CHPRC - REVIEW COMMENT RECORD (RCR)

1. Date	2. Review No.
09/17/2013	
3. Project No.	Page 1 of 1

5. Document Number(s)/Title(s)	6. Program/Project/Building Number	7. Reviewer	8. Organization/Group	9. Location/Phone
VSR13-001		Scot Fitzgerald	Analytical Support Group	2753/373-7495

17. Comment Submittal Approval	10. Agreement With Indicated Comment Disposition(s)	11. CLOSED
09/17/2013 Date Scot Fitzgerald Organization Manager (optional) (print and sign)	Date Reviewer/Point of Contact (print and sign) Author/Originator (print and sign)	9/17/2013 Date Scot Fitzgerald Reviewer/Point of Contact (print and sign) Author/Originator (print and sign)

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

CHPRC - REVIEW COMMENT RECORD (RCR)

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09/17/2013	
3. Project No.	Page 1 of 1

5. Document Number(s)/Title(s)	6. Program/Project/Building Number	7. Reviewer	8. Organization/Group	9. Location/Phone
VSR13-001		SL Huggins	Analytical Support Group	2753/373-7495

17. Comment Submittal Approval	10. Agreement With Indicated Comment Disposition(s)	11. CLOSED
09/17/2013 Date SL Huggins Organization Manager (optional) (print and sign)	Date Reviewer/Point of Contact (print and sign) Author/Originator (print and sign)	9/17/13 Date SL Huggins Reviewer/Point of Contact (print and sign) Author/Originator (print and sign)

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1	No issues noted					

ANALYTICAL QUALITY ASSOCIATES, INC.

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Data Validation Report for CH2M Hill Plateau Remediation Company

VSR13-001
Project 200 Area SGRP

Chemical & Radiochemical Validation - Level C

Validation Performed By: Eyda Hergenreder **Date:** 9-02-2013

Technical Review By: Ellen McEntee **Date:** 9-05-2013

Ellen McEntee

Quality Review By: _____ **Date:** 9-18-2013

Lonnie Morris
Quality Assurance Manager

TABLE OF CONTENTS

Semivolatile Organics

Memorandum	3
Appendix 1 – Glossary of Data Reporting Qualifiers	7
Appendix 2 – Summary of Data Qualification	9
Appendix 3 – Data Validation Supporting Documentation	11
Appendix 4 – Additional Documentation Requested By Client	19

Inorganics

Memorandum	44
Appendix 1 – Glossary of Data Reporting Qualifiers	48
Appendix 2 – Summary of Data Qualification	50
Appendix 3 – Data Validation Supporting Documentation	52
Appendix 4 – Additional Documentation Requested By Client	60

General Chemistry

Memorandum	73
Appendix 1 – Glossary of Data Reporting Qualifiers	76
Appendix 2 – Summary of Data Qualification	78
Appendix 3 – Data Validation Supporting Documentation	80
Appendix 4 – Additional Documentation Requested By Client	87

Radiochemistry

Memorandum	94
Appendix 1 – Glossary of Data Reporting Qualifiers	98
Appendix 2 – Summary of Data Qualification	100
Appendix 3 – Data Validation Supporting Documentation	102
Appendix 4 – Additional Documentation Requested By Client	110

Date: 02 September 2013
To: CH2M Hill (technical representative)
From: Analytical Quality Associates, Inc.
Project: 200 Area SGRP
Subject: Volatile Organics - Sample Data Group (SDG) WSCF130053, WSCF130128 and WSCF130232

INTRODUCTION

This memorandum presents the results of data validation for SDGs WSCF130053, WSCF130128 and WSCF130232 prepared by WSCF Analytical Laboratory. A list of samples validated along with the analytical methods is provided in the following table.

Sample ID	Sample Date	Media	Validation Level	Analytical Methods
B2MTC8	01/09/13	Water	C	8260B
B2MTD4	01/09/13	Water	C	8260B
B2MTD1	01/09/13	Water	C	8260B
B2N368	01/24/13	Water	C	8260B
B2N371	01/24/13	Water	C	8260B
B2NNT6	02/12/13	Water	C	8260B
B2NNV0	02/12/13	Water	C	8260B

Data validation was conducted in accordance with the CHPRC validation statement of work and the Sampling Analysis Plan for Eighteen Remediation Wells in the 200-ZP-1 Operable Unit, DOE/RL-2010-72, Rev. 1 (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 volatile organics are analysis within 14 days of sample collection. Sample preservation requires chilling to 4 degrees Celsius and acid preservation with hydrochloric or sulfuric acid to pH <2.

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

- **Blanks**

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

Laboratory Blanks

All laboratory blank results were acceptable.

Trip Blanks

No trip blanks were submitted for validation.

Field Blanks

No field blanks were submitted for validation.

Equipment Blanks

No equipment blanks were submitted for validation.

- **Accuracy**

Accuracy is evaluated by reviewing surrogate results, matrix spike sample results, and laboratory control sample results. According to the SAP, the laboratory control sample accuracy limits and the matrix spike sample accuracy limits are 80% to 120%.

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 WSCF130053, the MS or MSD recoveries for carbon disulfide and 1,2-dichloroethene were below the lower acceptance limit . The carbon disulfide and 1,2,-dichloroethene results for samples B2MTC8, B2MTD4 and B2MTD1 were non-detects and should be qualified as estimates and flagged “UJ.”

For SDG WSCF130128, the MSD recoveries for bromodichloromethane and 1,1,2,2-tetrachloroethane were above the upper acceptance limit. The bromodichloromethane and 1,1,2,2-tetrachloroethane results for samples B2N368 and B2N371 were non-detects and should not be qualified for the recovery infraction.

For SDG WSCF130232, the MS recovery for carbon disulfide was below the lower acceptance limit. The carbon disulfide results for samples B2NNT6 and B2NNV0 were non-detects and should be qualified as estimates and flagged "UJ."

Laboratory Control Samples (LCSs)

All LCS recoveries were acceptable with the following exceptions.

For SDG WSCF130128, the LCS recoveries for 1,2-dichloroethane and bromoform were above the upper acceptance limit. The 1,2-dichloroethane and bromoform results for samples B2N368 and B2N371 were non-detects and should not be qualified for the recovery infraction.

For SDG WSCF130232, the LCS recovery for carbon disulfide was below the lower acceptance limits. The resulst for samples B2NNT6 and B2NNV0 were non-detects and should be qualified as estimates and flagged "UJ."

- **Precision**

Precision is evaluated by reviewing MS/MSD results, field duplicate sample results, 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 ≤20%.

MS/MSD Samples

All MS/MSD relative percent difference values were acceptable.

Field Duplicate Samples

No field duplicates were submitted for validation.

Field Split Samples

No field splits were submitted for validation.

- **Internal Standards**

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

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

- **Detection Limits**

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

All reported sample MDLs with associated non-detected sample results were below the CRDLs with the following exceptions.

For SDG WSCF130053, 1,1-dichloroethene, trichloroethene, benzene, toluene, chlorobenzene, ethylbenzene, styrene, cis-1,3-dichloropropene, trans-1,3-dichloropropene, 1,2-dichloroethane, dibromochloromethane, tetrachloroethene, 1,1,1-trichloroethane, methylene chloride, carbon disulfide, bromoform, bromodichloromethane, 1,2-dichloropropane, methyl ethyl ketone, 1,1,2-trichloroethane and 1,1,2,2-tetrachloroethane for all samples and chloroform for sample B2MTD1.

- **Completeness**

SDGS WSCF130053, WSCF13128 and WSCF130232 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

Minor deficiencies leading to qualification of sample results as estimates were due to low MS or MSD recoveries for carbon disulfide and 1,2-dichloroethane and low LCS recovery for carbon disulfide. See the table in Appendix 2 for a listing of all affected sample results.

REFERENCES

GRP-GD-003, Rev. 0, Change 0, *Data Validation for Chemical Analyses*, August 2010.

DOE/RL-2010-72, Rev. 1, *Sampling Analysis Plan for Eighteen Remediation Wells in the 200-ZP-1 Operable Unit*, September 2012.

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

Volatile Organics Data Qualification Summary			
SDGs: WSCF130053, WSCF130128, WSCF130232	Reviewer: AQA	Project: 200 Area SGRP	Page 1 of 1
Analyte(s)	**Qualifier**	**Samples Affected**	**Reason**
Carbon disulfide, 1,2-dichloroethane	UJ	B2MTC8, B2MTD4, B2MTD1,	Low MS or MSD recoveries
Carbon disulfide	UJ	B2NNT6, B2NNV0	Low MS and LCS recoveries

Comments: None

Appendix 3

Data Validation Supporting Documentation

Appendix A - Chemical Data Validation Checklist

VALIDATION LEVEL:	A	B	(C)	D	E
PROJECT: 200 Area SGRP			DATA PACKAGE: VSR13-001		
VALIDATOR: Eyda Hergenreder		LAB: WSCF		DATE: 09-02-2013	
			SDG: WSCF130053, WSCF130128, WSCF130232		
ANALYSES PERFORMED					
SW-846 8260 X		SW-846 8260 (TCLP)	SW-846 8270		SW-846 8270 (TCLP)

SAMPLES/MATRIX Water samples

SDG WSCF130053: B2MTC8, B2MTD4, B2MTD1
SDG WSCF130128: B2N368, B2N371
SDG WSCF130232: B2NNT6, B2NNV0,

1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE

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

Comments: None

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

GC/MS tuning/performance check acceptable? ..... Yes No N/A

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

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

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

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

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

Comments:

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

Calibration blanks analyzed? (Levels D, E) ..... Yes No N/A

Calibration blank results acceptable? (Levels D, E) ..... Yes No N/A

Laboratory blanks analyzed? ..... Yes No N/A

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

Field/trip blanks analyzed? (Levels C, D, E) ..... Yes No N/A

Field/trip blank results acceptable? (Levels C, D, E) ..... Yes No N/A

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

Comments: None

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

Surrogates/system monitoring compounds analyzed? ..... Yes No N/A

Surrogate/system monitoring compound recoveries acceptable? ..... Yes No N/A

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

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

MS/MSD samples analyzed? ..... Yes No N/A

MS/MSD results acceptable? ..... Yes No N/A

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

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

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

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

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

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

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

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

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

Comments:

WSCF130053: Carbon disulfide MS 78%; 1,2-dichloroethane MSD 76%
WSCF130128: 1,2-dichloroethane LCS 124%, bromoform LCS 121%, bromodichloromethane MSD 122%
1,1,2,2-tetrachloroethane MSD 122%
WSCF130232: carbon disulfide LCS 79%, carbon sulfide MS 77%

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

MS/MSD samples analyzed? ..... Yes No N/A

MS/MSD RPD values acceptable? ..... Yes No N/A

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

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

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

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

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

Comments: None

6. SYSTEM PERFORMANCE (Levels D and E)

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

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

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

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

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

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

Comments:

7. HOLDING TIMES (all levels)

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

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

Comments: None

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

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

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

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

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

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

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

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

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

Comments: The following RDL for non-detects were not met

SDG WSCF130053: 1,1-dichloroethene, trichloroethene, benzene, toluene, chlorobenzene, ethylbenzene, styrene, cis-1,3-dichloropropene, trans-1,3-dichloropropene, 1,2-dichloroethane, dibromochloromethane, tetrachloroethene, 1,1,1-trichloroethane, methylene chloride, carbon disulfide, bromoform, bromodichloromethane, 1,2-dichloropropane, methyl ethyl ketone, 1,1,2-trichloroethane, 1,1,2,2-tetrachloroethane for all samples and chloroform for sample B2MTD1.

9. SAMPLE CLEANUP (Levels D and E)

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

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

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

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

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

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

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

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

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

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

Comments:

Comments (attach additional sheets as necessary): None

Appendix 4

Additional Documentation Requested By Client

Batch QC List

Attention Scot Fitzgerald
Department Organic, Volatiles

Group # WSCF130053

QC Batch	Analytical Batch	S#	Type	Sample #	Client Sample#	Original	Test
212351	212352	1	BLANK	87477	BLANK		SW-846 8260B Volatiles
212351	212352	2	LCS	87478	LCS		SW-846 8260B Volatiles
212351	212352	3	MS	87479	B2MTC8(130053001MS)	130053001	SW-846 8260B Volatiles
212351	212352	4	MSD	87480	B2MTC8(130053001MSD	130053001	SW-846 8260B Volatiles
212351	212352	5	SAMPLE	130053001	B2MTC8		SW-846 8260B Volatiles
212351	212352	6	SAMPLE	130053002	B2MTD4		SW-846 8260B Volatiles
212351	212352	7	SAMPLE	130053003	B2MTD1		SW-846 8260B Volatiles

Quality Control Report

Attention Scot Fitzgerald
Department Organic, Volatiles

Group # WSCF130053

Analytical Batch 212352 (QC Batch: 212351)
Associated Samples 130053001, 130053002, 130053003

Test SW-846 8260B Volatiles

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
BLANK			**QC Sample #87477**							
1,1-Dichloroethene	75-35-4		<1	ug/L					U	01/10/13
Trichloroethene	79-01-6		<1	ug/L					U	01/10/13
Benzene	71-43-2		<1	ug/L					U	01/10/13
Toluene	108-88-3		<1	ug/L					U	01/10/13
Chlorobenzene	108-90-7		<1	ug/L					U	01/10/13
1,1-Dichloroethane	75-34-3		<1	ug/L					U	01/10/13
Ethylbenzene	100-41-4		<1	ug/L					U	01/10/13
Styrene	100-42-5		<1	ug/L					U	01/10/13
cis-1,3-Dichloropropene	10061-01-5		<1	ug/L					U	01/10/13
trans-1,3-Dichloropropene	10061-02-6		<1	ug/L					U	01/10/13
1,2-Dichloroethane	107-06-2		<1	ug/L					U	01/10/13
Methyl isobutyl ketone	108-10-1		<1	ug/L					U	01/10/13
Dibromochloromethane	124-48-1		<1	ug/L					U	01/10/13
Tetrachloroethene	127-18-4		<1	ug/L					U	01/10/13
Total Xylenes	1330-20-7		<1	ug/L					U	01/10/13

* - QC result out of range n/a - Not Applicable

Quality Control Report

Attention Scot Fitzgerald
Department Organic, Volatiles

Group # WSCF130053

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
Total 1,2-Dichloroethene	540-59-0		<1	ug/L					U	01/10/13
Carbon tetrachloride	56-23-5		<1	ug/L					U	01/10/13
2-Hexanone	591-78-6		<1	ug/L					U	01/10/13
Acetone	67-64-1		<1	ug/L					U	01/10/13
Chloroform	67-66-3		<1	ug/L					U	01/10/13
1,1,1-Trichloroethane	71-55-6		<1	ug/L					U	01/10/13
Bromomethane	74-83-9		<1	ug/L					U	01/10/13
Chloromethane	74-87-3		<1	ug/L					U	01/10/13
Chloroethane	75-00-3		<1	ug/L					U	01/10/13
Vinyl chloride	75-01-4		<1	ug/L					U	01/10/13
Methylene chloride	75-09-2		<1	ug/L					U	01/10/13
Carbon disulfide	75-15-0		<1	ug/L					U	01/10/13
Bromoform	75-25-2		<1	ug/L					U	01/10/13
Bromodichloromethane	75-27-4		<1	ug/L					U	01/10/13
1,2-Dichloropropane	78-87-5		<1	ug/L					U	01/10/13
Methyl ethyl ketone	78-93-3		<1	ug/L					U	01/10/13
1,1,2-Trichloroethane	79-00-5		<1	ug/L					U	01/10/13
1,1,2,2-Tetrachloroethane	79-34-5		<1	ug/L					U	01/10/13
LCS			**QC Sample #87478**							
1,1-Dichloroethene	75-35-4		22	ug/L	88.7	75 - 125				01/10/13
Trichloroethene	79-01-6		24	ug/L	94.9	75 - 125				01/10/13

* - QC result out of range n/a - Not Applicable

Quality Control Report

Attention Scot Fitzgerald
Department Organic, Volatiles

Group # WSCF130053

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
Benzene	71-43-2		24	ug/L	95.6	75 - 125				01/10/13
Toluene	108-88-3		23	ug/L	93.4	75 - 125				01/10/13
Chlorobenzene	108-90-7		25	ug/L	100.6	75 - 125				01/10/13
1,1-Dichloroethane	75-34-3		21	ug/L	85	75 - 125				01/10/13
Ethylbenzene	100-41-4		23	ug/L	93.8	75 - 125				01/10/13
Styrene	100-42-5		25	ug/L	98.2	75 - 125				01/10/13
trans-1,3-Dichloropropene	10061-02-6		25	ug/L	100.1	75 - 125				01/10/13
1,2-Dichloroethane	107-06-2		26	ug/L	104.6	75 - 125				01/10/13
1,1,1-Trichloroethane	71-55-6		24	ug/L	97.8	75 - 125				01/10/13
Dibromochloromethane	124-48-1		25	ug/L	100.7	75 - 125				01/10/13
Carbon disulfide	75-15-0		20	ug/L	79.9	75 - 125				01/10/13
Bromoform	75-25-2		25	ug/L	101.8	75 - 125				01/10/13
Bromodichloromethane	75-27-4		26	ug/L	104.9	75 - 125				01/10/13
1,2-Dichloropropane	78-87-5		25	ug/L	99.7	75 - 125				01/10/13
1,1,2-Trichloroethane	79-00-5		25	ug/L	98.7	75 - 125				01/10/13
1,1,2,2-Tetrachloroethane	79-34-5		25	ug/L	98.9	75 - 125				01/10/13
MS			**QC Sample #87479**							
			Original 130053001							
1,1-Dichloroethene	75-35-4	<10	200	ug/L	80.6	75 - 125				01/10/13
Trichloroethene	79-01-6	<10	250	ug/L	98.2	75 - 125				01/10/13
Benzene	71-43-2	<10	230	ug/L	93.6	75 - 125				01/10/13

* - QC result out of range n/a - Not Applicable

Quality Control Report

Attention Scot Fitzgerald
Department Organic, Volatiles

Group # WSCF130053

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
Toluene	108-88-3	<10	230	ug/L	92.7	75 - 125				01/10/13
Chlorobenzene	108-90-7	<10	240	ug/L	97.6	75 - 125				01/10/13
1,1-Dichloroethane	75-34-3	<10	230	ug/L	91.7	75 - 125				01/10/13
Ethylbenzene	100-41-4	<10	230	ug/L	93	75 - 125				01/10/13
Styrene	100-42-5	<10	240	ug/L	94.2	75 - 125				01/10/13
trans-1,3-Dichloropropene	10061-02-6	<10	250	ug/L	101.9	75 - 125				01/10/13
1,2-Dichloroethane	107-06-2	<10	210	ug/L	83.6	75 - 125				01/10/13
1,1,1-Trichloroethane	71-55-6	<10	250	ug/L	100.1	75 - 125				01/10/13
Dibromochloromethane	124-48-1	<10	240	ug/L	95.6	75 - 125				01/10/13
Carbon disulfide	75-15-0	<10	190	ug/L	77.8	75 - 125				01/10/13
Bromoform	75-25-2	<10	230	ug/L	91.4	75 - 125				01/10/13
Bromodichloromethane	75-27-4	<10	250	ug/L	101.6	75 - 125				01/10/13
1,2-Dichloropropane	78-87-5	<10	240	ug/L	95.3	75 - 125				01/10/13
1,1,2-Trichloroethane	79-00-5	<10	240	ug/L	96.7	75 - 125				01/10/13
1,1,2,2-Tetrachloroethane	79-34-5	<10	250	ug/L	101.3	75 - 125				01/10/13
MSD			**QC Sample #87480**							
			Original 130053001						**Paired 87479**	
1,1-Dichloroethene	75-35-4	<10	210	ug/L	85.1	75 - 125	5.40	20		01/10/13
Trichloroethene	79-01-6	<10	250	ug/L	99	75 - 125	0.90	20		01/10/13
Benzene	71-43-2	<10	240	ug/L	94.2	75 - 125	0.60	20		01/10/13
Toluene	108-88-3	<10	240	ug/L	94.8	75 - 125	2.20	20		01/10/13

* - QC result out of range n/a - Not Applicable

Quality Control Report

Attention Scot Fitzgerald
Department Organic, Volatiles

Group # WSCF130053

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
Chlorobenzene	108-90-7	<10	240	ug/L	96.6	75 - 125	1.00	20		01/10/13
1,1-Dichloroethane	75-34-3	<10	230	ug/L	90.8	75 - 125	1.00	20		01/10/13
Ethylbenzene	100-41-4	<10	240	ug/L	94.2	75 - 125	1.20	20		01/10/13
Styrene	100-42-5	<10	240	ug/L	97.5	75 - 125	3.40	20		01/10/13
trans-1,3-Dichloropropene	10061-02-6	<10	250	ug/L	98.9	75 - 125	3.00	20		01/10/13
1,2-Dichloroethane	107-06-2	<10	190	ug/L	76	75 - 125	9.50	20		01/10/13
1,1,1-Trichloroethane	71-55-6	<10	250	ug/L	101.3	75 - 125	1.20	20		01/10/13
Dibromochloromethane	124-48-1	<10	230	ug/L	92	75 - 125	3.80	20		01/10/13
Carbon disulfide	75-15-0	<10	200	ug/L	81.1	75 - 125	4.20	20		01/10/13
Bromoform	75-25-2	<10	230	ug/L	90.2	75 - 125	1.30	20		01/10/13
Bromodichloromethane	75-27-4	<10	250	ug/L	99.7	75 - 125	1.90	20		01/10/13
1,2-Dichloropropane	78-87-5	<10	230	ug/L	93.7	75 - 125	1.70	20		01/10/13
1,1,2-Trichloroethane	79-00-5	<10	230	ug/L	91.9	75 - 125	5.10	20		01/10/13
1,1,2,2-Tetrachloroethane	79-34-5	<10	230	ug/L	91.8	75 - 125	9.80	20		01/10/13
SAMPLE			**Sample #130053001**							
1,2-Dichloroethane-d4	17060-07-0				102.6	75 - 125				01/10/13
Toluene-d8	2037-26-5				97.4	75 - 125				01/10/13
4-Bromofluorobenzene	460-00-4				98.6	75 - 125				01/10/13
SAMPLE			**Sample #130053002**							

* - QC result out of range n/a - Not Applicable

Quality Control Report

Attention Scot Fitzgerald
Department Organic, Volatiles

Group # WSCF130053

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
1,2-Dichloroethane-d4	17060-07-0				99.6	75 - 125				01/10/13
Toluene-d8	2037-26-5				99.6	75 - 125				01/10/13
4-Bromofluorobenzene	460-00-4				100.2	75 - 125				01/10/13
SAMPLE			**Sample #130053003**							
1,2-Dichloroethane-d4	17060-07-0				94.2	75 - 125				01/10/13
Toluene-d8	2037-26-5				102.3	75 - 125				01/10/13
4-Bromofluorobenzene	460-00-4				101.8	75 - 125				01/10/13
BLANK			**QC Sample #87477**							
1,2-Dichloroethane-d4	17060-07-0				101.4	75 - 125				01/10/13
Toluene-d8	2037-26-5				98.6	75 - 125				01/10/13
4-Bromofluorobenzene	460-00-4				100.5	75 - 125				01/10/13
LCS			**QC Sample #87478**							
1,2-Dichloroethane-d4	17060-07-0				108.1	75 - 125				01/10/13
Toluene-d8	2037-26-5				98.2	75 - 125				01/10/13
4-Bromofluorobenzene	460-00-4				97.9	75 - 125				01/10/13
MS			**QC Sample #87479**							
			Original	**130053001**						
1,2-Dichloroethane-d4	17060-07-0				104	75 - 125				01/10/13
Toluene-d8	2037-26-5				98.6	75 - 125				01/10/13

* - QC result out of range n/a - Not Applicable

Quality Control Report

Attention Scot Fitzgerald
Department Organic, Volatiles

Group # WSCF130053

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
4-Bromofluorobenzene	460-00-4				101	75 - 125				01/10/13
MSD			**QC Sample #87480**							
			Original	**130053001**				**Paired**	**87479**	
4-Bromofluorobenzene	460-00-4				93.9	75 - 125	n/a			01/10/13
1,2-Dichloroethane-d4	17060-07-0				97.2	75 - 125	n/a			01/10/13
Toluene-d8	2037-26-5				97.8	75 - 125	n/a			01/10/13

* - QC result out of range n/a - Not Applicable

Batch QC List

Attention Scot Fitzgerald
Department Organic, Volatiles

Group # WSCF130128

QC Batch	Analytical Batch	S#	Type	Sample #	Client Sample#	Original	Test
213025	213026	1	BLANK	88559	BLANK		SW-846 8260B Volatiles
213025	213026	2	LCS	88560	LCS		SW-846 8260B Volatiles
213025	213026	3	MS	88561	B2N368(130128001MS)	130128001	SW-846 8260B Volatiles
213025	213026	4	MSD	88562	B2N368(130128001MSD)	130128001	SW-846 8260B Volatiles
213025	213026	5	SAMPLE	130128001	B2N368		SW-846 8260B Volatiles
213025	213026	6	SAMPLE	130128001	B2N368		SW-846 8260B Volatiles
213025	213026	7	SAMPLE	130128002	B2N371		SW-846 8260B Volatiles
213025	213026	8	SAMPLE	130128002	B2N371		SW-846 8260B Volatiles

Quality Control Report

Attention Scot Fitzgerald
Department Organic, Volatiles

Group # WSCF130128

Analytical Batch 213026 (QC Batch: 213025)
Associated Samples 130128001, 130128002

Test SW-846 8260B Volatiles

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
BLANK			**QC Sample #88559**							
1,1-Dichloroethene	75-35-4		<1	ug/L					U	01/30/13
Trichloroethene	79-01-6		<1	ug/L					U	01/30/13
Benzene	71-43-2		<1	ug/L					U	01/30/13
Toluene	108-88-3		<1	ug/L					U	01/30/13
Chlorobenzene	108-90-7		<1	ug/L					U	01/30/13
1,1-Dichloroethane	75-34-3		<1	ug/L					U	01/30/13
Ethylbenzene	100-41-4		<1	ug/L					U	01/30/13
Styrene	100-42-5		<1	ug/L					U	01/30/13
cis-1,3-Dichloropropene	10061-01-5		<1	ug/L					U	01/30/13
trans-1,3-Dichloropropene	10061-02-6		<1	ug/L					U	01/30/13
1,2-Dichloroethane	107-06-2		<1	ug/L					U	01/30/13
Methyl isobutyl ketone	108-10-1		<1	ug/L					U	01/30/13
Dibromochloromethane	124-48-1		<1	ug/L					U	01/30/13
Tetrachloroethene	127-18-4		<1	ug/L					U	01/30/13
Total Xylenes	1330-20-7		<1	ug/L					U	01/30/13

* - QC result out of range n/a - Not Applicable

Quality Control Report

Attention Scot Fitzgerald
Department Organic, Volatiles

Group # WSCF130128

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
Total 1,2-Dichloroethene	540-59-0		<1	ug/L					U	01/30/13
Carbon tetrachloride	56-23-5		<1	ug/L					U	01/30/13
2-Hexanone	591-78-6		<1	ug/L					U	01/30/13
Acetone	67-64-1		<1	ug/L					U	01/30/13
Chloroform	67-66-3		<1	ug/L					U	01/30/13
1,1,1-Trichloroethane	71-55-6		<1	ug/L					U	01/30/13
Bromomethane	74-83-9		<1	ug/L					U	01/30/13
Chloromethane	74-87-3		<1	ug/L					U	01/30/13
Chloroethane	75-00-3		<1	ug/L					U	01/30/13
Vinyl chloride	75-01-4		<1	ug/L					U	01/30/13
Methylene chloride	75-09-2		<1	ug/L					U	01/30/13
Carbon disulfide	75-15-0		<1	ug/L					U	01/30/13
Bromoform	75-25-2		<1	ug/L					U	01/30/13
Bromodichloromethane	75-27-4		<1	ug/L					U	01/30/13
1,2-Dichloropropane	78-87-5		<1	ug/L					U	01/30/13
Methyl ethyl ketone	78-93-3		<1	ug/L					U	01/30/13
1,1,2-Trichloroethane	79-00-5		<1	ug/L					U	01/30/13
1,1,2,2-Tetrachloroethane	79-34-5		<1	ug/L					U	01/30/13
LCS			**QC Sample #88560**							
1,1-Dichloroethene	75-35-4		28	ug/L	110.5	75 - 125				01/30/13
Trichloroethene	79-01-6		28	ug/L	112.5	75 - 125				01/30/13

* - QC result out of range n/a - Not Applicable

Quality Control Report

Attention Scot Fitzgerald
Department Organic, Volatiles

Group # WSCF130128

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
Benzene	71-43-2		28	ug/L	110.1	75 - 125				01/30/13
Toluene	108-88-3		27	ug/L	108.4	75 - 125				01/30/13
Chlorobenzene	108-90-7		28	ug/L	111	75 - 125				01/30/13
1,1-Dichloroethane	75-34-3		27	ug/L	109.9	75 - 125				01/30/13
Ethylbenzene	100-41-4		28	ug/L	112	75 - 125				01/30/13
Styrene	100-42-5		28	ug/L	113	75 - 125				01/30/13
trans-1,3-Dichloropropene	10061-02-6		27	ug/L	109.3	75 - 125				01/30/13
1,2-Dichloroethane	107-06-2		31	ug/L	124.3	75 - 125				01/30/13
1,1,1-Trichloroethane	71-55-6		29	ug/L	114.2	75 - 125				01/30/13
Dibromochloromethane	124-48-1		28	ug/L	112.2	75 - 125				01/30/13
Carbon disulfide	75-15-0		27	ug/L	106.2	75 - 125				01/30/13
Bromoform	75-25-2		30	ug/L	121.3	75 - 125				01/30/13
Bromodichloromethane	75-27-4		29	ug/L	116.6	75 - 125				01/30/13
1,2-Dichloropropane	78-87-5		28	ug/L	111.9	75 - 125				01/30/13
1,1,2-Trichloroethane	79-00-5		30	ug/L	118.2	75 - 125				01/30/13
1,1,2,2-Tetrachloroethane	79-34-5		28	ug/L	110.8	75 - 125				01/30/13
MS			**QC Sample #88561**							
			Original 130128001							
1,1-Dichloroethene	75-35-4	<1	27	ug/L	107.9	75 - 125				01/30/13
Trichloroethene	79-01-6	4.9	28	ug/L	110.8	75 - 125				01/30/13
Benzene	71-43-2	<1	27	ug/L	108.6	75 - 125				01/30/13

* - QC result out of range n/a - Not Applicable

Quality Control Report

Attention Scot Fitzgerald
Department Organic, Volatiles

Group # WSCF130128

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
Toluene	108-88-3	<1	27	ug/L	109.5	75 - 125				01/30/13
Chlorobenzene	108-90-7	<1	27	ug/L	108.9	75 - 125				01/30/13
1,1-Dichloroethane	75-34-3	<1	27	ug/L	107.3	75 - 125				01/30/13
Ethylbenzene	100-41-4	<1	28	ug/L	111.4	75 - 125				01/30/13
Styrene	100-42-5	<1	28	ug/L	110.3	75 - 125				01/30/13
trans-1,3-Dichloropropene	10061-02-6	<1	27	ug/L	107.5	75 - 125				01/30/13
1,2-Dichloroethane	107-06-2	<1	28	ug/L	110.5	75 - 125				01/30/13
1,1,1-Trichloroethane	71-55-6	<1	29	ug/L	115	75 - 125				01/30/13
Dibromochloromethane	124-48-1	<1	27	ug/L	108.6	75 - 125				01/30/13
Carbon disulfide	75-15-0	<1	26	ug/L	103.4	75 - 125				01/30/13
Bromoform	75-25-2	<1	28	ug/L	110.2	75 - 125				01/30/13
Bromodichloromethane	75-27-4	<1	30	ug/L	118.4	75 - 125				01/30/13
1,2-Dichloropropane	78-87-5	<1	27	ug/L	108.8	75 - 125				01/30/13
1,1,2-Trichloroethane	79-00-5	<1	27	ug/L	108	75 - 125				01/30/13
1,1,2,2-Tetrachloroethane	79-34-5	<1	28	ug/L	111.5	75 - 125				01/30/13
MSD			**QC Sample #88562**							
			Original	**130128001**					**Paired**	**88561**
1,1-Dichloroethene	75-35-4	<1	28	ug/L	110.6	75 - 125	2.40	20		01/30/13
Trichloroethene	79-01-6	4.9	28	ug/L	112.2	75 - 125	1.10	20		01/30/13
Benzene	71-43-2	<1	28	ug/L	110.3	75 - 125	1.50	20		01/30/13
Toluene	108-88-3	<1	28	ug/L	110.3	75 - 125	0.70	20		01/30/13

* - QC result out of range n/a - Not Applicable

Quality Control Report

Attention Scot Fitzgerald
Department Organic, Volatiles

Group # WSCF130128

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
Chlorobenzene	108-90-7	<1	28	ug/L	111	75 - 125	2.00	20		01/30/13
1,1-Dichloroethane	75-34-3	<1	27	ug/L	109.4	75 - 125	2.00	20		01/30/13
Ethylbenzene	100-41-4	<1	28	ug/L	112.6	75 - 125	1.10	20		01/30/13
Styrene	100-42-5	<1	28	ug/L	113.1	75 - 125	2.50	20		01/30/13
trans-1,3-Dichloropropene	10061-02-6	<1	28	ug/L	111.7	75 - 125	3.80	20		01/30/13
1,2-Dichloroethane	107-06-2	<1	29	ug/L	116.5	75 - 125	5.30	20		01/30/13
1,1,1-Trichloroethane	71-55-6	<1	29	ug/L	116	75 - 125	0.80	20		01/30/13
Dibromochloromethane	124-48-1	<1	28	ug/L	113	75 - 125	4.00	20		01/30/13
Carbon disulfide	75-15-0	<1	26	ug/L	105.9	75 - 125	2.40	20		01/30/13
Bromoform	75-25-2	<1	30	ug/L	118.2	75 - 125	7.10	20		01/30/13
Bromodichloromethane	75-27-4	<1	30	ug/L	121.6	75 - 125	2.70	20		01/30/13
1,2-Dichloropropane	78-87-5	<1	28	ug/L	112.1	75 - 125	3.00	20		01/30/13
1,1,2-Trichloroethane	79-00-5	<1	28	ug/L	113	75 - 125	4.60	20		01/30/13
1,1,2,2-Tetrachloroethane	79-34-5	<1	30	ug/L	122	75 - 125	9.00	20		01/30/13

* - QC result out of range

n/a - Not Applicable

Quality Control Report

Attention Scot Fitzgerald
Department Organic, Volatiles

Group # WSCF130128

Analytical Batch 213026 (QC Batch: 213025)
Associated Samples 130128001, 130128002

Test SW-846 8260B Volatiles

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
SAMPLE			**Sample #130128001**							
1,2-Dichloroethane-d4	17060-07-0				89.6	75 - 125				01/30/13
Toluene-d8	2037-26-5				92.4	75 - 125				01/30/13
4-Bromofluorobenzene	460-00-4				91.5	75 - 125				01/30/13
SAMPLE			**Sample #130128002**							
1,2-Dichloroethane-d4	17060-07-0				89.6	75 - 125				01/30/13
Toluene-d8	2037-26-5				91.9	75 - 125				01/30/13
4-Bromofluorobenzene	460-00-4				91.4	75 - 125				01/30/13
BLANK			**QC Sample #88559**							
1,2-Dichloroethane-d4	17060-07-0				90.8	75 - 125				01/30/13
Toluene-d8	2037-26-5				92.8	75 - 125				01/30/13
4-Bromofluorobenzene	460-00-4				91.9	75 - 125				01/30/13
LCS			**QC Sample #88560**							
1,2-Dichloroethane-d4	17060-07-0				96.9	75 - 125				01/30/13

* - QC result out of range n/a - Not Applicable

Quality Control Report

Attention Scot Fitzgerald
Department Organic, Volatiles

Group # WSCF130128

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
Toluene-d8	2037-26-5				92.4	75 - 125				01/30/13
4-Bromofluorobenzene	460-00-4				91.5	75 - 125				01/30/13
MS			**QC Sample #88561**							
			Original	**130128001**						
1,2-Dichloroethane-d4	17060-07-0				90.1	75 - 125				01/30/13
Toluene-d8	2037-26-5				92.9	75 - 125				01/30/13
4-Bromofluorobenzene	460-00-4				91.4	75 - 125				01/30/13
MSD			**QC Sample #88562**							
			Original	**130128001**				**Paired**	**88561**	
1,2-Dichloroethane-d4	17060-07-0				91.7	75 - 125	n/a			01/30/13
Toluene-d8	2037-26-5				92.2	75 - 125	n/a			01/30/13
4-Bromofluorobenzene	460-00-4				92.2	75 - 125	n/a			01/30/13

* - QC result out of range n/a - Not Applicable

Batch QC List

Attention Scot Fitzgerald
Department Organic, Volatiles

Group # WSCF130232

QC Batch	Analytical Batch	S#	Type	Sample #	Client Sample#	Original	Test
213796	213797	1	BLANK	89387	BLANK		SW-846 8260B Volatiles
213796	213797	2	LCS	89388	LCS		SW-846 8260B Volatiles
213796	213797	3	MS	89389	B2NNT6(130232005MS)	130232005	SW-846 8260B Volatiles
213796	213797	4	MSD	89390	B2NNT6(130232005MSD	130232005	SW-846 8260B Volatiles
213796	213797	12	SAMPLE	130232005	B2NNT6		SW-846 8260B Volatiles
213796	213797	13	SAMPLE	130232005	B2NNT6		SW-846 8260B Volatiles
213796	213797	14	SAMPLE	130232006	B2NNV0		SW-846 8260B Volatiles

Quality Control Report

Attention Scot Fitzgerald
Department Organic, Volatiles

Group # WSCF130232

Analytical Batch 213797 (QC Batch: 213796)
Associated Samples 130232005, 130232006

Test SW-846 8260B Volatiles

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
BLANK			**QC Sample #89387**							
1,1-Dichloroethene	75-35-4		<1	ug/L					U	02/13/13
Trichloroethene	79-01-6		<0.5	ug/L					U	02/13/13
Benzene	71-43-2		<1	ug/L					U	02/13/13
Toluene	108-88-3		<1	ug/L					U	02/13/13
Chlorobenzene	108-90-7		<1	ug/L					U	02/13/13
1,1-Dichloroethane	75-34-3		<1	ug/L					U	02/13/13
Ethylbenzene	100-41-4		<1	ug/L					U	02/13/13
Styrene	100-42-5		<1	ug/L					U	02/13/13
cis-1,3-Dichloropropene	10061-01-5		<1	ug/L					U	02/13/13
trans-1,3-Dichloropropene	10061-02-6		<1	ug/L					U	02/13/13
1,2-Dichloroethane	107-06-2		<1	ug/L					U	02/13/13
Methyl isobutyl ketone	108-10-1		<1	ug/L					U	02/13/13
Dibromochloromethane	124-48-1		<1	ug/L					U	02/13/13
Tetrachloroethene	127-18-4		<1	ug/L					U	02/13/13
Total Xylenes	1330-20-7		<1	ug/L					U	02/13/13

* - QC result out of range n/a - Not Applicable

Quality Control Report

Attention Scot Fitzgerald
Department Organic, Volatiles

Group # WSCF130232

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
Total 1,2-Dichloroethene	540-59-0		<1	ug/L					U	02/13/13
Carbon tetrachloride	56-23-5		<1	ug/L					U	02/13/13
2-Hexanone	591-78-6		<5	ug/L					U	02/13/13
Acetone	67-64-1		<5	ug/L					U	02/13/13
Chloroform	67-66-3		<1	ug/L					U	02/13/13
1,1,1-Trichloroethane	71-55-6		<1	ug/L					U	02/13/13
Bromomethane	74-83-9		<1	ug/L					U	02/13/13
Chloromethane	74-87-3		<2	ug/L					U	02/13/13
Chloroethane	75-00-3		<2	ug/L					U	02/13/13
Vinyl chloride	75-01-4		<1	ug/L					U	02/13/13
Methylene chloride	75-09-2		<1	ug/L					U	02/13/13
Carbon disulfide	75-15-0		<1	ug/L					U	02/13/13
Bromoform	75-25-2		<1	ug/L					U	02/13/13
Bromodichloromethane	75-27-4		<1	ug/L					U	02/13/13
1,2-Dichloropropane	78-87-5		<1	ug/L					U	02/13/13
Methyl ethyl ketone	78-93-3		<1	ug/L					U	02/13/13
1,1,2-Trichloroethane	79-00-5		<1	ug/L					U	02/13/13
1,1,2,2-Tetrachloroethane	79-34-5		<1	ug/L					U	02/13/13
LCS			**QC Sample #89388**							
1,1-Dichloroethene	75-35-4		23	ug/L	90.1	75 - 125				02/13/13
Trichloroethene	79-01-6		24	ug/L	97.5	75 - 125				02/13/13

* - QC result out of range n/a - Not Applicable

Quality Control Report

Attention Scot Fitzgerald
Department Organic, Volatiles

Group # WSCF130232

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
Benzene	71-43-2		22	ug/L	89.4	75 - 125				02/13/13
Toluene	108-88-3		23	ug/L	90.6	75 - 125				02/13/13
Chlorobenzene	108-90-7		24	ug/L	96.6	75 - 125				02/13/13
1,1-Dichloroethane	75-34-3		22	ug/L	86.4	75 - 125				02/13/13
Ethylbenzene	100-41-4		24	ug/L	94.7	75 - 125				02/13/13
Styrene	100-42-5		24	ug/L	94.4	75 - 125				02/13/13
trans-1,3-Dichloropropene	10061-02-6		27	ug/L	107.3	75 - 125				02/13/13
1,2-Dichloroethane	107-06-2		26	ug/L	103.7	75 - 125				02/13/13
1,1,1-Trichloroethane	71-55-6		26	ug/L	105.4	75 - 125				02/13/13
Dibromochloromethane	124-48-1		26	ug/L	104.7	75 - 125				02/13/13
Carbon disulfide	75-15-0		20	ug/L	79.3	75 - 125				02/13/13
Bromoform	75-25-2		28	ug/L	113.5	75 - 125				02/13/13
Bromodichloromethane	75-27-4		26	ug/L	102.4	75 - 125				02/13/13
1,2-Dichloropropane	78-87-5		22	ug/L	88.8	75 - 125				02/13/13
1,1,2-Trichloroethane	79-00-5		24	ug/L	98	75 - 125				02/13/13
1,1,2,2-Tetrachloroethane	79-34-5		24	ug/L	95.4	75 - 125				02/13/13
MS			**QC Sample #89389**							
			Original 130232005							
1,1-Dichloroethene	75-35-4	<1	22	ug/L	88.2	75 - 125				02/13/13
Trichloroethene	79-01-6	0.59	25	ug/L	98.9	75 - 125				02/13/13
Benzene	71-43-2	<1	24	ug/L	94.9	75 - 125				02/13/13

* - QC result out of range n/a - Not Applicable

Quality Control Report

Attention Scot Fitzgerald
Department Organic, Volatiles

Group # WSCF130232

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
Toluene	108-88-3	<1	22	ug/L	86.9	75 - 125				02/13/13
Chlorobenzene	108-90-7	<1	24	ug/L	94.6	75 - 125				02/13/13
1,1-Dichloroethane	75-34-3	<1	21	ug/L	85.9	75 - 125				02/13/13
Ethylbenzene	100-41-4	<1	23	ug/L	93.1	75 - 125				02/13/13
Styrene	100-42-5	<1	23	ug/L	93.8	75 - 125				02/13/13
trans-1,3-Dichloropropene	10061-02-6	<1	26	ug/L	104.8	75 - 125				02/13/13
1,2-Dichloroethane	107-06-2	<1	26	ug/L	105.2	75 - 125				02/13/13
1,1,1-Trichloroethane	71-55-6	<1	27	ug/L	106.5	75 - 125				02/13/13
Dibromochloromethane	124-48-1	<1	26	ug/L	105.8	75 - 125				02/13/13
Carbon disulfide	75-15-0	<1	19	ug/L	77	75 - 125				02/13/13
Bromoform	75-25-2	<1	30	ug/L	119	75 - 125				02/13/13
Bromodichloromethane	75-27-4	<1	27	ug/L	107.4	75 - 125				02/13/13
1,2-Dichloropropane	78-87-5	<1	23	ug/L	92	75 - 125				02/13/13
1,1,2-Trichloroethane	79-00-5	<1	25	ug/L	98.4	75 - 125				02/13/13
1,1,2,2-Tetrachloroethane	79-34-5	<1	24	ug/L	98	75 - 125				02/13/13
MSD			**QC Sample #89390**							
			Original 130232005						**Paired 89389**	
1,1-Dichloroethene	75-35-4	<1	23	ug/L	92.3	75 - 125	4.60	20		02/13/13
Trichloroethene	79-01-6	0.59	25	ug/L	100.7	75 - 125	1.70	20		02/13/13
Benzene	71-43-2	<1	24	ug/L	96.3	75 - 125	1.50	20		02/13/13
Toluene	108-88-3	<1	24	ug/L	94	75 - 125	7.90	20		02/13/13

* - QC result out of range n/a - Not Applicable

Quality Control Report

Attention Scot Fitzgerald
Department Organic, Volatiles

Group # WSCF130232

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
Chlorobenzene	108-90-7	<1	25	ug/L	99	75 - 125	4.60	20		02/13/13
1,1-Dichloroethane	75-34-3	<1	22	ug/L	88.5	75 - 125	2.90	20		02/13/13
Ethylbenzene	100-41-4	<1	25	ug/L	98.5	75 - 125	5.60	20		02/13/13
Styrene	100-42-5	<1	24	ug/L	97	75 - 125	3.40	20		02/13/13
trans-1,3-Dichloropropene	10061-02-6	<1	26	ug/L	104.5	75 - 125	0.30	20		02/13/13
1,2-Dichloroethane	107-06-2	<1	26	ug/L	102	75 - 125	3.10	20		02/13/13
1,1,1-Trichloroethane	71-55-6	<1	27	ug/L	108.7	75 - 125	2.10	20		02/13/13
Dibromochloromethane	124-48-1	<1	26	ug/L	104.6	75 - 125	1.10	20		02/13/13
Carbon disulfide	75-15-0	<1	20	ug/L	80.2	75 - 125	4.00	20		02/13/13
Bromoform	75-25-2	<1	28	ug/L	110.9	75 - 125	7.10	20		02/13/13
Bromodichloromethane	75-27-4	<1	27	ug/L	107.5	75 - 125	0.10	20		02/13/13
1,2-Dichloropropane	78-87-5	<1	23	ug/L	92.9	75 - 125	1.00	20		02/13/13
1,1,2-Trichloroethane	79-00-5	<1	24	ug/L	97	75 - 125	1.40	20		02/13/13
1,1,2,2-Tetrachloroethane	79-34-5	<1	23	ug/L	91	75 - 125	7.40	20		02/13/13

* - QC result out of range

n/a - Not Applicable

Quality Control Report

Attention Scot Fitzgerald
Department Organic, Volatiles

Group # WSCF130232

Analytical Batch 213797 (QC Batch: 213796)
Associated Samples 130232005, 130232006

Test SW-846 8260B Volatiles

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
SAMPLE			**Sample #130232005**							
1,2-Dichloroethane-d4	17060-07-0				101.7	75 - 125				02/13/13
Toluene-d8	2037-26-5				92.5	75 - 125				02/13/13
4-Bromofluorobenzene	460-00-4				89.8	75 - 125				02/13/13
SAMPLE			**Sample #130232006**							
1,2-Dichloroethane-d4	17060-07-0				102.4	75 - 125				02/13/13
Toluene-d8	2037-26-5				91.6	75 - 125				02/13/13
4-Bromofluorobenzene	460-00-4				90.4	75 - 125				02/13/13
BLANK			**QC Sample #89387**							
1,2-Dichloroethane-d4	17060-07-0				103.8	75 - 125				02/13/13
Toluene-d8	2037-26-5				91.4	75 - 125				02/13/13
4-Bromofluorobenzene	460-00-4				88	75 - 125				02/13/13
LCS			**QC Sample #89388**							
1,2-Dichloroethane-d4	17060-07-0				103.6	75 - 125				02/13/13

* - QC result out of range n/a - Not Applicable

Quality Control Report

Attention Scot Fitzgerald
Department Organic, Volatiles

Group # WSCF130232

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
Toluene-d8	2037-26-5				91.7	75 - 125				02/13/13
4-Bromofluorobenzene	460-00-4				88.4	75 - 125				02/13/13
MS			**QC Sample #89389**							
			Original	**130232005**						
1,2-Dichloroethane-d4	17060-07-0				110	75 - 125				02/13/13
Toluene-d8	2037-26-5				88.1	75 - 125				02/13/13
4-Bromofluorobenzene	460-00-4				87	75 - 125				02/13/13
MSD			**QC Sample #89390**							
			Original	**130232005**				**Paired**	**89389**	
1,2-Dichloroethane-d4	17060-07-0				102.6	75 - 125	n/a			02/13/13
Toluene-d8	2037-26-5				88.8	75 - 125	n/a			02/13/13
4-Bromofluorobenzene	460-00-4				87.2	75 - 125	n/a			02/13/13

* - QC result out of range n/a - Not Applicable

Date: 02 September 2013
To: CH2M Hill (technical representative)
From: Analytical Quality Associates, Inc.
Project: 200 Area SGRP
Subject: Inorganics - Sample Data Groups (SDGs) WSCF130128 and WSCF130232

INTRODUCTION

This memorandum presents the results of data validation for SDGs WSCF130128 and WSCF130232 prepared by WSCF Analytical Laboratory. A list of samples validated along with the analytical methods is provided in the following table.

Sample ID	Sample Date	Media	Validation Level	Analytical Methods
B2N369	01/24/13	Water	C	6010, 200.8
B2N372	01/24/13	Water	C	6010, 200.8
B2NNT6	02/12/13	Water	C	6010, 200.8
B2NNV0	02/12/13	Water	C	6010, 200.8

Data validation was conducted in accordance with the CHPRC validation statement of work and the Sampling Analysis Plan for Eighteen Remediation Wells in the 200-ZP-1 Operable Units, DOE/RL-2010-72, Rev. 1 (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 requires acid preservation with nitric acid to pH <2.

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

- **Blanks**

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

Laboratory Blanks

All laboratory blank results were acceptable with the following exceptions.

For SDG WSCF130128, the V laboratory blank result was > the method detection limit (MDL) but < the reporting limit (RL). The V results for samples B2N369 and B2N372 were well above the RL and should not be qualified.

For SDG WSCF130232, the Sr laboratory blank result was > the MDL but < the RL. The Sr results for samples B2NNT6 and B2NNV0 were well above the RL and should not be qualified.

Trip Blanks

No trip blanks were submitted for validation.

Field Blanks

No field blanks were submitted for validation.

Equipment Blanks

No equipment blanks were submitted for validation.

- **Accuracy**

Accuracy is evaluated by reviewing matrix spike sample results, laboratory control sample results, and ICP-AES interference check sample results. According to the SAP, the laboratory control sample and the matrix spike sample accuracy limits are 80% to 120%.

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

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

For SDG WSCF130232, the MS and MSD recoveries for Fe were > the upper acceptance limit. The Fe results for samples B2NNT6 and B2NNV0 were detects and should be qualified as estimates and flagged "J+."

Laboratory Control Samples (LCSs)

All LCS recoveries were acceptable.

ICP-AES Interference Check Samples (ICSs)

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

- **Precision**

Precision is evaluated by reviewing MS/MSD results, field duplicate sample results, field split sample results, and ICP serial dilution results. These QC results provide information on the laboratory reproducibility and whether sampling activities are adequate to acquire consistent sample results. According to the SAP, the relative percent difference (RPD) limits are ≤20%. 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**

SDGs WSCF130128 and WSCF130232 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

Minor deficiencies leading to qualification of sample results for Fe as estimates were due to high matrix spike recoveries. See the table in Appendix 2 for a listing of all affected sample results.

REFERENCES

GRP-GD-003, Rev. 0, Change 0, *Data Validation for Chemical Analyses*, August 2010.

DOE/RL-2010-72, Rev. 1, *Sampling Analysis Plan for Eighteen Remediation Wells in the 200-ZP-1 Operable Unit*, September 2012.

Appendix 1

Glossary of Data Reporting Qualifiers

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

- **U** — The constituent was analyzed for, but was not detected. The data should be considered usable for decision-making purposes.

- **UJ** — The constituent was analyzed for and was not detected. Due to a quality control deficiency identified during data validation the value reported may not accurately reflect the RL. The data should be considered usable for decision-making purposes.

- **J** — Indicates the constituent was analyzed for and detected. The associated value is estimated due to a quality control deficiency identified during data validation. The data should be considered usable for decision-making purposes.

- **J+** — Indicates the constituent was analyzed for and detected. The associated value is estimated with a suspected positive bias due to a quality control deficiency identified during data validation. The data should be considered usable for decision-making purposes.

- **J-** — Indicates the constituent was analyzed for and detected. The associated value is estimated with a suspected negative bias due to a quality control deficiency identified during data validation. The data should be considered usable for decision-making purposes.

- **N** — The analysis indicates the presence of an analyte that has been tentatively identified.

- **NJ** — The analysis indicates the presence of an analyte that has been tentatively identified and the associated numerical value represents its approximate concentration.

- **NJ+** — The analysis indicates the presence of an analyte that has been tentatively identified. The associated value is estimated with a suspected positive bias due to a quality control deficiency identified during data validation.

- **NJ-** — The analysis indicates the presence of an analyte that has been tentatively identified. The associated value is estimated with a suspected negative bias due to a quality control deficiency identified during data validation.

- **UR** — Indicates the constituent was analyzed for and not detected; however, due to an identified quality control deficiency the data should be considered unusable for decision-making purposes.

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

Appendix 2

Summary of Data Qualification

Inorganic Data Qualification Summary			
SDG: WSCF130128, WSCF130232	Reviewer: AQA	Project: 200 Area SGRP	Page 1 of 1
Analyte(s)	**Qualifier**	**Samples Affected**	**Reason**
Fe	J+	B2NNT6, B2NNV0	High MS and MSD recoveries

Comments: None

Appendix 3

Data Validation Supporting Documentation

VALIDATION LEVEL:	A	B	C	D	E
PROJECT: 200 Area SGRP			DATA PACKAGE: VSR13-001		
VALIDATOR: Eyda Hergenreder		LAB: WSCF		DATE: 09-02-2013	
			SDG: WSCF130128, WSCF130232		
ANALYSES PERFORMED					
SW-846/ICP X	SW-846/GFAA	SW-846/Hg		EPA 200.8 X	
SAMPLES/MATRIX Water samples SDG WSCF130128: B2N369, B2N372 SDG WSCF130232: B2NNT6, B2NNV0					

1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE

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

Comments: None

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

Initial calibrations performed on all instruments? ..... Yes No N/A

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

ICP interference checks acceptable? ..... Yes No N/A

ICV and CCV checks performed on all instruments? ..... Yes No N/A

ICV and CCV checks acceptable? ..... Yes No N/A

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

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

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

Comments:

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

ICB and CCB checks performed for all applicable analyses? (Levels D, E) ..... Yes No N/A

ICB and CCB results acceptable? (Levels D, E) ..... Yes No N/A

Laboratory blanks analyzed? ..... Yes No N/A

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

Field blanks analyzed? (Levels C, D, E) ..... Yes No N/A

Field blank results acceptable? (Levels C, D, E) ..... Yes No N/A

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

Comments:

SDG WSCF130128: V 0.563 ug/L
SDG WSCF130232: Sr 0.271 ug/L

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

MS/MSD samples analyzed? ..... (Yes) No N/A

MS/MSD results acceptable? ..... Yes (No) N/A

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

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

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

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

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

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

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

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

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

Comments:

WSCF130232: Fe MS/MSD 122%/145%

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

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

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

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

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

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

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

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

Comments: None

6. ICP QUALITY CONTROL (Levels D and E)

ICP serial dilution samples analyzed? ..... Yes No N/A

ICP serial dilution %D values acceptable? ..... Yes No N/A

ICP post digestion spike required? ..... Yes No N/A

ICP post digestion spike values acceptable? ..... Yes No N/A

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

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

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

Comments:

7. HOLDING TIMES (all levels)

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

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

Comments: None

8. RESULT QUANTITATION AND DETECTION LIMITS (all levels)

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

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

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

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

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

Comments: None

Comments (attach additional sheets as necessary):

More

Appendix 4

Additional Documentation Requested By Client

Batch QC List

Attention Scot Fitzgerald
Department Inorganic

Group # WSCF130128

QC Batch	Analytical Batch	S#	Type	Sample #	Client Sample#	Original	Test
212948	212948	2	BLANK	88289	BLANK		Anions by Ion Chromatography (Water)
212948	212948	3	LCS	88290	LCS		Anions by Ion Chromatography (Water)
212948	212948	4	DUP	88291	B2NB53(130129002DUP)	130129002	Anions by Ion Chromatography (Water)
212948	212948	5	MS	88292	B2NB53(130129002MS)	130129002	Anions by Ion Chromatography (Water)
212948	212948	6	MSD	88293	B2NB53(130129002MSD)	130129002	Anions by Ion Chromatography (Water)
212948	212948	9	SAMPLE	130128003	B2N369		Anions by Ion Chromatography (Water)
212948	212948	11	SAMPLE	130128004	B2N372		Anions by Ion Chromatography (Water)
212957	212985	5	BLANK	88331	BLANK		ICP-6010 - All possible metals
212957	212985	7	LCS	88333	LCS		ICP-6010 - All possible metals
212957	212985	9	MS	88334	B2N3X4(130098001MS)	130098001	ICP-6010 - All possible metals
212957	212985	10	MSD	88335	B2N3X4(130098001MSD)	130098001	ICP-6010 - All possible metals
212957	212985	30	SAMPLE	130128003	B2N369		ICP-6010 - All possible metals
212957	212985	31	SAMPLE	130128004	B2N372		ICP-6010 - All possible metals
213000	213000	1	BLANK	88458	BLANK		Hexavalent chromium Discrete Analyzer
213000	213000	3	LCS	88460	LCS		Hexavalent chromium Discrete Analyzer
213000	213000	4	DUP	88461	B2N372(130128004DUP)	130128004	Hexavalent chromium Discrete Analyzer
213000	213000	5	MS	88462	B2N372(130128004MS)	130128004	Hexavalent chromium Discrete Analyzer
213000	213000	6	SAMPLE	130128003	B2N369		Hexavalent chromium Discrete Analyzer
213000	213000	7	SAMPLE	130128004	B2N372		Hexavalent chromium Discrete Analyzer
213288	213299	4	BLANK	88893	BLANK		ICP-2008 MS All possible metal
213288	213299	5	LCS	88894	LCS		ICP-2008 MS All possible metal
213288	213299	7	MS	88895	B2N634(130096012MS)	130096012	ICP-2008 MS All possible metal
213288	213299	8	MSD	88896	B2N634(130096012MSD)	130096012	ICP-2008 MS All possible metal

Batch QC List

Attention Scot Fitzgerald
Department Inorganic

Group # WSCF130128

QC Batch	Analytical Batch	S#	Type	Sample #	Client Sample#	Original	Test
213288	213299	17	SAMPLE	130128003	B2N369		ICP-2008 MS All possible metal
213288	213299	20	SAMPLE	130128004	B2N372		ICP-2008 MS All possible metal
213288	213299	32	BLANK	88893	BLANK		ICP-2008 MS All possible metal
213288	213299	33	LCS	88894	LCS		ICP-2008 MS All possible metal
213288	213299	35	MS	88895	B2N634(130096012MS)	130096012	ICP-2008 MS All possible metal
213288	213299	36	MSD	88896	B2N634(130096012MSD)	130096012	ICP-2008 MS All possible metal
213288	213299	37	SAMPLE	130128003	B2N369		ICP-2008 MS All possible metal
213288	213299	38	SAMPLE	130128004	B2N372		ICP-2008 MS All possible metal

Quality Control Report

Attention Scot Fitzgerald
Department Inorganic

Group # WSCF130128

Analytical Batch 212985 (QC Batch: 212957)
Associated Samples 130128003, 130128004

Test ICP-6010 - All possible metals

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
BLANK			**QC Sample #88331**							
Iron	7439-89-6		<19	ug/L					U	01/30/13
Magnesium	7439-95-4		<4.0	ug/L					U	01/30/13
Calcium	7440-70-2		<49	ug/L					U	01/30/13
LCS			**QC Sample #88333**							
Iron	7439-89-6		1000	ug/L	100.2	80 - 120				01/30/13
Magnesium	7439-95-4		10200	ug/L	102.1	80 - 120				01/30/13
Calcium	7440-70-2		20200	ug/L	101	80 - 120				01/30/13
MS			**QC Sample #88334**							
			Original 130098001							
Iron	7439-89-6		974	ug/L	97.4	75 - 125				01/30/13
Magnesium	7439-95-4		9860	ug/L	98.6	75 - 125				01/30/13
Calcium	7440-70-2		21000	ug/L	105	75 - 125			X	01/30/13
MSD			**QC Sample #88335**							
			Original 130098001					**Paired**	**88334**	
Iron	7439-89-6		987	ug/L	98.7	75 - 125	1.20	20		01/30/13
Magnesium	7439-95-4		9820	ug/L	98.2	75 - 125	0.10	20		01/30/13
Calcium	7440-70-2		19700	ug/L	98.6	75 - 125	1.30	20	X	01/30/13

* - QC result out of range n/a - Not Applicable

Quality Control Report

Attention Scot Fitzgerald
Department Inorganic

Group # WSCF130128

Analytical Batch 213299 (QC Batch: 213288)
Associated Samples 130128003, 130128004

Test ICP-2008 MS All possible metal

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
BLANK			**QC Sample #88893**							
Aluminum	7429-90-5		<5.0	ug/L					U	02/06/13
Manganese	7439-96-5		<0.10	ug/L					U	02/06/13
Nickel	7440-02-0		<0.10	ug/L					U	02/06/13
Barium	7440-39-3		<0.20	ug/L					U	02/06/13
Cadmium	7440-43-9		<0.050	ug/L					U	02/06/13
Chromium	7440-47-3		<0.10	ug/L					U	02/06/13
Cobalt	7440-48-4		<0.050	ug/L					U	02/06/13
Copper	7440-50-8		<0.10	ug/L					U	02/06/13
Vanadium	7440-62-2		0.563	ug/L					B	02/06/13
Lead	7439-92-1		<0.050	ug/L					U	02/06/13
Mercury	7439-97-6		<0.050	ug/L					U	02/07/13
Strontium	7440-24-6		<0.10	ug/L					U	02/06/13
Uranium	7440-61-1		<0.050	ug/L					U	02/06/13
Arsenic	7440-38-2		<0.20	ug/L					U	02/06/13
LCS			**QC Sample #88894**							
Aluminum	7429-90-5		418	ug/L	104.6	85 - 115				02/06/13

* - QC result out of range n/a - Not Applicable

Quality Control Report

Attention Scot Fitzgerald
Department Inorganic

Group # WSCF130128

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
Manganese	7439-96-5		42.9	ug/L	107.2	85 - 115				02/06/13
Nickel	7440-02-0		42.7	ug/L	106.7	85 - 115				02/06/13
Barium	7440-39-3		42.0	ug/L	104.9	85 - 115				02/06/13
Cadmium	7440-43-9		41.0	ug/L	102.4	85 - 115				02/06/13
Chromium	7440-47-3		42.8	ug/L	107	85 - 115				02/06/13
Cobalt	7440-48-4		42.9	ug/L	107.2	85 - 115				02/06/13
Copper	7440-50-8		42.6	ug/L	106.5	85 - 115				02/06/13
Vanadium	7440-62-2		43.3	ug/L	108.2	85 - 115				02/06/13
Lead	7439-92-1		42.7	ug/L	106.6	85 - 115				02/06/13
Mercury	7439-97-6		1.93	ug/L	96.4	85 - 115				02/07/13
Strontium	7440-24-6		422	ug/L	105.5	85 - 115				02/06/13
Uranium	7440-61-1		43.5	ug/L	108.7	85 - 115				02/06/13
Arsenic	7440-38-2		41.4	ug/L	103.4	85 - 115				02/06/13
MS			**QC Sample #88895**							
			Original 130096012							
Aluminum	7429-90-5		405	ug/L	101.3	70 - 130				02/06/13
Manganese	7439-96-5		41.3	ug/L	103.3	70 - 130				02/06/13
Nickel	7440-02-0		40.0	ug/L	100.1	70 - 130				02/06/13
Barium	7440-39-3		36.9	ug/L	92.3	70 - 130				02/06/13
Cadmium	7440-43-9		39.4	ug/L	98.6	70 - 130				02/06/13
Chromium	7440-47-3		40.8	ug/L	102.1	70 - 130				02/06/13
Cobalt	7440-48-4		40.5	ug/L	101.2	70 - 130				02/06/13
Copper	7440-50-8		39.8	ug/L	99.5	70 - 130				02/06/13

* - QC result out of range n/a - Not Applicable

Quality Control Report

Attention Scot Fitzgerald
Department Inorganic

Group # WSCF130128

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
Vanadium	7440-62-2		41.9	ug/L	104.7	70 - 130				02/06/13
Lead	7439-92-1		41.5	ug/L	103.6	70 - 130				02/06/13
Mercury	7439-97-6		1.86	ug/L	93	70 - 130				02/07/13
Strontium	7440-24-6		385	ug/L	96.2	70 - 130				02/06/13
Uranium	7440-61-1		43.4	ug/L	108.6	70 - 130				02/06/13
Arsenic	7440-38-2		40.6	ug/L	101.4	70 - 130				02/06/13
MSD			**QC Sample #88896**							
			Original 130096012					**Paired**	**88895**	
Aluminum	7429-90-5		416	ug/L	103.9	70 - 130	2.50	20		02/06/13
Manganese	7439-96-5		42.4	ug/L	105.9	70 - 130	2.50	20		02/06/13
Nickel	7440-02-0		40.8	ug/L	101.9	70 - 130	1.70	20		02/06/13
Barium	7440-39-3		41.3	ug/L	103.2	70 - 130	4.70	20		02/06/13
Cadmium	7440-43-9		40.7	ug/L	101.7	70 - 130	3.20	20		02/06/13
Chromium	7440-47-3		42.1	ug/L	105.3	70 - 130	2.60	20		02/06/13
Cobalt	7440-48-4		41.6	ug/L	103.9	70 - 130	2.70	20		02/06/13
Copper	7440-50-8		40.5	ug/L	101.3	70 - 130	1.80	20		02/06/13
Vanadium	7440-62-2		43.5	ug/L	108.7	70 - 130	2.60	20		02/06/13
Lead	7439-92-1		42.6	ug/L	106.5	70 - 130	2.70	20		02/06/13
Mercury	7439-97-6		1.80	ug/L	90	70 - 130	3.20	20		02/07/13
Strontium	7440-24-6		408	ug/L	102.1	70 - 130	3.70	20		02/06/13
Uranium	7440-61-1		44.2	ug/L	110.4	70 - 130	1.50	20		02/06/13
Arsenic	7440-38-2		42.0	ug/L	105.1	70 - 130	3.10	20		02/06/13

* - QC result out of range n/a - Not Applicable

Batch QC List

Attention Scot Fitzgerald
Department Inorganic

Group # WSCF130232

QC Batch	Analytical Batch	S#	Type	Sample #	Client Sample#	Original	Test
213783	213857	5	BLANK	89344	BLANK		ICP-6010 - All possible metals
213783	213857	7	LCS	89346	LCS		ICP-6010 - All possible metals
213783	213857	9	MS	89347	B2NNR8(130220005MS)	130220005	ICP-6010 - All possible metals
213783	213857	10	MSD	89348	B2NNR8(130220005MSD	130220005	ICP-6010 - All possible metals
213783	213857	30	SAMPLE	130232005	B2NNT6		ICP-6010 - All possible metals
213783	213857	31	SAMPLE	130232006	B2NNV0		ICP-6010 - All possible metals
213863	213863	2	BLANK	89435	BLANK		Anions by Ion Chromatography (Water)
213863	213863	3	LCS	89436	LCS		Anions by Ion Chromatography (Water)
213863	213863	4	DUP	89437	B2NLW1(130230008DUP	130230008	Anions by Ion Chromatography (Water)
213863	213863	5	MS	89438	B2NLW1(130230008MS)	130230008	Anions by Ion Chromatography (Water)
213863	213863	6	MSD	89439	B2NLW1(130230008MSD	130230008	Anions by Ion Chromatography (Water)
213863	213863	18	SAMPLE	130232003	B2NNV2		Anions by Ion Chromatography (Water)
213863	213863	19	SAMPLE	130232004	B2NNT8		Anions by Ion Chromatography (Water)
213984	213984	17	LCS	89529	LCS		Hexavalent chromium Discrete Analyzer
213984	213984	18	BLANK	89530	BLANK		Hexavalent chromium Discrete Analyzer
213984	213984	19	DUP	89531	B2NNT7(130232002DUP)	130232002	Hexavalent chromium Discrete Analyzer
213984	213984	20	MS	89532	B2NNT7(130232002MS)	130232002	Hexavalent chromium Discrete Analyzer
213984	213984	21	SAMPLE	130232001	B2NNV1		Hexavalent chromium Discrete Analyzer
213984	213984	22	SAMPLE	130232002	B2NNT7		Hexavalent chromium Discrete Analyzer
214080	214092	4	BLANK	89745	BLANK		ICP-2008 MS All possible metal
214080	214092	5	LCS	89746	LCS		ICP-2008 MS All possible metal
214080	214092	7	MS	89747	B2NNT2(130220006MS)	130220006	ICP-2008 MS All possible metal
214080	214092	8	MSD	89748	B2NNT2(130220006MSD	130220006	ICP-2008 MS All possible metal

Batch QC List

Attention Scot Fitzgerald
Department Inorganic

Group # WSCF130232

QC Batch	Analytical Batch	S#	Type	Sample #	Client Sample#	Original	Test
214080	214092	11	SAMPLE	130232005	B2NNT6		ICP-2008 MS All possible metal
214080	214092	12	SAMPLE	130232006	B2NNV0		ICP-2008 MS All possible metal

Quality Control Report

Attention Scot Fitzgerald
Department Inorganic

Group # WSCF130232

Analytical Batch 213857 (QC Batch: 213783)
Associated Samples 130232005, 130232006

Test ICP-6010 - All possible metals

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
BLANK			**QC Sample #89344**							
Iron	7439-89-6		<19	ug/L					U	02/14/13
Magnesium	7439-95-4		<4.0	ug/L					U	02/14/13
Calcium	7440-70-2		<49	ug/L					U	02/14/13
LCS			**QC Sample #89346**							
Iron	7439-89-6		1040	ug/L	103.5	80 - 120				02/14/13
Magnesium	7439-95-4		10600	ug/L	105.9	80 - 120				02/14/13
Calcium	7440-70-2		21000	ug/L	105	80 - 120				02/14/13
MS			**QC Sample #89347**							
			Original 130220005							
Iron	7439-89-6		1220	ug/L	122.4	75 - 125				02/14/13
Magnesium	7439-95-4		10100	ug/L	100.9	75 - 125				02/14/13
Calcium	7440-70-2		21000	ug/L	105	75 - 125			X	02/14/13
MSD			**QC Sample #89348**							
			Original 130220005					**Paired**	**89347**	
Iron	7439-89-6		1450	ug/L	145.2	75 - 125	9.10	20	N	02/14/13
Magnesium	7439-95-4		9880	ug/L	98.8	75 - 125	0.50	20		02/14/13
Calcium	7440-70-2		19600	ug/L	98	75 - 125	1.40	20	X	02/14/13

* - QC result out of range n/a - Not Applicable

Quality Control Report

Attention Scot Fitzgerald
Department Inorganic

Group # WSCF130232

Analytical Batch 214092 (QC Batch: 214080)
Associated Samples 130232005, 130232006

Test ICP-2008 MS All possible metal

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
BLANK			**QC Sample #89745**							
Aluminum	7429-90-5		<5.0	ug/L					U	02/22/13
Manganese	7439-96-5		<0.10	ug/L					U	02/22/13
Nickel	7440-02-0		<0.10	ug/L					U	02/22/13
Barium	7440-39-3		<0.20	ug/L					U	02/22/13
Cadmium	7440-43-9		<0.050	ug/L					U	02/22/13
Chromium	7440-47-3		<0.10	ug/L					U	02/22/13
Cobalt	7440-48-4		<0.050	ug/L					U	02/22/13
Copper	7440-50-8		<0.10	ug/L					U	02/22/13
Vanadium	7440-62-2		<0.20	ug/L					U	02/22/13
Lead	7439-92-1		<0.050	ug/L					U	02/22/13
Mercury	7439-97-6		<0.050	ug/L					Uo	02/22/13
Strontium	7440-24-6		0.271	ug/L					B	02/22/13
Uranium	7440-61-1		<0.050	ug/L					U	02/22/13
Arsenic	7440-38-2		<0.20	ug/L					U	02/22/13
LCS			**QC Sample #89746**							
Aluminum	7429-90-5		358	ug/L	89.6	85 - 115				02/22/13

* - QC result out of range n/a - Not Applicable

Quality Control Report

Attention Scot Fitzgerald
Department Inorganic

Group # WSCF130232

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
Manganese	7439-96-5		35.5	ug/L	88.8	85 - 115				02/22/13
Nickel	7440-02-0		35.0	ug/L	87.5	85 - 115				02/22/13
Barium	7440-39-3		35.4	ug/L	88.6	85 - 115				02/22/13
Cadmium	7440-43-9		35.2	ug/L	88.1	85 - 115				02/22/13
Chromium	7440-47-3		35.8	ug/L	89.5	85 - 115				02/22/13
Cobalt	7440-48-4		35.6	ug/L	89.1	85 - 115				02/22/13
Copper	7440-50-8		34.8	ug/L	87	85 - 115				02/22/13
Vanadium	7440-62-2		35.7	ug/L	89.3	85 - 115				02/22/13
Lead	7439-92-1		36.0	ug/L	90.1	85 - 115				02/22/13
Mercury	7439-97-6		1.70	ug/L	84.8	85 - 115			o	02/22/13
Strontium	7440-24-6		356	ug/L	89.1	85 - 115				02/22/13
Uranium	7440-61-1		35.3	ug/L	88.2	85 - 115				02/22/13
Arsenic	7440-38-2		35.5	ug/L	88.6	85 - 115				02/22/13
MS			**QC Sample #89747**							
			Original 130220006							
Aluminum	7429-90-5		395	ug/L	98.8	70 - 130				02/22/13
Manganese	7439-96-5		35.0	ug/L	87.6	70 - 130				02/22/13
Nickel	7440-02-0		36.9	ug/L	92.3	70 - 130				02/22/13
Barium	7440-39-3		36.1	ug/L	90.2	70 - 130				02/22/13
Cadmium	7440-43-9		38.8	ug/L	96.9	70 - 130				02/22/13
Chromium	7440-47-3		38.6	ug/L	96.4	70 - 130				02/22/13
Cobalt	7440-48-4		37.4	ug/L	93.6	70 - 130				02/22/13
Copper	7440-50-8		35.9	ug/L	89.7	70 - 130				02/22/13

* - QC result out of range n/a - Not Applicable

Quality Control Report

Attention Scot Fitzgerald
Department Inorganic

Group # WSCF130232

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
Vanadium	7440-62-2		39.1	ug/L	97.9	70 - 130				02/22/13
Lead	7439-92-1		40.3	ug/L	100.7	70 - 130				02/22/13
Mercury	7439-97-6		2.01	ug/L	100.3	70 - 130			o	02/22/13
Strontium	7440-24-6		378	ug/L	94.5	70 - 130				02/22/13
Uranium	7440-61-1		42.2	ug/L	105.5	70 - 130				02/22/13
Arsenic	7440-38-2		40.9	ug/L	102.2	70 - 130				02/22/13
MSD			**QC Sample #89748**							
			Original 130220006					**Paired**	**89747**	
Aluminum	7429-90-5		403	ug/L	100.7	70 - 130	1.80	20		02/22/13
Manganese	7439-96-5		38.4	ug/L	96	70 - 130	3.60	20		02/22/13
Nickel	7440-02-0		38.2	ug/L	95.5	70 - 130	3.30	20		02/22/13
Barium	7440-39-3		39.5	ug/L	98.8	70 - 130	3.20	20		02/22/13
Cadmium	7440-43-9		38.5	ug/L	96.2	70 - 130	0.70	20		02/22/13
Chromium	7440-47-3		40.2	ug/L	100.5	70 - 130	3.90	20		02/22/13
Cobalt	7440-48-4		38.3	ug/L	95.7	70 - 130	2.20	20		02/22/13
Copper	7440-50-8		36.6	ug/L	91.5	70 - 130	2.00	20		02/22/13
Vanadium	7440-62-2		40.8	ug/L	102	70 - 130	3.50	20		02/22/13
Lead	7439-92-1		41.1	ug/L	102.7	70 - 130	2.00	20		02/22/13
Mercury	7439-97-6		2.11	ug/L	105.4	70 - 130	5.00	20	o	02/22/13
Strontium	7440-24-6		391	ug/L	97.7	70 - 130	1.70	20		02/22/13
Uranium	7440-61-1		42.8	ug/L	106.9	70 - 130	1.30	20		02/22/13
Arsenic	7440-38-2		41.0	ug/L	102.4	70 - 130	0.20	20		02/22/13

* - QC result out of range n/a - Not Applicable

Date: 02 September 2013
To: CH2M Hill (technical representative)
From: Analytical Quality Associates, Inc.
Project: 200 Area SGRP
Subject: General Chemistry - Sample Data Groups (SDGs) WSCF130128 and WSCF130232

INTRODUCTION

This memorandum presents the results of data validation for SDGs WSCF130128 and WSCF130232 prepared by WSCF Analytical Laboratory. A list of samples validated along with the analytical methods is provided in the following table.

Sample ID	Sample Date	Media	Validation Level	Analytical Methods
B2N369	01/24/13	Water	C	7196 & 300.0
B2N372	01/24/13	Water	C	7196 & 300.0
B2NNV1	02/12/13	Water	C	7196
B2NNT7	02/12/13	Water	C	7196
B2NNV2	02/12/13	Water	C	300.0
B2NNT8	02/12/13	Water	C	300.0

Data validation was conducted in accordance with the CHPRC validation statement of work and the Sampling Analysis Plan for Eighteen Remediation Wells in the 200-ZP-1 Operable Units, DOE/RL-2010-72, Rev. 1 (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:

- Nitrate as nitrogen – analysis within 48 hours of sample collection
- Hexavalent chromium – analysis within 24 hours of sample collection

Sample preservation requires chilling to 4 degrees Celsius.

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

- **Blanks**

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

Laboratory Blanks

All laboratory blank results were acceptable.

Trip Blanks

No trip blanks were submitted for validation.

Field Blanks

No field blanks were submitted for validation.

Equipment Blanks

No equipment blanks were submitted for validation.

- **Accuracy**

Accuracy is evaluated by reviewing matrix spike sample results and laboratory control sample results. According to the SAP, the matrix spike and laboratory control sample accuracy limits are 80% to 120%.

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

All MS/MSD recoveries were acceptable.

Laboratory Control Samples (LCSs)

All LCS recoveries were acceptable.

- **Precision**

Precision is evaluated by reviewing MS/MSD results, 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 ≤20%.

MS/MSD Samples

All MS/MSD RPD values were acceptable.

Laboratory Duplicate Samples

All laboratory duplicate results were acceptable.

Field Duplicate Samples

No field duplicates were submitted for validation.

Field Split Samples

No field splits were submitted for validation.

- **Detection Limits**

Reported 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 WSCF130128 and WSCF130232 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

None found.

REFERENCES

GRP-GD-003, Rev. 0, Change 0, *Data Validation for Chemical Analyses*, August 2010.

DOE/RL-2010-72, Rev. 1, *Sampling Analysis Plan for Eighteen Remediation Wells in the 200-ZP-1 Operable Unit*, September 2012.

Appendix 1

Glossary of Data Reporting Qualifiers

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

- **U** — The constituent was analyzed for, but was not detected. The data should be considered usable for decision-making purposes.

- **UJ** — The constituent was analyzed for and was not detected. Due to a quality control deficiency identified during data validation the value reported may not accurately reflect the RL. The data should be considered usable for decision-making purposes.

- **J** — Indicates the constituent was analyzed for and detected. The associated value is estimated due to a quality control deficiency identified during data validation. The data should be considered usable for decision-making purposes.

- **J+** — Indicates the constituent was analyzed for and detected. The associated value is estimated with a suspected positive bias due to a quality control deficiency identified during data validation. The data should be considered usable for decision-making purposes.

- **J-** — Indicates the constituent was analyzed for and detected. The associated value is estimated with a suspected negative bias due to a quality control deficiency identified during data validation. The data should be considered usable for decision-making purposes.

- **N** — The analysis indicates the presence of an analyte that has been tentatively identified.

- **NJ** — The analysis indicates the presence of an analyte that has been tentatively identified and the associated numerical value represents its approximate concentration.

- **NJ+** — The analysis indicates the presence of an analyte that has been tentatively identified. The associated value is estimated with a suspected positive bias due to a quality control deficiency identified during data validation.

- **NJ-** — The analysis indicates the presence of an analyte that has been tentatively identified. The associated value is estimated with a suspected negative bias due to a quality control deficiency identified during data validation.

- **UR** — Indicates the constituent was analyzed for and not detected; however, due to an identified quality control deficiency the data should be considered unusable for decision-making purposes.

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

Appendix 2

Summary of Data Qualification

General Chemistry Data Qualification Summary			
SDG: WSCF130128, WSCF130232	Reviewer: AQA	Project: 200 Area SGRP	Page 1 of 1
Analyte(s)	**Qualifier**	**Samples Affected**	**Reason**
Cr(VI), Nitrate as Nitrogen	None	N/A	N/A

Comments: None

Appendix 3

Data Validation Supporting Documentation

VALIDATION LEVEL:	A	B	(C)	D	E
PROJECT: 200 Area SGRP			DATA PACKAGE: VSR13-001		
VALIDATOR: Eyda Hergenreder		LAB: WSCF		DATE: 09-02-2013	
			SDG: WSCF130128, WSCF130232		
ANALYSES PERFORMED					
Anions/IC X	TOC	TOX	TPH-418.1	Oil and Grease	Alkalinity
Ammonia	BOD/COD	Chloride	Chromium-VI X	pH	NO_3/NO_2
Sulfate	TDS	TKN	Phosphate	Cyanide	

SAMPLES/MATRIX Water samples

SDG WSCF130128: B2N369, B2N372
SDG WSCF130232: B2NNV1, B2NNT7, B2NNV2, B2NNT8

1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE

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

Comments: None

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

Initial calibrations performed on all instruments? ..... Yes No N/A

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

ICV and CCV checks performed on all instruments? ..... Yes No N/A

ICV and CCV checks acceptable? ..... Yes No N/A

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

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

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

Comments:

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

ICB and CCB checks performed for all applicable analyses? (Levels D, E) ..... Yes No N/A

ICB and CCB results acceptable? (Levels D, E) ..... Yes No N/A

Laboratory blanks analyzed? ..... Yes No N/A

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

Field blanks analyzed? (Levels C, D, E) ..... Yes No N/A

Field blank results acceptable? (Levels C, D, E) ..... Yes No N/A

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

Comments: None

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

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

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

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

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

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

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

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

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

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

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

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

Comments: None

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

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

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

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

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

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

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

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

Comments: None

6. HOLDING TIMES (all levels)

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

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

Comments: None

7. RESULT QUANTITATION AND DETECTION LIMITS (all levels)

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

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

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

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

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

Comments: None

Comments (attach additional sheets as necessary):

More

Appendix 4

Additional Documentation Requested By Client

Batch QC List

Attention Scot Fitzgerald
Department Inorganic

Group # WSCF130128

QC Batch	Analytical Batch	S#	Type	Sample #	Client Sample#	Original	Test
212948	212948	2	BLANK	88289	BLANK		Anions by Ion Chromatography (Water)
212948	212948	3	LCS	88290	LCS		Anions by Ion Chromatography (Water)
212948	212948	4	DUP	88291	B2NB53(130129002DUP)	130129002	Anions by Ion Chromatography (Water)
212948	212948	5	MS	88292	B2NB53(130129002MS)	130129002	Anions by Ion Chromatography (Water)
212948	212948	6	MSD	88293	B2NB53(130129002MSD)	130129002	Anions by Ion Chromatography (Water)
212948	212948	9	SAMPLE	130128003	B2N369		Anions by Ion Chromatography (Water)
212948	212948	11	SAMPLE	130128004	B2N372		Anions by Ion Chromatography (Water)
212957	212985	5	BLANK	88331	BLANK		ICP-6010 - All possible metals
212957	212985	7	LCS	88333	LCS		ICP-6010 - All possible metals
212957	212985	9	MS	88334	B2N3X4(130098001MS)	130098001	ICP-6010 - All possible metals
212957	212985	10	MSD	88335	B2N3X4(130098001MSD)	130098001	ICP-6010 - All possible metals
212957	212985	30	SAMPLE	130128003	B2N369		ICP-6010 - All possible metals
212957	212985	31	SAMPLE	130128004	B2N372		ICP-6010 - All possible metals
213000	213000	1	BLANK	88458	BLANK		Hexavalent chromium Discrete Analyzer
213000	213000	3	LCS	88460	LCS		Hexavalent chromium Discrete Analyzer
213000	213000	4	DUP	88461	B2N372(130128004DUP)	130128004	Hexavalent chromium Discrete Analyzer
213000	213000	5	MS	88462	B2N372(130128004MS)	130128004	Hexavalent chromium Discrete Analyzer
213000	213000	6	SAMPLE	130128003	B2N369		Hexavalent chromium Discrete Analyzer
213000	213000	7	SAMPLE	130128004	B2N372		Hexavalent chromium Discrete Analyzer
213288	213299	4	BLANK	88893	BLANK		ICP-2008 MS All possible metal
213288	213299	5	LCS	88894	LCS		ICP-2008 MS All possible metal
213288	213299	7	MS	88895	B2N634(130096012MS)	130096012	ICP-2008 MS All possible metal
213288	213299	8	MSD	88896	B2N634(130096012MSD)	130096012	ICP-2008 MS All possible metal

Quality Control Report

Attention Scot Fitzgerald
Department Inorganic

Group # WSCF130128

Analytical Batch 212948 (QC Batch: 212948)
Associated Samples 130128003, 130128004

Test Anions by Ion Chromatography (Water)

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
BLANK			**QC Sample #88289**							
Nitrate-N	NO3-N		<0.019	ug/mL					U	01/24/13
LCS			**QC Sample #88290**							
Nitrate-N	NO3-N		0.893	ug/mL	100.8	90 - 110				01/24/13
DUP			**QC Sample #88291**							
			Original 130129002							
Nitrate-N	NO3-N		7.65	ug/mL			0.60	20	D	01/24/13
MS			**QC Sample #88292**							
			Original 130129002							
Nitrate-N	NO3-N		0.894	ug/mL	100	80 - 120			D	01/24/13
MSD			**QC Sample #88293**							
			Original 130129002					**Paired**	**88292**	
Nitrate-N	NO3-N		1.07	ug/mL	119.5	80 - 120	2.00	20	D	01/24/13

* - QC result out of range n/a - Not Applicable

Quality Control Report

Attention Scot Fitzgerald
Department Inorganic

Group # WSCF130128

Analytical Batch 213000 (QC Batch: 213000)
Associated Samples 130128003, 130128004

Test Hexavalent chromium Discrete Analyzer

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
BLANK			**QC Sample #88458**							
Hexavalent chromium	18540-29-9		<0.0020	mg/L					U	01/24/13
LCS			**QC Sample #88460**							
Hexavalent chromium	18540-29-9		0.0518	mg/L	103.6	90 - 110				01/24/13
DUP			**QC Sample #88461**							
			Original 130128004							
Hexavalent chromium	18540-29-9	0.0400	0.0410	mg/L			2.50	20		01/24/13
MS			**QC Sample #88462**							
			Original 130128004							
Hexavalent chromium	18540-29-9	0.0400	0.0397	mg/L	99.2	85 - 115				01/24/13

* - QC result out of range n/a - Not Applicable

Batch QC List

Attention Scot Fitzgerald
Department Inorganic

Group # WSCF130232

QC Batch	Analytical Batch	S#	Type	Sample #	Client Sample#	Original	Test
213783	213857	5	BLANK	89344	BLANK		ICP-6010 - All possible metals
213783	213857	7	LCS	89346	LCS		ICP-6010 - All possible metals
213783	213857	9	MS	89347	B2NNR8(130220005MS)	130220005	ICP-6010 - All possible metals
213783	213857	10	MSD	89348	B2NNR8(130220005MSD	130220005	ICP-6010 - All possible metals
213783	213857	30	SAMPLE	130232005	B2NNT6		ICP-6010 - All possible metals
213783	213857	31	SAMPLE	130232006	B2NNV0		ICP-6010 - All possible metals
213863	213863	2	BLANK	89435	BLANK		Anions by Ion Chromatography (Water)
213863	213863	3	LCS	89436	LCS		Anions by Ion Chromatography (Water)
213863	213863	4	DUP	89437	B2NLW1(130230008DUP	130230008	Anions by Ion Chromatography (Water)
213863	213863	5	MS	89438	B2NLW1(130230008MS)	130230008	Anions by Ion Chromatography (Water)
213863	213863	6	MSD	89439	B2NLW1(130230008MSD	130230008	Anions by Ion Chromatography (Water)
213863	213863	18	SAMPLE	130232003	B2NNV2		Anions by Ion Chromatography (Water)
213863	213863	19	SAMPLE	130232004	B2NNT8		Anions by Ion Chromatography (Water)
213984	213984	17	LCS	89529	LCS		Hexavalent chromium Discrete Analyzer
213984	213984	18	BLANK	89530	BLANK		Hexavalent chromium Discrete Analyzer
213984	213984	19	DUP	89531	B2NNT7(130232002DUP)	130232002	Hexavalent chromium Discrete Analyzer
213984	213984	20	MS	89532	B2NNT7(130232002MS)	130232002	Hexavalent chromium Discrete Analyzer
213984	213984	21	SAMPLE	130232001	B2NNV1		Hexavalent chromium Discrete Analyzer
213984	213984	22	SAMPLE	130232002	B2NNT7		Hexavalent chromium Discrete Analyzer
214080	214092	4	BLANK	89745	BLANK		ICP-2008 MS All possible metal
214080	214092	5	LCS	89746	LCS		ICP-2008 MS All possible metal
214080	214092	7	MS	89747	B2NNT2(130220006MS)	130220006	ICP-2008 MS All possible metal
214080	214092	8	MSD	89748	B2NNT2(130220006MSD	130220006	ICP-2008 MS All possible metal

Quality Control Report

Attention Scot Fitzgerald
Department Inorganic

Group # WSCF130232

Analytical Batch 213863 (QC Batch: 213863)
Associated Samples 130232003, 130232004

Test Anions by Ion Chromatography (Water)

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
BLANK			**QC Sample #89435**							
Nitrate-N	NO3-N		<0.019	ug/mL					U	02/13/13
LCS			**QC Sample #89436**							
Nitrate-N	NO3-N		0.885	ug/mL	100	90 - 110				02/13/13
DUP			**QC Sample #89437**							
			Original 130230008							
Nitrate-N	NO3-N		0.721	ug/mL			3.50	20	D	02/13/13
MS			**QC Sample #89438**							
			Original 130230008							
Nitrate-N	NO3-N		0.894	ug/mL	100	80 - 120			D	02/13/13
MSD			**QC Sample #89439**							
			Original 130230008					**Paired**	**89438**	
Nitrate-N	NO3-N		0.872	ug/mL	97.5	80 - 120	1.40	20	D	02/13/13

* - QC result out of range n/a - Not Applicable

Quality Control Report

Attention Scot Fitzgerald
Department Inorganic

Group # WSCF130232

Analytical Batch 213984 (QC Batch: 213984)
Associated Samples 130232001, 130232002

Test Hexavalent chromium Discrete Analyzer

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
LCS			**QC Sample #89529**							
Hexavalent chromium	18540-29-9		0.0506	mg/L	101.2	90 - 110				02/12/13
BLANK			**QC Sample #89530**							
Hexavalent chromium	18540-29-9		<0.0020	mg/L					U	02/12/13
DUP			**QC Sample #89531**							
			Original 130232002							
Hexavalent chromium	18540-29-9	0.00240	0.00240	mg/L			0.00	20	B	02/12/13
MS			**QC Sample #89532**							
			Original 130232002							
Hexavalent chromium	18540-29-9	0.00240	0.0431	mg/L	107.8	85 - 115				02/12/13

* - QC result out of range n/a - Not Applicable

Date: 02 September 2013
To: CH2M Hill (technical representative)
From: Analytical Quality Associates, Inc.
Project: 200 Area SGRP
Subject: Radiochemical - Sample Data Groups (SDGs) WSCF130128 and WSCF130232

INTRODUCTION

This memorandum presents the results of data validation for SDGs WSCF130128 and WSCF130232 prepared by WSCF Analytical Laboratory. A list of samples validated along with the analytical methods is provided in the following table.

Sample ID	Sample Date	Media	Validation Level	Analytical Methods
B2N369	01/24/13	Water	C	Tritium & Tc-99
B2N372	01/24/13	Water	C	Tritium & Tc-99
B2NNT6	02/12/13	Water	C	Tritium & Tc-99
B2NNV0	02/13/13	Water	C	Tritium & Tc-99

Data validation was conducted in accordance with the CHPRC validation statement of work and the Sampling Analysis Plan for Eighteen Remediation Wells in the 200-ZP-1 Operable Unit, DOE/RL-2010-72, Rev. 1 (SAP). Appendices 1 through 4 provide the following information as indicated below:

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

DATA QUALITY OBJECTIVES

- **Holding Times and Sample Preservation**

Holding times are calculated from Chain-of-Custody forms to determine the validity of the results. The maximum holding time for radiochemical analysis is 180 days. Sample preservation for Tc-99 samples requires acid preservation with nitric acid to pH <2. There are no specific preservation requirements for tritium.

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

- **Blanks**

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

Laboratory Blanks

All laboratory blank results were acceptable.

Trip Blanks

No trip blanks were submitted for validation.

Field Blanks

No field blanks were submitted for validation.

Equipment Blanks

No equipment blanks were submitted for validation.

- **Accuracy**

Accuracy is evaluated by reviewing matrix spike sample results, laboratory control sample results, and chemical recovery factors. Chemical recovery factors are determined through use of a carrier or tracer and provide assessment of the chemical separation process that is affected by the laboratory procedure, sample matrix, and/or interference. Chemical recovery factors are used to correct sample concentration, uncertainty, and MDC results. According to the SAP, the laboratory control sample accuracy limits are 80% to 120%. The matrix spike sample accuracy limits are ones specified by the DV procedure.

Matrix Spike (MS) Samples

All MS recoveries for tritium were acceptable.

For SDGs WSCF130128 and WSCF130232, MS analyses were not performed for Tc-99. All Tc-99 sample results were detects and should be qualified as estimates and flagged "J." See the table in Appendix 2 for a listing of all affected sample results.

Laboratory Control Samples (LCSs)

All LCS recoveries were acceptable.

Carrier/Tracer Recovery Factors

Carrier/tracer analyses were not required for the requested methods.

- **Precision**

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

sampling activities are adequate to acquire consistent sample results. According to the SAP, the relative percent difference (RPD) limits are ≤20%. When duplicate RPDs exceed the limits and have associated results <5X the MDCs the precision limits are ones specified by the DV procedure.

Laboratory Duplicate Samples

All laboratory duplicate results for tritium were acceptable.

For SDGs WSCF130128 and WSCF130232 laboratory duplicate samples were not included with the analysis of Tc-99. The Tc-99 results for all samples were detect and should be qualified as an estimate and flagged "J" due to lack of matrix-specific precision data.

Field Duplicate Samples

No field duplicates were submitted for validation.

Field Split Samples

No field splits were submitted for validation.

- **Detection Limits**

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

All reported sample MDCs were below the CRDLs.

- **Completeness**

SDGs WSCF130128 and WSCF130232 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

Minor deficiencies leading to qualification of sample results for Tc-99 as estimates were due to lack of MS and duplicate analyses. See the table in Appendix 2 for a listing of all affected sample results.

REFERENCES

GRP-GD-002, Rev. 0, Change 0, *Data Validation for Radiochemical Analyses*, August 2010.

DOE/RL-2010-72, Rev. 1, *Sampling Analysis Plan for Eighteen Remediation Wells in the 200-ZP-1 Operable Unit*, September 2012.

Appendix 1

Glossary of Data Reporting Qualifiers

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

- **U** ─ The constituent was analyzed for and was not detected. The data should be considered usable for decision-making purposes.

- **UJ** ─ The constituent was analyzed for and was not detected. Due to a quality control deficiency identified during data validation the value reported may not accurately reflect the MDC. The data should be considered usable for decision-making purposes.

- **J** ─ Indicates the constituent was analyzed for and detected. The associated value is estimated due to a quality control deficiency identified during data validation. The data should be considered usable for decision-making purposes.

- **J+** ─ Indicates the constituent was analyzed for and detected. The associated value is estimated with a suspected positive bias due to a quality control deficiency identified during data validation. The data should be considered usable for decision-making purposes.

- **J-** ─ Indicates the constituent was analyzed for and detected. The associated value is estimated with a suspected negative bias due to a quality control deficiency identified during data validation. The data should be considered usable for decision-making purposes.

- **UR** ─ Indicates the constituent was analyzed for and not detected; however, due to an identified quality control deficiency the data should be considered unusable for decision-making purposes.

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

Appendix 2

Summary of Data Qualification

Radiochemical Data Qualification Summary			
SDGs: WSCF130128, WSCF130232	Reviewer: AQA	Project: 200 Area SGRP	Page 1 of 1
Analyte(s)	**Qualifier**	**Samples Affected**	**Reason**
Tc-99	J	B2N369, B2N372, B2NNT6, B2NNV0	Lack of MS and precision data

Comments: None

Appendix 3

Data Validation Supporting Documentation

Appendix B - Radiochemical Data Validation Checklist

RADIOCHEMICAL DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	(C)	D	E
PROJECT: 200 Area SGRP			DATA PACKAGE: VSR13-001		
VALIDATOR: Eyda Hergenreder		LAB: WSCF		DATE: 09-02-2013	
			SDG: WSCF130128, WSCF130232		
ANALYSES PERFORMED					
Gross Alpha/Beta	Strontium-90	Technetium-99 X	Alpha Spectroscopy	Gamma Spectroscopy	
Total Uranium	Radium-22	Tritium X	C-14	I-129	

SAMPLES/MATRIX Water samples

SDG WSCF130128: B2N369, B2N372
SDG WSCF130232: B2NNT6, B2NNV0

1. Completeness ..... ☐ N/A

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

Comments: None

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

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

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

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

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

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

Comments:

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

Calibration checked within required frequency? ..... Yes No N/A
Calibration check acceptable? ..... Yes No N/A
Calibration check standards traceable? ..... Yes No N/A
Calibration check standards expired? ..... Yes No N/A
Calculation check acceptable?..... Yes No N/A
Comments:

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

Background Counts checked within required frequency? ..... Yes No N/A
Background Counts acceptable? ..... Yes No N/A
Calculation check acceptable?..... Yes No N/A
Comments:

5. Blanks (Levels B, C, D, E) ☐ N/A

Method blank analyzed within required frequency? Yes No N/A
Method blank results acceptable? Yes No N/A
Analytes detected in method blank? Yes No N/A
Field blank(s) analyzed? Yes No N/A
Field blank results acceptable? Yes No N/A
Analytes detected in field blank(s)? Yes No N/A
Transcription/Calculation Errors? (Levels D, E) Yes No N/A
Comments: None

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

LCS /BSS analyzed within required frequency? Yes No N/A
LCS/BSS recoveries acceptable? Yes No N/A
LCS/BSS traceable? (Levels D,E) Yes No N/A
LCS/BSS expired? (Levels D,E) Yes No N/A
LCS/BSS levels correct? (Levels D,E) Yes No N/A
Transcription/Calculation Errors? (Levels D, E) Yes No N/A
Comments: None

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

Chemical carrier added? ..... Yes No (N/A)
Chemical recovery acceptable? ..... Yes No (N/A)
Chemical carrier traceable? (Levels D, E) ..... Yes No (N/A)
Chemical carrier expired? (Levels D, E) ..... Yes No (N/A)
Transcription/Calculation errors? (Levels D, E) ..... Yes No (N/A)
Comments: None

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

Tracer added? ..... Yes No (N/A)
Tracer recovery acceptable? ..... Yes No (N/A)
Tracer traceable? (Levels D, E) ..... Yes No (N/A)
Tracer expired? (Levels D, E) ..... Yes No (N/A)
Transcription/Calculation errors? (Levels D, E) ..... Yes No (N/A)
Comments: None

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

Matrix spike analyzed?..... Yes (No) N/A
Spike recoveries acceptable? ..... (Yes) No N/A
Spike source traceable? (Levels D, E) ..... Yes No (N/A)
Spike source expired? Levels D, E) ..... Yes No (N/A)
Transcription/Calculation Errors? (Levels D, E)..... Yes No (N/A)
Comments:
No matrix spike was included with the analysis of Tc-99

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

Duplicates Analyzed at required frequency? ..... Yes (No) N/A
RPD Values Acceptable?..... (Yes) No N/A
Transcription/Calculation Errors? (Levels D, E)..... Yes No (N/A)
Comments:

No laboratory duplicate sample was included with the analysis of Tc-99

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

Field duplicate sample(s) analyzed? ..... Yes No (N/A)
Field duplicate RPD values acceptable? ..... Yes No (N/A)
Field split sample(s) analyzed? ..... Yes No (N/A)
Field split RPD values acceptable? ..... Yes No (N/A)
Performance audit sample(s) analyzed? ..... Yes No (N/A)
Performance audit sample results acceptable? ..... Yes No (N/A)
Comments: None

12. Holding Times (All levels)

Are sample holding times acceptable? ..... (Yes) No N/A
Comments: None

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

Results reported for all required sample analyses? ..... (Yes) No N/A
Results supported in raw data?(Levels D, E) ..... Yes No (N/A)
Results Acceptable? (Levels D, E) ..... Yes No (N/A)
Transcription/Calculation errors? (Levels D, E) ..... Yes No (N/A)
MDA's meet required detection limits? ..... (Yes) No N/A
Transcription/calculation errors? (Levels D, E) ..... Yes No (N/A)
Comments: None

Appendix 4

Additional Documentation Requested By Client

Batch QC List

Attention Scot Fitzgerald
Department Radiochemistry

Group # WSCF130128

QC Batch	Analytical Batch	S#	Type	Sample #	Client Sample#	Original	Test
212873	213164	1	BLANK	88189	BLANK		Tritium by LSC
212873	213164	2	LCS	88190	LCS		Tritium by LSC
212873	213164	4	DUP	88191	B2N6Y1(130122023DUP)	130122023	Tritium by LSC
212873	213164	5	MS	88192	B2N6Y1(130122023MS)	130122023	Tritium by LSC
212873	213164	13	SAMPLE	130128003	B2N369		Tritium by LSC
212873	213164	14	SAMPLE	130128004	B2N372		Tritium by LSC
213154	213262	1	BLANK	88664	BLANK		Technetium-99 by ICP MS
213154	213262	2	LCS	88665	LCS		Technetium-99 by ICP MS
213154	213262	3	SAMPLE	130128003	B2N369		Technetium-99 by ICP MS
213154	213262	4	SAMPLE	130128004	B2N372		Technetium-99 by ICP MS

Quality Control Report

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Department Radiochemistry

Group # WSCF130128

Analytical Batch 213164 (QC Batch: 212873)
Associated Samples 130128003, 130128004

Test Tritium by LSC

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit		RQ	Analyzed
BLANK			**QC Sample #88189**								
Tritium	10028-17-8		-130	pCi/L						U	01/25/13
LCS			**QC Sample #88190**								
Tritium	10028-17-8		3100	pCi/L	98.8	80 - 120					01/25/13
DUP			**QC Sample #88191**								
			Original 130122023								
Tritium	10028-17-8		-0.011	pCi/L			200.10	20	*	UX	01/25/13
MS			**QC Sample #88192**								
			Original 130122023								
Tritium	10028-17-8		21000	pCi/L	99.9	75 - 125					01/25/13

* - QC result out of range n/a - Not Applicable

Quality Control Report

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Department Radiochemistry

Group # WSCF130128

Analytical Batch 213262 (QC Batch: 213154)
Associated Samples 130128003, 130128004

Test Technetium-99 by ICP MS

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
BLANK			**QC Sample #88664**							
Technetium-99	14133-76-7		<0.0010	ug/L					U	02/04/13
LCS			**QC Sample #88665**							
Technetium-99	14133-76-7		0.049	ug/L	90.9	85 - 115				02/04/13

* - QC result out of range

n/a - Not Applicable

Batch QC List

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Department Radiochemistry

Group # WSCF130232

QC Batch	Analytical Batch	S#	Type	Sample #	Client Sample#	Original	Test
213788	213989	1	BLANK	89362	BLANK		Tritium by LSC
213788	213989	2	LCS	89363	LCS		Tritium by LSC
213788	213989	4	DUP	89364	B2N9N9(130228012DUP)	130228012	Tritium by LSC
213788	213989	5	MS	89365	B2N9N9(130228012MS)	130228012	Tritium by LSC
213788	213989	10	SAMPLE	130232005	B2NNT6		Tritium by LSC
213788	213989	11	SAMPLE	130232006	B2NNV0		Tritium by LSC
213969	213998	1	BLANK	89474	BLANK		Technetium-99 by ICP MS
213969	213998	2	LCS	89475	LCS		Technetium-99 by ICP MS
213969	213998	12	SAMPLE	130232005	B2NNT6		Technetium-99 by ICP MS
213969	213998	13	SAMPLE	130232006	B2NNV0		Technetium-99 by ICP MS

Quality Control Report

Attention Scot Fitzgerald
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Group # WSCF130232

Analytical Batch 213989 (QC Batch: 213788)
Associated Samples 130232005, 130232006

Test Tritium by LSC

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
BLANK			**QC Sample #89362**							
Tritium	10028-17-8		-200	pCi/L					U	02/24/13
LCS			**QC Sample #89363**							
Tritium	10028-17-8		3300	pCi/L	103.3	80 - 120				02/24/13
DUP			**QC Sample #89364**							
			Original 130228012							
Tritium	10028-17-8		5500	pCi/L			1.90	20		02/24/13
MS			**QC Sample #89365**							
			Original 130228012							
Tritium	10028-17-8		24000	pCi/L	117.2	75 - 125				02/24/13

* - QC result out of range n/a - Not Applicable

Quality Control Report

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Group # WSCF130232

Analytical Batch 213998 (QC Batch: 213969)
Associated Samples 130232005, 130232006

Test Technetium-99 by ICP MS

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
BLANK			**QC Sample #89474**							
Technetium-99	14133-76-7		<0.0010	ug/L					U	02/19/13
LCS			**QC Sample #89475**							
Technetium-99	14133-76-7		0.058	ug/L	108.2	85 - 115				02/19/13

* - QC result out of range n/a - Not Applicable