

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
4,4'-DDD	0.52	U	1.6	0.52	ug/Kg		07/11/17 10:57	07/13/17 16:29	1
4,4'-DDE	0.22	U	1.6	0.22	ug/Kg		07/11/17 10:57	07/13/17 16:29	1
4,4'-DDT	0.56	U	1.6	0.56	ug/Kg		07/11/17 10:57	07/13/17 16:29	1
Aldrin	0.24	U	1.6	0.24	ug/Kg		07/11/17 10:57	07/13/17 16:29	1
alpha-BHC	0.20	U	1.6	0.20	ug/Kg		07/11/17 10:57	07/13/17 16:29	1
beta-BHC	0.63	U	1.6	0.63	ug/Kg		07/11/17 10:57	07/13/17 16:29	1
delta-BHC	0.38	U	1.6	0.38	ug/Kg		07/11/17 10:57	07/13/17 16:29	1
Dieldrin	0.20	U	1.6	0.20	ug/Kg		07/11/17 10:57	07/13/17 16:29	1
Endosulfan I	0.17	U	1.6	0.17	ug/Kg		07/11/17 10:57	07/13/17 16:29	1
Endosulfan II	0.27	U	1.6	0.27	ug/Kg		07/11/17 10:57	07/13/17 16:29	1
Endosulfan sulfate	0.26	U	1.6	0.26	ug/Kg		07/11/17 10:57	07/13/17 16:29	1
Endrin	0.29	U	1.6	0.29	ug/Kg		07/11/17 10:57	07/13/17 16:29	1
Endrin aldehyde	0.16	U	1.6	0.16	ug/Kg		07/11/17 10:57	07/13/17 16:29	1
gamma-BHC (Lindane)	0.44	U	1.6	0.44	ug/Kg		07/11/17 10:57	07/13/17 16:29	1
Heptachlor epoxide	0.40	U	1.6	0.40	ug/Kg		07/11/17 10:57	07/13/17 16:29	1
Methoxychlor	0.42	U	3.1	0.42	ug/Kg		07/11/17 10:57	07/13/17 16:29	1
Toxaphene	15	U	63	15	ug/Kg		07/11/17 10:57	07/13/17 16:29	1
<b>Surrogate</b>	<b>%Recovery</b>	<b>MB Qualifier</b>	<b>Limits</b>				<b>Prepared</b>	<b>Analyzed</b>	<b>Dil Fac</b>
Decachlorobiphenyl	101		63 - 124				07/11/17 10:57	07/13/17 16:29	1
Tetrachloro-m-xylene	102		59 - 115				07/11/17 10:57	07/13/17 16:29	1

Lab Sample ID: LCS 280-380348/2-A  
 Matrix: Solid  
 Analysis Batch: 380695

Client Sample ID: Lab Control Sample  
 Prep Type: Total/NA  
 Prep Batch: 380348

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
4,4'-DDD	16.3	15.8		ug/Kg		97	69 - 130
4,4'-DDE	16.3	15.3		ug/Kg		94	70 - 130
4,4'-DDT	16.3	15.1		ug/Kg		93	67 - 130
Aldrin	16.3	15.0		ug/Kg		92	69 - 130
alpha-BHC	16.3	15.2		ug/Kg		93	65 - 130

TestAmerica Denver

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**QC Sample Results**

Client: CH2M Hill Plateau Remediation Company  
 Project/Site: F17-049

TestAmerica Job ID: 280-98955-1  
 SDG: DN0171

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

**Lab Sample ID: LCS 280-380348/2-A**  
**Matrix: Solid**  
**Analysis Batch: 380695**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 380348**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits	
beta-BHC	16.3	15.5		ug/Kg		95	62 - 130	
delta-BHC	16.3	15.3		ug/Kg		94	67 - 130	
Dieldrin	16.3	15.7		ug/Kg		97	70 - 130	
Endosulfan I	16.3	15.3		ug/Kg		94	67 - 130	
Endosulfan II	16.3	14.8		ug/Kg		91	69 - 130	
Endosulfan sulfate	16.3	15.3		ug/Kg		94	69 - 130	
Endrin	16.3	15.6		ug/Kg		96	69 - 130	
Endrin aldehyde	16.3	14.0		ug/Kg		86	41 - 130	
gamma-BHC (Lindane)	16.3	15.4		ug/Kg		94	66 - 130	
Heptachlor epoxide	16.3	15.4		ug/Kg		95	70 - 130	
Methoxychlor	16.3	14.5		ug/Kg		89	65 - 130	
<b>LCS LCS</b>								
<b>Surrogate</b>	<b>%Recovery</b>	<b>Qualifier</b>	<b>Limits</b>					
Decachlorobiphenyl	97		63 - 124					
Tetrachloro-m-xylene	100		59 - 115					

**Lab Sample ID: 280-98955-3 MS**  
**Matrix: Soil**  
**Analysis Batch: 380695**

**Client Sample ID: B3BLP7**  
**Prep Type: Total/NA**  
**Prep Batch: 380348**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits	
4,4'-DDD	0.55	U	15.5	14.1		ug/Kg	☼	91	69 - 126	
4,4'-DDE	0.24	U	15.5	13.7		ug/Kg	☼	89	71 - 116	
4,4'-DDT	0.59	U	15.5	14.6		ug/Kg	☼	94	67 - 132	
Aldrin	0.25	U	15.5	13.4		ug/Kg	☼	86	69 - 116	
alpha-BHC	0.21	U	15.5	13.5		ug/Kg	☼	87	65 - 122	
beta-BHC	0.66	U	15.5	13.7		ug/Kg	☼	88	62 - 121	
delta-BHC	0.40	U	15.5	13.5		ug/Kg	☼	87	67 - 122	
Dieldrin	0.21	U	15.5	14.1		ug/Kg	☼	91	71 - 120	
Endosulfan I	0.18	U	15.5	13.6		ug/Kg	☼	88	67 - 115	
Endosulfan II	0.29	U	15.5	13.3		ug/Kg	☼	86	69 - 120	
Endosulfan sulfate	0.28	U	15.5	13.7		ug/Kg	☼	88	69 - 126	
Endrin	0.31	U	15.5	14.0		ug/Kg	☼	91	69 - 129	
Endrin aldehyde	0.17	U	15.5	12.6		ug/Kg	☼	81	41 - 128	
gamma-BHC (Lindane)	0.46	U	15.5	13.7		ug/Kg	☼	89	66 - 120	
Heptachlor epoxide	0.43	U	15.5	14.0		ug/Kg	☼	90	71 - 119	
Methoxychlor	0.45	U	15.5	14.4		ug/Kg	☼	93	65 - 139	
<b>MS MS</b>										
<b>Surrogate</b>	<b>%Recovery</b>	<b>Qualifier</b>	<b>Limits</b>							
Decachlorobiphenyl	89		63 - 124							
Tetrachloro-m-xylene	91		59 - 115							

**Lab Sample ID: 280-98955-3 MSD**  
**Matrix: Soil**  
**Analysis Batch: 380695**

**Client Sample ID: B3BLP7**  
**Prep Type: Total/NA**  
**Prep Batch: 380348**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits		RPD	
											RPD	Limit
4,4'-DDD	0.55	U	16.4	14.8		ug/Kg	☼	91	69 - 126	5	30	

TestAmerica Denver

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**QC Sample Results**

Client: CH2M Hill Plateau Remediation Company  
Project/Site: F17-049

TestAmerica Job ID: 280-98955-1  
SDG: DN0171

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

**Lab Sample ID: 280-98955-3 MSD**  
**Matrix: Soil**  
**Analysis Batch: 380695**

**Client Sample ID: B3BLP7**  
**Prep Type: Total/NA**  
**Prep Batch: 380348**

Analyte	Sample	Sample	Spike	MSD	MSD	Unit	D	%Rec	Limits	RPD	Limit
	Result	Qualifier	Added	Result	Qualifier						
4,4'-DDE	0.24	U	16.4	14.3		ug/Kg	*	88	71 - 116	4	30
4,4'-DDT	0.59	U	16.4	15.2		ug/Kg	*	93	67 - 132	3	30
Aldrin	0.25	U	16.4	14.1		ug/Kg	*	86	69 - 116	5	50
alpha-BHC	0.21	U	16.4	14.2		ug/Kg	*	87	65 - 122	5	30
beta-BHC	0.66	U	16.4	14.5		ug/Kg	*	89	62 - 121	6	30
delta-BHC	0.40	U	16.4	14.2		ug/Kg	*	87	67 - 122	5	30
Dieldrin	0.21	U	16.4	14.7		ug/Kg	*	90	71 - 120	4	30
Endosulfan I	0.18	U	16.4	14.3		ug/Kg	*	87	67 - 115	5	30
Endosulfan II	0.29	U	16.4	13.6		ug/Kg	*	83	69 - 120	3	30
Endosulfan sulfate	0.28	U	16.4	13.7		ug/Kg	*	84	69 - 126	0	30
Endrin	0.31	U	16.4	14.6		ug/Kg	*	89	69 - 129	4	30
Endrin aldehyde	0.17	U	16.4	12.6		ug/Kg	*	77	41 - 128	0	30
gamma-BHC (Lindane)	0.46	U	16.4	14.5		ug/Kg	*	88	66 - 120	5	30
Heptachlor epoxide	0.43	U	16.4	14.6		ug/Kg	*	89	71 - 119	4	30
Methoxychlor	0.45	U	16.4	13.7		ug/Kg	*	84	65 - 139	5	30
	<b>MSD</b>	<b>MSD</b>									
<b>Surrogate</b>	<b>%Recovery</b>	<b>Qualifier</b>	<b>Limits</b>								
Decachlorobiphenyl	88		63 - 124								
Tetrachloro-m-xylene	91		59 - 115								

**Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)**

**Lab Sample ID: MB 280-380234/1-A**  
**Matrix: Solid**  
**Analysis Batch: 380574**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 380234**

Analyte	MB	MB	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Diesel (C10-C28)	1110	J	3700	630	ug/Kg		07/10/17 12:15	07/12/17 17:20	1
Kerosene (C8-C12)	920	U	3700	920	ug/Kg		07/10/17 12:15	07/12/17 17:20	1
	<b>MB</b>	<b>MB</b>							
<b>Surrogate</b>	<b>%Recovery</b>	<b>Qualifier</b>	<b>Limits</b>				<b>Prepared</b>	<b>Analyzed</b>	<b>Dil Fac</b>
o-Terphenyl	82		49 - 140				07/10/17 12:15	07/12/17 17:20	1

**Lab Sample ID: LCS 280-380234/2-A**  
**Matrix: Solid**  
**Analysis Batch: 380574**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 380234**

Analyte	Spike Added	LCS	LCS	Unit	D	%Rec	Limits
		Result	Qualifier				
Diesel (C10-C28)	62500	56700		ug/Kg		91	53 - 130
		<b>LCS</b>	<b>LCS</b>				
<b>Surrogate</b>	<b>%Recovery</b>	<b>Qualifier</b>	<b>Limits</b>				
o-Terphenyl	100		49 - 140				

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**Surrogate Summary**

Client: CH2M Hill Plateau Remediation Company  
Project/Site: F17-049

TestAmerica Job ID: 280-98955-1  
SDG: DN0171

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

Matrix: Soil

Prep Type: Total/NA

Lab Sample ID	Client Sample ID	Percent Surrogate Recovery (Acceptance Limits)		
		FBP (39-120)	NBZ (42-120)	TPH (35-124)
280-98955-1	B3BLR7	64	49	73
280-98955-1 MS	B3BLR7	73	60	76
280-98955-1 MSD	B3BLR7	70	60	74
280-98955-2	B3BLP9	65	55	62
280-98955-3	B3BLP7	60	52	54
280-98955-4	B3BLR5	65	54	64
280-98955-5	B3BLT3	58	50	63
280-98955-6	B3BLR9	74	60	90
280-98955-7	B3BLT1	56	48	56
280-98955-8	B3BLP3	63	53	71
280-98955-9	B3BLR3	82	70	106
280-98955-10	B3BLR1	61	50	66
280-98955-11	B3BLP1	57	49	62
280-98955-12	B3BLN9	62	52	61
280-98955-13	B3BLN7	59	49	67
280-98955-14	B3BLP5	58	45	68

**Surrogate Legend**

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

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

Matrix: Solid

Prep Type: Total/NA

Lab Sample ID	Client Sample ID	Percent Surrogate Recovery (Acceptance Limits)		
		FBP (39-120)	NBZ (42-120)	TPH (35-124)
LCS 280-380235/2-A	Lab Control Sample	78	66	78
MB 280-380235/1-A	Method Blank	77	65	83

**Surrogate Legend**

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

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

Matrix: Soil

Prep Type: Total/NA

Lab Sample ID	Client Sample ID	Percent Surrogate Recovery (Acceptance Limits)	
		DCB1 (63-124)	TCX1 (59-115)
280-98955-1	B3BLR7	84	95
280-98955-2	B3BLP9	130 X	97
280-98955-3	B3BLP7	87	90
280-98955-3 MS	B3BLP7	89	91
280-98955-3 MSD	B3BLP7	88	91
280-98955-4	B3BLR5	95	95
280-98955-5	B3BLT3	93	94
280-98955-6	B3BLR9	96	96

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**Surrogate Summary**

Client: CH2M Hill Plateau Remediation Company  
 Project/Site: F17-049

TestAmerica Job ID: 280-98955-1  
 SDG: DN0171

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

**Matrix: Soil**

**Prep Type: Total/NA**

Percent Surrogate Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	DCB1 (63-124)	TCX1 (59-115)
280-98955-7	B3BLT1	96	91
280-98955-8	B3BLP3	101	96
280-98955-9	B3BLR3	96	100
280-98955-10	B3BLR1	91	94
280-98955-11	B3BLP1	94	96
280-98955-12	B3BLN9	92	93
280-98955-13	B3BLN7	95	96
280-98955-14	B3BLP5	92	93

**Surrogate Legend**

DCB = Decachlorobiphenyl  
 TCX = Tetrachloro-m-xylene

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

**Matrix: Solid**

**Prep Type: Total/NA**

Percent Surrogate Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	DCB1 (63-124)	TCX1 (59-115)
LCS 280-380348/2-A	Lab Control Sample	97	100
MB 280-380348/1-A	Method Blank	101	102

**Surrogate Legend**

DCB = Decachlorobiphenyl  
 TCX = Tetrachloro-m-xylene

**Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)**

**Matrix: Soil**

**Prep Type: Total/NA**

Percent Surrogate Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	OTPH (49-140)
280-98955-1	B3BLR7	85
280-98955-2	B3BLP9	96
280-98955-2 MS	B3BLP9	96
280-98955-2 MS	B3BLP9	103
280-98955-2 MSD	B3BLP9	98
280-98955-2 MSD	B3BLP9	97
280-98955-3	B3BLP7	94
280-98955-4	B3BLR5	94
280-98955-5	B3BLT3	96
280-98955-6	B3BLR9	93
280-98955-7	B3BLT1	98
280-98955-8	B3BLP3	98
280-98955-9	B3BLR3	94
280-98955-10	B3BLR1	92
280-98955-11	B3BLP1	96
280-98955-12	B3BLN9	95
280-98955-13	B3BLN7	96
280-98955-14	B3BLP5	99

TestAmerica Denver

Date: 03 August 2017  
 To: CH2M Hill (technical representative)  
 From: Analytical Quality Associates, Inc.  
 Project: 100-K  
 Subject: Inorganics - Sample Data Groups (SDG) DN0171

## **INTRODUCTION**

This memorandum presents the results of data validation for SDG DN0171 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>
B3BLR7	7/05/17	Soil	C	6010C, 7471B
B3BLP9	7/05/17	Soil	C	6010C, 7471B
B3BLP7	7/05/17	Soil	C	6010C, 7471B
B3BLR5	7/05/17	Soil	C	6010C, 7471B
B3BLT3	7/05/17	Soil	C	6010C, 7471B
B3BLR9	7/05/17	Soil	C	6010C, 7471B
B3BLT1	7/05/17	Soil	C	6010C, 7471B
B3BLP3	7/05/17	Soil	C	6010C, 7471B
B3BLR3	7/05/17	Soil	C	6010C, 7471B
B3BLR1	7/05/17	Soil	C	6010C, 7471B
B3BLP1	7/05/17	Soil	C	6010C, 7471B
B3BLN9	7/05/17	Soil	C	6010C, 7471B
B3BLN7	7/05/17	Soil	C	6010C, 7471B
B3BLP5	7/05/17	Soil	C	6010C, 7471B

Data validation was conducted in accordance with the CHPRC validation statement of work and the 100 Area Remedial Action Sampling and Analysis Plan, DOE/RL-96-22, Rev. 5 (SAP). Appendices 1 through 4 provide the following information as indicated below:

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

## **DATA QUALITY OBJECTIVES**

- **Holding Times and Sample Preservation**

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

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

- **Blanks**

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

**Laboratory Blanks**

All laboratory blank results were acceptable with the following exceptions.

For SDG DN0171, the Ba and Cr laboratory blank results were detects > the method detection limits (MDLs) but < the reporting limits (RLs). The Ba and Cr results for sample B3BLR3 were detects > the MDL but < the RL and should be qualified as estimates and flagged “J+.” All other associated Ba and Cr sample results were detects >20X the blank value and should not be qualified.

**Trip Blanks**

All trip blank results were acceptable with the following exceptions.

For SDG DN0171, the Ba, Cr, Co, Cu, Mn, Ni, V and Zn results for trip blank sample B3BLR3 were detects > the MDLs but ≤ the RLs. No data should be qualified as a result.

**Field Blanks**

No field blanks were submitted for validation.

**Equipment Blanks**

No equipment blanks were submitted for validation.

- **Accuracy**

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

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

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

For SDG DN0171, the MS and MSD recoveries for Sb were < the lower acceptance limit but  $\geq 30\%$ . All associated sample results were non-detects and should be qualified as estimates and flagged “UJ.”

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

All LCS recoveries were acceptable.

### **ICP-AES Interference Check Samples (ICSs)**

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

- **Precision**

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

### **MS/MSD Samples**

All MS/MSD RPD values were acceptable.

### **Field Duplicate Samples**

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.

- **Completeness**

SDG DN0171 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 laboratory blank infractions for Ba and Cr and low matrix spike recoveries for Sb. See the table in Appendix 2 for a listing of all affected sample results.

### **REFERENCES**

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

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

## **Appendix 1**

### **Glossary of Data Reporting Qualifiers**

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

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

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

<b>Inorganic Data Qualification Summary</b>			
SDG: DN0171	Reviewer: AQA	Project: 100-K	Page 1 of 1
<b>Analyte(s)</b>	<b>Qualifier</b>	<b>Samples Affected</b>	<b>Reason</b>
Ba & Cr	J+	B3BLR3	Laboratory blank contamination
Sb	UJ	B3BLR7, B3BLP9, B3BLP7, B3BLR5, B3BLT3, B3BLR9, B3BLT1, B3BLP3, B3BLR3, B3BLR1, B3BLP1, B3BLN9, B3BLN7, B3BLP5	Low matrix spike recoveries

Comments: None

## **Appendix 3**

### **Data Validation Supporting Documentation**

**Data Validation for Chemical Analyses**

Published Date: 10/03/16

SGRP-GD-SMP-50117

Effective Date: 10/03/16

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

VALIDATION LEVEL:	A	B	<input checked="" type="radio"/> C	D	E
PROJECT: 100-K			DATA PACKAGE: VSR17-009		
VALIDATOR: Eyda Hergenreder		LAB: TestAmerica		DATE: 08/03/17	
			SDG: DN0171		
ANALYSES PERFORMED					
SW-846/ICP X	SW-846/GFAA	SW-846/Hg X	SW-846 Cyanide		
SAMPLES/MATRIX Soil					
SDG DN0171: B3BLR7, B3BLP9, B3BLP7, B3BLR5, B3BLT3, B3BLR9, B3BLT1, B3BLP3, B3BLR3, B3BLR1, B3BLP1, B3BLN9, B3BLN7, B3BLP5					

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

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

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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 type="radio"/> N/A
Initial calibrations acceptable?	Yes No <input type="radio"/> N/A
ICP interference checks acceptable?	Yes No <input type="radio"/> N/A
ICV and CCV checks performed on all instruments?	Yes No <input type="radio"/> N/A
ICV and CCV checks 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)

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

Comments:

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SDG DN0171: MB results Ba 125.7 ug/Kg, Cr 59.7 ug/Kg

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Trip Blank B3BLR3: Ba 336 ug/Kg, Cr 246 ug/Kg, Co 80.4 ug/Kg, Cu 376 ug/Kg, Mn 562 ug/Kg, Ni 126 ug/Kg  
V 109 ug/Kg, Zn 376 ug/Kg





**Data Validation for Chemical Analyses**

Published Date: 10/03/16

SGRP-GD-SMP-50117

Effective Date: 10/03/16

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

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

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

Comments:

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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: F17-049

TestAmerica Job ID: 280-98955-1  
SDG: DN0171

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

**Lab Sample ID: MB 280-380035/1-A**  
**Matrix: Solid**  
**Analysis Batch: 380372**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 380035**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	733	U	1500	733	ug/Kg	-	07/07/17 13:30	07/10/17 14:51	1
Arsenic	665	U	2000	665	ug/Kg	-	07/07/17 13:30	07/10/17 14:51	1
Barium	125.7	B	1000	104	ug/Kg	-	07/07/17 13:30	07/10/17 14:51	1
Beryllium	33.0	U	500	33.0	ug/Kg	-	07/07/17 13:30	07/10/17 14:51	1
Boron	980	U	10000	980	ug/Kg	-	07/07/17 13:30	07/10/17 14:51	1
Cadmium	41.0	U	500	41.0	ug/Kg	-	07/07/17 13:30	07/10/17 14:51	1
Chromium	59.70	B	1500	58.0	ug/Kg	-	07/07/17 13:30	07/10/17 14:51	1
Cobalt	100	U	1000	100	ug/Kg	-	07/07/17 13:30	07/10/17 14:51	1
Copper	217	U	2000	217	ug/Kg	-	07/07/17 13:30	07/10/17 14:51	1
Manganese	100	U	1000	100	ug/Kg	-	07/07/17 13:30	07/10/17 14:51	1
Molybdenum	260	U	2000	260	ug/Kg	-	07/07/17 13:30	07/10/17 14:51	1
Nickel	132	U	4000	132	ug/Kg	-	07/07/17 13:30	07/10/17 14:51	1
Selenium	860	U	1500	860	ug/Kg	-	07/07/17 13:30	07/10/17 14:51	1
Silver	160	U	1000	160	ug/Kg	-	07/07/17 13:30	07/10/17 14:51	1
Vanadium	94.0	U	2000	94.0	ug/Kg	-	07/07/17 13:30	07/10/17 14:51	1

**Lab Sample ID: MB 280-380035/1-A**  
**Matrix: Solid**  
**Analysis Batch: 380507**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 380035**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Zinc	398	U	3000	398	ug/Kg	-	07/07/17 13:30	07/11/17 16:43	1

**Lab Sample ID: MB 280-380035/1-A**  
**Matrix: Solid**  
**Analysis Batch: 380643**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 380035**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	310	U	900	310	ug/Kg	-	07/07/17 13:30	07/12/17 17:21	1

**Lab Sample ID: LCS 280-380035/2-A**  
**Matrix: Solid**  
**Analysis Batch: 380372**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 380035**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Antimony	50000	50410		ug/Kg	-	101	80 - 120
Arsenic	100000	100200		ug/Kg	-	100	80 - 120
Barium	200000	197600		ug/Kg	-	99	80 - 120
Beryllium	5000	4994		ug/Kg	-	100	80 - 120
Boron	100000	98260		ug/Kg	-	98	80 - 120
Cadmium	10000	9991		ug/Kg	-	100	80 - 120
Chromium	20000	20290		ug/Kg	-	101	80 - 120
Cobalt	50000	47510		ug/Kg	-	95	80 - 120
Copper	25000	24580		ug/Kg	-	98	80 - 120
Manganese	50000	49340		ug/Kg	-	99	80 - 120
Molybdenum	100000	98960		ug/Kg	-	99	80 - 120
Nickel	50000	48560		ug/Kg	-	97	80 - 120
Selenium	200000	191300		ug/Kg	-	96	80 - 120
Silver	5000	5094		ug/Kg	-	102	80 - 120

TestAmerica Denver

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**QC Sample Results**

Client: CH2M Hill Plateau Remediation Company  
 Project/Site: F17-049

TestAmerica Job ID: 280-98955-1  
 SDG: DN0171

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

Lab Sample ID: LCS 280-380035/2-A  
 Matrix: Solid  
 Analysis Batch: 380372

Client Sample ID: Lab Control Sample  
 Prep Type: Total/NA  
 Prep Batch: 380035  
 %Rec.

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Vanadium	50000	49000		ug/Kg		98	80 - 120

Lab Sample ID: LCS 280-380035/2-A  
 Matrix: Solid  
 Analysis Batch: 380507

Client Sample ID: Lab Control Sample  
 Prep Type: Total/NA  
 Prep Batch: 380035  
 %Rec.

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Zinc	50000	50840		ug/Kg		102	80 - 120

Lab Sample ID: LCS 280-380035/2-A  
 Matrix: Solid  
 Analysis Batch: 380643

Client Sample ID: Lab Control Sample  
 Prep Type: Total/NA  
 Prep Batch: 380035  
 %Rec.

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Lead	50000	50000		ug/Kg		100	80 - 120

Lab Sample ID: 280-98955-4 MS  
 Matrix: Soil  
 Analysis Batch: 380372

Client Sample ID: B3BLR5  
 Prep Type: Total/NA  
 Prep Batch: 380035  
 %Rec.

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Antimony	545	U N	47300	18850	N	ug/Kg	☼	40	75 - 125
Arsenic	4600		94600	90770		ug/Kg	☼	91	75 - 125
Barium	81300		189000	256500		ug/Kg	☼	93	75 - 125
Beryllium	528		4730	5166		ug/Kg	☼	98	75 - 125
Boron	1020	B	94600	87730		ug/Kg	☼	92	75 - 125
Cadmium	45.3	B	9460	8850		ug/Kg	☼	93	75 - 125
Chromium	11600		18900	30320		ug/Kg	☼	99	75 - 125
Cobalt	16600		47300	58820		ug/Kg	☼	89	75 - 125
Copper	25200		23700	46370		ug/Kg	☼	90	75 - 125
Manganese	457000		47300	533200	X	ug/Kg	☼	161	75 - 125
Molybdenum	213	B	94600	84530		ug/Kg	☼	89	75 - 125
Nickel	14500		47300	57210		ug/Kg	☼	90	75 - 125
Selenium	639	U	189000	166500		ug/Kg	☼	88	75 - 125
Silver	130	B	4730	4750		ug/Kg	☼	98	75 - 125
Vanadium	71100		47300	122800		ug/Kg	☼	109	75 - 125

Lab Sample ID: 280-98955-4 MS  
 Matrix: Soil  
 Analysis Batch: 380507

Client Sample ID: B3BLR5  
 Prep Type: Total/NA  
 Prep Batch: 380035  
 %Rec.

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Zinc	60600		47300	104300		ug/Kg	☼	92	75 - 125

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**QC Sample Results**

Client: CH2M Hill Plateau Remediation Company  
 Project/Site: F17-049

TestAmerica Job ID: 280-98955-1  
 SDG: DN0171

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

Lab Sample ID: 280-98955-4 MS  
 Matrix: Soil  
 Analysis Batch: 380643

Client Sample ID: B3BLR5  
 Prep Type: Total/NA  
 Prep Batch: 380035  
 %Rec.

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Lead	6810		47300	47810		ug/Kg	☼	87	75 - 125

Lab Sample ID: 280-98955-4 MSD  
 Matrix: Soil  
 Analysis Batch: 380372

Client Sample ID: B3BLR5  
 Prep Type: Total/NA  
 Prep Batch: 380035  
 %Rec. RPD

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Antimony	545	U N	40900	14980	N	ug/Kg	☼	37	75 - 125	23	35
Arsenic	4600		81900	75570		ug/Kg	☼	87	75 - 125	18	35
Barium	81300		164000	233900		ug/Kg	☼	93	75 - 125	9	35
Beryllium	528		4090	4354		ug/Kg	☼	93	75 - 125	17	35
Boron	1020	B	81900	73340		ug/Kg	☼	88	75 - 125	18	35
Cadmium	45.3	B	8190	7384		ug/Kg	☼	90	75 - 125	18	35
Chromium	11600		16400	25960		ug/Kg	☼	88	75 - 125	15	35
Cobalt	16600		40900	51210		ug/Kg	☼	84	75 - 125	14	35
Copper	25200		20500	42480		ug/Kg	☼	85	75 - 125	9	35
Manganese	457000		40900	512600	X	ug/Kg	☼	136	75 - 125	4	35
Molybdenum	213	B	81900	70820		ug/Kg	☼	86	75 - 125	18	35
Nickel	14500		40900	49250		ug/Kg	☼	85	75 - 125	15	35
Selenium	639	U	164000	138000		ug/Kg	☼	84	75 - 125	19	35
Silver	130	B	4090	3926		ug/Kg	☼	93	75 - 125	19	35
Vanadium	71100		40900	112000		ug/Kg	☼	100	75 - 125	9	35

Lab Sample ID: 280-98955-4 MSD  
 Matrix: Soil  
 Analysis Batch: 380507

Client Sample ID: B3BLR5  
 Prep Type: Total/NA  
 Prep Batch: 380035  
 %Rec. RPD

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Zinc	60600		40900	95250		ug/Kg	☼	85	75 - 125	9	35

Lab Sample ID: 280-98955-4 MSD  
 Matrix: Soil  
 Analysis Batch: 380643

Client Sample ID: B3BLR5  
 Prep Type: Total/NA  
 Prep Batch: 380035  
 %Rec. RPD

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Lead	6810		40900	42260		ug/Kg	☼	87	75 - 125	12	35

**Method: 7471B - Mercury (CVAA)**

Lab Sample ID: MB 280-380388/1-A  
 Matrix: Solid  
 Analysis Batch: 380511

Client Sample ID: Method Blank  
 Prep Type: Total/NA  
 Prep Batch: 380388

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	5.5	U	17.0	5.5	ug/Kg		07/11/17 12:13	07/11/17 15:26	1

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**QC Sample Results**

Client: CH2M Hill Plateau Remediation Company  
 Project/Site: F17-049

TestAmerica Job ID: 280-98955-1  
 SDG: DN0171

**Method: 7471B - Mercury (CVAA) (Continued)**

**Lab Sample ID: LCS 280-380388/2-A**  
**Matrix: Solid**  
**Analysis Batch: 380511**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 380388**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Mercury	333	333.2		ug/Kg		100	80 - 120

**Lab Sample ID: 280-98955-4 MS**  
**Matrix: Soil**  
**Analysis Batch: 380511**

**Client Sample ID: B3BLR5**  
**Prep Type: Total/NA**  
**Prep Batch: 380388**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	Limits
Mercury	6.8	B	430	460.8		ug/Kg	☼	105	75 - 125

**Lab Sample ID: 280-98955-4 MSD**  
**Matrix: Soil**  
**Analysis Batch: 380511**

**Client Sample ID: B3BLR5**  
**Prep Type: Total/NA**  
**Prep Batch: 380388**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Mercury	6.8	B	406	436.3		ug/Kg	☼	106	75 - 125	5	35

Date: 03 August 2017  
 To: CH2M Hill (technical representative)  
 From: Analytical Quality Associates, Inc.  
 Project: 100-K  
 Subject: General Chemistry - Sample Data Groups (SDGs) WC2150 and WC2151

## **INTRODUCTION**

This memorandum presents the results of data validation for SDGs WC2150 and WC2151 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>
B3BM18	7/05/17	Soil	C	300.0, 7196A
B3BLN8	7/05/17	Soil	C	300.0, 7196A
B3BLP0	7/05/17	Soil	C	300.0, 7196A
B3BLP2	7/05/17	Soil	C	300.0, 7196A
B3BLP4	7/05/17	Soil	C	300.0, 7196A
B3BLP6	7/05/17	Soil	C	300.0, 7196A
B3BLP8	7/05/17	Soil	C	300.0, 7196A
B3BLR8	7/05/17	Soil	C	300.0, 7196A
B3BLT0	7/05/17	Soil	C	300.0, 7196A
B3BLT2	7/05/17	Soil	C	300.0, 7196A
B3BLT4	7/05/17	Soil	C	300.0, 7196A
B3BM30	7/05/17	Soil	C	300.0, 7196A
B38M28	7/05/17	Soil	C	300.0, 7196A
B3BM24	7/05/17	Soil	C	300.0, 7196A
B3BM26	7/05/17	Soil	C	300.0, 7196A
B3BM22	7/05/17	Soil	C	300.0, 7196A
B3BM14	7/05/17	Soil	C	300.0, 7196A
B3BM20	7/05/17	Soil	C	300.0, 7196A
B3BM16	7/05/17	Soil	C	300.0, 7196A
B3BM12	7/05/17	Soil	C	300.0, 7196A
B3BLR0	7/05/17	Soil	C	300.0, 7196A
B3BLR2	7/05/17	Soil	C	300.0, 7196A
B3BLR4	7/05/17	Soil	C	300.0, 7196A
B3BLR6	7/05/17	Soil	C	300.0, 7196A

Data validation was conducted in accordance with the CHPRC validation statement of work and the 100 Area Remedial Action Sampling and Analysis Plan, DOE/RL-96-22, Rev. 5 (SAP). Appendices 1 through 4 provide the following information as indicated below:

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

## **DATA QUALITY OBJECTIVES**

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

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

- Anions – extraction within 28 days of sample collection and analysis within 48 hours after extraction
- Hexavalent chromium – extraction and analysis within 30 days of sample collection

Sample preservation for the above analyses requires chilling to <6 degrees Celsius.

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

### **• Blanks**

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

#### **Laboratory Blanks**

All laboratory blank results were acceptable with the following exception.

For SDG WC2151, the nitrate as N laboratory blank result was a detect > the method detection limit (MDL) but < the reporting limit (RL). The results for sample B3BLR4 and B3BM12 were detects < the RL and should be qualified as an estimate and flagged “J+.” All other associated sample results were detects > the RL but ≤ 20X the laboratory blank and should be qualified as estimates and flagged “J+.”

#### **Trip Blanks**

All trip blank results were acceptable with the following exceptions.

For SDG WC2151, chloride, nitrate and sulfate were detected in trip blank sample B3BLR4 and chloride, nitrate, fluoride, nitrite and sulfate were detected in trip blank sample B3BM26.

#### **Field Blanks**

No field blanks were submitted for validation.

#### **Equipment Blanks**

No equipment blanks were submitted for validation.

- **Accuracy**

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

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

**Laboratory Duplicate Samples**

All laboratory duplicate results were acceptable.

**Field Duplicate Samples**

All field duplicate results were acceptable.

**Field Split Samples**

No field splits were submitted for validation.

- **Detection Limits**

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

All reported sample MDLs were below the CRDLs.

- **Completeness**

SDGs WC2150 and WC2151 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 100%.

**MAJOR DEFICIENCIES**

None found.

**MINOR DEFICIENCIES**

A minor deficiency leading to qualification of nitrate as N sample results as estimates were due to laboratory blank contamination. See the table in Appendix 2 for a listing of all affected sample results.

**REFERENCES**

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

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

## **Appendix 1**

### **Glossary of Data Reporting Qualifiers**

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

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

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

<b>General Chemistry Data Qualification Summary</b>			
SDG: WC2150, WC2151	Reviewer: AQA	Project: 100-K	Page 1 of 1
<b>Analyte(s)</b>	<b>Qualifier</b>	<b>Samples Affected</b>	<b>Reason</b>
Nitrate at N	J+	B3BM28, B3BM24, B3BM26, B3BM22, B3BM14, B3MB20, B3BM16, B3BM12, B3BLR0, B3BLR2, B3BLR4, B3BLR6	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	<b>C</b>	D	E
PROJECT: 100-K			DATA PACKAGE: VSR17-009		
VALIDATOR: Eyda Hergenreder		LAB: TestAmerica		DATE: 08/03/17	
			SDG: WC2150, WC2151		
ANALYSES PERFORMED					
Anions/IC <sub>X</sub>	TOC	TOX	TPH-418.1	Oil and Grease	Alkalinity
Ammonia	BOD/COD	Chloride	Chromium-VI <sub>X</sub>	pH	NO <sub>3</sub> /NO <sub>2</sub>
Sulfate	TDS	TKN	Phosphate		
SAMPLES/MATRIX Soil					
SDG WC2150: B3BM18, B3BLN8, B3BLP0, B3BLP2, B3BLP4, B3BLP6, B3BLP8, B3BLR8, B3BLT0, B3BLT2, B3BLT4, B3BM30					
SDG WC2151: B3BM28, B3BM24, B3BM26, B3BM22, B3BM14, B3BM20, B3BM16, B3BM12, B3BLR0, B3BLR2, B3BLR4, B3BLR6					

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

Technical verification documentation present?	Yes <b>No</b> 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)	<input checked="" type="radio"/> Yes No N/A
Field blank results acceptable? (Levels C, D, E)	Yes <input checked="" type="radio"/> No N/A
Transcription/calculation errors? (Levels D, E)	Yes No <input checked="" type="radio"/> N/A

Comments:

SDG WC2151 MB: Nitrate 0.164 mg/Kg

Trip Blank sample B3BLR4: Chloride 2.1 mg/Kg, nitrate 0.19 mg/Kg, sulfate 2.7 mg/Kg

Trip Blank sample B3BM26: Chloride 3.5 mg/Kg, nitrate 0.40 mg/Kg, fluoride 0.58 mg/Kg, nitrite 0.34 mg/Kg  
Sulfate 4.0 mg/Kg



## Data Validation for Chemical Analyses

Published Date: 10/03/16

SGRP-GD-SMP-50117

Effective Date: 10/03/16

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

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

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

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#### 6. 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: F17-049

TestAmerica Job ID: 300-5741-1  
 SDG: WC2150

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

**Lab Sample ID: MB 300-8525/1-A**  
**Matrix: Solid**  
**Analysis Batch: 8518**

**Client Sample ID: Method Blank**  
**Prep Type: Soluble**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	0.14	U	0.28	0.14	mg/Kg			07/10/17 19:14	1
Nitrite as N	0.19	U	0.38	0.19	mg/Kg			07/10/17 19:14	1

**Lab Sample ID: LCS 300-8525/2-A**  
**Matrix: Solid**  
**Analysis Batch: 8518**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Soluble**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Nitrate as N	22.5	23.2		mg/Kg		103	80 - 120
Nitrite as N	30.3	31.5		mg/Kg		104	80 - 120

**Lab Sample ID: 300-5741-1 MS**  
**Matrix: Solid**  
**Analysis Batch: 8518**

**Client Sample ID: B3BM18**  
**Prep Type: Soluble**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Nitrate as N	0.59		22.9	24.0		mg/Kg	☼	102	75 - 125
Nitrite as N	0.19	U	30.8	31.8		mg/Kg	☼	103	75 - 125

**Lab Sample ID: 300-5741-7 MS**  
**Matrix: Solid**  
**Analysis Batch: 8518**

**Client Sample ID: B3BLP8**  
**Prep Type: Soluble**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Nitrate as N	0.43		22.8	23.8		mg/Kg	☼	103	75 - 125
Nitrite as N	0.19	U	30.7	31.8		mg/Kg	☼	104	75 - 125

**Lab Sample ID: 300-5741-1 DU**  
**Matrix: Solid**  
**Analysis Batch: 8518**

**Client Sample ID: B3BM18**  
**Prep Type: Soluble**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Nitrate as N	0.59		0.516		mg/Kg	☼	14	30
Nitrite as N	0.19	U	0.19	U	mg/Kg	☼	NC	30

**Lab Sample ID: 300-5741-7 DU**  
**Matrix: Solid**  
**Analysis Batch: 8518**

**Client Sample ID: B3BLP8**  
**Prep Type: Soluble**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Nitrate as N	0.43		0.430		mg/Kg	☼	0.6	30
Nitrite as N	0.19	U	0.19	U	mg/Kg	☼	NC	30

**Lab Sample ID: MB 300-8525/1-A**  
**Matrix: Solid**  
**Analysis Batch: 8519**

**Client Sample ID: Method Blank**  
**Prep Type: Soluble**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	0.99	U	2.0	0.99	mg/Kg			07/10/17 19:14	1

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**QC Sample Results**

Client: CH2M Hill Plateau Remediation Company  
Project/Site: F17-049

TestAmerica Job ID: 300-5741-1  
SDG: WC2150

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

**Lab Sample ID: MB 300-8525/1-A**  
**Matrix: Solid**  
**Analysis Batch: 8519**

**Client Sample ID: Method Blank**  
**Prep Type: Soluble**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Fluoride	0.25	U	0.49	0.25	mg/Kg			07/10/17 19:14	1
Sulfate	1.2	U	2.5	1.2	mg/Kg			07/10/17 19:14	1

**Lab Sample ID: LCS 300-8525/2-A**  
**Matrix: Solid**  
**Analysis Batch: 8519**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Soluble**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	160	162		mg/Kg		102	80 - 120
Fluoride	39.9	41.0		mg/Kg		103	80 - 120
Sulfate	199	205		mg/Kg		103	80 - 120

**Lab Sample ID: 300-5741-1 MS**  
**Matrix: Solid**  
**Analysis Batch: 8519**

**Client Sample ID: B3BM18**  
**Prep Type: Soluble**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	1.3	B	162	164		mg/Kg	☼	101	75 - 125
Fluoride	0.62		40.5	40.7		mg/Kg	☼	99	75 - 125
Sulfate	3.2		202	210		mg/Kg	☼	102	75 - 125

**Lab Sample ID: 300-5741-7 MS**  
**Matrix: Solid**  
**Analysis Batch: 8519**

**Client Sample ID: B3BLP8**  
**Prep Type: Soluble**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	1.3	B	161	164		mg/Kg	☼	101	75 - 125
Fluoride	1.5		40.3	39.1		mg/Kg	☼	93	75 - 125
Sulfate	2.5		202	208		mg/Kg	☼	102	75 - 125

**Lab Sample ID: 300-5741-1 DU**  
**Matrix: Solid**  
**Analysis Batch: 8519**

**Client Sample ID: B3BM18**  
**Prep Type: Soluble**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Chloride	1.3	B	1.36	B	mg/Kg	☼	4	30
Fluoride	0.62		0.519		mg/Kg	☼	18	30
Sulfate	3.2		2.68		mg/Kg	☼	19	30

**Lab Sample ID: 300-5741-7 DU**  
**Matrix: Solid**  
**Analysis Batch: 8519**

**Client Sample ID: B3BLP8**  
**Prep Type: Soluble**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Chloride	1.3	B	1.28	B	mg/Kg	☼	1	30
Fluoride	1.5		1.50		mg/Kg	☼	0.1	30
Sulfate	2.5		2.43	B	mg/Kg	☼	2	30

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**QC Sample Results**

Client: CH2M Hill Plateau Remediation Company  
 Project/Site: F17-049

TestAmerica Job ID: 300-5741-1  
 SDG: WC2150

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

**Lab Sample ID: MB 300-8485/1-A**  
**Matrix: Solid**  
**Analysis Batch: 8561**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 8485**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cr (VI)	0.15	U	2.0	0.15	mg/Kg		07/06/17 07:20	07/06/17 15:54	1

**Lab Sample ID: LCS 300-8485/2-A**  
**Matrix: Solid**  
**Analysis Batch: 8561**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 8485**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Cr (VI)	20.0	19.19		mg/Kg		96	85 - 115

**Lab Sample ID: 300-5741-1 MS**  
**Matrix: Solid**  
**Analysis Batch: 8561**

**Client Sample ID: B3BM18**  
**Prep Type: Total/NA**  
**Prep Batch: 8485**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Cr (VI)	0.40	B y	30.0	27.01		mg/Kg		89	75 - 125

**Lab Sample ID: 300-5741-1 MSI**  
**Matrix: Solid**  
**Analysis Batch: 8561**

**Client Sample ID: B3BM18**  
**Prep Type: Total/NA**  
**Prep Batch: 8485**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSI Result	MSI Qualifier	Unit	D	%Rec	%Rec. Limits
Cr (VI)	0.40	B y	654	685.6	D	mg/Kg		105	75 - 125

**Lab Sample ID: 300-5741-1 DU**  
**Matrix: Solid**  
**Analysis Batch: 8561**

**Client Sample ID: B3BM18**  
**Prep Type: Total/NA**  
**Prep Batch: 8485**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Cr (VI)	0.40	B y	0.244	B y	mg/Kg		48	35

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**QC Sample Results**

Client: CH2M Hill Plateau Remediation Company  
 Project/Site: F17-049

TestAmerica Job ID: 300-5742-1  
 SDG: WC2151

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

Lab Sample ID: DLCK 300-8557/4  
 Matrix: Solid  
 Analysis Batch: 8557

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

Analyte	Spike Added	DLCK Result	DLCK Qualifier	Unit	D	%Rec	%Rec. Limits
Nitrate as N	0.0282	0.0324		mg/L		115	60 - 140

Lab Sample ID: MB 300-8552/1-A  
 Matrix: Solid  
 Analysis Batch: 8557

Client Sample ID: Method Blank  
 Prep Type: Soluble

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	0.164	B	0.27	0.14	mg/Kg			07/12/17 14:40	1
Nitrite as N	0.19	U	0.37	0.19	mg/Kg			07/12/17 14:40	1

Lab Sample ID: LCS 300-8552/2-A  
 Matrix: Solid  
 Analysis Batch: 8557

Client Sample ID: Lab Control Sample  
 Prep Type: Soluble

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Nitrate as N	22.6	22.9		mg/Kg		101	80 - 120
Nitrite as N	30.4	31.0		mg/Kg		102	80 - 120

Lab Sample ID: 300-5742-1 MS  
 Matrix: Solid  
 Analysis Batch: 8557

Client Sample ID: B3BM28  
 Prep Type: Soluble

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Nitrate as N	2.0		22.7	25.3		mg/Kg	☼	103	75 - 125
Nitrite as N	0.19	U	30.5	31.1		mg/Kg	☼	102	75 - 125

Lab Sample ID: 300-5742-1 DU  
 Matrix: Solid  
 Analysis Batch: 8557

Client Sample ID: B3BM28  
 Prep Type: Soluble

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	Limit
Nitrate as N	2.0		2.24		mg/Kg	☼	13	30
Nitrite as N	0.19	U	0.393		mg/Kg	☼	NC	30

Lab Sample ID: MB 300-8552/1-A  
 Matrix: Solid  
 Analysis Batch: 8558

Client Sample ID: Method Blank  
 Prep Type: Soluble

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	0.98	U	2.0	0.98	mg/Kg			07/12/17 14:40	1
Fluoride	0.25	U	0.49	0.25	mg/Kg			07/12/17 14:40	1
Sulfate	1.2	U	2.5	1.2	mg/Kg			07/12/17 14:40	1

Lab Sample ID: LCS 300-8552/2-A  
 Matrix: Solid  
 Analysis Batch: 8558

Client Sample ID: Lab Control Sample  
 Prep Type: Soluble

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	160	160		mg/Kg		100	80 - 120

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**QC Sample Results**

Client: CH2M Hill Plateau Remediation Company  
Project/Site: F17-049

TestAmerica Job ID: 300-5742-1  
SDG: WC2151

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

Lab Sample ID: LCS 300-8552/2-A  
Matrix: Solid  
Analysis Batch: 8558

Client Sample ID: Lab Control Sample  
Prep Type: Soluble

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Fluoride	40.0	40.0		mg/Kg		100	80 - 120
Sulfate	200	202		mg/Kg		101	80 - 120

Lab Sample ID: 300-5742-7 MS  
Matrix: Solid  
Analysis Batch: 8558

Client Sample ID: B3BM16  
Prep Type: Soluble

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	2.6		161	162		mg/Kg	☼	99	75 - 125
Fluoride	1.1		40.3	39.6		mg/Kg	☼	96	75 - 125
Sulfate	4.1		201	204		mg/Kg	☼	99	75 - 125

Lab Sample ID: 300-5742-7 DU  
Matrix: Solid  
Analysis Batch: 8558

Client Sample ID: B3BM16  
Prep Type: Soluble

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Chloride	2.6		2.04		mg/Kg	☼	23	30
Fluoride	1.1		0.927		mg/Kg	☼	16	30
Sulfate	4.1		3.30		mg/Kg	☼	21	30

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

Lab Sample ID: MB 300-8493/1-A  
Matrix: Solid  
Analysis Batch: 8605

Client Sample ID: Method Blank  
Prep Type: Total/NA  
Prep Batch: 8493

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cr (VI)	0.15	U	2.0	0.15	mg/Kg		07/06/17 09:34	07/06/17 11:32	1

Lab Sample ID: LCS 300-8493/2-A  
Matrix: Solid  
Analysis Batch: 8605

Client Sample ID: Lab Control Sample  
Prep Type: Total/NA  
Prep Batch: 8493

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Cr (VI)	20.0	20.01		mg/Kg		100	85 - 115

Lab Sample ID: 300-5742-1 MS  
Matrix: Solid  
Analysis Batch: 8605

Client Sample ID: B3BM28  
Prep Type: Total/NA  
Prep Batch: 8493

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Cr (VI)	0.31	B y	30.0	26.97		mg/Kg		89	75 - 125

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**QC Sample Results**

Client: CH2M Hill Plateau Remediation Company  
 Project/Site: F17-049

TestAmerica Job ID: 300-5742-1  
 SDG: WC2151

**Method: 7196A - Chromium, Hexavalent (Continued)**

**Lab Sample ID: 300-5742-1 MSI**  
**Matrix: Solid**  
**Analysis Batch: 8605**

**Client Sample ID: B3BM28**  
**Prep Type: Total/NA**  
**Prep Batch: 8493**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSI Result	MSI Qualifier	Unit	D	%Rec	%Rec. Limits
Cr (VI)	0.31	B y	636	643.1	D	mg/Kg		101	75 - 125

**Lab Sample ID: 300-5742-1 DU**  
**Matrix: Solid**  
**Analysis Batch: 8605**

**Client Sample ID: B3BM28**  
**Prep Type: Total/NA**  
**Prep Batch: 8493**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Cr (VI)	0.31	B y	0.200	B y	mg/Kg		44	35

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13