REVIEW COMMENT RECORD (RCR)

1. Date	2. Review No.
04/05/2011	
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
VSR11-039, Data Validation Report for CHPRC - Project 100 Area RI/FS, Chemical and Radiochemical Validation - Level C	S&GRP Sample Data Groups (SDGs); WSCF111115	JA Edwards	Environmental Quality Assurance (EQA)	2420 Stevens Rm. 345 376-4324

17. Comment Submittal Approval	10. Agreement With Indicated Comment Disposition(s)	11. CLOSED
Date / Organization Manager (optional) (print and sign)	JA Edwards — Reviewer/Point of Contact (print and sign); 04/05/2011 (07) — Date; Author/Originator (print and sign)	JA Edwards — Reviewer/Point of Contact (print and sign); 04/05/2011 (07) — Date; 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
	(Page 3, 38, & 82,of 169) INTRODUCTON - TPA missing, and (Page 6, 40, & 85, of 169) REFERENCES - TPA missing; TPA-CN-368, Tri Party Agreement TPA Change Notice Form, DOE/RL-2009-40 The TPA is referenced in General Chemistry INTRODUCTION (page 112) and also in REFERENCES (page 114). (TPA does NOT include Radiochemical)	TPA-CN-368 for DOE/RL-2009-40 is missing. Consistency	ADD: To INTRODUCTION and REFERENCE sections, TPA-CN-368, Tri Party Agreement TPA Change Notice Form, DOE/RL-2009-40, *Sampling And Analysis Plan For The 100-DR-1 100-DR-2 100-HR-1 100-HR-2 And 100-HR-3 Operable Units Remedial Investigation Feasibility Study* Rev 0, June 2010	Y	Not accepted. The only item in TPA-CN-368 that was related to data validation was a change to hexavalent chromium. This is why it was referenced in the General Chemistry section of the DVR only.	CLOSED
	(Page 22 of 169) Issue Resolution Form SAF No(s): F10-216, Sample(s): B27CB0 Incorrect SAF. SAF should be F10-230. See COC F10-230-023 (page 24 of 169)	SAF should be correct for the sample ID. Consistency	CHANGE: F10-216 TO: F10-230	Y	Client form annotated with correct SAF #.	CLOSED

CHPRC - REVIEW COMMENT RECORD (RCR)

1. Date	2. Review No.
04/05/2011	
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
VSR11-039		Scot Fitzgerald	Analytical Support Group	2753/373-7495

17. Comment Submittal Approval	10. Agreement With Indicated Comment Disposition(s)	11. CLOSED
Date / Organization Manager (optional) (print and sign)	Scot Fitzgerald Reviewer/Point of Contact (print and sign) 04/05/2011 Date Author/Originator (print and sign)	Scot Fitzgerald Reviewer/Point of Contact (print and sign) 04/05/2011 Date 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
	No issues noted.					

ANALYTICAL QUALITY ASSOCIATES, INC.
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Albuquerque, NM 87123
505-299-5201
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Data Validation Report for CH2M Hill Plateau Remediation Company

VSR11-039
Project 100 Area RI/FS

Chemical & Radiochemical Validation - Level C

Validation Performed By: Eyda Hergenreder **Date:** 4-04-2011

Validation Reviewed By: Carl Schlosser **Date:** 4-04-2011

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Date: 04 April 2011
To: CH2M Hill (technical representative)
From: Analytical Quality Associates, Inc.
Project: 100 Area RI/FS
Subject: Volatile Organics - Sample Data Group (SDG) WSCF111115

INTRODUCTION

This memorandum presents the results of data validation for SDG WSCF111115 prepared by WSCF Analytical Laboratories. 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
B29HL2	01/12/11	Water	C	8260B
B27CB0	01/12/11	Water	C	8260B

Data validation was conducted in accordance with the CHPRC validation statement of work and the Sampling and Analysis Plan for the 100-DR-1, 100-DR-2, 100-HR-1, 100-HR-2, and 100-HR-3 Operable Units Remedial Investigation/Feasibility Study, DOE/RL-2009-40, Rev. 0 (SAP). Appendices 1 through 6 provide the following information as indicated below:

Appendix 1. Glossary of Data Reporting Qualifiers
Appendix 2. Summary of Data Qualification
Appendix 3. Annotated Laboratory Reports
Appendix 4. Laboratory Narrative and Chain-of-Custody Documentation
Appendix 5. Data Validation Supporting Documentation
Appendix 6. Additional Documentation Requested By Client

DATA QUALITY OBJECTIVES

- **Holding Times and Sample Preservation**

Holding times are calculated from Chain-of-Custody forms to determine the validity of the results. The holding time requirements for volatile organics are analysis within 14 days of sample collection. Sample preservation requires chilling to 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

All trip blank results were acceptable.

Field Blanks

No field blanks were submitted for validation.

Equipment Blanks

No equipment blanks were submitted for validation.

- **Accuracy**

Accuracy is evaluated by reviewing surrogate results, matrix spike sample results, and laboratory control sample results. According to the SAP, the matrix spike and laboratory control sample accuracy limits are 80% to 120%. The limits for reported analytes not listed in the SAP are specified by the DV procedure.

Surrogates

All surrogate recoveries were acceptable.

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

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

The only 8260B MS/MSD analytes reported were 1,1-dichloroethene, trichloroethene, benzene, toluene and chlorobenzene. Reported analytes not represented in the MS/MSDs were cis-1,3-dichloropropene, trans-1,3-dichloropropene, methyl isobutyl ketone, 2-hexanone, acetone, carbon disulfide, bromodichloromethane and methyl ethyl ketone. All sample results for these non-represented analytes were non-detects and should be qualified as estimates and flagged "UJ."

The MS and MSD recoveries for trichloroethene were below the lower acceptance limit. All associated trichloroethene sample results and all associated reported analytes represented by trichloroethene were non-detects and should be qualified as estimates and flagged "UJ." See the table in Appendix 2 for a listing of all affected sample results.

The MSD recovery for 1,1-dichloroethene was above the upper acceptance limit. All associated 1,1-dichloroethene sample results and all associated reported analytes represented by 1,1-dichloroethene were non-detects and should not be qualified.

Laboratory Control Samples (LCSs)

All LCS recoveries were acceptable with the following exceptions.

The only 8260B LCS analytes reported were 1,1-dichloroethene, benzene, chlorobenzene, toluene and trichloroethene. Reported analytes not represented in the LCSs were cis-1,3-dichloropropene, trans-1,3-dichloropropene, methyl isobutyl ketone, 2-hexanone, acetone, carbon disulfide, bromodichloromethane and methyl ethyl ketone. All sample results for these non-represented analytes were non-detects and should be qualified as estimates and flagged "UJ."

The LCS recovery for trichloroethene was below the lower acceptance limit. All associated trichloroethene sample results and all associated reported analytes represented by trichloroethene were non-detects and should be qualified as estimates and flagged "UJ." See the table in Appendix 2 for a listing of all affected sample results.

The LCS recovery for 1,1-dichloroethene was above the upper acceptance limit. All associated 1,1-dichloroethene sample results and all associated reported analytes represented by 1,1-dichloroethene were non-detects and should not be qualified.

- **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%. The limits for reported analytes not listed in the SAP are specified by the DV procedure.

MS/MSD Samples

All MS/MSD relative percent difference values were acceptable.

Field Duplicate Samples

No field duplicates were submitted for validation.

Field Split Samples

No field splits were submitted for validation.

- **Internal Standards**

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

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

- **Detection Limits**

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

All reported sample MDLs were below the CRDLs.

- **Completeness**

SDG WSCF111115 was submitted for validation and verified for completeness. Completeness is based on the percentage of data determined to be valid (i.e., not rejected). The completion percentage was 100%.

MAJOR DEFICIENCIES

None found.

MINOR DEFICIENCIES

Minor deficiencies leading to qualification of sample results as estimates were due to MS/MSD and LCS recovery infractions, and non-represented QC data for multiple analytes. 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-2009-40, Rev. 0, *Sampling and Analysis Plan for the 100-DR-1, 100-DR-2, 100-HR-1, 100-HR-2, and 100-HR-3 Operable Units Remedial Investigation/Feasibility Study*, March 2010.

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			
SDG: WSCF111115	Reviewer: AQA	Project: 100 Area RI/FS	Page 1 of 1
Analyte(s)	**Qualifier**	**Samples Affected**	**Reason**
cis-1,3-dichloropropene trans-1,3-dichloropropene methyl isobutyl ketone 2-hexanone acetone carbon disulfide bromodichloromethane methyl ethyl ketone	UJ	B29HL2, B27CB0	Non-represented MS/MSD and LCS data
carbon tetrachloride dibromochloromethane tetrachloroethene trichloroethene 1,1,1-trichloroethane 1,1,2-trichloroethane 1,1,2,2-tetrachloroethane	UJ	B29HL2, B27CB0	Low MS/MSD and LCS recoveries

Comments: None

Appendix 3

Annotated Laboratory Reports

WSCF Analytical Results Report

Attention Michael Neely
Department Organic, Volatiles

Group # WSCF111115

Sample # 111115001
SAF# F10-216
Sample ID B29HL2

Matrix WATER
Sampled 01/12/11
Received 01/12/11

Test Performed	CAS #		Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
8260 Prep											**01/14/11**
SW-846 8260B											
1,1-Dichloroethene	75-35-4		LA-523-455	U	<1		ug/L	1	1	5	01/19/11
Trichloroethene	79-01-6	UJ	LA-523-455	U	<1		ug/L	1	1	5	01/19/11
Benzene	71-43-2		LA-523-455	U	<1		ug/L	1	1	5	01/19/11
Toluene	108-88-3		LA-523-455	U	<1		ug/L	1	1	5	01/19/11
Chlorobenzene	108-90-7		LA-523-455	U	<1		ug/L	1	1	5	01/19/11
1,1-Dichloroethane	75-34-3		LA-523-455	U	<1		ug/L	1	1	5	01/19/11
Ethylbenzene	100-41-4		LA-523-455	U	<1		ug/L	1	1	5	01/19/11
Styrene	100-42-5		LA-523-455	U	<1		ug/L	1	1	5	01/19/11
cis-1,3-Dichloropropene	10061-01-5	UJ	LA-523-455	U	<1		ug/L	1	1	5	01/19/11
trans-1,3-Dichloropropene	10061-02-6	UJ	LA-523-455	U	<1		ug/L	1	1	5	01/19/11
1,2-Dichloroethane	107-06-2		LA-523-455	U	<1		ug/L	1	1	5	01/19/11
Methyl isobutyl ketone	108-10-1	UJ	LA-523-455	U	<1		ug/L	1	1	5	01/19/11
Dibromochloromethane	124-48-1	UJ	LA-523-455	U	<1		ug/L	1	1	5	01/19/11
Tetrachloroethene	127-18-4	UJ	LA-523-455	U	<1		ug/L	1	1	5	01/19/11
Total Xylenes	1330-20-7		LA-523-455	U	<1		ug/L	1	1	5	01/19/11
Total 1,2-Dichloroethene	540-59-0		LA-523-455	U	<1		ug/L	1	1	5	01/19/11

MDL = Minimum Detection
RQ = Result Qualifier
TP Err = Total Propagated
DF = Dilution Factor
+ - Indicates more than nine qualifier

B - Analyte was detected in both the BLANK and SAMPLE
D - Analyte was reported at a secondary diltution factor.
E - The calibration exceeds the calibration range (GC/MS).
J - Analyte < PQL (or EQL) >= MDL.
N - Presumed evidence based on MS library search(GC/MS only)

T - MS/MSD recovery outside control limits(GC/MS only).
U - Analyzed for but not detected above limiting criteria.
X,Y or Z - See comment detail and/or narrative.
N - MS and/or MSD recovery outside control limits.
PQL is equivalent to Estimated Quantitation Limit (EQL)

WSCF Analytical Results Report

Attention Michael Neely
Department Organic, Volatiles

Group # WSCF111115

Sample # 111115001
SAF# F10-216
Sample ID B29HL2

Matrix WATER
Sampled 01/12/11
Received 01/12/11

Test Performed	CAS #		Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
Carbon tetrachloride	56-23-5	UJ	LA-523-455	U	<1		ug/L	1	1	5	01/19/11
2-Hexanone	591-78-6	UJ	LA-523-455	U	<1		ug/L	1	1	5	01/19/11
Acetone	67-64-1	UJ	LA-523-455	U	<1		ug/L	1	1	5	01/19/11
Chloroform	67-66-3		LA-523-455	U	<1		ug/L	1	1	5	01/19/11
1,1,1-Trichloroethane	71-55-6	UJ	LA-523-455	U	<1		ug/L	1	1	5	01/19/11
Bromomethane	74-83-9		LA-523-455	U	<1		ug/L	1	1	5	01/19/11
Chloromethane	74-87-3		LA-523-455	U	<1		ug/L	1	1	5	01/19/11
Chloroethane	75-00-3		LA-523-455	U	<1		ug/L	1	1	5	01/19/11
Vinyl chloride	75-01-4		LA-523-455	U	<1		ug/L	1	1	5	01/19/11
Methylene chloride	75-09-2		LA-523-455	U	<1		ug/L	1	1	5	01/19/11
Carbon disulfide	75-15-0	UJ	LA-523-455	U	<1		ug/L	1	1	5	01/19/11
Bromoform	75-25-2		LA-523-455	U	<1		ug/L	1	1	5	01/19/11
Bromodichloromethane	75-27-4	UJ	LA-523-455	U	<1		ug/L	1	1	5	01/19/11
1,2-Dichloropropane	78-87-5		LA-523-455	U	<1		ug/L	1	1	5	01/19/11
Methyl ethyl ketone	78-93-3	UJ	LA-523-455	U	<1		ug/L	1	1	5	01/19/11
1,1,2-Trichloroethane	79-00-5	UJ	LA-523-455	U	<1		ug/L	1	1	5	01/19/11
1,1,2,2-Tetrachloroethane	79-34-5	UJ	LA-523-455	U	<1		ug/L	1	1	5	01/19/11
trans-1,2-Dichloroethene	156-60-5		LA-523-455	U	<1		ug/L	1	1	5	01/19/11

MDL = Minimum Detection
RQ = Result Qualifier
TP Err = Total Propagated
DF = Dilution Factor
+ - Indicates more than nine qualifier

B - Analyte was detected in both the BLANK and SAMPLE
D - Analyte was reported at a secondary diltution factor.
E - The calibration exceeds the calibration range (GC/MS).
J - Analyte < PQL (or EQL) >= MDL.
N - Presumed evidence based on MS library search(GC/MS only)

T - MS/MSD recovery outside control limits(GC/MS only).
U - Analyzed for but not detected above limiting criteria.
X,Y or Z - See comment detail and/or narrative.
N - MS and/or MSD recovery outside control limits.
PQL is equivalent to Estimated Quantitation Limit (EQL)

WSCF Analytical Results Report

Attention Michael Neely
Department Organic, Volatiles

Group # WSCF111115

Sample # 111115001
SAF# F10-216
Sample ID B29HL2

Matrix WATER
Sampled 01/12/11
Received 01/12/11

Test Performed	CAS #	Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
cis-1,2-Dichloroethene	156-59-2	LA-523-455	U	<1		ug/L	1	1	5	01/19/11

MDL = Minimum Detection
RQ = Result Qualifier
TP Err = Total Propagated
DF = Dilution Factor
+ - Indicates more than nine qualifier

B - Analyte was detected in both the BLANK and SAMPLE
D - Analyte was reported at a secondary diltution factor.
E - The calibration exceeds the calibration range (GC/MS).
J - Analyte < PQL (or EQL) >= MDL.
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U - Analyzed for but not detected above limiting criteria.
X,Y or Z - See comment detail and/or narrative.
N - MS and/or MSD recovery outside control limits.
PQL is equivalent to Estimated Quantitation Limit (EQL)

WSCF Analytical Results Report

Attention Michael Neely
Department Organic, Volatiles

Group # WSCF111115

Sample # 111115002
SAF# ~~F10-216~~ F10-230
Sample ID B27CB0

Matrix WATER
Sampled 01/12/11
Received 01/12/11

Test Performed	CAS #		Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
8260 Prep											**01/14/11**
SW-846 8260B											
1,1-Dichloroethene	75-35-4		LA-523-455	U	<1		ug/L	1	1	5	01/19/11
Trichloroethene	79-01-6	UJ	LA-523-455	U	<1		ug/L	1	1	5	01/19/11
Benzene	71-43-2		LA-523-455	U	<1		ug/L	1	1	5	01/19/11
Toluene	108-88-3		LA-523-455	U	<1		ug/L	1	1	5	01/19/11
Chlorobenzene	108-90-7		LA-523-455	U	<1		ug/L	1	1	5	01/19/11
1,1-Dichloroethane	75-34-3		LA-523-455	U	<1		ug/L	1	1	5	01/19/11
Ethylbenzene	100-41-4		LA-523-455	U	<1		ug/L	1	1	5	01/19/11
Styrene	100-42-5		LA-523-455	U	<1		ug/L	1	1	5	01/19/11
cis-1,3-Dichloropropene	10061-01-5	UJ	LA-523-455	U	<1		ug/L	1	1	5	01/19/11
trans-1,3-Dichloropropene	10061-02-6	UJ	LA-523-455	U	<1		ug/L	1	1	5	01/19/11
1,2-Dichloroethane	107-06-2		LA-523-455	U	<1		ug/L	1	1	5	01/19/11
Methyl isobutyl ketone	108-10-1	UJ	LA-523-455	U	<1		ug/L	1	1	5	01/19/11
Dibromochloromethane	124-48-1	UJ	LA-523-455	U	<1		ug/L	1	1	5	01/19/11
Tetrachloroethene	127-18-4	UJ	LA-523-455	U	<1		ug/L	1	1	5	01/19/11
Total Xylenes	1330-20-7		LA-523-455	U	<1		ug/L	1	1	5	01/19/11
Total 1,2-Dichloroethene	540-59-0		LA-523-455	U	<1		ug/L	1	1	5	01/19/11

MDL = Minimum Detection
RQ = Result Qualifier
TP Err = Total Propagated
DF = Dilution Factor
+ - Indicates more than nine qualifier

B - Analyte was detected in both the BLANK and SAMPLE
D - Analyte was reported at a secondary diltution factor.
E - The calibration exceeds the calibration range (GC/MS).
J - Analyte < PQL (or EQL) >= MDL.
N - Presumed evidence based on MS library search(GC/MS only)

T - MS/MSD recovery outside control limits(GC/MS only).
U - Analyzed for but not detected above limiting criteria.
X,Y or Z - See comment detail and/or narrative.
N - MS and/or MSD recovery outside control limits.
PQL is equivalent to Estimated Quantitation Limit (EQL)

WSCF Analytical Results Report

Attention Michael Neely
Department Organic, Volatiles

Group # WSCF111115

Sample # 111115002
SAF# ~~F10-216~~ F10-230
Sample ID B27CB0

Matrix WATER
Sampled 01/12/11
Received 01/12/11

Test Performed	CAS #		Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
Carbon tetrachloride	56-23-5	UJ	LA-523-455	U	<1		ug/L	1	1	5	01/19/11
2-Hexanone	591-78-6	UJ	LA-523-455	U	<1		ug/L	1	1	5	01/19/11
Acetone	67-64-1	UJ	LA-523-455	U	<1		ug/L	1	1	5	01/19/11
Chloroform	67-66-3		LA-523-455	U	<1		ug/L	1	1	5	01/19/11
1,1,1-Trichloroethane	71-55-6	UJ	LA-523-455	U	<1		ug/L	1	1	5	01/19/11
Bromomethane	74-83-9		LA-523-455	U	<1		ug/L	1	1	5	01/19/11
Chloromethane	74-87-3		LA-523-455	U	<1		ug/L	1	1	5	01/19/11
Chloroethane	75-00-3		LA-523-455	U	<1		ug/L	1	1	5	01/19/11
Vinyl chloride	75-01-4		LA-523-455	U	<1		ug/L	1	1	5	01/19/11
Methylene chloride	75-09-2		LA-523-455	U	<1		ug/L	1	1	5	01/19/11
Carbon disulfide	75-15-0	UJ	LA-523-455	U	<1		ug/L	1	1	5	01/19/11
Bromoform	75-25-2		LA-523-455	U	<1		ug/L	1	1	5	01/19/11
Bromodichloromethane	75-27-4	UJ	LA-523-455	U	<1		ug/L	1	1	5	01/19/11
1,2-Dichloropropane	78-87-5		LA-523-455	U	<1		ug/L	1	1	5	01/19/11
Methyl ethyl ketone	78-93-3	UJ	LA-523-455	U	<1		ug/L	1	1	5	01/19/11
1,1,2-Trichloroethane	79-00-5	UJ	LA-523-455	U	<1		ug/L	1	1	5	01/19/11
1,1,2,2-Tetrachloroethane	79-34-5	UJ	LA-523-455	U	<1		ug/L	1	1	5	01/19/11
trans-1,2-Dichloroethene	156-60-5		LA-523-455	U	<1		ug/L	1	1	5	01/19/11

MDL = Minimum Detection
RQ = Result Qualifier
TP Err = Total Propagated
DF = Dilution Factor
+ - Indicates more than nine qualifier

B - Analyte was detected in both the BLANK and SAMPLE
D - Analyte was reported at a secondary diltution factor.
E - The calibration exceeds the calibration range (GC/MS).
J - Analyte < PQL (or EQL) >= MDL.
N - Presumed evidence based on MS library search(GC/MS only)

T - MS/MSD recovery outside control limits(GC/MS only).
U - Analyzed for but not detected above limiting criteria.
X,Y or Z - See comment detail and/or narrative.
N - MS and/or MSD recovery outside control limits.
PQL is equivalent to Estimated Quantitation Limit (EQL)

WSCF Analytical Results Report

Attention Michael Neely
Department Organic, Volatiles

Group # WSCF111115

Sample # 111115002
SAF# ~~F10-216~~ F10-230
Sample ID B27CB0

Matrix WATER
Sampled 01/12/11
Received 01/12/11

Test Performed	CAS #	Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
cis-1,2-Dichloroethene	156-59-2	LA-523-455	U	<1		ug/L	1	1	5	01/19/11

MDL = Minimum Detection
RQ = Result Qualifier
TP Err = Total Propagated
DF = Dilution Factor
+ - Indicates more than nine qualifier

B - Analyte was detected in both the BLANK and SAMPLE
D - Analyte was reported at a secondary diltution factor.
E - The calibration exceeds the calibration range (GC/MS).
J - Analyte < PQL (or EQL) >= MDL.
N - Presumed evidence based on MS library search(GC/MS only)

T - MS/MSD recovery outside control limits(GC/MS only).
U - Analyzed for but not detected above limiting criteria.
X,Y or Z - See comment detail and/or narrative.
N - MS and/or MSD recovery outside control limits.
PQL is equivalent to Estimated Quantitation Limit (EQL)

Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

Attachment 2
Narrative
WSCF111115

Introduction

Samples were received at the WSCF laboratory as referenced on the WSCF SAF Number Cross Reference table included in the final report. The samples were analyzed for the analytes indicated on the attached copy of the chain of custody (COC) form in accordance with the *Statement of Work (SOW), Modification No. 2 to Agreement 36587, Release 3, "FH WSCF ANALYTICAL SERVICES FOR GROUNDWATER."*

The narrative (Attachment 2) will address sample characteristics, analyses requested and general information in performance of the analytical methods. A Data Summary Report (Attachment 3) includes analytical results, a comment report detailing method abnormalities, tentatively identified peaks if applicable, method references, and Laboratory QC information as applicable. Copies of the chain of custody and sample receipt documentation are included as Attachment 4. Also find attached an Issue Resolution Form (IRF) pertaining to Laboratory Control Sample recovery failure for Semi-Volatile analysis (SVOC 8270).

It should be noted that the attached chain of custody was not stamped "ICED" by the WSCF Laboratory Sample Custodian during sample receiving. However, based on procedure LO-090-403 form "NOTICE OF IMPROPER SAMPLE SUBMITTAL" was not submitted and was not stamped "NOT ICED". No anomaly was noted during sample receipt.

The following generic data qualifiers (i.e., B, D, U and J) may be applicable to this report, as appropriate

- **B** – Sample results with a concentration greater than the MDL but less than the PQL are B flagged (applies to inorganic and wet chemical analyses), as appropriate.
- **D** – Sample results are D flagged if dilution(s) were required, as appropriate.
- **J** – Sample results with a concentration greater than the MDL but less than the PQL are J flagged (applies to organic analyses), as appropriate.
- **U** – Analyzed for but not detected above limiting criteria. Relative Percent Difference (RPD) values associated with an analyte qualified with a "U" are not applicable.

Analytical Methodology for Requested Analyses

Refer to *WSCF Method References Report* for a complete listing of approved analytical methods.

Inorganic Comments

Anions – Hold time requirements for this analysis were met. A Duplicate, Matrix Spike, Matrix Spike Duplicate, Blank and Laboratory Control Sample were analyzed with this delivery group. Analytical Note(s):

- All applicable QC controls are within the established limits.

Attachment 2
Narrative
WSCF111115

Hexavalent Chromium – The hold time requirement for this analysis was met. A Duplicate, Matrix Spike, Blank and Laboratory Control Sample were analyzed with this delivery group. Analytical Note(s):

- All applicable QC controls are within the established limits.

ICP-MS Metals – The hold time requirements for this analysis were met. A Matrix Spike, Matrix Spike Duplicate, Blank and Laboratory Control Sample were analyzed with this delivery group. Analytical Note(s):

- All applicable QC controls are within the established limits.

Organic Comments

Semi-VOA – The hold time requirements for this analysis were met. A Matrix Spike, Matrix Spike Duplicate, Blank and Laboratory Control Sample (Refer to analytical note below) were analyzed with this delivery group. Analytical Note(s):

- An Issue Resolution Form (CHPRC Tracking Number: 11-331) was issued for sample B27CB0 (111115002) for exceeding the Laboratory Control Sample recovery limits for Semi-Volatile analysis (SVOC 8270) of the following: 2-Nirtroaniline, 4-Nitrophenol, 4-Chloroaniline, and 3,3-Dichlorobenzidine. Proposed resolution is to accept data as is.

- Di-n-octylphthalate and 3,3-Dichlorobenzidine did not meet the MS and or MSD acceptance limits. Sample results for this analytes were "T" Flagged.

- Phenol and Di-n-octylphthalate did not meet the MS / MSD RPD acceptance limits. Sample results for this analyte were not flagged. The quality control report was flagged for RPD failure.

- All other applicable QC controls are within the established limits.

VOA – The hold time requirement for this analysis was met. A Matrix Spike, Matrix Spike Duplicate, Blank and Laboratory Control Sample were analyzed with this delivery group. Analytical Note(s):

- All applicable QC controls are within the established limits.

Radiochemistry Comments

Rad Chem – The hold time requirement for this analysis was met. A Duplicate, Matrix Spike (Matrix Spikes apply only to Technetium & Tritium), Blank and Laboratory Control Sample were analyzed with this delivery group. Analytical Note(s):

Tracers are used to determine chemical yield. RPD is monitored in sample duplicate and is not required for tracer recovery per SOW.

Narrative

- Gamma Energy Analysis:
  - All applicable QC controls are within the established limits.
- Gross Alpha / Gross Beta:
  - All applicable QC controls are within the established limits.
- Strontium-89/90:
  - All applicable QC controls are within the established limits.
- Tritium:
  - All applicable QC controls are within the established limits.
- Technetium-99:
  - All applicable QC controls are within the established limits.

We certify that this data package is in compliance with the SOW, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this data package has been authorized by the Analytical Laboratory Manager (or designee) and the Client Services representative as verified by electronic signatures shown on the WSCF ANALYTICAL RESULTS REPORT.

Attachment 2
Narrative
WSCF111115

ISSUE RESOLUTION FORM

CHPRC TRACKING NUMBER: 11-331

Date: 02/15/2011 TEST: SVOC 8270 **DUE DATE: 2/24/11**

SAF No(s): ~~F10-216~~ F10-230

SDG (s): 111115

LOGIN No(s): 111115002

Sample No(s): B27CB0

Submitted By: M. Avila
Phone No.: 373-1613
Fax No.:

Submitted To: S. Champoux
Phone No.: 373-5290
Fax No.:

ISSUE	PROPOSED RESOLUTION
The batch had LCS percent recovery failure for the following compounds: 2-Nitroaniline: 62.4 % (limits 63-119%) 3,3-Dichlorobenzidine: 12% (limits 39-155%) 4-Chloroaniline: 74.8 % (limits 83-154%) 4-Nitrophenol: 23.9 % (limits 25-126%)	Accept the data as-is and note in the narrative.

CHPRC/BHI/WMH/PNNL COMMENTS

Accept proposed resolution

Sara Champoux 2/16/2011

Signature and Date

EH
04/06/11

4

CH2MHill Plateau Remediation Company

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

F10-216-163 PAGE 1 OF 1

COLLECTOR	Romo, Kacek, Bolan
SAMPLING LOCATION	C7622 (199-D5-132); I-021
ICE CHEST NO.	
SHIPPED TO	Waste Sampling & Characterization
COMPANY CONTACT	RADLOFF, AW
TELEPHONE NO.	376-4554
PROJECT COORDINATOR	RADLOFF, AW
PRICE CODE	7N
DATA TURNAROUND	45 Days / 45 Days
PROJECT DESIGNATION	100 Area Remedial Investigation/Feasibility Analysis - 100-HR-3 Groundwat
SAF NO.	F10-216
AIR QUALITY	[ ]
FIELD LOGBOOK NO.	HNF-N-595-12 PG 49
ACTUAL SAMPLE DEPTH	88.7' FT
COA	300110ES10
METHOD OF SHIPMENT	GOVERNMENT VEHICLE
OFFSITE PROPERTY NO.	N/A
BILL OF LADING/AIR BILL NO.	N/A

MATRIX*: A=Air, DL=Drum Liquids, DS=Drum Solids, L=Liquid, O=Oil, S=Soil, SE=Sediment, T=Tissue, V=Vegetation, W=Water, WI=Wipe, X=Other

POSSIBLE SAMPLE HAZARDS/ REMARKS
Contains Radioactive Material at concentrations that may or may not be regulated for transportation per 49 CFR / IATA Dangerous Goods Regulations but are not releasable per DOE Order 5400.5 (1990/1993)

111115

SPECIAL HANDLING AND/OR STORAGE

PRESERVATION	HCl or H2SO4 to pH <2/Cool-4C	HNO3 to pH <2	Cool-4C	Cool-4C	HNO3 to pH <2	HNO3 to pH <2	HNO3 to pH <2	None	HCl to pH <2
HOLDING TIME	14 Days	6 Months	24 Hours	48 Hours	6 Months	6 Months	6 Months	6 Months	6 Months
TYPE OF CONTAINER	aGS*	G/P	aG	G/P	G/P	G/P	G/P	G/P	G/P
NO. OF CONTAINER(S)	3	1	1	1	1	1	2	1	2
VOLUME	40mL	500mL	500mL	250mL	500mL	500mL	1L	250mL	1L
SAMPLE ANALYSIS	VOA - 8260 (TCL 100 Area RI/FS);	SEE ITEM (1) IN SPECIAL INSTRUCTIONS 200.8	Chromium Hex - 7196;	IC Anions - 300.0 (100 Area RI/FS);	Gamma Spectroscopy (100 Area RI/FS);	SEE ITEM (2) IN SPECIAL INSTRUCTIONS GAB	Strontium-89,90 - Total Sr;	Tritium - Ion Ex;	Technetium-99;

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME									
B29HL2 (X)1	WATER	1-12-11	1253	–	–	–	–	–	–	–	–	–

CHAIN OF POSSESSION

RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
Rob Romo, Rob Romo	1-12-11 1415	Victor Osing	1/12/11 1415
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME

SIGN/ PRINT NAMES

SPECIAL INSTRUCTIONS

** The laboratory is to report all TICs for Method 8260.
** The CACN for all analytical work at WSCF laboratory is 401642ES20.
** The 100 Area S&GRP Characterization and Monitoring Sampling and Analysis GKI applies to this SAF.
(1) ICP/MS - 200.8 (100 Area RI/FS) {Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Cobalt, Copper, Lead, Manganese, Nickel, Selenium, Silver, Thallium, Vanadium, Zinc}; ICP/MS - 200.8 (Add-on) {Uranium}; 200.8_HG - ICPMS (100 Area RI/FS);
(2) Gross Alpha {Gross alpha}; Gross Beta {Gross beta};

ORIGINAL

LABORATORY SECTION	RECEIVED BY	TITLE	DATE/TIME
FINAL SAMPLE DISPOSITION	DISPOSAL METHOD	DISPOSED BY	DATE/TIME

A-6003-618 (REV 2)

Sample Receipt

Chain of Custody

CH2MHill Plateau Remediation Company — **CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST** — F10-230-023 — PAGE 1 OF 1

COLLECTOR: Romo, Kauck, Becan	COMPANY CONTACT: ANNA RADLOFF	TELEPHONE NO.: 376-4554	PROJECT COORDINATOR: RADLOFF, AW
SAMPLING LOCATION: C7622 (199-D5-132); I-021 FTB	PROJECT DESIGNATION: 100 Area Remedial Investigation/Feasibility Analysis - 100-HR-3 - QC Sampl		SAF NO.: F10-230
ICE CHEST NO.	FIELD LOGBOOK NO.: HNF-N-585-12 Pg 49	ACTUAL SAMPLE DEPTH: (N/A)	COA: 300110ES10
SHIPPED TO: Waste Sampling & Characterization	OFFSITE PROPERTY NO.: SEE PTR		BILL OF LADING/AIR BILL NO.: SEE PTR

PRICE CODE: 7N — AIR QUALITY: ☐ — DATA TURNAROUND: 45 Days / 45 Days — METHOD OF SHIPMENT: GOVERNMENT VEHICLE

MATRIX*: A=Air, DL=Drum Liquids, DS=Drum Solids, L=Liquid, O=Oil, S=Soil, SE=Sediment, T=Tissue, V=Vegetation, W=Water, WI=Wipe, X=Other

POSSIBLE SAMPLE HAZARDS/ REMARKS: Contains Radioactive Material at concentrations that may or may not be regulated for transportation per 49 CFR / IATA Dangerous Goods Regulations but are not releasable per DOE Order 5400.5 (1990/1993)

SPECIAL HANDLING AND/OR STORAGE

PRESERVATION	HCl or H2SO4 to pH <2/Cool~4C	Cool~4C
HOLDING TIME	14 Days	7/40 Days
TYPE OF CONTAINER	aGs*	aG
NO. OF CONTAINER(S)	3	4
VOLUME	40mL	1L
SAMPLE ANALYSIS	VOA - 8260 (TCL 100 Area RI/FS);	Semi-VOA - 8270 (TCL 100 Area RI/FS);

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME		
B27CB0 (02	WATER	1-12-11	1250	–	–

CHAIN OF POSSESSION	DATE/TIME	SIGN/ PRINT NAMES	DATE/TIME
RELINQUISHED BY/REMOVED FROM: Rob Romo, Robert Romo 1-12-11	1415	RECEIVED BY/STORED IN: Vil Tao [signature] 1/12/11	1415
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME

SPECIAL INSTRUCTIONS: ** The laboratory is to report all TICs for Method 8260.☐☐** The CACN for all analytical work at WSCF laboratory is 401642ES20.☐** The 100 Area S&GRP Characterization and Monitoring Sampling and Analysis GKI applies to this SAF.☐

LABORATORY SECTION — RECEIVED BY — TITLE — DATE/TIME

FINAL SAMPLE DISPOSITION — DISPOSAL METHOD — DISPOSED BY — DATE/TIME

A-6003-618 (REV 2)

Appendix 5

Data Validation Supporting Documentation

Appendix A - Chemical Data Validation Checklist

VALIDATION LEVEL:	A	B	(C)	D	E
PROJECT: 100 Area RI/FS			DATA PACKAGE: VSR11-039		
VALIDATOR: Eyda Hergenreder		LAB: WSCF		DATE: 04-04-2011	
			SDG: WSCF111115		
ANALYSES PERFORMED					
SW-846 8260 X		SW-846 8260 (TCLP)	SW-846 8270		SW-846 8270 (TCLP)
SAMPLES/MATRIX Water samples SDG WSCF111115: B29HL2, B27CB0					

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:

MS/MSD and LCS data is not available for cis-1,3-dichloropropene, trans-1,3-dichloropropene, methyl isobutyl ketone, 2-hexanone, acetone, carbon disulfide, bromodichloromethane and methyl ethyl ketone

trichloroethene MS/MSD %R = 77%/76%; 1,1-dichloroethene MSD %R = 121%

trichloroethene LCS %R = 77%; 1,1-dichloroethene LCS %R = 123%

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: None

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 6

Additional Documentation Requested By Client

Quality Control Report

Attention Michael Neely
Department Organic, Volatiles

Group # WSCF111115

QC Batch 174221
Associated Samples 111115001, 111115002

Test SW-846 8260B Volatiles, separate prep

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
BLANK			**QC Sample #46500**							
1,1-Dichloroethene	75-35-4		<1	ug/L					U	01/19/11
Trichloroethene	79-01-6		<1	ug/L					U	01/19/11
Benzene	71-43-2		<1	ug/L					U	01/19/11
Toluene	108-88-3		<1	ug/L					U	01/19/11
Chlorobenzene	108-90-7		<1	ug/L					U	01/19/11
1,1-Dichloroethane	75-34-3		<1	ug/L					U	01/19/11
Ethylbenzene	100-41-4		<1	ug/L					U	01/19/11
Styrene	100-42-5		<1	ug/L					U	01/19/11
cis-1,3-Dichloropropene	10061-01-5		<1	ug/L					U	01/19/11
trans-1,3-Dichloropropene	10061-02-6		<1	ug/L					U	01/19/11
1,2-Dichloroethane	107-06-2		<1	ug/L					U	01/19/11
Methyl isobutyl ketone	108-10-1		<1	ug/L					U	01/19/11
Dibromochloromethane	124-48-1		<1	ug/L					U	01/19/11
Tetrachloroethene	127-18-4		<1	ug/L					U	01/19/11
Total Xylenes	1330-20-7		<1	ug/L					U	01/19/11
Total 1,2-Dichloroethene	540-59-0		<1	ug/L					U	01/19/11
Carbon tetrachloride	56-23-5		<1	ug/L					U	01/19/11

Quality Control Report

Attention Michael Neely
Department Organic, Volatiles

Group # WSCF111115

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
2-Hexanone	591-78-6		<1	ug/L					U	01/19/11
Acetone	67-64-1		<1	ug/L					U	01/19/11
Chloroform	67-66-3		<1	ug/L					U	01/19/11
1,1,1-Trichloroethane	71-55-6		<1	ug/L					U	01/19/11
Bromomethane	74-83-9		<1	ug/L					U	01/19/11
Chloromethane	74-87-3		<1	ug/L					U	01/19/11
Chloroethane	75-00-3		<1	ug/L					U	01/19/11
Vinyl chloride	75-01-4		<1	ug/L					U	01/19/11
Methylene chloride	75-09-2		<1	ug/L					U	01/19/11
Carbon disulfide	75-15-0		<1	ug/L					U	01/19/11
Bromoform	75-25-2		<1	ug/L					U	01/19/11
Bromodichloromethane	75-27-4		<1	ug/L					U	01/19/11
1,2-Dichloropropane	78-87-5		<1	ug/L					U	01/19/11
Methyl ethyl ketone	78-93-3		<1	ug/L					U	01/19/11
1,1,2-Trichloroethane	79-00-5		<1	ug/L					U	01/19/11
1,1,2,2-Tetrachloroethane	79-34-5		<1	ug/L					U	01/19/11
trans-1,2-Dichloroethene	156-60-5		<1	ug/L					U	01/19/11
cis-1,2-Dichloroethene	156-59-2		<1	ug/L					U	01/19/11
LCS			**QC Sample #46501**							
1,1-Dichloroethene	75-35-4		31	ug/L	123.3	75 - 125				01/19/11
Trichloroethene	79-01-6		19	ug/L	77.4	75 - 125				01/19/11
Benzene	71-43-2		22	ug/L	86	75 - 125				01/19/11

Quality Control Report

Attention Michael Neely
Department Organic, Volatiles

Group # WSCF111115

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
Toluene	108-88-3		22	ug/L	88	75 - 125				01/19/11
Chlorobenzene	108-90-7		24	ug/L	97.7	75 - 125				01/19/11
MS			**QC Sample #46502**							
			Original	**111114007**						
1,1-Dichloroethene	75-35-4		30	ug/L	120.3	75 - 125				01/19/11
Trichloroethene	79-01-6		19	ug/L	77.4	75 - 125				01/19/11
Benzene	71-43-2		21	ug/L	84.6	75 - 125				01/19/11
Toluene	108-88-3		21	ug/L	84.2	75 - 125				01/19/11
Chlorobenzene	108-90-7		23	ug/L	92.2	75 - 125				01/19/11
MSD			**QC Sample #46503**							
			Original	**111114007**					**Paired**	**46502**
1,1-Dichloroethene	75-35-4		30	ug/L	121.1	75 - 125	0.70	20		01/19/11
Trichloroethene	79-01-6		19	ug/L	76	75 - 125	1.80	20		01/19/11
Benzene	71-43-2		22	ug/L	86.2	75 - 125	1.90	20		01/19/11
Toluene	108-88-3		22	ug/L	87.8	75 - 125	4.20	20		01/19/11
Chlorobenzene	108-90-7		24	ug/L	97.8	75 - 125	5.90	20		01/19/11

Quality Control Report

Attention Michael Neely
Department Organic, Volatiles

Group # WSCF111115

QC Batch 174221
Associated Samples 111115001, 111115002

Test SW-846 8260B Volatiles, separate prep

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
SAMPLE			**Sample #111115001**							
1,2-Dichloroethane-d4	17060-07-0			ug/L	104.6	75 - 125				01/19/11
Toluene-d8	2037-26-5				98	75 - 125				01/19/11
4-Bromofluorobenzene	460-00-4				80.6	75 - 125				01/19/11
SAMPLE			**Sample #111115002**							
1,2-Dichloroethane-d4	17060-07-0				99.6	75 - 125				01/19/11
Toluene-d8	2037-26-5				98.1	75 - 125				01/19/11
4-Bromofluorobenzene	460-00-4				78.7	75 - 125				01/19/11
BLANK			**QC Sample #46500**							
1,2-Dichloroethane-d4	17060-07-0				94.5	75 - 125				01/19/11
Toluene-d8	2037-26-5				88.2	75 - 125				01/19/11
4-Bromofluorobenzene	460-00-4				77.7	75 - 125				01/19/11
LCS			**QC Sample #46501**							
1,2-Dichloroethane-d4	17060-07-0				99.6	75 - 125				01/19/11
Toluene-d8	2037-26-5				88.4	75 - 125				01/19/11

Quality Control Report

Attention Michael Neely
Department Organic, Volatiles

Group # WSCF111115

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
4-Bromofluorobenzene	460-00-4				78.5	75 - 125				01/19/11
MS			**QC Sample #46502**							
			Original	**111114007**						
1,2-Dichloroethane-d4	17060-07-0				97.5	75 - 125				01/19/11
Toluene-d8	2037-26-5				88.6	75 - 125				01/19/11
4-Bromofluorobenzene	460-00-4				76.3	75 - 125				01/19/11
MSD			**QC Sample #46503**							
			Original	**111114007**					**Paired** **46502**	
1,2-Dichloroethane-d4	17060-07-0				93.3	75 - 125	4.40	20		01/19/11
Toluene-d8	2037-26-5				85.9	75 - 125	3.10	20		01/19/11
4-Bromofluorobenzene	460-00-4				78.8	75 - 125	3.20	20		01/19/11

Date: 04 April 2011
To: CH2M Hill (technical representative)
From: Analytical Quality Associates, Inc.
Project: 100 Area RI/FS
Subject: Semivolatile Organics - Sample Data Group (SDG) WSCF111115

INTRODUCTION

This memorandum presents the results of data validation for SDG WSCF111115 prepared by WSCF Analytical Laboratories. The sample validated along with the analytical method is provided in the following table.

Sample ID	Sample Date	Media	Validation Level	Analytical Methods
B27CB0	01/12/11	Water	C	8270D

Data validation was conducted in accordance with the CHPRC validation statement of work and the Sampling and Analysis Plan for the 100-DR-1, 100-DR-2, 100-HR-1, 100-HR-2, and 100-HR-3 Operable Units Remedial Investigation/Feasibility Study, DOE/RL-2009-40, Rev. 0 (SAP). Appendices 1 through 6 provide the following information as indicated below:

Appendix 1. Glossary of Data Reporting Qualifiers
Appendix 2. Summary of Data Qualification
Appendix 3. Annotated Laboratory Reports
Appendix 4. Laboratory Narrative and Chain-of-Custody Documentation
Appendix 5. Data Validation Supporting Documentation
Appendix 6. Additional Documentation Requested By Client

DATA QUALITY OBJECTIVES

- **Holding Times and Sample Preservation**

Holding times are calculated from Chain-of-Custody forms to determine the validity of the results. The holding time requirements for semi-volatile organics in water are extraction within 7 days of sample collection and analysis within 40 days of sample extraction. Sample preservation requires chilling to 4 degrees Celsius.

The sample was extracted and analyzed within the prescribed holding times and properly preserved.

- **Blanks**

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

Laboratory Blanks

All laboratory blank results were acceptable with the following exception.

The diethyl phthalate and di-n-butylphthalate laboratory blank results were > the method detection limits (MDLs) but < the reporting limits (RLs). The associated sample results were non-detects and should not be qualified for the blank infractions.

Trip Blanks

All trip blank results were acceptable.

Field Blanks

No field blanks were submitted for validation.

Equipment Blanks

No equipment blanks were submitted for validation.

- **Accuracy**

Accuracy is evaluated by reviewing surrogate results, matrix spike sample results, and laboratory control sample results. According to the SAP, the matrix spike and laboratory control sample accuracy limits are 80% to 120%. The limits for reported analytes not listed in the SAP are specified by the DV procedure.

Surrogates

All surrogate recoveries were acceptable.

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

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

The MS and MSD recoveries for 3,3-dichlorobenzidiene were well below 20%. The associated sample result was a non-detect and should be qualified as unusable and flagged "UR," based on professional judgment.

The MS and/or MSD recoveries for 4-nitrophenol, 1,4-dichlorobenzene, phenol, pentachlorophenol, 2-methylphenol, hexachloroethane, 2-nitrophenol, 2,4-dichlorophenol, 2-nitroaniline and carbazole were below the lower acceptance limit but ≥20%. All associated sample results for these analytes were non-detects and should qualified as estimates and flagged "UJ."

The MS and MSD recoveries for di-n-octylphthalate were above the upper acceptance limit. The associated sample result was a non-detect and should not be qualified.

Laboratory Control Samples (LCSs)

All LCS recoveries were acceptable with the following exceptions.

The LCS recoveries for 4-nitrophenol and 3,3-dichlorobenzidine were <30%. The associated sample results were non-detects and should be qualified as unusable and flagged "UR."

The LCS recoveries for 1,4-dichlorobenzene, phenol, 1,2,4-trichlorobenzene, 2,4-dinitrotoluene, pyrene, 4-chloro-3-methylphenol, n-nitroso-di-n-propylamine, acenaphthene, pentachlorophenol, 2-chlorophenol, 2-methylphenol, hexachloroethane, 2-nitrophenol, 2,4-dimethylphenol, 2,4-dichlorophenol, naphthalene, 2-nitroanailine, dibenzofuran, fluorene, hexachlorobenzene, anthracene, carbazole, di-n-butylphthalate, benzo(a)pyrene, bis(1-chloro-2-propyl)ether and 4-chloroaniline were below the lower acceptance limit but >30%. All associated sample results for these analytes 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%. 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 with the following exceptions.

The MS/MSD RPDs for phenol and di-n-octylphthalate were above the acceptance limits. The associated sample results for these analytes were non-detects and should be qualified as estimates and flagged "UJ."

Field Duplicate Samples

No field duplicates were submitted for validation.

Field Split Samples

No field splits were submitted for validation.

- **Internal Standards**

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

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

- **Detection Limits**

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

All reported sample MDLs were below the CRDLs.

- **Completeness**

SDG WSCF111115 was submitted for validation and verified for completeness. Completeness is based on the percentage of data determined to be valid (i.e., not rejected). The completion percentage for method 8270D was 97%.

MAJOR DEFICIENCIES

Major deficiencies leading to qualification of 4-nitrophenol and 3,3-dichlorobenzidine sample result as unusable were due to very low MS/MSD and/or LCS recoveries.

MINOR DEFICIENCIES

Minor deficiencies leading to qualification of sample results as estimates were due to MS/MSD and LCS recovery infractions.

REFERENCES

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

DOE/RL-2009-40, Rev. 0, *Sampling and Analysis Plan for the 100-DR-1, 100-DR-2, 100-HR-1, 100-HR-2, and 100-HR-3 Operable Units Remedial Investigation/Feasibility Study*, March 2010.

Appendix 1

Glossary of Data Reporting Qualifiers

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

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

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

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

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

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

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

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

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

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

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

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

Appendix 2

Summary of Data Qualification

Semivolatile Organics Data Qualification Summary			
SDG: WSCF111115	Reviewer: AQA	Project: 100 Area RI/FS	Page 1 of 1
Analyte(s)	**Qualifier**	**Samples Affected**	**Reason**
3,3-dichlorobenzidine	**UR**	B27CB0	Very low MS/MSD and LCS recoveries
4-nitrophenol	**UR**	B27CB0	Very low LCS recovery and low MS/MSD recoveries
1,4-dichlorobenzene pentachlorophenol 2-methylphenol hexachloroethane 2-nitrophenol 2,4-dichlorophenol 2-nitroaniline carbazole	UJ	B27CB0	Low MS and/or MSD recoveries and low LCS recoveries
1,2,4-trichlorobenzene 2,4-dinitrotoluene pyrene 4-chloro-3-methylphenol n-nitroso-di-n-propylamine acenaphthene 2-chlorophenol 2,4-dimethylphenol naphthalene dibenzofuran fluorene hexachlorobenzene anthracene di-n-butylphthalate benzo(a)pyrene bis(1-chloro-2-propyl)ether 4-chloroaniline	UJ	B27CB0	Low LCS recoveries
di-n-octylphthalate	UJ	B27CB0	Poor MS/MSD precision
phenol	UJ	B27CB0	Low MS/MSD recoveries, low LCS recovery and poor MS/MSD precision

Comments: None

Appendix 3

Annotated Laboratory Reports

WSCF Analytical Results Report

Attention Michael Neely
Department Organic, Semivolatiles

Group # WSCF111115

Sample # 111115002
SAF# ~~F10-216~~ F10-230
Sample ID B27CB0

Matrix WATER
Sampled 01/12/11
Received 01/12/11

Test Performed	CAS #		Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
8270 Prep											**01/18/11**
SW-846 8270D											
4-Nitrophenol	100-02-7	UR	LA-523-456	UX	<1		ug/L	1	1	4	01/25/11
1,4-Dichlorobenzene	106-46-7	UJ	LA-523-456	U	<1		ug/L	1	1	4	01/25/11
Phenol	108-95-2	UJ	LA-523-456	U	<1		ug/L	1	1	4	01/25/11
1,2,4-Trichlorobenzene	120-82-1	UJ	LA-523-456	U	<1		ug/L	1	1	4	01/25/11
2,4-Dinitrotoluene	121-14-2	UJ	LA-523-456	U	<1		ug/L	1	1	4	01/25/11
Pyrene	129-00-0	UJ	LA-523-456	U	<1		ug/L	1	1	4	01/25/11
4-Chloro-3-methylphenol	59-50-7	UJ	LA-523-456	U	<1		ug/L	1	1	4	01/25/11
n-Nitroso-di-n-propylamine	621-64-7	UJ	LA-523-456	U	<1		ug/L	1	1	4	01/25/11
Acenaphthene	83-32-9	UJ	LA-523-456	U	<1		ug/L	1	1	4	01/25/11
Pentachlorophenol	87-86-5	UJ	LA-523-456	U	<1		ug/L	1	1	4	01/25/11
2-Chlorophenol	95-57-8	UJ	LA-523-456	U	<1		ug/L	1	1	4	01/25/11
4-Nitroaniline	100-01-6		LA-523-456	U	<1		ug/L	1	1	4	01/25/11
4-Bromophenyl-phenylether	101-55-3		LA-523-456	U	<1		ug/L	1	1	4	01/25/11
2,4-Dimethylphenol	105-67-9	UJ	LA-523-456	U	<1		ug/L	1	1	4	01/25/11
4-Chloroaniline	106-47-8	UJ	LA-523-456	UX	<1		ug/L	1	1	4	01/25/11

MDL = Minimum Detection
RQ = Result Qualifier
TP Err = Total Propagated
DF = Dilution Factor
+ - Indicates more than nine qualifier

B - Analyte was detected in both the BLANK and SAMPLE
D - Analyte was reported at a secondary diltution factor.
E - The calibration exceeds the calibration range (GC/MS).
J - Analyte < lowest calibration but >= MDL.
N - Presumed evidence based on MS library search(GC/MS only)

T - MS/MSD recovery outside control limits(GC/MS only).
U - Analyzed for but not detected above limiting criteria.
X,Y or Z - See comment detail and/or narrative.
PQL is equivalent to Estimated Quantitation Limit (EQL)

WSCF Analytical Results Report

Attention Michael Neely
Department Organic, Semivolatiles

Group # WSCF111115

Sample # 111115002
SAF# ~~F10-216~~ F10-230
Sample ID B27CB0

Matrix WATER
Sampled 01/12/11
Received 01/12/11

Test Performed	CAS #		Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
Bis(1-Chloro-2-propyl)ether	108-60-1	UJ	LA-523-456	U	<1		ug/L	1	1	4	01/25/11
Bis-(2-Chloroethyl) ether	111-44-4		LA-523-456	U	<1		ug/L	1	1	4	01/25/11
Bis-(2-Chloroethoxy)methane	111-91-1		LA-523-456	U	<1		ug/L	1	1	4	01/25/11
Bis-(2-Ethylhexyl)phthalate	117-81-7		LA-523-456	U	<1		ug/L	1	1	4	01/25/11
Di-n-octylphthalate	117-84-0	UJ	LA-523-456	UT	<1		ug/L	1	1	4	01/25/11
Hexachlorobenzene	118-74-1	UJ	LA-523-456	U	<1		ug/L	1	1	4	01/25/11
Anthracene	120-12-7	UJ	LA-523-456	U	<1		ug/L	1	1	4	01/25/11
2,4-Dichlorophenol	120-83-2	UJ	LA-523-456	U	<1		ug/L	1	1	4	01/25/11
Dimethylphthalate	131-11-3		LA-523-456	U	<1		ug/L	1	1	4	01/25/11
Dibenzofuran	132-64-9	UJ	LA-523-456	U	<1		ug/L	1	1	4	01/25/11
Benzo(g,h,i)perylene	191-24-2		LA-523-456	U	<1		ug/L	1	1	4	01/25/11
Indeno(1,2,3-cd)pyrene	193-39-5		LA-523-456	U	<1		ug/L	1	1	4	01/25/11
Benzo(b)fluoranthene	205-99-2		LA-523-456	U	<1		ug/L	1	1	4	01/25/11
Fluoranthene	206-44-0		LA-523-456	U	<1		ug/L	1	1	4	01/25/11
Benzo(k)fluoranthene	207-08-9		LA-523-456	U	<1		ug/L	1	1	4	01/25/11
Acenaphthylene	208-96-8		LA-523-456	U	<1		ug/L	1	1	4	01/25/11
Chrysene	218-01-9		LA-523-456	U	<1		ug/L	1	1	4	01/25/11

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E - The calibration exceeds the calibration range (GC/MS).
J - Analyte < lowest calibration but >= MDL.
N - Presumed evidence based on MS library search(GC/MS only)

T - MS/MSD recovery outside control limits(GC/MS only).
U - Analyzed for but not detected above limiting criteria.
X,Y or Z - See comment detail and/or narrative.
PQL is equivalent to Estimated Quantitation Limit (EQL)

WSCF Analytical Results Report

Attention Michael Neely
Department Organic, Semivolatiles

Group # WSCF111115

Sample # 111115002
SAF# ~~F10-216~~ F10-230
Sample ID B27CB0

Matrix WATER
Sampled 01/12/11
Received 01/12/11

Test Performed	CAS #		Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
Benzo(a)pyrene	50-32-8	UJ	LA-523-456	U	<1		ug/L	1	1	4	01/25/11
2,4-Dinitrophenol	51-28-5		LA-523-456	U	<1		ug/L	1	1	4	01/25/11
Dibenzo(a,h)anthracene	53-70-3		LA-523-456	U	<1		ug/L	1	1	4	01/25/11
4,6-Dinitro-2-methylphenol	534-52-1		LA-523-456	U	<1		ug/L	1	1	4	01/25/11
1,3-Dichlorobenzene	541-73-1		LA-523-456	U	<1		ug/L	1	1	4	01/25/11
Benzo(a)anthracene	56-55-3		LA-523-456	U	<1		ug/L	1	1	4	01/25/11
2,6-Dinitrotoluene	606-20-2		LA-523-456	U	<1		ug/L	1	1	4	01/25/11
4-Chlorophenyl-phenylether	7005-72-3		LA-523-456	U	<1		ug/L	1	1	4	01/25/11
Hexachlorocyclopentadiene	77-47-4		LA-523-456	U	<1		ug/L	1	1	4	01/25/11
Isophorone	78-59-1		LA-523-456	U	<1		ug/L	1	1	4	01/25/11
Diethyl phthalate	84-66-2		LA-523-456	U	<1		ug/L	1	1	4	01/25/11
Di-n-butylphthalate	84-74-2	UJ	LA-523-456	U	<1		ug/L	1	1	4	01/25/11
Phenanthrene	85-01-8		LA-523-456	U	<1		ug/L	1	1	4	01/25/11
Butylbenzylphthalate	85-68-7		LA-523-456	U	<1		ug/L	1	1	4	01/25/11
n-Nitrosodiphenylamine	86-30-6		LA-523-456	U	<1		ug/L	1	1	4	01/25/11
Fluorene	86-73-7	UJ	LA-523-456	U	<1		ug/L	1	1	4	01/25/11

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DF = Dilution Factor
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E - The calibration exceeds the calibration range (GC/MS).
J - Analyte < lowest calibration but >= MDL.
N - Presumed evidence based on MS library search(GC/MS only)

T - MS/MSD recovery outside control limits(GC/MS only).
U - Analyzed for but not detected above limiting criteria.
X,Y or Z - See comment detail and/or narrative.
PQL is equivalent to Estimated Quantitation Limit (EQL)

WSCF Analytical Results Report

Attention Michael Neely
Department Organic, Semivolatiles

Group # WSCF111115

Sample # 111115002
SAF# ~~F10-216~~ F10-230
Sample ID B27CB0

Matrix WATER
Sampled 01/12/11
Received 01/12/11

Test Performed	CAS #		Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
Carbazole	86-74-8	UJ	LA-523-456	U	<1		ug/L	1	1	4	01/25/11
Hexachlorobutadiene	87-68-3		LA-523-456	U	<1		ug/L	1	1	4	01/25/11
2-Nitroaniline	88-74-4	UJ	LA-523-456	UX	<1		ug/L	1	1	4	01/25/11
2-Nitrophenol	88-75-5	UJ	LA-523-456	U	<1		ug/L	1	1	4	01/25/11
Naphthalene	91-20-3	UJ	LA-523-456	U	<1		ug/L	1	1	4	01/25/11
2-Methylnaphthalene	91-57-6		LA-523-456	U	<1		ug/L	1	1	4	01/25/11
2-Chloronaphthalene	91-58-7		LA-523-456	U	<1		ug/L	1	1	4	01/25/11
3,3-Dichlorobenzidine	91-94-1	UR	LA-523-456	UTX	<1		ug/L	1	1	4	01/25/11
2-Methylphenol	95-48-7	UJ	LA-523-456	U	<1		ug/L	1	1	4	01/25/11
1,2-Dichlorobenzene	95-50-1		LA-523-456	U	<1		ug/L	1	1	4	01/25/11
2,4,5-Trichlorophenol	95-95-4		LA-523-456	U	<1		ug/L	1	1	4	01/25/11
Nitrobenzene	98-95-3		LA-523-456	U	<1		ug/L	1	1	4	01/25/11
3-Nitroaniline	99-09-2		LA-523-456	U	<1		ug/L	1	1	4	01/25/11
3 & 4 Methylphenol, Total	65794-96-9		LA-523-456	U	<1		ug/L	1	1	4	01/25/11
Hexachloroethane	67-72-1	UJ	LA-523-456	U	<1		ug/L	1	1	4	01/25/11
2,4,6-Trichlorophenol	88-06-2		LA-523-456	U	<1		ug/L	1	1	4	01/25/11

MDL = Minimum Detection
RQ = Result Qualifier
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DF = Dilution Factor
+ - Indicates more than nine qualifier

B - Analyte was detected in both the BLANK and SAMPLE
D - Analyte was reported at a secondary diltution factor.
E - The calibration exceeds the calibration range (GC/MS).
J - Analyte < lowest calibration but >= MDL.
N - Presumed evidence based on MS library search(GC/MS only)

T - MS/MSD recovery outside control limits(GC/MS only).
U - Analyzed for but not detected above limiting criteria.
X,Y or Z - See comment detail and/or narrative.
PQL is equivalent to Estimated Quantitation Limit (EQL)

Tentatively Identified Peak Report

Attention Michael Neely
Department Organic, Semivolatiles

Group # WSCF111115

Peak Name		CAS #	RT	RQ	Result	Units
111115002	**B27CB0**					
3-Hexen-1-ol		544-12-7	5.9740		4.3	ug/L

Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

Attachment 2
Narrative
WSCF111115

Introduction

Samples were received at the WSCF laboratory as referenced on the WSCF SAF Number Cross Reference table included in the final report. The samples were analyzed for the analytes indicated on the attached copy of the chain of custody (COC) form in accordance with the *Statement of Work (SOW), Modification No. 2 to Agreement 36587, Release 3, "FH WSCF ANALYTICAL SERVICES FOR GROUNDWATER."*

The narrative (Attachment 2) will address sample characteristics, analyses requested and general information in performance of the analytical methods. A Data Summary Report (Attachment 3) includes analytical results, a comment report detailing method abnormalities, tentatively identified peaks if applicable, method references, and Laboratory QC information as applicable. Copies of the chain of custody and sample receipt documentation are included as Attachment 4. Also find attached an Issue Resolution Form (IRF) pertaining to Laboratory Control Sample recovery failure for Semi-Volatile analysis (SVOC 8270).

It should be noted that the attached chain of custody was not stamped "ICED" by the WSCF Laboratory Sample Custodian during sample receiving. However, based on procedure LO-090-403 form "NOTICE OF IMPROPER SAMPLE SUBMITTAL" was not submitted and was not stamped "NOT ICED". No anomaly was noted during sample receipt.

The following generic data qualifiers (i.e., B, D, U and J) may be applicable to this report, as appropriate

- **B** – Sample results with a concentration greater than the MDL but less than the PQL are B flagged (applies to inorganic and wet chemical analyses), as appropriate.
- **D** – Sample results are D flagged if dilution(s) were required, as appropriate.
- **J** – Sample results with a concentration greater than the MDL but less than the PQL are J flagged (applies to organic analyses), as appropriate.
- **U** – Analyzed for but not detected above limiting criteria. Relative Percent Difference (RPD) values associated with an analyte qualified with a "U" are not applicable.

Analytical Methodology for Requested Analyses

Refer to *WSCF Method References Report* for a complete listing of approved analytical methods.

Inorganic Comments

Anions – Hold time requirements for this analysis were met. A Duplicate, Matrix Spike, Matrix Spike Duplicate, Blank and Laboratory Control Sample were analyzed with this delivery group. Analytical Note(s):

- All applicable QC controls are within the established limits.

Attachment 2
Narrative
WSCF111115

Hexavalent Chromium – The hold time requirement for this analysis was met. A Duplicate, Matrix Spike, Blank and Laboratory Control Sample were analyzed with this delivery group. Analytical Note(s):

- All applicable QC controls are within the established limits.

ICP-MS Metals – The hold time requirements for this analysis were met. A Matrix Spike, Matrix Spike Duplicate, Blank and Laboratory Control Sample were analyzed with this delivery group. Analytical Note(s):

- All applicable QC controls are within the established limits.

Organic Comments

Semi-VOA – The hold time requirements for this analysis were met. A Matrix Spike, Matrix Spike Duplicate, Blank and Laboratory Control Sample (Refer to analytical note below) were analyzed with this delivery group. Analytical Note(s):

- An Issue Resolution Form (CHPRC Tracking Number: 11-331) was issued for sample B27CB0 (111115002) for exceeding the Laboratory Control Sample recovery limits for Semi-Volatile analysis (SVOC 8270) of the following: 2-Nirtroaniline, 4-Nitrophenol, 4-Chloroaniline, and 3,3-Dichlorobenzidine. Proposed resolution is to accept data as is.

- Di-n-octylphthalate and 3,3-Dichlorobenzidine did not meet the MS and or MSD acceptance limits. Sample results for this analytes were "T" Flagged.

- Phenol and Di-n-octylphthalate did not meet the MS / MSD RPD acceptance limits. Sample results for this analyte were not flagged. The quality control report was flagged for RPD failure.

- All other applicable QC controls are within the established limits.

VOA – The hold time requirement for this analysis was met. A Matrix Spike, Matrix Spike Duplicate, Blank and Laboratory Control Sample were analyzed with this delivery group. Analytical Note(s):

- All applicable QC controls are within the established limits.

Radiochemistry Comments

Rad Chem – The hold time requirement for this analysis was met. A Duplicate, Matrix Spike (Matrix Spikes apply only to Technetium & Tritium), Blank and Laboratory Control Sample were analyzed with this delivery group. Analytical Note(s):

Tracers are used to determine chemical yield. RPD is monitored in sample duplicate and is not required for tracer recovery per SOW.

Narrative

- Gamma Energy Analysis:
  - All applicable QC controls are within the established limits.
- Gross Alpha / Gross Beta:
  - All applicable QC controls are within the established limits.
- Strontium-89/90:
  - All applicable QC controls are within the established limits.
- Tritium:
  - All applicable QC controls are within the established limits.
- Technetium-99:
  - All applicable QC controls are within the established limits.

We certify that this data package is in compliance with the SOW, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this data package has been authorized by the Analytical Laboratory Manager (or designee) and the Client Services representative as verified by electronic signatures shown on the WSCF ANALYTICAL RESULTS REPORT.

Attachment 2
Narrative
WSCF111115

ISSUE RESOLUTION FORM

CHPRC TRACKING NUMBER: 11-331

Date: 02/15/2011 TEST: SVOC 8270 **DUE DATE: 2/24/11**

SAF No(s): F10-216

SDG (s): 111115

LOGIN No(s): 111115002

Sample No(s): B27CB0

Submitted By: M. Avila
Phone No.: 373-1613
Fax No.:

Submitted To: S. Champoux
Phone No.: 373-5290
Fax No.:

ISSUE	PROPOSED RESOLUTION
The batch had LCS percent recovery failure for the following compounds: 2-Nitroaniline: 62.4 % (limits 63-119%) 3,3-Dichlorobenzidine: 12% (limits 39-155%) 4-Chloroaniline: 74.8 % (limits 83-154%) 4-Nitrophenol: 23.9 % (limits 25-126%)	Accept the data as-is and note in the narrative.

CHPRC/BHI/WMH/PNNL COMMENTS

Accept proposed resolution

Sara Champoux 2/16/2011

Signature and Date

4

CH2MHill Plateau Remediation Company

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

F10-216-163 PAGE 1 OF 1

COLLECTOR	Romo, Kacek, Bolan
SAMPLING LOCATION	C7622 (199-D5-132); I-021
ICE CHEST NO.	
SHIPPED TO	Waste Sampling & Characterization
COMPANY CONTACT	RADLOFF, AW
TELEPHONE NO.	376-4554
PROJECT COORDINATOR	RADLOFF, AW
PRICE CODE	7N
DATA TURNAROUND	45 Days / 45 Days
PROJECT DESIGNATION	100 Area Remedial Investigation/Feasibility Analysis - 100-HR-3 Groundwat
SAF NO.	F10-216
AIR QUALITY	
FIELD LOGBOOK NO.	HNF-N-595-12 PG 49
ACTUAL SAMPLE DEPTH	88.7' FT
COA	300110ES10
METHOD OF SHIPMENT	GOVERNMENT VEHICLE
OFFSITE PROPERTY NO.	N/A
BILL OF LADING/AIR BILL NO.	N/A

MATRIX*: A=Air, DL=Drum Liquids, DS=Drum Solids, L=Liquid, O=Oil, S=Soil, SE=Sediment, T=Tissue, V=Vegetation, W=Water, WI=Wipe, X=Other

POSSIBLE SAMPLE HAZARDS/ REMARKS
Contains Radioactive Material at concentrations that may or may not be regulated for transportation per 49 CFR / IATA Dangerous Goods Regulations but are not releasable per DOE Order 5400.5 (1990/1993)

111115

SPECIAL HANDLING AND/OR STORAGE

PRESERVATION	HCl or H2SO4 to pH <2/Cool-4C	HNO3 to pH <2	Cool-4C	Cool-4C	HNO3 to pH <2	HNO3 to pH <2	HNO3 to pH <2	None	HCl to pH <2
HOLDING TIME	14 Days	6 Months	24 Hours	48 Hours	6 Months	6 Months	6 Months	6 Months	6 Months
TYPE OF CONTAINER	aGS*	G/P	aG	G/P	G/P	G/P	G/P	G/P	G/P
NO. OF CONTAINER(S)	3	1	1	1	1	1	2	1	2
VOLUME	40mL	500mL	500mL	250mL	500mL	500mL	1L	250mL	1L
SAMPLE ANALYSIS	VOA - 8260 (TCL 100 Area RI/FS);	SEE ITEM (1) IN SPECIAL INSTRUCTIONS 200.8	Chromium Hex - 7196;	IC Anions - 300.0 (100 Area RI/FS);	Gamma Spectroscopy (100 Area RI/FS);	SEE ITEM (2) IN SPECIAL INSTRUCTIONS GAB	Strontium-89,90 - Total Sr;	Tritium - Ion Ex;	Technetium-99;

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME									
B29HL2 (X)	WATER	1-12-11	1253	–	–	–	–	–	–	–	–	–

CHAIN OF POSSESSION / **SIGN/ PRINT NAMES**

RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
Rob Romo, Rob Romo	1-12-11 1415	Victor Osing	1/12/11 1415
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME

SPECIAL INSTRUCTIONS

** The laboratory is to report all TICs for Method 8260.
** The CACN for all analytical work at WSCF laboratory is 401642ES20.
** The 100 Area S&GRP Characterization and Monitoring Sampling and Analysis GKI applies to this SAF.
(1) ICP/MS - 200.8 (100 Area RI/FS) {Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Cobalt, Copper, Lead, Manganese, Nickel, Selenium, Silver, Thallium, Vanadium, Zinc}; ICP/MS - 200.8 (Add-on) {Uranium}; 200.8_HG - ICPMS (100 Area RI/FS);
(2) Gross Alpha {Gross alpha}; Gross Beta {Gross beta};

ORIGINAL

LABORATORY SECTION	RECEIVED BY	TITLE	DATE/TIME
FINAL SAMPLE DISPOSITION	DISPOSAL METHOD	DISPOSED BY	DATE/TIME

A-6003-618 (REV 2)

Sample Receipt

Chain of Custody

CH2MHill Plateau Remediation Company — **CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST** — F10-230-023 — PAGE 1 OF 1

COLLECTOR: Romo, Kauck, Becan	COMPANY CONTACT: ANNA RADLOFF	TELEPHONE NO.: 376-4554	PROJECT COORDINATOR: RADLOFF, AW
SAMPLING LOCATION: C7622 (199-D5-132); I-021 FTB	PROJECT DESIGNATION: 100 Area Remedial Investigation/Feasibility Analysis - 100-HR-3 - QC Sampl		SAF NO.: F10-230
ICE CHEST NO.	FIELD LOGBOOK NO.: HNF-N-585-12 Pg 49	ACTUAL SAMPLE DEPTH: (N/A)	COA: 300110ES10
SHIPPED TO: Waste Sampling & Characterization	OFFSITE PROPERTY NO.: SEE PTR		BILL OF LADING/AIR BILL NO.: SEE PTR

PRICE CODE: 7N — AIR QUALITY: ☐ — DATA TURNAROUND: 45 Days / 45 Days — METHOD OF SHIPMENT: GOVERNMENT VEHICLE

MATRIX*: A=Air, DL=Drum Liquids, DS=Drum Solids, L=Liquid, O=Oil, S=Soil, SE=Sediment, T=Tissue, V=Vegetation, W=Water, WI=Wipe, X=Other

POSSIBLE SAMPLE HAZARDS/ REMARKS: Contains Radioactive Material at concentrations that may or may not be regulated for transportation per 49 CFR / IATA Dangerous Goods Regulations but are not releasable per DOE Order 5400.5 (1990/1993)

SPECIAL HANDLING AND/OR STORAGE

PRESERVATION	HCl or H2SO4 to pH <2/Cool~4C	Cool~4C
HOLDING TIME	14 Days	7/40 Days
TYPE OF CONTAINER	aGs*	aG
NO. OF CONTAINER(S)	3	4
VOLUME	40mL	1L
SAMPLE ANALYSIS	VOA - 8260 (TCL 100 Area RI/FS);	Semi-VOA - 8270 (TCL 100 Area RI/FS);

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME		
B27CB0 (02	WATER	1-12-11	1250	–	–

CHAIN OF POSSESSION / **SIGN/ PRINT NAMES**

RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
Rob Romo, Robert Romo	1-12-11 1415	Vil Tao Simms	1/12/11 1415
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME

SPECIAL INSTRUCTIONS

** The laboratory is to report all TICs for Method 8260.☐☐** The CACN for all analytical work at WSCF laboratory is 401642ES20.☐** The 100 Area S&GRP Characterization and Monitoring Sampling and Analysis GKI applies to this SAF.☐

LABORATORY SECTION — RECEIVED BY — TITLE — DATE/TIME

FINAL SAMPLE DISPOSITION — DISPOSAL METHOD — DISPOSED BY — DATE/TIME

A-6003-618 (REV 2)

Appendix 5

Data Validation Supporting Documentation

Appendix A - Chemical Data Validation Checklist

VALIDATION LEVEL:	A	B	C	D	E
PROJECT: 100 Area RI/FS			DATA PACKAGE: VSR11-039		
VALIDATOR: Eyda Hergenreder		LAB: WSCF		DATE: 04-04-2011	
			SDG: WSCF111115		
ANALYSES PERFORMED					
SW-846 8260		SW-846 8260 (TCLP)	SW-846 8270 X		SW-846 8270 (TCLP)
SAMPLES/MATRIX Water sample SDG WSCF111115: B27CB0					

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:
Laboratory blank: diethyl phthalate 2.3 ug/L; di-n-butylphthalate 1.1 ug/L

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: See QC reports at end of worksheets for unacceptable MS/MSD and LCS recoveries

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:
MS/MSD RPD infractions: phenol 23%, di-n-octylphthalate 24%

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: None

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):

See attached

Quality Control Report

Attention Michael Neely
Department Organic, Semivolatiles

Group # WSCF111115

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
3-Nitroaniline	99-09-2		<1	ug/L					U	01/25/11
3 & 4 Methylphenol, Total	65794-96-9		<1	ug/L					U	01/25/11
Hexachloroethane	67-72-1		<1	ug/L					U	01/25/11
2,4,6-Trichlorophenol	88-06-2		<1	ug/L					U	01/25/11
LCS			**QC Sample #46568**							
4-Nitrophenol	100-02-7		7.2	ug/L	23.9	25 - 126			X	01/25/11
1,4-Dichlorobenzene	106-46-7		13	ug/L	65.6	41 - 118				01/25/11
Phenol	108-95-2		14	ug/L	45.7	25 - 147				01/25/11
1,2,4-Trichlorobenzene	120-82-1		21	ug/L	71	57 - 120				01/25/11
2,4-Dinitrotoluene	121-14-2		21	ug/L	69	62 - 113				01/25/11
Pyrene	129-00-0		24	ug/L	79	56 - 135				01/25/11
4-Chloro-3-methylphenol	59-50-7		21	ug/L	70.6	59 - 117				01/25/11
n-Nitroso-di-n-propylamine	621-64-7		22	ug/L	74.2	64 - 118				01/25/11
Acenaphthene	83-32-9		22	ug/L	72.4	60 - 115				01/25/11
Pentachlorophenol	87-86-5		14	ug/L	48.3	25 - 132				01/25/11
2-Chlorophenol	95-57-8		21	ug/L	70.3	60 - 110				01/25/11
2-Methylphenol	95-48-7		21	ug/L	68.9	44 - 119				01/25/11
Hexachloroethane	67-72-1		20	ug/L	65.6	33 - 124				01/25/11
2-Nitrophenol	88-75-5		17	ug/L	57.4	56 - 108				01/25/11
2,4-Dimethylphenol	105-67-9		22	ug/L	72.8	59 - 117				01/25/11
2,4-Dichlorophenol	120-83-2		21	ug/L	69.6	63 - 112				01/25/11
Naphthalene	91-20-3		21	ug/L	69.4	59 - 113				01/25/11

Quality Control Report

Attention Michael Neely
Department Organic, Semivolatiles

Group # WSCF111115

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
2-Nitroaniline	88-74-4		19	ug/L	62.4	63 - 119			X	01/25/11
Dibenzofuran	132-64-9		21	ug/L	71	62 - 116				01/25/11
Fluorene	86-73-7		22	ug/L	73.6	61 - 116				01/25/11
Hexachlorobenzene	118-74-1		23	ug/L	76.8	58 - 121				01/25/11
Anthracene	120-12-7		22	ug/L	74.5	58 - 122				01/25/11
Carbazole	86-74-8		23	ug/L	61.7	48 - 143				01/25/11
Di-n-butylphthalate	84-74-2		24	ug/L	78.8	63 - 127				01/25/11
3,3-Dichlorobenzidine	91-94-1		3.6	ug/L	12	39 - 155			JX	01/25/11
Bis-(2-Ethylhexyl)phthalate	117-81-7		24	ug/L	80.6	47 - 159				01/25/11
Di-n-octylphthalate	117-84-0		26	ug/L	88.1	43 - 162				01/25/11
Benzo(a)pyrene	50-32-8		21	ug/L	71.3	44 - 148				01/25/11
Bis(1-Chloro-2-propyl)ether	108-60-1		22	ug/L	73.7	59 - 118				01/25/11
4-Chloroaniline	106-47-8		28	ug/L	74.8	83 - 154			X	01/25/11
MS			**QC Sample #46569**							
			Original 111115002							
4-Nitrophenol	100-02-7	<1	7.3	ug/L	25.6	25 - 149			X	01/25/11
1,4-Dichlorobenzene	106-46-7	<1	15	ug/L	78.1	52 - 116				01/25/11
Phenol	108-95-2	<1	13	ug/L	44.8	25 - 153				01/25/11
1,2,4-Trichlorobenzene	120-82-1	<1	24	ug/L	84.7	62 - 122				01/25/11
2,4-Dinitrotoluene	121-14-2	<1	24	ug/L	83.6	59 - 116				01/25/11
Pyrene	129-00-0	<1	25	ug/L	88.8	67 - 123				01/25/11
4-Chloro-3-methylphenol	59-50-7	<1	24	ug/L	84.5	57 - 118				01/25/11

Quality Control Report

Attention Michael Neely
Department Organic, Semivolatiles

Group # WSCF111115

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
n-Nitroso-di-n-propylamine	621-64-7	<1	24	ug/L	84.4	64 - 121				01/25/11
Acenaphthene	83-32-9	<1	24	ug/L	83.8	62 - 116				01/25/11
Pentachlorophenol	87-86-5	<1	18	ug/L	61.9	25 - 144				01/25/11
2-Chlorophenol	95-57-8	<1	24	ug/L	82.3	54 - 117				01/25/11
2-Methylphenol	95-48-7	<1	22	ug/L	75.4	34 - 121				01/25/11
Hexachloroethane	67-72-1	<1	21	ug/L	73.8	51 - 116				01/25/11
2-Nitrophenol	88-75-5	<1	20	ug/L	70.2	62 - 108				01/25/11
2,4-Dimethylphenol	105-67-9	<1	25	ug/L	86.3	58 - 111				01/25/11
2,4-Dichlorophenol	120-83-2	<1	23	ug/L	81.9	64 - 112				01/25/11
Naphthalene	91-20-3	<1	23	ug/L	81.8	64 - 112				01/25/11
2-Nitroaniline	88-74-4	<1	18	ug/L	64.3	45 - 131			X	01/25/11
Dibenzofuran	132-64-9	<1	24	ug/L	85	66 - 114				01/25/11
Fluorene	86-73-7	<1	24	ug/L	85.7	65 - 112				01/25/11
Hexachlorobenzene	118-74-1	<1	25	ug/L	88.2	62 - 123				01/25/11
Anthracene	120-12-7	<1	25	ug/L	87.1	65 - 114				01/25/11
Carbazole	86-74-8	<1	26	ug/L	71	59 - 136				01/25/11
Di-n-butylphthalate	84-74-2	<1	26	ug/L	89.7	70 - 121				01/25/11
3,3-Dichlorobenzidine	91-94-1	<1	3.6	ug/L	12.5	25 - 155			JTX	01/25/11
Bis-(2-Ethylhexyl)phthalate	117-81-7	<1	28	ug/L	96.4	58 - 138				01/25/11
Di-n-octylphthalate	117-84-0	<1	44	ug/L	155.3	57 - 143			T	01/25/11
Benzo(a)pyrene	50-32-8	<1	23	ug/L	80.5	52 - 129				01/25/11
Bis(1-Chloro-2-propyl)ether	108-60-1	<1	24	ug/L	85.1	65 - 116				01/25/11
4-Chloroaniline	106-47-8	<1	33	ug/L	90.2	25 - 162			X	01/25/11

Quality Control Report

Attention Michael Neely
Department Organic, Semivolatiles

Group # WSCF111115

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit		RQ	Analyzed
MSD			**QC Sample #46570**								
			Original	**111115002**					**Paired**	**46569**	
4-Nitrophenol	100-02-7	<1	8.5	ug/L	29.8	25 - 149	15.20	20		X	01/25/11
1,4-Dichlorobenzene	106-46-7	<1	15	ug/L	76.9	52 - 116	1.50	20			01/25/11
Phenol	108-95-2	<1	16	ug/L	56.5	25 - 153	23.10	20	*	X	01/25/11
1,2,4-Trichlorobenzene	120-82-1	<1	23	ug/L	81.8	62 - 122	3.50	20			01/25/11
2,4-Dinitrotoluene	121-14-2	<1	24	ug/L	82.6	59 - 116	1.20	20			01/25/11
Pyrene	129-00-0	<1	26	ug/L	91.5	67 - 123	3.00	20			01/25/11
4-Chloro-3-methylphenol	59-50-7	<1	24	ug/L	85	57 - 118	0.60	20			01/25/11
n-Nitroso-di-n-propylamine	621-64-7	<1	24	ug/L	85.5	64 - 121	1.30	20			01/25/11
Acenaphthene	83-32-9	<1	24	ug/L	84.8	62 - 116	1.20	20			01/25/11
Pentachlorophenol	87-86-5	<1	18	ug/L	64.4	25 - 144	4.00	20			01/25/11
2-Chlorophenol	95-57-8	<1	24	ug/L	82.7	54 - 117	0.50	20			01/25/11
2-Methylphenol	95-48-7	<1	22	ug/L	78.3	34 - 121	3.80	20			01/25/11
Hexachloroethane	67-72-1	<1	22	ug/L	75.3	51 - 116	2.00	20			01/25/11
2-Nitrophenol	88-75-5	<1	19	ug/L	67.4	62 - 108	4.10	20			01/25/11
2,4-Dimethylphenol	105-67-9	<1	25	ug/L	86.2	58 - 111	0.10	20			01/25/11
2,4-Dichlorophenol	120-83-2	<1	23	ug/L	79	64 - 112	3.60	20			01/25/11
Naphthalene	91-20-3	<1	23	ug/L	81	64 - 112	1.00	20			01/25/11
2-Nitroaniline	88-74-4	<1	19	ug/L	67.5	45 - 131	4.90	20		X	01/25/11
Dibenzofuran	132-64-9	<1	25	ug/L	86.1	66 - 114	1.30	20			01/25/11
Fluorene	86-73-7	<1	25	ug/L	86	65 - 112	0.30	20			01/25/11
Hexachlorobenzene	118-74-1	<1	25	ug/L	88.2	62 - 123	0.00	20			01/25/11

Quality Control Report

Attention Michael Neely
Department Organic, Semivolatiles

Group # WSCF111115

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit		RQ	Analyzed
Anthracene	120-12-7	<1	25	ug/L	88	65 - 114	1.00	20			01/25/11
Carbazole	86-74-8	<1	26	ug/L	70.8	59 - 136	0.30	20			01/25/11
Di-n-butylphthalate	84-74-2	<1	26	ug/L	89.8	70 - 121	0.10	20			01/25/11
3,3-Dichlorobenzidine	91-94-1	<1	3.1	ug/L	11	25 - 155	12.80	20		JTX	01/25/11
Bis-(2-Ethylhexyl)phthalate	117-81-7	<1	27	ug/L	93.8	58 - 138	2.70	20			01/25/11
Di-n-octylphthalate	117-84-0	<1	35	ug/L	122.7	57 - 143	23.50	20	*	X	01/25/11
Benzo(a)pyrene	50-32-8	<1	23	ug/L	82	52 - 129	1.80	20			01/25/11
Bis(1-Chloro-2-propyl)ether	108-60-1	<1	24	ug/L	83.9	65 - 116	1.40	20			01/25/11
4-Chloroaniline	106-47-8	<1	33	ug/L	92.2	25 - 162	2.20	20		X	01/25/11

Appendix 6

Additional Documentation Requested By Client

Quality Control Report

Attention Michael Neely
Department Organic, Semivolatiles

Group # WSCF111115

QC Batch 174394
Associated Samples 111115002

Test SW-846 8270D Semivolatiles

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
BLANK			**QC Sample #46567**							
4-Nitrophenol	100-02-7		<1	ug/L					UX	01/25/11
1,4-Dichlorobenzene	106-46-7		<1	ug/L					U	01/25/11
Phenol	108-95-2		<1	ug/L					U	01/25/11
1,2,4-Trichlorobenzene	120-82-1		<1	ug/L					U	01/25/11
2,4-Dinitrotoluene	121-14-2		<1	ug/L					U	01/25/11
Pyrene	129-00-0		<1	ug/L					U	01/25/11
4-Chloro-3-methylphenol	59-50-7		<1	ug/L					U	01/25/11
n-Nitroso-di-n-propylamine	621-64-7		<1	ug/L					U	01/25/11
Acenaphthene	83-32-9		<1	ug/L					U	01/25/11
Pentachlorophenol	87-86-5		<1	ug/L					U	01/25/11
2-Chlorophenol	95-57-8		<1	ug/L					U	01/25/11
4-Nitroaniline	100-01-6		<1	ug/L					U	01/25/11
4-Bromophenyl-phenylether	101-55-3		<1	ug/L					U	01/25/11
2,4-Dimethylphenol	105-67-9		<1	ug/L					U	01/25/11
4-Chloroaniline	106-47-8		<1	ug/L					UX	01/25/11
Bis(1-Chloro-2-propyl)ether	108-60-1		<1	ug/L					U	01/25/11

Quality Control Report

Attention Michael Neely
Department Organic, Semivolatiles

Group # WSCF111115

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
Bis-(2-Chloroethyl) ether	111-44-4		<1	ug/L					U	01/25/11
Bis-(2-Chloroethoxy)methane	111-91-1		<1	ug/L					U	01/25/11
Bis-(2-Ethylhexyl)phthalate	117-81-7		<1	ug/L					U	01/25/11
Di-n-octylphthalate	117-84-0		<1	ug/L					U	01/25/11
Hexachlorobenzene	118-74-1		<1	ug/L					U	01/25/11
Anthracene	120-12-7		<1	ug/L					U	01/25/11
2,4-Dichlorophenol	120-83-2		<1	ug/L					U	01/25/11
Dimethylphthalate	131-11-3		<1	ug/L					U	01/25/11
Dibenzofuran	132-64-9		<1	ug/L					U	01/25/11
Benzo(g,h,i)perylene	191-24-2		<1	ug/L					U	01/25/11
Indeno(1,2,3-cd)pyrene	193-39-5		<1	ug/L					U	01/25/11
Benzo(b)fluoranthene	205-99-2		<1	ug/L					U	01/25/11
Fluoranthene	206-44-0		<1	ug/L					U	01/25/11
Benzo(k)fluoranthene	207-08-9		<1	ug/L					U	01/25/11
Acenaphthylene	208-96-8		<1	ug/L					U	01/25/11
Chrysene	218-01-9		<1	ug/L					U	01/25/11
Benzo(a)pyrene	50-32-8		<1	ug/L					U	01/25/11
2,4-Dinitrophenol	51-28-5		<1	ug/L					U	01/25/11
Dibenzo(a,h)anthracene	53-70-3		<1	ug/L					U	01/25/11
4,6-Dinitro-2-methylphenol	534-52-1		<1	ug/L					U	01/25/11
1,3-Dichlorobenzene	541-73-1		<1	ug/L					U	01/25/11

Quality Control Report

Attention Michael Neely
Department Organic, Semivolatiles

Group # WSCF111115

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
Benzo(a)anthracene	56-55-3		<1	ug/L					U	01/25/11
2,6-Dinitrotoluene	606-20-2		<1	ug/L					U	01/25/11
4-Chlorophenyl-phenylether	7005-72-3		<1	ug/L					U	01/25/11
Hexachlorocyclopentadiene	77-47-4		<1	ug/L					U	01/25/11
Isophorone	78-59-1		<1	ug/L					U	01/25/11
Diethyl phthalate	84-66-2		2.3	ug/L					J	01/25/11
Di-n-butylphthalate	84-74-2		1.1	ug/L					J	01/25/11
Phenanthrene	85-01-8		<1	ug/L					U	01/25/11
Butylbenzylphthalate	85-68-7		<1	ug/L					U	01/25/11
n-Nitrosodiphenylamine	86-30-6		<1	ug/L					U	01/25/11
Fluorene	86-73-7		<1	ug/L					U	01/25/11
Carbazole	86-74-8		<1	ug/L					U	01/25/11
Hexachlorobutadiene	87-68-3		<1	ug/L					U	01/25/11
2-Nitroaniline	88-74-4		<1	ug/L					UX	01/25/11
2-Nitrophenol	88-75-5		<1	ug/L					U	01/25/11
Naphthalene	91-20-3		<1	ug/L					U	01/25/11
2-Methylnaphthalene	91-57-6		<1	ug/L					U	01/25/11
2-Chloronaphthalene	91-58-7		<1	ug/L					U	01/25/11
3,3-Dichlorobenzidine	91-94-1		<1	ug/L					UX	01/25/11
2-Methylphenol	95-48-7		<1	ug/L					U	01/25/11
1,2-Dichlorobenzene	95-50-1		<1	ug/L					U	01/25/11
2,4,5-Trichlorophenol	95-95-4		<1	ug/L					U	01/25/11
Nitrobenzene	98-95-3		<1	ug/L					U	01/25/11

Quality Control Report

Attention Michael Neely
Department Organic, Semivolatiles

Group # WSCF111115

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
3-Nitroaniline	99-09-2		<1	ug/L					U	01/25/11
3 & 4 Methylphenol, Total	65794-96-9		<1	ug/L					U	01/25/11
Hexachloroethane	67-72-1		<1	ug/L					U	01/25/11
2,4,6-Trichlorophenol	88-06-2		<1	ug/L					U	01/25/11
LCS			**QC Sample #46568**							
4-Nitrophenol	100-02-7		7.2	ug/L	23.9	25 - 126			X	01/25/11
1,4-Dichlorobenzene	106-46-7		13	ug/L	65.6	41 - 118				01/25/11
Phenol	108-95-2		14	ug/L	45.7	25 - 147				01/25/11
1,2,4-Trichlorobenzene	120-82-1		21	ug/L	71	57 - 120				01/25/11
2,4-Dinitrotoluene	121-14-2		21	ug/L	69	62 - 113				01/25/11
Pyrene	129-00-0		24	ug/L	79	56 - 135				01/25/11
4-Chloro-3-methylphenol	59-50-7		21	ug/L	70.6	59 - 117				01/25/11
n-Nitroso-di-n-propylamine	621-64-7		22	ug/L	74.2	64 - 118				01/25/11
Acenaphthene	83-32-9		22	ug/L	72.4	60 - 115				01/25/11
Pentachlorophenol	87-86-5		14	ug/L	48.3	25 - 132				01/25/11
2-Chlorophenol	95-57-8		21	ug/L	70.3	60 - 110				01/25/11
2-Methylphenol	95-48-7		21	ug/L	68.9	44 - 119				01/25/11
Hexachloroethane	67-72-1		20	ug/L	65.6	33 - 124				01/25/11
2-Nitrophenol	88-75-5		17	ug/L	57.4	56 - 108				01/25/11
2,4-Dimethylphenol	105-67-9		22	ug/L	72.8	59 - 117				01/25/11
2,4-Dichlorophenol	120-83-2		21	ug/L	69.6	63 - 112				01/25/11
Naphthalene	91-20-3		21	ug/L	69.4	59 - 113				01/25/11

Quality Control Report

Attention Michael Neely
Department Organic, Semivolatiles

Group # WSCF111115

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
2-Nitroaniline	88-74-4		19	ug/L	62.4	63 - 119			X	01/25/11
Dibenzofuran	132-64-9		21	ug/L	71	62 - 116				01/25/11
Fluorene	86-73-7		22	ug/L	73.6	61 - 116				01/25/11
Hexachlorobenzene	118-74-1		23	ug/L	76.8	58 - 121				01/25/11
Anthracene	120-12-7		22	ug/L	74.5	58 - 122				01/25/11
Carbazole	86-74-8		23	ug/L	61.7	48 - 143				01/25/11
Di-n-butylphthalate	84-74-2		24	ug/L	78.8	63 - 127				01/25/11
3,3-Dichlorobenzidine	91-94-1		3.6	ug/L	12	39 - 155			JX	01/25/11
Bis-(2-Ethylhexyl)phthalate	117-81-7		24	ug/L	80.6	47 - 159				01/25/11
Di-n-octylphthalate	117-84-0		26	ug/L	88.1	43 - 162				01/25/11
Benzo(a)pyrene	50-32-8		21	ug/L	71.3	44 - 148				01/25/11
Bis(1-Chloro-2-propyl)ether	108-60-1		22	ug/L	73.7	59 - 118				01/25/11
4-Chloroaniline	106-47-8		28	ug/L	74.8	83 - 154			X	01/25/11
MS			**QC Sample #46569**							
			Original 111115002							
4-Nitrophenol	100-02-7	<1	7.3	ug/L	25.6	25 - 149			X	01/25/11
1,4-Dichlorobenzene	106-46-7	<1	15	ug/L	78.1	52 - 116				01/25/11
Phenol	108-95-2	<1	13	ug/L	44.8	25 - 153				01/25/11
1,2,4-Trichlorobenzene	120-82-1	<1	24	ug/L	84.7	62 - 122				01/25/11
2,4-Dinitrotoluene	121-14-2	<1	24	ug/L	83.6	59 - 116				01/25/11
Pyrene	129-00-0	<1	25	ug/L	88.8	67 - 123				01/25/11
4-Chloro-3-methylphenol	59-50-7	<1	24	ug/L	84.5	57 - 118				01/25/11

Quality Control Report

Attention Michael Neely
Department Organic, Semivolatiles

Group # WSCF111115

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
n-Nitroso-di-n-propylamine	621-64-7	<1	24	ug/L	84.4	64 - 121				01/25/11
Acenaphthene	83-32-9	<1	24	ug/L	83.8	62 - 116				01/25/11
Pentachlorophenol	87-86-5	<1	18	ug/L	61.9	25 - 144				01/25/11
2-Chlorophenol	95-57-8	<1	24	ug/L	82.3	54 - 117				01/25/11
2-Methylphenol	95-48-7	<1	22	ug/L	75.4	34 - 121				01/25/11
Hexachloroethane	67-72-1	<1	21	ug/L	73.8	51 - 116				01/25/11
2-Nitrophenol	88-75-5	<1	20	ug/L	70.2	62 - 108				01/25/11
2,4-Dimethylphenol	105-67-9	<1	25	ug/L	86.3	58 - 111				01/25/11
2,4-Dichlorophenol	120-83-2	<1	23	ug/L	81.9	64 - 112				01/25/11
Naphthalene	91-20-3	<1	23	ug/L	81.8	64 - 112				01/25/11
2-Nitroaniline	88-74-4	<1	18	ug/L	64.3	45 - 131			X	01/25/11
Dibenzofuran	132-64-9	<1	24	ug/L	85	66 - 114				01/25/11
Fluorene	86-73-7	<1	24	ug/L	85.7	65 - 112				01/25/11
Hexachlorobenzene	118-74-1	<1	25	ug/L	88.2	62 - 123				01/25/11
Anthracene	120-12-7	<1	25	ug/L	87.1	65 - 114				01/25/11
Carbazole	86-74-8	<1	26	ug/L	71	59 - 136				01/25/11
Di-n-butylphthalate	84-74-2	<1	26	ug/L	89.7	70 - 121				01/25/11
3,3-Dichlorobenzidine	91-94-1	<1	3.6	ug/L	12.5	25 - 155			JTX	01/25/11
Bis-(2-Ethylhexyl)phthalate	117-81-7	<1	28	ug/L	96.4	58 - 138				01/25/11
Di-n-octylphthalate	117-84-0	<1	44	ug/L	155.3	57 - 143			T	01/25/11
Benzo(a)pyrene	50-32-8	<1	23	ug/L	80.5	52 - 129				01/25/11
Bis(1-Chloro-2-propyl)ether	108-60-1	<1	24	ug/L	85.1	65 - 116				01/25/11
4-Chloroaniline	106-47-8	<1	33	ug/L	90.2	25 - 162			X	01/25/11

Quality Control Report

Attention Michael Neely
Department Organic, Semivolatiles

Group # WSCF111115

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit		RQ	Analyzed
MSD			**QC Sample #46570**								
			Original	**111115002**					**Paired**	**46569**	
4-Nitrophenol	100-02-7	<1	8.5	ug/L	29.8	25 - 149	15.20	20		X	01/25/11
1,4-Dichlorobenzene	106-46-7	<1	15	ug/L	76.9	52 - 116	1.50	20			01/25/11
Phenol	108-95-2	<1	16	ug/L	56.5	25 - 153	23.10	20	*	X	01/25/11
1,2,4-Trichlorobenzene	120-82-1	<1	23	ug/L	81.8	62 - 122	3.50	20			01/25/11
2,4-Dinitrotoluene	121-14-2	<1	24	ug/L	82.6	59 - 116	1.20	20			01/25/11
Pyrene	129-00-0	<1	26	ug/L	91.5	67 - 123	3.00	20			01/25/11
4-Chloro-3-methylphenol	59-50-7	<1	24	ug/L	85	57 - 118	0.60	20			01/25/11
n-Nitroso-di-n-propylamine	621-64-7	<1	24	ug/L	85.5	64 - 121	1.30	20			01/25/11
Acenaphthene	83-32-9	<1	24	ug/L	84.8	62 - 116	1.20	20			01/25/11
Pentachlorophenol	87-86-5	<1	18	ug/L	64.4	25 - 144	4.00	20			01/25/11
2-Chlorophenol	95-57-8	<1	24	ug/L	82.7	54 - 117	0.50	20			01/25/11
2-Methylphenol	95-48-7	<1	22	ug/L	78.3	34 - 121	3.80	20			01/25/11
Hexachloroethane	67-72-1	<1	22	ug/L	75.3	51 - 116	2.00	20			01/25/11
2-Nitrophenol	88-75-5	<1	19	ug/L	67.4	62 - 108	4.10	20			01/25/11
2,4-Dimethylphenol	105-67-9	<1	25	ug/L	86.2	58 - 111	0.10	20			01/25/11
2,4-Dichlorophenol	120-83-2	<1	23	ug/L	79	64 - 112	3.60	20			01/25/11
Naphthalene	91-20-3	<1	23	ug/L	81	64 - 112	1.00	20			01/25/11
2-Nitroaniline	88-74-4	<1	19	ug/L	67.5	45 - 131	4.90	20		X	01/25/11
Dibenzofuran	132-64-9	<1	25	ug/L	86.1	66 - 114	1.30	20			01/25/11
Fluorene	86-73-7	<1	25	ug/L	86	65 - 112	0.30	20			01/25/11
Hexachlorobenzene	118-74-1	<1	25	ug/L	88.2	62 - 123	0.00	20			01/25/11

Quality Control Report

Attention Michael Neely
Department Organic, Semivolatiles

Group # WSCF111115

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit		RQ	Analyzed
Anthracene	120-12-7	<1	25	ug/L	88	65 - 114	1.00	20			01/25/11
Carbazole	86-74-8	<1	26	ug/L	70.8	59 - 136	0.30	20			01/25/11
Di-n-butylphthalate	84-74-2	<1	26	ug/L	89.8	70 - 121	0.10	20			01/25/11
3,3-Dichlorobenzidine	91-94-1	<1	3.1	ug/L	11	25 - 155	12.80	20		JTX	01/25/11
Bis-(2-Ethylhexyl)phthalate	117-81-7	<1	27	ug/L	93.8	58 - 138	2.70	20			01/25/11
Di-n-octylphthalate	117-84-0	<1	35	ug/L	122.7	57 - 143	23.50	20	*	X	01/25/11
Benzo(a)pyrene	50-32-8	<1	23	ug/L	82	52 - 129	1.80	20			01/25/11
Bis(1-Chloro-2-propyl)ether	108-60-1	<1	24	ug/L	83.9	65 - 116	1.40	20			01/25/11
4-Chloroaniline	106-47-8	<1	33	ug/L	92.2	25 - 162	2.20	20		X	01/25/11

Quality Control Report

Attention Michael Neely
Department Organic, Semivolatiles

Group # WSCF111115

QC Batch 174394
Associated Samples 111115002

Test SW-846 8270D Semivolatiles

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
SAMPLE			**Sample #111115002**							
2-Fluorophenol	367-12-4				68.6	44 - 135				01/25/11
Phenol-d5	4165-62-2				43.3	41 - 136				01/25/11
Nitrobenzene-d5	4165-60-0				91.8	53 - 129				01/25/11
2-Fluorobiphenyl	321-60-8				92.3	36 - 141				01/25/11
2,4,6-Tribromophenol	118-79-6				68.6	17 - 142				01/25/11
Terphenyl-d14	98904-43-9				99.2	61 - 142				01/25/11
BLANK			**QC Sample #46567**							
2-Fluorophenol	367-12-4				86.2	44 - 135				01/25/11
Phenol-d5	4165-62-2				59.8	41 - 136				01/25/11
Nitrobenzene-d5	4165-60-0				90.6	53 - 129				01/25/11
2-Fluorobiphenyl	321-60-8				87.1	36 - 141				01/25/11
2,4,6-Tribromophenol	118-79-6				73.2	17 - 142				01/25/11
Terphenyl-d14	98904-43-9				104.2	61 - 142				01/25/11
LCS			**QC Sample #46568**							
2-Fluorophenol	367-12-4				70.3	25 - 122				01/25/11
Phenol-d5	4165-62-2				46.3	25 - 144				01/25/11
Nitrobenzene-d5	4165-60-0				79.7	63 - 112				01/25/11

Quality Control Report

Attention Michael Neely
Department Organic, Semivolatiles

Group # WSCF111115

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
2-Fluorobiphenyl	321-60-8				77.8	52 - 113				01/25/11
2,4,6-Tribromophenol	118-79-6				79.3	26 - 131				01/25/11
Terphenyl-d14	98904-43-9				90.4	63 - 132				01/25/11
MS			**QC Sample #46569**							
			Original	**111115002**						
2-Fluorophenol	367-12-4				75.9	25 - 122				01/25/11
Phenol-d5	4165-62-2				51.4	25 - 144				01/25/11
Nitrobenzene-d5	4165-60-0				98.8	63 - 112				01/25/11
2-Fluorobiphenyl	321-60-8				96.5	52 - 113				01/25/11
2,4,6-Tribromophenol	118-79-6				90.4	26 - 131				01/25/11
Terphenyl-d14	98904-43-9				103.3	63 - 132				01/25/11
MSD			**QC Sample #46570**							
			Original	**111115002**					**Paired** **46569**	
2-Fluorophenol	367-12-4				79.2	25 - 122	4.30	20		01/25/11
Phenol-d5	4165-62-2				58.4	25 - 144	12.80	20		01/25/11
Nitrobenzene-d5	4165-60-0				89.8	63 - 112	9.50	20		01/25/11
2-Fluorobiphenyl	321-60-8				90.9	52 - 113	6.00	20		01/25/11
2,4,6-Tribromophenol	118-79-6				87.2	26 - 131	3.60	20		01/25/11
Terphenyl-d14	98904-43-9				99	63 - 132	4.30	20		01/25/11

Date: 04 April 2011
To: CH2M Hill (technical representative)
From: Analytical Quality Associates, Inc.
Project: 100 Area RI/FS
Subject: Inorganics - Sample Data Group (SDG) WSCF111115

INTRODUCTION

This memorandum presents the results of data validation for SDG WSCF111115 prepared by WSCF Analytical Laboratories. The sample validated along with the analytical method is provided in the following table.

Sample ID	Sample Date	Media	Validation Level	Analytical Methods
B29HL2	01/12/11	Water	C	200.8

Data validation was conducted in accordance with the CHPRC validation statement of work and the Sampling and Analysis Plan for the 100-DR-1, 100-DR-2, 100-HR-1, 100-HR-2, and 100-HR-3 Operable Units Remedial Investigation/Feasibility Study, DOE/RL-2009-40, Rev. 0 (SAP). Appendices 1 through 6 provide the following information as indicated below:

Appendix 1. Glossary of Data Reporting Qualifiers
Appendix 2. Summary of Data Qualification
Appendix 3. Annotated Laboratory Reports
Appendix 4. Laboratory Narrative and Chain-of-Custody Documentation
Appendix 5. Data Validation Supporting Documentation
Appendix 6. 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 sample was 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, laboratory control sample results, and ICP-AES interference check sample results. According to the SAP, the matrix spike sample and laboratory control sample accuracy limits are 80% to 120%. The limits for reported analytes not listed in the SAP are specified by the DV procedure. The interference check sample limits are ones specified by the DV procedure.

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

All MS/MSD recoveries were acceptable.

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, sample results, field duplicate sample results, field split sample results, and ICP serial dilution results. These QC results provide information on the laboratory reproducibility and whether sampling activities are adequate to acquire consistent sample results. According to the SAP, the relative percent difference (RPD) limits are ±20%. The limits for reported analytes not listed in the SAP are specified by the DV procedure. The serial dilution limits are ones specified by the DV procedure.

MS/MSD Samples

All MS/MSD RPD values were acceptable.

Field Duplicate Samples

No field duplicates were submitted for validation.

Field Split Samples

No field splits were submitted for validation.

ICP Serial Dilution Samples

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

- **ICP-MS Internal Standards**

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

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

- **Detection Limits**

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

All reported sample MDLs were below the CRDLs.

- **Completeness**

SDG WSCF111115 was submitted for validation and verified for completeness. Completeness is based on the percentage of data determined to be valid (i.e., not rejected). The completion percentage was 100%.

MAJOR DEFICIENCIES

None found.

MINOR DEFICIENCIES

None found.

REFERENCES

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

DOE/RL-2009-40, Rev. 0, *Sampling and Analysis Plan for the 100-DR-1, 100-DR-2, 100-HR-1, 100-HR-2, and 100-HR-3 Operable Units Remedial Investigation/Feasibility Study*, March 2010.

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: WSCF111115	Reviewer: AQA	Project: 100 Area RI/FS	Page 1 of 1
Analyte(s)	**Qualifier**	**Samples Affected**	**Reason**
Inorganics	None	N/A	N/A

Comments: None

Appendix 3

Annotated Laboratory Reports

WSCF Analytical Results Report

Attention Michael Neely
Department Inorganic

Group # WSCF111115

Sample # 111115001
SAF# F10-216
Sample ID B29HL2

Matrix WATER
Sampled 01/12/11
Received 01/12/11

Test Performed	CAS #	Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
Anions by IC										**01/13/11**
Anions by IC										
Fluoride	16984-48-8	LA-533-410	BD	0.113		ug/mL	2	0.088	0.40	01/13/11
Chloride	16887-00-6	LA-533-410	D	17.5		ug/mL	2	0.084	0.80	01/13/11
Nitrite-N	NO2-N	LA-533-410	UD	<0.036		ug/mL	2	0.036	0.20	01/13/11
Bromide	24959-67-9	LA-533-410	BD	0.297		ug/mL	2	0.11	1.0	01/13/11
Nitrate-N	NO3-N	LA-533-410	D	14.2		ug/mL	10	0.097	1.0	01/13/11
Phosphate-P	PO4-P	LA-533-410	UD	<0.14		ug/mL	2	0.14	0.80	01/13/11
Sulfate	14808-79-8	LA-533-410	D	142		ug/mL	10	0.83	10	01/13/11
Cr(VI)										**01/12/11**
Cr(VI)										
Hexavalent chromium	18540-29-9	LA-265-403		0.0155		mg/L	1	0.0020	0.0050	01/12/11
ICPMS Prep										**01/19/11**
ICP-MS										
Manganese	7439-96-5	LA-505-412	D	63.5		ug/L	2	0.20	2.0	02/01/11
Nickel	7440-02-0	LA-505-412	BD	1.88		ug/L	2	0.40	4.0	02/01/11
Silver	7440-22-4	LA-505-412	UD	<0.20		ug/L	2	0.20	2.0	02/01/11
Antimony	7440-36-0	LA-505-412	UD	<0.60		ug/L	2	0.60	6.0	02/01/11
Barium	7440-39-3	LA-505-412	D	115		ug/L	2	0.40	4.0	02/01/11

MDL = Minimum Detection
RQ = Result Qualifier
TP Err = Total Propagated
DF = Dilution Factor
+ - Indicates more than nine qualifier

B - Analyte < the PQL(or EQL)but >= the IDL/MDL(Inorganic)
C - Analyte was found in the Associated Blank. (Inorganic)
D - Analyte was reported at a secondary diltution factor.
E - Analyte is an estimate, see comment section.
N - MS and/or MSD recovery outside control limits.

U - Analyzed for but not detected above limiting criteria.
X,Y or Z - See comment detail and/or narrative.
PQL is equivalent to Estimated Quantitation Limit (EQL)

WSCF Analytical Results Report

Attention Michael Neely
Department Inorganic

Group # WSCF111115

Sample # 111115001
SAF# F10-216
Sample ID B29HL2

Matrix WATER
Sampled 01/12/11
Received 01/12/11

Test Performed	CAS #	Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
Beryllium	7440-41-7	LA-505-412	UD	<0.10		ug/L	2	0.10	1.0	02/01/11
Cadmium	7440-43-9	LA-505-412	UD	<0.20		ug/L	2	0.20	2.0	02/01/11
Chromium	7440-47-3	LA-505-412	D	28.9		ug/L	2	1.0	10	02/01/11
Cobalt	7440-48-4	LA-505-412	D	0.705		ug/L	2	0.10	0.50	02/01/11
Copper	7440-50-8	LA-505-412	BD	0.788		ug/L	2	0.20	2.0	02/01/11
Vanadium	7440-62-2	LA-505-412	D	14.2		ug/L	2	0.40	4.0	02/01/11
Zinc	7440-66-6	LA-505-412	D	58.1		ug/L	2	1.6	10	02/01/11
Lead	7439-92-1	LA-505-412	UD	<0.20		ug/L	2	0.20	2.0	02/01/11
Mercury	7439-97-6	LA-505-412	U	<0.10		ug/L	2	0.10	0.40	02/01/11
Thallium	7440-28-0	LA-505-412	UD	<0.10		ug/L	2	0.10	1.0	02/01/11
Uranium	7440-61-1	LA-505-412	D	3.86		ug/L	2	0.10	0.40	02/01/11
Arsenic	7440-38-2	LA-505-412	BD	2.13		ug/L	2	0.80	8.0	02/01/11
Selenium	7782-49-2	LA-505-412	BD	3.42		ug/L	2	0.60	6.0	02/01/11

MDL = Minimum Detection
RQ = Result Qualifier
TP Err = Total Propagated
DF = Dilution Factor
+ - Indicates more than nine qualifier

B - Analyte < the PQL(or EQL)but >= the IDL/MDL(Inorganic)
C - Analyte was found in the Associated Blank. (Inorganic)
D - Analyte was reported at a secondary diltution factor.
E - Analyte is an estimate, see comment section.
N - MS and/or MSD recovery outside control limits.

U - Analyzed for but not detected above limiting criteria.
X,Y or Z - See comment detail and/or narrative.
PQL is equivalent to Estimated Quantitation Limit (EQL)

Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

Attachment 2
Narrative
WSCF111115

Introduction

Samples were received at the WSCF laboratory as referenced on the WSCF SAF Number Cross Reference table included in the final report. The samples were analyzed for the analytes indicated on the attached copy of the chain of custody (COC) form in accordance with the *Statement of Work (SOW), Modification No. 2 to Agreement 36587, Release 3, "FH WSCF ANALYTICAL SERVICES FOR GROUNDWATER."*

The narrative (Attachment 2) will address sample characteristics, analyses requested and general information in performance of the analytical methods. A Data Summary Report (Attachment 3) includes analytical results, a comment report detailing method abnormalities, tentatively identified peaks if applicable, method references, and Laboratory QC information as applicable. Copies of the chain of custody and sample receipt documentation are included as Attachment 4. Also find attached an Issue Resolution Form (IRF) pertaining to Laboratory Control Sample recovery failure for Semi-Volatile analysis (SVOC 8270).

It should be noted that the attached chain of custody was not stamped "ICED" by the WSCF Laboratory Sample Custodian during sample receiving. However, based on procedure LO-090-403 form "NOTICE OF IMPROPER SAMPLE SUBMITTAL" was not submitted and was not stamped "NOT ICED". No anomaly was noted during sample receipt.

The following generic data qualifiers (i.e., B, D, U and J) may be applicable to this report, as appropriate

- **B** – Sample results with a concentration greater than the MDL but less than the PQL are B flagged (applies to inorganic and wet chemical analyses), as appropriate.
- **D** – Sample results are D flagged if dilution(s) were required, as appropriate.
- **J** – Sample results with a concentration greater than the MDL but less than the PQL are J flagged (applies to organic analyses), as appropriate.
- **U** – Analyzed for but not detected above limiting criteria. Relative Percent Difference (RPD) values associated with an analyte qualified with a "U" are not applicable.

Analytical Methodology for Requested Analyses

Refer to *WSCF Method References Report* for a complete listing of approved analytical methods.

Inorganic Comments

Anions – Hold time requirements for this analysis were met. A Duplicate, Matrix Spike, Matrix Spike Duplicate, Blank and Laboratory Control Sample were analyzed with this delivery group. Analytical Note(s):

- All applicable QC controls are within the established limits.

Attachment 2
Narrative
WSCF111115

Hexavalent Chromium – The hold time requirement for this analysis was met. A Duplicate, Matrix Spike, Blank and Laboratory Control Sample were analyzed with this delivery group. Analytical Note(s):

- All applicable QC controls are within the established limits.

ICP-MS Metals – The hold time requirements for this analysis were met. A Matrix Spike, Matrix Spike Duplicate, Blank and Laboratory Control Sample were analyzed with this delivery group. Analytical Note(s):

- All applicable QC controls are within the established limits.

Organic Comments

Semi-VOA – The hold time requirements for this analysis were met. A Matrix Spike, Matrix Spike Duplicate, Blank and Laboratory Control Sample (Refer to analytical note below) were analyzed with this delivery group. Analytical Note(s):

- An Issue Resolution Form (CHPRC Tracking Number: 11-331) was issued for sample B27CB0 (111115002) for exceeding the Laboratory Control Sample recovery limits for Semi-Volatile analysis (SVOC 8270) of the following: 2-Nirtroaniline, 4-Nitrophenol, 4-Chloroaniline, and 3,3-Dichlorobenzidine. Proposed resolution is to accept data as is.

- Di-n-octylphthalate and 3,3-Dichlorobenzidine did not meet the MS and or MSD acceptance limits. Sample results for this analytes were "T" Flagged.

- Phenol and Di-n-octylphthalate did not meet the MS / MSD RPD acceptance limits. Sample results for this analyte were not flagged. The quality control report was flagged for RPD failure.

- All other applicable QC controls are within the established limits.

VOA – The hold time requirement for this analysis was met. A Matrix Spike, Matrix Spike Duplicate, Blank and Laboratory Control Sample were analyzed with this delivery group. Analytical Note(s):

- All applicable QC controls are within the established limits.

Radiochemistry Comments

Rad Chem – The hold time requirement for this analysis was met. A Duplicate, Matrix Spike (Matrix Spikes apply only to Technetium & Tritium), Blank and Laboratory Control Sample were analyzed with this delivery group. Analytical Note(s):

Tracers are used to determine chemical yield. RPD is monitored in sample duplicate and is not required for tracer recovery per SOW.

Narrative

- Gamma Energy Analysis:
  - All applicable QC controls are within the established limits.
- Gross Alpha / Gross Beta:
  - All applicable QC controls are within the established limits.
- Strontium-89/90:
  - All applicable QC controls are within the established limits.
- Tritium:
  - All applicable QC controls are within the established limits.
- Technetium-99:
  - All applicable QC controls are within the established limits.

We certify that this data package is in compliance with the SOW, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this data package has been authorized by the Analytical Laboratory Manager (or designee) and the Client Services representative as verified by electronic signatures shown on the WSCF ANALYTICAL RESULTS REPORT.

Attachment 2
Narrative
WSCF111115

ISSUE RESOLUTION FORM

CHPRC TRACKING NUMBER: 11-331

Date: 02/15/2011 TEST: SVOC 8270 **DUE DATE: 2/24/11**

SAF No(s): F10-216

SDG (s): 111115

LOGIN No(s): 111115002

Sample No(s): B27CB0

Submitted By: M. Avila
Phone No.: 373-1613
Fax No.:

Submitted To: S. Champoux
Phone No.: 373-5290
Fax No.:

ISSUE	PROPOSED RESOLUTION
The batch had LCS percent recovery failure for the following compounds: 2-Nitroaniline: 62.4 % (limits 63-119%) 3,3-Dichlorobenzidine: 12% (limits 39-155%) 4-Chloroaniline: 74.8 % (limits 83-154%) 4-Nitrophenol: 23.9 % (limits 25-126%)	Accept the data as-is and note in the narrative.

CHPRC/BHI/WMH/PNNL COMMENTS

Accept proposed resolution

Sara Champoux 2/16/2011

Signature and Date

4

CH2MHill Plateau Remediation Company

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

F10-216-163 PAGE 1 OF 1

COLLECTOR	Romo, Kacek, Bolan
SAMPLING LOCATION	C7622 (199-D5-132); I-021
ICE CHEST NO.	
SHIPPED TO	Waste Sampling & Characterization
COMPANY CONTACT	RADLOFF, AW
TELEPHONE NO.	376-4554
PROJECT COORDINATOR	RADLOFF, AW
PRICE CODE	7N
DATA TURNAROUND	45 Days / 45 Days
PROJECT DESIGNATION	100 Area Remedial Investigation/Feasibility Analysis - 100-HR-3 Groundwat
SAF NO.	F10-216
AIR QUALITY	
FIELD LOGBOOK NO.	HNF-N-595-12 PG 49
ACTUAL SAMPLE DEPTH	88.7' FT
COA	300110ES10
METHOD OF SHIPMENT	GOVERNMENT VEHICLE
OFFSITE PROPERTY NO.	N/A
BILL OF LADING/AIR BILL NO.	N/A

MATRIX*: A=Air, DL=Drum Liquids, DS=Drum Solids, L=Liquid, O=Oil, S=Soil, SE=Sediment, T=Tissue, V=Vegetation, W=Water, WI=Wipe, X=Other

POSSIBLE SAMPLE HAZARDS/ REMARKS
Contains Radioactive Material at concentrations that may or may not be regulated for transportation per 49 CFR / IATA Dangerous Goods Regulations but are not releasable per DOE Order 5400.5 (1990/1993)

111115

SPECIAL HANDLING AND/OR STORAGE

PRESERVATION	HCl or H2SO4 to pH <2/Cool-4C	HNO3 to pH <2	Cool-4C	Cool-4C	HNO3 to pH <2	HNO3 to pH <2	HNO3 to pH <2	None	HCl to pH <2
HOLDING TIME	14 Days	6 Months	24 Hours	48 Hours	6 Months	6 Months	6 Months	6 Months	6 Months
TYPE OF CONTAINER	aGS*	G/P	aG	G/P	G/P	G/P	G/P	G/P	G/P
NO. OF CONTAINER(S)	3	1	1	1	1	1	2	1	2
VOLUME	40mL	500mL	500mL	250mL	500mL	500mL	1L	250mL	1L
SAMPLE ANALYSIS	VOA - 8260 (TCL 100 Area RI/FS);	SEE ITEM (1) IN SPECIAL INSTRUCTIONS	Chromium Hex - 7196;	IC Anions - 300.0 (100 Area RI/FS);	Gamma Spectroscopy (100 Area RI/FS);	SEE ITEM (2) IN SPECIAL INSTRUCTIONS	Strontium-89,90 - Total Sr;	Tritium - Ion Fr;	Technetium-99;
		DCB				GAB			

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME								
B29HL2 (X)1	WATER	1-12-11	1253	—	—	—	—	—	—	—	—

CHAIN OF POSSESSION

RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
Rob Romo, Rob Romo 1-12-11	1415	Victor Osing 1/12/11	1415
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME

SIGN/ PRINT NAMES

SPECIAL INSTRUCTIONS

** The laboratory is to report all TICs for Method 8260.
** The CACN for all analytical work at WSCF laboratory is 401642ES20.
** The 100 Area S&GRP Characterization and Monitoring Sampling and Analysis GKI applies to this SAF.
(1) ICP/MS - 200.8 (100 Area RI/FS) {Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Cobalt, Copper, Lead, Manganese, Nickel, Selenium, Silver, Thallium, Vanadium, Zinc}; ICP/MS - 200.8 (Add-on) {Uranium}; 200.8_HG - ICPMS (100 Area RI/FS);
(2) Gross Alpha {Gross alpha}; Gross Beta {Gross beta};

ORIGINAL

LABORATORY SECTION	RECEIVED BY	TITLE	DATE/TIME
FINAL SAMPLE DISPOSITION	DISPOSAL METHOD	DISPOSED BY	DATE/TIME

A-6003-618 (REV 2)

CH2MHill Plateau Remediation Company — **CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST** — F10-230-023 — PAGE 1 OF 1

COLLECTOR: Romo, Kauck, Becan	COMPANY CONTACT: ANNA RADLOFF	TELEPHONE NO.: 376-4554	PROJECT COORDINATOR: RADLOFF, AW
SAMPLING LOCATION: C7622 (199-D5-132); I-021 FTB	PROJECT DESIGNATION: 100 Area Remedial Investigation/Feasibility Analysis - 100-HR-3 - QC Sampl		SAF NO.: F10-230
ICE CHEST NO.	FIELD LOGBOOK NO.: HNF-N-585-12 Pg 49	ACTUAL SAMPLE DEPTH: (N/A)	COA: 300110ES10
SHIPPED TO: Waste Sampling & Characterization	OFFSITE PROPERTY NO.: SEE PTR		BILL OF LADING/AIR BILL NO.: SEE PTR

PRICE CODE: 7N — AIR QUALITY: ☐ — DATA TURNAROUND: 45 Days / 45 Days — METHOD OF SHIPMENT: GOVERNMENT VEHICLE

MATRIX*: A=Air, DL=Drum Liquids, DS=Drum Solids, L=Liquid, O=Oil, S=Soil, SE=Sediment, T=Tissue, V=Vegetation, W=Water, WI=Wipe, X=Other

POSSIBLE SAMPLE HAZARDS/ REMARKS: Contains Radioactive Material at concentrations that may or may not be regulated for transportation per 49 CFR / IATA Dangerous Goods Regulations but are not releasable per DOE Order 5400.5 (1990/1993)

SPECIAL HANDLING AND/OR STORAGE

PRESERVATION	HCl or H2SO4 to pH <2/Cool~4C	Cool~4C
HOLDING TIME	14 Days	7/40 Days
TYPE OF CONTAINER	aGs*	aG
NO. OF CONTAINER(S)	3	4
VOLUME	40mL	1L
SAMPLE ANALYSIS	VOA - 8260 (TCL 100 Area RI/FS);	Semi-VOA - 8270 (TCL 100 Area RI/FS);

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME		
B27CB0 (02	WATER	1-12-11	1250	–	–

CHAIN OF POSSESSION / **SIGN/ PRINT NAMES**

RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
Rob Romo, Robert Romo	1-12-11 1415	Vil Tao	1/12/11 1415
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME

SPECIAL INSTRUCTIONS

** The laboratory is to report all TICs for Method 8260.☐☐** The CACN for all analytical work at WSCF laboratory is 401642ES20.☐** The 100 Area S&GRP Characterization and Monitoring Sampling and Analysis GKI applies to this SAF.☐

LABORATORY SECTION	RECEIVED BY	TITLE	DATE/TIME
FINAL SAMPLE DISPOSITION	DISPOSAL METHOD	DISPOSED BY	DATE/TIME

A-6003-618 (REV 2)

Appendix 5

Data Validation Supporting Documentation

VALIDATION LEVEL:	A	B	C	D	E
PROJECT: 100 Area RI/FS			DATA PACKAGE: VSR11-039		
VALIDATOR: Eyda Hergenreder		LAB: WSCF		DATE: 04-04-2011	
			SDG: WSCF111115		
ANALYSES PERFORMED					
SW-846/ICP	SW-846/GFAA	SW-846/Hg		EPA 200.8 X	

SAMPLES/MATRIX Water sample

SDG WSCF111115: B29HL2

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: None

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: 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. 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

Appendix 6

Additional Documentation Requested By Client

Quality Control Report

Attention Michael Neely
Department Inorganic

Group # WSCF111115

QC Batch 174689
Associated Samples 111115001

Test ICP-2008 MS All possible metal

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
BLANK			**QC Sample #46871**							
Manganese	7439-96-5		<0.10	ug/L					U	02/01/11
Nickel	7440-02-0		<0.20	ug/L					U	02/01/11
Silver	7440-22-4		<0.10	ug/L					U	02/01/11
Antimony	7440-36-0		<0.30	ug/L					U	02/01/11
Barium	7440-39-3		<0.20	ug/L					U	02/01/11
Beryllium	7440-41-7		<0.10	ug/L					U	02/01/11
Cadmium	7440-43-9		<0.10	ug/L					U	02/01/11
Chromium	7440-47-3		<0.50	ug/L					U	02/01/11
Cobalt	7440-48-4		<0.050	ug/L					U	02/01/11
Copper	7440-50-8		<0.10	ug/L					U	02/01/11
Vanadium	7440-62-2		<0.20	ug/L					U	02/01/11
Zinc	7440-66-6		<0.80	ug/L					U	02/01/11
Lead	7439-92-1		<0.10	ug/L					U	02/01/11
Mercury	7439-97-6		<0.050	ug/L					U	02/01/11
Thallium	7440-28-0		<0.050	ug/L					U	02/01/11
Uranium	7440-61-1		<0.050	ug/L					U	02/01/11
Arsenic	7440-38-2		<0.40	ug/L					U	02/01/11
Selenium	7782-49-2		<0.30	ug/L					U	02/01/11

Quality Control Report

Attention Michael Neely
Department Inorganic

Group # WSCF111115

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
LCS			**QC Sample #46872**							
Manganese	7439-96-5		41.8	ug/L	104.6	85 - 115				02/01/11
Nickel	7440-02-0		42.4	ug/L	105.9	85 - 115				02/01/11
Silver	7440-22-4		43.7	ug/L	109.2	85 - 115				02/01/11
Antimony	7440-36-0		40.8	ug/L	102.1	85 - 115				02/01/11
Barium	7440-39-3		41.7	ug/L	104.2	85 - 115				02/01/11
Beryllium	7440-41-7		43.6	ug/L	109	85 - 115				02/01/11
Cadmium	7440-43-9		41.0	ug/L	102.4	85 - 115				02/01/11
Chromium	7440-47-3		43.2	ug/L	108	85 - 115				02/01/11
Cobalt	7440-48-4		42.5	ug/L	106.2	85 - 115				02/01/11
Copper	7440-50-8		42.2	ug/L	105.4	85 - 115				02/01/11
Vanadium	7440-62-2		42.7	ug/L	106.8	85 - 115				02/01/11
Zinc	7440-66-6		39.6	ug/L	99.1	85 - 115				02/01/11
Lead	7439-92-1		42.5	ug/L	106.2	85 - 115				02/01/11
Mercury	7439-97-6		2.05	ug/L	102.6	85 - 115				02/01/11
Thallium	7440-28-0		42.1	ug/L	105.3	85 - 115				02/01/11
Uranium	7440-61-1		43.4	ug/L	108.6	85 - 115				02/01/11
Arsenic	7440-38-2		41.1	ug/L	102.8	85 - 115				02/01/11
Selenium	7782-49-2		41.9	ug/L	104.8	85 - 115				02/01/11
MS			**QC Sample #46873**							
			Original	**111102004**						
Manganese	7439-96-5		39.6	ug/L	99.1	70 - 130				02/01/11
Nickel	7440-02-0		39.4	ug/L	98.4	70 - 130				02/01/11
Silver	7440-22-4		41.6	ug/L	103.9	70 - 130				02/01/11

Quality Control Report

Attention Michael Neely
Department Inorganic

Group # WSCF111115

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
Antimony	7440-36-0		41.9	ug/L	104.6	70 - 130				02/01/11
Barium	7440-39-3		39.9	ug/L	99.8	70 - 130				02/01/11
Beryllium	7440-41-7		44.6	ug/L	111.6	70 - 130				02/01/11
Cadmium	7440-43-9		40.5	ug/L	101.3	70 - 130				02/01/11
Chromium	7440-47-3		41.2	ug/L	103	70 - 130				02/01/11
Cobalt	7440-48-4		39.7	ug/L	99.3	70 - 130				02/01/11
Copper	7440-50-8		38.6	ug/L	96.5	70 - 130				02/01/11
Vanadium	7440-62-2		41.7	ug/L	104.3	70 - 130				02/01/11
Zinc	7440-66-6		37.6	ug/L	94.1	70 - 130				02/01/11
Lead	7439-92-1		43.0	ug/L	107.6	70 - 130				02/01/11
Mercury	7439-97-6		2.12	ug/L	105.8	70 - 130				02/01/11
Thallium	7440-28-0		43.6	ug/L	108.9	70 - 130				02/01/11
Uranium	7440-61-1		44.9	ug/L	112.2	70 - 130				02/01/11
Arsenic	7440-38-2		42.4	ug/L	106	70 - 130				02/01/11
Selenium	7782-49-2		38.0	ug/L	95	70 - 130				02/01/11
MSD			**QC Sample #46874**							
			Original 111102004						**Paired 46873**	
Manganese	7439-96-5		39.4	ug/L	98.5	70 - 130	0.60	20		02/01/11
Nickel	7440-02-0		39.2	ug/L	98.1	70 - 130	0.30	20		02/01/11
Silver	7440-22-4		41.2	ug/L	103.1	70 - 130	0.80	20		02/01/11
Antimony	7440-36-0		41.4	ug/L	103.5	70 - 130	1.10	20		02/01/11
Barium	7440-39-3		40.4	ug/L	100.9	70 - 130	1.10	20		02/01/11
Beryllium	7440-41-7		43.1	ug/L	107.7	70 - 130	3.60	20		02/01/11
Cadmium	7440-43-9		40.4	ug/L	101	70 - 130	0.30	20		02/01/11
Chromium	7440-47-3		41.1	ug/L	102.8	70 - 130	0.20	20		02/01/11

Quality Control Report

Attention Michael Neely
Department Inorganic

Group # WSCF111115

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
Cobalt	7440-48-4		39.6	ug/L	99	70 - 130	0.30	20		02/01/11
Copper	7440-50-8		38.0	ug/L	95	70 - 130	1.60	20		02/01/11
Vanadium	7440-62-2		40.7	ug/L	101.8	70 - 130	2.40	20		02/01/11
Zinc	7440-66-6		37.5	ug/L	93.7	70 - 130	0.40	20		02/01/11
Lead	7439-92-1		42.2	ug/L	105.6	70 - 130	1.90	20		02/01/11
Mercury	7439-97-6		2.06	ug/L	103	70 - 130	2.70	20		02/01/11
Thallium	7440-28-0		42.7	ug/L	106.8	70 - 130	1.90	20		02/01/11
Uranium	7440-61-1		44.5	ug/L	111.1	70 - 130	1.00	20		02/01/11
Arsenic	7440-38-2		42.8	ug/L	107	70 - 130	0.90	20		02/01/11
Selenium	7782-49-2		38.8	ug/L	96.9	70 - 130	2.00	20		02/01/11

Date: 04 April 2011
To: CH2M Hill (technical representative)
From: Analytical Quality Associates, Inc.
Project: 100 Area RI/FS
Subject: General Chemistry - Sample Data Group (SDG) WSCF111115

INTRODUCTION

This memorandum presents the results of data validation for SDG WSCF111115 prepared by WSCF Analytical Laboratories. The sample validated along with the analytical method is provided in the following table.

Sample ID	Sample Date	Media	Validation Level	Analytical Methods
B29HL2	01/12/11	Water	C	300.0 & 7196A

Data validation was conducted in accordance with the CHPRC validation statement of work and the Sampling and Analysis Plan for the 100-DR-1, 100-DR-2, 100-HR-1, 100-HR-2, and 100-HR-3 Operable Units Remedial Investigation/Feasibility Study, DOE/RL-2009-40, Rev. 0/TPA-CN-368 (SAP). Appendices 1 through 6 provide the following information as indicated below:

Appendix 1. Glossary of Data Reporting Qualifiers
Appendix 2. Summary of Data Qualification
Appendix 3. Annotated Laboratory Reports
Appendix 4. Laboratory Narrative and Chain-of-Custody Documentation
Appendix 5. Data Validation Supporting Documentation
Appendix 6. 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 all anions are analysis within 48 hours of sample collection and the holding time requirement for hexavalent chromium is analysis within 24 hours of sample collection. Sample preservation for the analyses requires chilling to 4 degrees Celsius.

The sample was 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 for all anions and the matrix spike sample accuracy limit for hexavalent chromium are 80% to 120% and the laboratory control sample accuracy limit for hexavalent chromium are ones specified by the DV procedure.

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

All MS/MSD recoveries were acceptable.

Laboratory Control Samples (LCSs)

All LCS recoveries were acceptable.

- **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%. The RPD 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.

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**

SDG WSCF111115 was submitted for validation and verified for completeness. Completeness is based on the percentage of data determined to be valid (i.e., not rejected). The completion percentage was 100%.

MAJOR DEFICIENCIES

None found.

MINOR DEFICIENCIES

None found.

REFERENCES

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

DOE/RL-2009-40, Rev. 0, *Sampling and Analysis Plan for the 100-DR-1, 100-DR-2, 100-HR-1, 100-HR-2, and 100-HR-3 Operable Units Remedial Investigation/Feasibility Study*, March 2010.

TPA-CN-368, Change Notice Form for DOE/RL-2009-40, Rev. 0, June 2010.

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: WSCF111115	Reviewer: AQA	Project: 100 Area RI/FS	Page 1 of 1
Analyte(s)	**Qualifier**	**Samples Affected**	**Reason**
Anions & Cr(VI)	None	N/A	N/A

Comments: None

Appendix 3

Annotated Laboratory Reports

WSCF Analytical Results Report

Attention Michael Neely
Department Inorganic

Group # WSCF111115

Sample # 111115001
SAF# F10-216
Sample ID B29HL2

Matrix WATER
Sampled 01/12/11
Received 01/12/11

Test Performed	CAS #	Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
Anions by IC										**01/13/11**
Anions by IC										
Fluoride	16984-48-8	LA-533-410	BD	0.113		ug/mL	2	0.088	0.40	01/13/11
Chloride	16887-00-6	LA-533-410	D	17.5		ug/mL	2	0.084	0.80	01/13/11
Nitrite-N	NO2-N	LA-533-410	UD	<0.036		ug/mL	2	0.036	0.20	01/13/11
Bromide	24959-67-9	LA-533-410	BD	0.297		ug/mL	2	0.11	1.0	01/13/11
Nitrate-N	NO3-N	LA-533-410	D	14.2		ug/mL	10	0.097	1.0	01/13/11
Phosphate-P	PO4-P	LA-533-410	UD	<0.14		ug/mL	2	0.14	0.80	01/13/11
Sulfate	14808-79-8	LA-533-410	D	142		ug/mL	10	0.83	10	01/13/11
Cr(VI)										**01/12/11**
Cr(VI)										
Hexavalent chromium	18540-29-9	LA-265-403		0.0155		mg/L	1	0.0020	0.0050	01/12/11
ICPMS Prep										**01/19/11**
ICP-MS										
Manganese	7439-96-5	LA-505-412	D	63.5		ug/L	2	0.20	2.0	02/01/11
Nickel	7440-02-0	LA-505-412	BD	1.88		ug/L	2	0.40	4.0	02/01/11
Silver	7440-22-4	LA-505-412	UD	<0.20		ug/L	2	0.20	2.0	02/01/11
Antimony	7440-36-0	LA-505-412	UD	<0.60		ug/L	2	0.60	6.0	02/01/11
Barium	7440-39-3	LA-505-412	D	115		ug/L	2	0.40	4.0	02/01/11

MDL = Minimum Detection
RQ = Result Qualifier
TP Err = Total Propagated
DF = Dilution Factor
+ - Indicates more than nine qualifier

B - Analyte < the PQL(or EQL)but >= the IDL/MDL(Inorganic)
C - Analyte was found in the Associated Blank. (Inorganic)
D - Analyte was reported at a secondary diltution factor.
E - Analyte is an estimate, see comment section.
N - MS and/or MSD recovery outside control limits.

U - Analyzed for but not detected above limiting criteria.
X,Y or Z - See comment detail and/or narrative.
PQL is equivalent to Estimated Quantitation Limit (EQL)

Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

Attachment 2
Narrative
WSCF111115

Introduction

Samples were received at the WSCF laboratory as referenced on the WSCF SAF Number Cross Reference table included in the final report. The samples were analyzed for the analytes indicated on the attached copy of the chain of custody (COC) form in accordance with the *Statement of Work (SOW), Modification No. 2 to Agreement 36587, Release 3, "FH WSCF ANALYTICAL SERVICES FOR GROUNDWATER."*

The narrative (Attachment 2) will address sample characteristics, analyses requested and general information in performance of the analytical methods. A Data Summary Report (Attachment 3) includes analytical results, a comment report detailing method abnormalities, tentatively identified peaks if applicable, method references, and Laboratory QC information as applicable. Copies of the chain of custody and sample receipt documentation are included as Attachment 4. Also find attached an Issue Resolution Form (IRF) pertaining to Laboratory Control Sample recovery failure for Semi-Volatile analysis (SVOC 8270).

It should be noted that the attached chain of custody was not stamped "ICED" by the WSCF Laboratory Sample Custodian during sample receiving. However, based on procedure LO-090-403 form "NOTICE OF IMPROPER SAMPLE SUBMITTAL" was not submitted and was not stamped "NOT ICED". No anomaly was noted during sample receipt.

The following generic data qualifiers (i.e., B, D, U and J) may be applicable to this report, as appropriate

- **B** – Sample results with a concentration greater than the MDL but less than the PQL are B flagged (applies to inorganic and wet chemical analyses), as appropriate.
- **D** – Sample results are D flagged if dilution(s) were required, as appropriate.
- **J** – Sample results with a concentration greater than the MDL but less than the PQL are J flagged (applies to organic analyses), as appropriate.
- **U** – Analyzed for but not detected above limiting criteria. Relative Percent Difference (RPD) values associated with an analyte qualified with a "U" are not applicable.

Analytical Methodology for Requested Analyses

Refer to *WSCF Method References Report* for a complete listing of approved analytical methods.

Inorganic Comments

Anions – Hold time requirements for this analysis were met. A Duplicate, Matrix Spike, Matrix Spike Duplicate, Blank and Laboratory Control Sample were analyzed with this delivery group. Analytical Note(s):

- All applicable QC controls are within the established limits.

Attachment 2
Narrative
WSCF111115

Hexavalent Chromium – The hold time requirement for this analysis was met. A Duplicate, Matrix Spike, Blank and Laboratory Control Sample were analyzed with this delivery group. Analytical Note(s):

- All applicable QC controls are within the established limits.

ICP-MS Metals – The hold time requirements for this analysis were met. A Matrix Spike, Matrix Spike Duplicate, Blank and Laboratory Control Sample were analyzed with this delivery group. Analytical Note(s):

- All applicable QC controls are within the established limits.

Organic Comments

Semi-VOA – The hold time requirements for this analysis were met. A Matrix Spike, Matrix Spike Duplicate, Blank and Laboratory Control Sample (Refer to analytical note below) were analyzed with this delivery group. Analytical Note(s):

- An Issue Resolution Form (CHPRC Tracking Number: 11-331) was issued for sample B27CB0 (111115002) for exceeding the Laboratory Control Sample recovery limits for Semi-Volatile analysis (SVOC 8270) of the following: 2-Nirtroaniline, 4-Nitrophenol, 4-Chloroaniline, and 3,3-Dichlorobenzidine. Proposed resolution is to accept data as is.

- Di-n-octylphthalate and 3,3-Dichlorobenzidine did not meet the MS and or MSD acceptance limits. Sample results for this analytes were "T" Flagged.

- Phenol and Di-n-octylphthalate did not meet the MS / MSD RPD acceptance limits. Sample results for this analyte were not flagged. The quality control report was flagged for RPD failure.

- All other applicable QC controls are within the established limits.

VOA – The hold time requirement for this analysis was met. A Matrix Spike, Matrix Spike Duplicate, Blank and Laboratory Control Sample were analyzed with this delivery group. Analytical Note(s):

- All applicable QC controls are within the established limits.

Radiochemistry Comments

Rad Chem – The hold time requirement for this analysis was met. A Duplicate, Matrix Spike (Matrix Spikes apply only to Technetium & Tritium), Blank and Laboratory Control Sample were analyzed with this delivery group. Analytical Note(s):

Tracers are used to determine chemical yield. RPD is monitored in sample duplicate and is not required for tracer recovery per SOW.

Narrative

- Gamma Energy Analysis:
  - All applicable QC controls are within the established limits.
- Gross Alpha / Gross Beta:
  - All applicable QC controls are within the established limits.
- Strontium-89/90:
  - All applicable QC controls are within the established limits.
- Tritium:
  - All applicable QC controls are within the established limits.
- Technetium-99:
  - All applicable QC controls are within the established limits.

We certify that this data package is in compliance with the SOW, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this data package has been authorized by the Analytical Laboratory Manager (or designee) and the Client Services representative as verified by electronic signatures shown on the WSCF ANALYTICAL RESULTS REPORT.

Attachment 2
Narrative
WSCF111115

ISSUE RESOLUTION FORM

CHPRC TRACKING NUMBER: 11-331

Date: 02/15/2011 TEST: SVOC 8270 **DUE DATE: 2/24/11**

SAF No(s): F10-216

SDG (s): 111115

LOGIN No(s): 111115002

Sample No(s): B27CB0

Submitted By: M. Avila
Phone No.: 373-1613
Fax No.:

Submitted To: S. Champoux
Phone No.: 373-5290
Fax No.:

ISSUE	PROPOSED RESOLUTION
The batch had LCS percent recovery failure for the following compounds: 2-Nitroaniline: 62.4 % (limits 63-119%) 3,3-Dichlorobenzidine: 12% (limits 39-155%) 4-Chloroaniline: 74.8 % (limits 83-154%) 4-Nitrophenol: 23.9 % (limits 25-126%)	Accept the data as-is and note in the narrative.

CHPRC/BHI/WMH/PNNL COMMENTS

Accept proposed resolution

Sara Champoux 2/16/2011

Signature and Date

4

CH2MHill Plateau Remediation Company

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

F10-216-163 PAGE 1 OF 1

COLLECTOR	Romo, Kacek, Bolan
SAMPLING LOCATION	C7622 (199-D5-132); I-021
ICE CHEST NO.	
SHIPPED TO	Waste Sampling & Characterization
COMPANY CONTACT	RADLOFF, AW
TELEPHONE NO.	376-4554
PROJECT COORDINATOR	RADLOFF, AW
PRICE CODE	7N
DATA TURNAROUND	45 Days / 45 Days
PROJECT DESIGNATION	100 Area Remedial Investigation/Feasibility Analysis - 100-HR-3 Groundwat
SAF NO.	F10-216
AIR QUALITY	
FIELD LOGBOOK NO.	HNF-N-595-12 PG 49
ACTUAL SAMPLE DEPTH	88.7' FT
COA	300110ES10
METHOD OF SHIPMENT	GOVERNMENT VEHICLE
OFFSITE PROPERTY NO.	N/A
BILL OF LADING/AIR BILL NO.	N/A

MATRIX*: A=Air, DL=Drum Liquids, DS=Drum Solids, L=Liquid, O=Oil, S=Soil, SE=Sediment, T=Tissue, V=Vegetation, W=Water, WI=Wipe, X=Other

POSSIBLE SAMPLE HAZARDS/ REMARKS
Contains Radioactive Material at concentrations that may or may not be regulated for transportation per 49 CFR / IATA Dangerous Goods Regulations but are not releasable per DOE Order 5400.5 (1990/1993)

111115

SPECIAL HANDLING AND/OR STORAGE

PRESERVATION	HCl or H2SO4 to pH <2/Cool-4C	HNO3 to pH <2	Cool-4C	Cool-4C	HNO3 to pH <2	HNO3 to pH <2	HNO3 to pH <2	None	HCl to pH <2
HOLDING TIME	14 Days	6 Months	24 Hours	48 Hours	6 Months	6 Months	6 Months	6 Months	6 Months
TYPE OF CONTAINER	aGS*	G/P	aG	G/P	G/P	G/P	G/P	G/P	G/P
NO. OF CONTAINER(S)	3	1	1	1	1	1	2	1	2
VOLUME	40mL	500mL	500mL	250mL	500mL	500mL	1L	250mL	1L
SAMPLE ANALYSIS	VOA - 8260 (TCL 100 Area RI/FS);	SEE ITEM (1) IN SPECIAL INSTRUCTIONS DCG-8	Chromium Hex - 7196;	IC Anions - 300.0 (100 Area RI/FS);	Gamma Spectroscopy (100 Area RI/FS);	SEE ITEM (2) IN SPECIAL INSTRUCTIONS GAB	Strontium-89,90 - Total Sr;	Tritium - Ion Ex;	Technetium-99;

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME									
B29HL2 (X)1	WATER	1-12-11	1253	–	–	–	–	–	–	–	–	–

CHAIN OF POSSESSION

RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
Rob Romo, Rob Romo	1-12-11 1415	Victor Osing	1/12/11 1415

SPECIAL INSTRUCTIONS

** The laboratory is to report all TICs for Method 8260.
** The CACN for all analytical work at WSCF laboratory is 401642ES20.
** The 100 Area S&GRP Characterization and Monitoring Sampling and Analysis GKI applies to this SAF.
(1) ICP/MS - 200.8 (100 Area RI/FS) {Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Cobalt, Copper, Lead, Manganese, Nickel, Selenium, Silver, Thallium, Vanadium, Zinc}; ICP/MS - 200.8 (Add-on) {Uranium}; 200.8_HG - ICPMS (100 Area RI/FS);
(2) Gross Alpha {Gross alpha}; Gross Beta {Gross beta};

ORIGINAL

LABORATORY SECTION	RECEIVED BY	TITLE	DATE/TIME
FINAL SAMPLE DISPOSITION	DISPOSAL METHOD	DISPOSED BY	DATE/TIME

A-6003-618 (REV 2)

Sample Receipt

Chain of Custody

CH2MHill Plateau Remediation Company — **CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST** — F10-230-023 — PAGE 1 OF 1

COLLECTOR: Romo, Kauck, Becan	COMPANY CONTACT: ANNA RADLOFF	TELEPHONE NO.: 376-4554	PROJECT COORDINATOR: RADLOFF, AW
SAMPLING LOCATION: C7622 (199-D5-132); I-021 FTB	PROJECT DESIGNATION: 100 Area Remedial Investigation/Feasibility Analysis - 100-HR-3 - QC Sampl		SAF NO.: F10-230
ICE CHEST NO.	FIELD LOGBOOK NO.: HNF-N-585-12 Pg 49	ACTUAL SAMPLE DEPTH: (N/A)	COA: 300110ES10
SHIPPED TO: Waste Sampling & Characterization	OFFSITE PROPERTY NO.: SEE PTR		BILL OF LADING/AIR BILL NO.: SEE PTR

PRICE CODE: 7N — AIR QUALITY: ☐ — DATA TURNAROUND: 45 Days / 45 Days — METHOD OF SHIPMENT: GOVERNMENT VEHICLE

MATRIX*: A=Air, DL=Drum Liquids, DS=Drum Solids, L=Liquid, O=Oil, S=Soil, SE=Sediment, T=Tissue, V=Vegetation, W=Water, WI=Wipe, X=Other

POSSIBLE SAMPLE HAZARDS/ REMARKS: Contains Radioactive Material at concentrations that may or may not be regulated for transportation per 49 CFR / IATA Dangerous Goods Regulations but are not releasable per DOE Order 5400.5 (1990/1993)

SPECIAL HANDLING AND/OR STORAGE

PRESERVATION	HCl or H2SO4 to pH <2/Cool~4C	Cool~4C
HOLDING TIME	14 Days	7/40 Days
TYPE OF CONTAINER	aGs*	aG
NO. OF CONTAINER(S)	3	4
VOLUME	40mL	1L
SAMPLE ANALYSIS	VOA - 8260 (TCL 100 Area RI/FS);	Semi-VOA - 8270 (TCL 100 Area RI/FS);

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME		
B27CB0 (02	WATER	1-12-11	1250	–	–

CHAIN OF POSSESSION / **SIGN/ PRINT NAMES**

RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
Rob Romo, Robert Romo	1-12-11 1415	Vil Tao Simms	1/12/11 1415
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME

SPECIAL INSTRUCTIONS

** The laboratory is to report all TICs for Method 8260.☐☐** The CACN for all analytical work at WSCF laboratory is 401642ES20.☐** The 100 Area S&GRP Characterization and Monitoring Sampling and Analysis GKI applies to this SAF.☐

LABORATORY SECTION — RECEIVED BY — TITLE — DATE/TIME

FINAL SAMPLE DISPOSITION — DISPOSAL METHOD — DISPOSED BY — DATE/TIME

A-6003-618 (REV 2)

Appendix 5

Data Validation Supporting Documentation

VALIDATION LEVEL:	A	B	(C)	D	E
PROJECT: 100 Area RI/FS			DATA PACKAGE: VSR11-039		
VALIDATOR: Eyda Hergenreder		LAB: WSCF		DATE: 04-04-2011	
			SDG: WSCF111115		
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 sample

SDG WSCF111115: B29HL2

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

Appendix 6

Additional Documentation Requested By Client

Quality Control Report

Attention Michael Neely
Department Inorganic

Group # WSCF111115

QC Batch 174193
Associated Samples 111115001

Test Hexavalent chromium Discrete Analyzer

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
BLANK			**QC Sample #46398**							
Hexavalent chromium	18540-29-9		<0.0020	mg/L					U	01/12/11
LCS			**QC Sample #46400**							
Hexavalent chromium	18540-29-9		0.0494	mg/L	98.8	90 - 110				01/12/11
DUP			**QC Sample #46401**							
			Original 111113001							
Hexavalent chromium	18540-29-9		0.0121	mg/L			4.00	20		01/12/11
MS			**QC Sample #46402**							
			Original 111113001							
Hexavalent chromium	18540-29-9		0.0419	mg/L	104.8	85 - 115				01/12/11

Quality Control Report

Attention Michael Neely
Department Inorganic

Group # WSCF111115

QC Batch 174207
Associated Samples 111115001

Test Anions by Ion Chromatography (Water)

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
BLANK			**QC Sample #46447**							
Fluoride	16984-48-8		<0.044	ug/mL					U	01/13/11
Chloride	16887-00-6		<0.042	ug/mL					U	01/13/11
Nitrite-N	NO2-N		<0.018	ug/mL					U	01/13/11
Bromide	24959-67-9		<0.054	ug/mL					U	01/13/11
Nitrate-N	NO3-N		<9.7E-3	ug/mL					U	01/13/11
Phosphate-P	PO4-P		<0.072	ug/mL					U	01/13/11
Sulfate	14808-79-8		<0.083	ug/mL					U	01/13/11
LCS			**QC Sample #46448**							
Fluoride	16984-48-8		0.945	ug/mL	95.4	90 - 110				01/13/11
Chloride	16887-00-6		1.91	ug/mL	96.6	90 - 110				01/13/11
Nitrite-N	NO2-N		0.907	ug/mL	92.7	90 - 110				01/13/11
Bromide	24959-67-9		3.90	ug/mL	99.5	90 - 110				01/13/11
Nitrate-N	NO3-N		0.893	ug/mL	100.9	90 - 110				01/13/11
Phosphate-P	PO4-P		1.85	ug/mL	96.5	90 - 110				01/13/11
Sulfate	14808-79-8		3.83	ug/mL	97.7	90 - 110				01/13/11
DUP			**QC Sample #46449**							
			Original	**111125001**						
Fluoride	16984-48-8		0.163	ug/mL			2.40	20	BD	01/13/11

Quality Control Report

Attention Michael Neely
Department Inorganic

Group # WSCF111115

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
Chloride	16887-00-6		14.5	ug/mL			2.00	20	D	01/13/11
Nitrite-N	NO2-N		0.102	ug/mL			5.70	20	BD	01/13/11
Bromide	24959-67-9		<0.11	ug/mL			0.00	20	UD	01/13/11
Nitrate-N	NO3-N		4.21	ug/mL			1.90	20	D	01/13/11
Phosphate-P	PO4-P		<0.14	ug/mL			0.00	20	UD	01/13/11
Sulfate	14808-79-8		38.6	ug/mL			1.50	20	D	01/13/11
MS			**QC Sample #46450**							
			Original 111125001							
Fluoride	16984-48-8		0.915	ug/mL	91.5	80 - 120			D	01/13/11
Chloride	16887-00-6		1.82	ug/mL	91.1	80 - 120			D	01/13/11
Nitrite-N	NO2-N		0.922	ug/mL	93.3	80 - 120			D	01/13/11
Bromide	24959-67-9		3.88	ug/mL	97.9	80 - 120			D	01/13/11
Nitrate-N	NO3-N		0.842	ug/mL	94.2	80 - 120			D	01/13/11
Phosphate-P	PO4-P		1.86	ug/mL	96.2	80 - 120			D	01/13/11
Sulfate	14808-79-8		3.69	ug/mL	93.1	80 - 120			D	01/13/11
MSD			**QC Sample #46451**							
			Original 111125001					**Paired**	**46450**	
Fluoride	16984-48-8		0.943	ug/mL	94.3	80 - 120	3.00	20	D	01/13/11
Chloride	16887-00-6		1.86	ug/mL	92.9	80 - 120	2.00	20	D	01/13/11
Nitrite-N	NO2-N		1.06	ug/mL	106.9	80 - 120	13.60	20	D	01/13/11
Bromide	24959-67-9		3.90	ug/mL	98.4	80 - 120	0.50	20	D	01/13/11
Nitrate-N	NO3-N		0.995	ug/mL	111.3	80 - 120	16.60	20	D	01/13/11
Phosphate-P	PO4-P		1.86	ug/mL	96.5	80 - 120	0.30	20	D	01/13/11
Sulfate	14808-79-8		3.85	ug/mL	97.2	80 - 120	4.30	20	D	01/13/11

Date: 04 April 2011
To: CH2M Hill (technical representative)
From: Analytical Quality Associates, Inc.
Project: 100 Area RI/FS
Subject: Radiochemical - Sample Data Group (SDG) WSCF111115

INTRODUCTION

This memorandum presents the results of data validation for SDG WSCF111115 prepared by WSCF Analytical Laboratories. The sample validated along with the analytical methods is provided in the following table.

Sample ID	Sample Date	Media	Validation Level	Analytical Methods
B29HL2	01/12/11	Water	C	Gross αβ, Gamma, H-3, Sr-89/90 & Tc-99

Data validation was conducted in accordance with the CHPRC validation statement of work and the Sampling and Analysis Plan for the 100-DR-1, 100-DR-2, 100-HR-1, 100-HR-2, and 100-HR-3 Operable Units Remedial Investigation/Feasibility Study, DOE/RL-2009-40, Rev. 0 (SAP). Appendices 1 through 6 provide the following information as indicated below:

Appendix 1. Glossary of Data Reporting Qualifiers
Appendix 2. Summary of Data Qualification
Appendix 3. Annotated Laboratory Reports
Appendix 4. Laboratory Narrative and Chain-of-Custody Documentation
Appendix 5. Data Validation Supporting Documentation
Appendix 6. 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 the water sample for all analyses except tritium and Tc-99 requires acid preservation with nitric acid to pH <2. The sample preservation for Tc-99 required acid preservation with hydrochloric acid to pH <2.

The sample was 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 70% to 130%. The matrix spike sample accuracy limits are ones specified by the DV procedure. The limits for reported analytes not listed in the SAP are specified by the DV procedure.

Matrix Spike (MS) Samples

The MS recoveries for tritium and Tc-99 were acceptable. MS analyses were not required for Sr-89/90, gross alpha/beta and gamma spectrometry.

Laboratory Control Samples (LCSs)

All LCS recoveries were acceptable.

Carrier/Tracer Recovery Factors

All carrier/tracer recovery factors were acceptable.

- **Precision**

Precision is evaluated by reviewing laboratory duplicate, field duplicate, and field split sample results. These QC results provide information on the laboratory reproducibility and whether sampling activities are adequate to acquire consistent sample results. According to the SAP, the

relative percent difference (RPD) limits are ±30%. The RPD limits for reported analytes not listed in the SAP are specified by the DV procedure.

Laboratory Duplicate Samples

All laboratory duplicate results were acceptable.

Field Duplicate Samples

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

The gross alpha, Cs-134, Cs-137 and Be-7 MDCs for sample B29HL2 were > the CRDLs.

- **Completeness**

SDG WSCF111115 was submitted for validation and verified for completeness. Completeness is based on the percentage of data determined to be valid (i.e., not rejected). The completion percentage of all radiochemical analyses was 100%.

MAJOR DEFICIENCIES

None found.

MINOR DEFICIENCIES

None found.

REFERENCES

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

DOE/RL-2009-40, Rev. 0, *Sampling and Analysis Plan for the 100-DR-1, 100-DR-2, 100-HR-1, 100-HR-2, and 100-HR-3 Operable Units Remedial Investigation/Feasibility Study*, March 2010.

Appendix 1

Glossary of Data Reporting Qualifiers

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

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

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

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

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

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

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

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

Appendix 2

Summary of Data Qualification

Radiochemical Data Qualification Summary			
SDG: WSCF111115	Reviewer: AQA	Project: 100 Area RI/FS	Page 1 of 1
Analyte(s)	**Qualifier**	**Samples Affected**	**Reason**
Radiochemical	None	N/A	N/A

Comments: None

Appendix 3

Annotated Laboratory Reports

WSCF Analytical Results Report

Attention Michael Neely
Department Radiochemistry

Group # WSCF111115

Sample # 111115001
SAF# F10-216
Sample ID B29HL2

Matrix WATER
Sampled 01/12/11
Received 01/12/11

Test Performed	CAS #	Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
Alpha/Beta Prep										**01/25/11**
Gross Alpha/Beta										
Gross Alpha	12587-46-1	LA-508-415	U	2.3	2.3	pCi/L	1	3.6		02/04/11
Gross Beta	12587-47-2	LA-508-415		120	13	pCi/L	1	3.4		02/04/11
GEA Prep										**01/24/11**
GEA										
Antimony-125	14234-35-6	LA-508-481	U	2.4		pCi/L	1	49		01/24/11
Cesium-134	13967-70-9	LA-508-481	U	21		pCi/L	1	97		01/24/11
Cesium-137	10045-97-3	LA-508-481	U	0.82		pCi/L	1	18		01/24/11
Cobalt-60	10198-40-0	LA-508-481	U	-1.4		pCi/L	1	17		01/24/11
Europium-152	14683-23-9	LA-508-481	U	7.9		pCi/L	1	50		01/24/11
Europium-154	15585-10-1	LA-508-481	U	-10		pCi/L	1	46		01/24/11
Europium-155	14391-16-3	LA-508-481	U	-8.4		pCi/L	1	43		01/24/11
Potassium-40	13966-00-2	LA-508-481	U	-200		pCi/L	1	360		01/24/11
Ruthenium-106	13967-48-1	LA-508-481	U	35		pCi/L	1	160		01/24/11
Beryllium-7	13966-02-4	LA-508-481	U	11		pCi/L	1	160		01/24/11
H3 EICHROM										**01/13/11**
TRI-CARB LSC										
Tritium	10028-17-8	LA-508-421		1.1E4	2300	pCi/L	1	350		02/09/11

MDL = Minimum Detection
RQ = Result Qualifier
TP Err = Total Propagated
DF = Dilution Factor
+ - Indicates more than nine qualifier

B - Analyte was detected in both the BLANK and SAMPLE
U - Analyzed for but not detected above limiting criteria.
N - Spike Recovery is Outside Control Limits.
X,Y or Z - See comment detail and/or narrative.

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Group # WSCF111115

Sample # 111115001
SAF# F10-216
Sample ID B29HL2

Matrix WATER
Sampled 01/12/11
Received 01/12/11

Test Performed	CAS #	Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
SR-89/90										**01/18/11**
SR-89/90										
Strontium-89/90	SR-RAD	LA-220-406		42	6.5	pCi/L	1	1.7		01/26/11
Tc-99										**01/14/11**
TRI-CARB LSC										
Technetium-99	14133-76-7	LA-508-421	U	-0.10	4.4	pCi/L	1	7.3		01/28/11

MDL = Minimum Detection
RQ = Result Qualifier
TP Err = Total Propagated
DF = Dilution Factor
+ - Indicates more than nine qualifier

B - Analyte was detected in both the BLANK and SAMPLE
U - Analyzed for but not detected above limiting criteria.
N - Spike Recovery is Outside Control Limits.
X,Y or Z - See comment detail and/or narrative.

Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

Attachment 2
Narrative
WSCF111115

Introduction

Samples were received at the WSCF laboratory as referenced on the WSCF SAF Number Cross Reference table included in the final report. The samples were analyzed for the analytes indicated on the attached copy of the chain of custody (COC) form in accordance with the *Statement of Work (SOW), Modification No. 2 to Agreement 36587, Release 3, "FH WSCF ANALYTICAL SERVICES FOR GROUNDWATER."*

The narrative (Attachment 2) will address sample characteristics, analyses requested and general information in performance of the analytical methods. A Data Summary Report (Attachment 3) includes analytical results, a comment report detailing method abnormalities, tentatively identified peaks if applicable, method references, and Laboratory QC information as applicable. Copies of the chain of custody and sample receipt documentation are included as Attachment 4. Also find attached an Issue Resolution Form (IRF) pertaining to Laboratory Control Sample recovery failure for Semi-Volatile analysis (SVOC 8270).

It should be noted that the attached chain of custody was not stamped "ICED" by the WSCF Laboratory Sample Custodian during sample receiving. However, based on procedure LO-090-403 form "NOTICE OF IMPROPER SAMPLE SUBMITTAL" was not submitted and was not stamped "NOT ICED". No anomaly was noted during sample receipt.

The following generic data qualifiers (i.e., B, D, U and J) may be applicable to this report, as appropriate

- **B** – Sample results with a concentration greater than the MDL but less than the PQL are B flagged (applies to inorganic and wet chemical analyses), as appropriate.
- **D** – Sample results are D flagged if dilution(s) were required, as appropriate.
- **J** – Sample results with a concentration greater than the MDL but less than the PQL are J flagged (applies to organic analyses), as appropriate.
- **U** – Analyzed for but not detected above limiting criteria. Relative Percent Difference (RPD) values associated with an analyte qualified with a "U" are not applicable.

Analytical Methodology for Requested Analyses

Refer to *WSCF Method References Report* for a complete listing of approved analytical methods.

Inorganic Comments

Anions – Hold time requirements for this analysis were met. A Duplicate, Matrix Spike, Matrix Spike Duplicate, Blank and Laboratory Control Sample were analyzed with this delivery group. Analytical Note(s):

- All applicable QC controls are within the established limits.

Attachment 2
Narrative
WSCF111115

Hexavalent Chromium – The hold time requirement for this analysis was met. A Duplicate, Matrix Spike, Blank and Laboratory Control Sample were analyzed with this delivery group. Analytical Note(s):

- All applicable QC controls are within the established limits.

ICP-MS Metals – The hold time requirements for this analysis were met. A Matrix Spike, Matrix Spike Duplicate, Blank and Laboratory Control Sample were analyzed with this delivery group. Analytical Note(s):

- All applicable QC controls are within the established limits.

Organic Comments

Semi-VOA – The hold time requirements for this analysis were met. A Matrix Spike, Matrix Spike Duplicate, Blank and Laboratory Control Sample (Refer to analytical note below) were analyzed with this delivery group. Analytical Note(s):

- An Issue Resolution Form (CHPRC Tracking Number: 11-331) was issued for sample B27CB0 (111115002) for exceeding the Laboratory Control Sample recovery limits for Semi-Volatile analysis (SVOC 8270) of the following: 2-Nirtroaniline, 4-Nitrophenol, 4-Chloroaniline, and 3,3-Dichlorobenzidine. Proposed resolution is to accept data as is.

- Di-n-octylphthalate and 3,3-Dichlorobenzidine did not meet the MS and or MSD acceptance limits. Sample results for this analytes were "T" Flagged.

- Phenol and Di-n-octylphthalate did not meet the MS / MSD RPD acceptance limits. Sample results for this analyte were not flagged. The quality control report was flagged for RPD failure.

- All other applicable QC controls are within the established limits.

VOA – The hold time requirement for this analysis was met. A Matrix Spike, Matrix Spike Duplicate, Blank and Laboratory Control Sample were analyzed with this delivery group. Analytical Note(s):

- All applicable QC controls are within the established limits.

Radiochemistry Comments

Rad Chem – The hold time requirement for this analysis was met. A Duplicate, Matrix Spike (Matrix Spikes apply only to Technetium & Tritium), Blank and Laboratory Control Sample were analyzed with this delivery group. Analytical Note(s):

Tracers are used to determine chemical yield. RPD is monitored in sample duplicate and is not required for tracer recovery per SOW.

Narrative

- Gamma Energy Analysis:
  - All applicable QC controls are within the established limits.
- Gross Alpha / Gross Beta:
  - All applicable QC controls are within the established limits.
- Strontium-89/90:
  - All applicable QC controls are within the established limits.
- Tritium:
  - All applicable QC controls are within the established limits.
- Technetium-99:
  - All applicable QC controls are within the established limits.

We certify that this data package is in compliance with the SOW, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this data package has been authorized by the Analytical Laboratory Manager (or designee) and the Client Services representative as verified by electronic signatures shown on the WSCF ANALYTICAL RESULTS REPORT.

Attachment 2
Narrative
WSCF111115

ISSUE RESOLUTION FORM

CHPRC TRACKING NUMBER: 11-331

Date: 02/15/2011 TEST: SVOC 8270 **DUE DATE: 2/24/11**

SAF No(s): F10-216

SDG (s): 111115

LOGIN No(s): 111115002

Sample No(s): B27CB0

Submitted By: M. Avila
Phone No.: 373-1613
Fax No.:

Submitted To: S. Champoux
Phone No.: 373-5290
Fax No.:

ISSUE	PROPOSED RESOLUTION
The batch had LCS percent recovery failure for the following compounds: 2-Nitroaniline: 62.4 % (limits 63-119%) 3,3-Dichlorobenzidine: 12% (limits 39-155%) 4-Chloroaniline: 74.8 % (limits 83-154%) 4-Nitrophenol: 23.9 % (limits 25-126%)	Accept the data as-is and note in the narrative.

CHPRC/BHI/WMH/PNNL COMMENTS

Accept proposed resolution

Sara Champoux 2/16/2011

Signature and Date

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CH2MHill Plateau Remediation Company

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

F10-216-163

PAGE 1 OF 1

COLLECTOR	Romo, Kacek, Bolan
SAMPLING LOCATION	C7622 (199-D5-132); I-021
ICE CHEST NO.	
SHIPPED TO	Waste Sampling & Characterization
COMPANY CONTACT	RADLOFF, AW
TELEPHONE NO.	376-4554
PROJECT COORDINATOR	RADLOFF, AW
PRICE CODE	7N
DATA TURNAROUND	45 Days / 45 Days
PROJECT DESIGNATION	100 Area Remedial Investigation/Feasibility Analysis - 100-HR-3 Groundwat
SAF NO.	F10-216
AIR QUALITY	
FIELD LOGBOOK NO.	HNF-N-595-12 PG 49
ACTUAL SAMPLE DEPTH	88.7' FT
COA	300110ES10
METHOD OF SHIPMENT	GOVERNMENT VEHICLE
OFFSITE PROPERTY NO.	N/A
BILL OF LADING/AIR BILL NO.	N/A

MATRIX*: A=Air, DL=Drum Liquids, DS=Drum Solids, L=Liquid, O=Oil, S=Soil, SE=Sediment, T=Tissue, V=Vegetation, W=Water, WI=Wipe, X=Other

POSSIBLE SAMPLE HAZARDS/ REMARKS
Contains Radioactive Material at concentrations that may or may not be regulated for transportation per 49 CFR / IATA Dangerous Goods Regulations but are not releasable per DOE Order 5400.5 (1990/1993)

111115

SPECIAL HANDLING AND/OR STORAGE

PRESERVATION	HCl or H2SO4 to pH <2/Cool-4C	HNO3 to pH <2	Cool-4C	Cool-4C	HNO3 to pH <2	HNO3 to pH <2	HNO3 to pH <2	None	HCl to pH <2
HOLDING TIME	14 Days	6 Months	24 Hours	48 Hours	6 Months	6 Months	6 Months	6 Months	6 Months
TYPE OF CONTAINER	aGS*	G/P	aG	G/P	G/P	G/P	G/P	G/P	G/P
NO. OF CONTAINER(S)	3	1	1	1	1	1	2	1	2
VOLUME	40mL	500mL	500mL	250mL	500mL	500mL	1L	250mL	1L
SAMPLE ANALYSIS	VOA - 8260 (TCL 100 Area RI/FS);	SEE ITEM (1) IN SPECIAL INSTRUCTIONS DCG-8	Chromium Hex - 7196;	IC Anions - 300.0 (100 Area RI/FS);	Gamma Spectroscopy (100 Area RI/FS);	SEE ITEM (2) IN SPECIAL INSTRUCTIONS GAB	Strontium-89,90 - Total Sr;	Tritium - Ion Ex;	Technetium-99;
SAMPLE NO.	B29HL2 (X)1								
MATRIX*	WATER								
SAMPLE DATE / SAMPLE TIME	1-12-11 1253								

CHAIN OF POSSESSION

RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
Rob Romo, Rob Romo 1-12-11	1415	Victor Osing 1/12/11	1415
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME

SPECIAL INSTRUCTIONS

** The laboratory is to report all TICs for Method 8260.
** The CACN for all analytical work at WSCF laboratory is 401642ES20.
** The 100 Area S&GRP Characterization and Monitoring Sampling and Analysis GKI applies to this SAF.
(1) ICP/MS - 200.8 (100 Area RI/FS) {Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Cobalt, Copper, Lead, Manganese, Nickel, Selenium, Silver, Thallium, Vanadium, Zinc}; ICP/MS - 200.8 (Add-on) {Uranium}; 200.8_HG - ICPMS (100 Area RI/FS);
(2) Gross Alpha {Gross alpha}; Gross Beta {Gross beta};

ORIGINAL

LABORATORY SECTION	RECEIVED BY	TITLE	DATE/TIME
FINAL SAMPLE DISPOSITION	DISPOSAL METHOD	DISPOSED BY	DATE/TIME

A-6003-618 (REV 2)

Sample Receipt

Chain of Custody

CH2MHill Plateau Remediation Company — **CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST** — F10-230-023 — PAGE 1 OF 1

COLLECTOR: Romo, Kauck, Becan	COMPANY CONTACT: ANNA RADLOFF	TELEPHONE NO.: 376-4554	PROJECT COORDINATOR: RADLOFF, AW
SAMPLING LOCATION: C7622 (199-D5-132); I-021 FTB	PROJECT DESIGNATION: 100 Area Remedial Investigation/Feasibility Analysis - 100-HR-3 - QC Sampl		SAF NO.: F10-230
ICE CHEST NO.	FIELD LOGBOOK NO.: HNF-N-585-12 Pg 49	ACTUAL SAMPLE DEPTH: (N/A)	COA: 300110ES10
SHIPPED TO: Waste Sampling & Characterization	OFFSITE PROPERTY NO.: SEE PTR		BILL OF LADING/AIR BILL NO.: SEE PTR

PRICE CODE: 7N — AIR QUALITY: ☐ — DATA TURNAROUND: 45 Days / 45 Days — METHOD OF SHIPMENT: GOVERNMENT VEHICLE

MATRIX*: A=Air, DL=Drum Liquids, DS=Drum Solids, L=Liquid, O=Oil, S=Soil, SE=Sediment, T=Tissue, V=Vegetation, W=Water, WI=Wipe, X=Other

POSSIBLE SAMPLE HAZARDS/ REMARKS: Contains Radioactive Material at concentrations that may or may not be regulated for transportation per 49 CFR / IATA Dangerous Goods Regulations but are not releasable per DOE Order 5400.5 (1990/1993)

SPECIAL HANDLING AND/OR STORAGE

PRESERVATION	HCl or H2SO4 to pH <2/Cool~4C	Cool~4C
HOLDING TIME	14 Days	7/40 Days
TYPE OF CONTAINER	aGs*	aG
NO. OF CONTAINER(S)	3	4
VOLUME	40mL	1L
SAMPLE ANALYSIS	VOA - 8260 (TCL 100 Area RI/FS);	Semi-VOA - 8270 (TCL 100 Area RI/FS);

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME		
B27CB0 (02	WATER	1-12-11	1250	–	–

CHAIN OF POSSESSION	DATE/TIME	SIGN/ PRINT NAMES	DATE/TIME
RELINQUISHED BY/REMOVED FROM: Rob Romo, Robert Romo 1-12-11	1415	RECEIVED BY/STORED IN: Vil Tao Simms 1/12/11	1415
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME

SPECIAL INSTRUCTIONS: ** The laboratory is to report all TICs for Method 8260.☐☐** The CACN for all analytical work at WSCF laboratory is 401642ES20.☐** The 100 Area S&GRP Characterization and Monitoring Sampling and Analysis GKI applies to this SAF.☐

LABORATORY SECTION — RECEIVED BY — TITLE — DATE/TIME

FINAL SAMPLE DISPOSITION — DISPOSAL METHOD — DISPOSED BY — DATE/TIME

A-6003-618 (Rev 2)

Appendix 5

Data Validation Supporting Documentation

Appendix B - Radiochemical Data Validation Checklist

RADIOCHEMICAL DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	(C)	D	E
PROJECT: 100 Area RI/FS			DATA PACKAGE: VSR11-039		
VALIDATOR: Eyda Hergenreder		LAB: WSCF		DATE: 04-04-2011	
			SDG: WSCF111115		
ANALYSES PERFORMED					
Gross Alpha/Beta X	Strontium-90 X	Technetium-99 X	Alpha Spectroscopy	Gamma Spectroscopy X	
Total Uranium	Radium-22	Tritium X	C-14	I-129	
SAMPLES/MATRIX Water sample SDG WSCF111115: B29HL2					

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: None

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: None

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

MDCs > CRDLs for associated non-detect sample results

B29HL2: gross alpha CRDL = 3 pCi/L: MDC = 3.6 pCi/L
Cs-134 CRDL = 15 pCi/L; MDC = 97 pCi/L
Cs-137 CRDL = 15 pCi/L; MDC = 18 pCi/L
Be-7 CRDL = 50 pCi/L; MDC = 160 pCi/L

Appendix 6

Additional Documentation Requested By Client

Quality Control Report

Attention Michael Neely
Department Radiochemistry

Group # WSCF111115

QC Batch 174104
Associated Samples 111115001

Test Tritium by LSC

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit		RQ	Analyzed
BLANK			**QC Sample #46367**								
Tritium	10028-17-8		150	pCi/L						U	02/09/11
LCS			**QC Sample #46368**								
Tritium	10028-17-8		3500	pCi/L	109.2	80 - 120					02/09/11
DUP			**QC Sample #46369**								
			Original 111112006								
Tritium	10028-17-8		-23	pCi/L			305.70	20	*	U	02/09/11
MS			**QC Sample #46370**								
			Original 111112006								
Tritium	10028-17-8		19000	pCi/L	94.5	75 - 125					02/09/11

Quality Control Report

Attention Michael Neely
Department Radiochemistry

Group # WSCF111115

QC Batch 174191
Associated Samples 111115001

Test Gross Alpha/Gross Beta

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit		RQ	Analyzed
BLANK			**QC Sample #46392**								
Gross Alpha	12587-46-1		0.97	pCi/L						U	02/04/11
Gross Beta	12587-47-2		0.42	pCi/L						U	02/04/11
LCS			**QC Sample #46393**								
Gross Alpha	12587-46-1		76	pCi/L	92.7	80 - 120					02/04/11
Gross Beta	12587-47-2		250	pCi/L	115.5	80 - 120					02/04/11
DUP			**QC Sample #46394**								
			Original 111130010								
Gross Alpha	12587-46-1		-0.69	pCi/L			503.30	20	*	U	02/04/11
Gross Beta	12587-47-2		11	pCi/L			16.70	20			02/04/11

Quality Control Report

Attention Michael Neely
Department Radiochemistry

Group # WSCF111115

QC Batch 174283
Associated Samples 111115001

Test TC99 by Liquid Scintillation

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit		RQ	Analyzed
BLANK			**QC Sample #46504**								
Technetium-99	14133-76-7		-1.5	pCi/L						U	01/28/11
LCS			**QC Sample #46505**								
Technetium-99	14133-76-7		220	pCi/L	102.2	80 - 120					01/28/11
DUP			**QC Sample #46506**								
			Original 111112006								
Technetium-99	14133-76-7		-0.30	pCi/L			800.00	20	*	U	01/28/11
MS			**QC Sample #46507**								
			Original 111112006								
Technetium-99	14133-76-7		920	pCi/L	105.4	75 - 125					01/28/11

Quality Control Report

Attention Michael Neely
Department Radiochemistry

Group # WSCF111115

QC Batch 174405
Associated Samples 111115001

Test Strontium 89/90 (GPC/GEA)

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
BLANK			**QC Sample #46609**							
Strontium-89/90	SR-RAD		-6.5	pCi/L					U	01/26/11
LCS			**QC Sample #46610**							
Strontium-89/90	SR-RAD		91	pCi/L	97.7	80 - 120				01/26/11
DUP			**QC Sample #46611**							
			Original 111115001							
Strontium-89/90	SR-RAD	42	48	pCi/L			13.30	20		01/26/11

Quality Control Report

Attention Michael Neely
Department Radiochemistry

Group # WSCF111115

QC Batch 174802
Associated Samples 111115001

Test Gamma Energy Analysis-general

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit		RQ	Analyzed
IBLANK			**QC Sample #47028**								
Antimony-125	14234-35-6		-0.68	pCi/L						U	01/27/11
Cesium-134	13967-70-9		18	pCi/L						U	01/27/11
Cesium-137	10045-97-3		4.4	pCi/L						U	01/27/11
Cobalt-60	10198-40-0		0.52	pCi/L						U	01/27/11
Europium-152	14683-23-9		0.32	pCi/L						U	01/27/11
Europium-154	15585-10-1		-8.4	pCi/L						U	01/27/11
Europium-155	14391-16-3		-0.51	pCi/L						U	01/27/11
Potassium-40	13966-00-2		20	pCi/L						U	01/27/11
Ruthenium-106	13967-48-1		14	pCi/L						U	01/27/11
Beryllium-7	13966-02-4		2.3	pCi/L						U	01/27/11
LCS			**QC Sample #47029**								
Cesium-137	10045-97-3		6400	pCi/sample	106.8	80 - 120					01/27/11
Cobalt-60	10198-40-0		10000	pCi/sample	104.6	80 - 120					01/27/11
DUP			**QC Sample #47030**								
			Original 111087006								
Antimony-125	14234-35-6		7.5	pCi/L			-745.50	20	*	U	01/26/11
Cesium-134	13967-70-9		12	pCi/L			21.20	20	*	U	01/26/11
Cesium-137	10045-97-3		1.6	pCi/L			76.90	20	*	U	01/26/11

Quality Control Report

Attention Michael Neely
Department Radiochemistry

Group # WSCF111115

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit		RQ	Analyzed
Cobalt-60	10198-40-0		17	pCi/L			6.10	20			01/26/11
Europium-152	14683-23-9		-1.3	pCi/L			253.60	20	*	U	01/26/11
Europium-154	15585-10-1		10	pCi/L			501.80	20	*	U	01/26/11
Europium-155	14391-16-3		14	pCi/L			6.90	20		U	01/26/11
Potassium-40	13966-00-2		23	pCi/L			79.60	20	*	U	01/26/11
Ruthenium-106	13967-48-1		-17	pCi/L			-386.20	20	*	U	01/26/11
Beryllium-7	13966-02-4		-12	pCi/L			-2200.00	20	*	U	01/26/11

Quality Control Report

Attention Michael Neely
Department Radiochemistry

Group # WSCF111115

QC Batch 174405
Associated Samples 111115001

Test Strontium 89/90 (GPC/GEA)

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
SAMPLE			**Sample #111115001**							
Strontium-85	13967-73-2				88	25 - 105				01/26/11
BLANK			**QC Sample #46609**							
Strontium-85	13967-73-2				90.6	25 - 105				01/26/11
LCS			**QC Sample #46610**							
Strontium-85	13967-73-2				92.4	25 - 105				01/26/11
DUP			**QC Sample #46611**							
			Original 111115001							
Strontium-85	13967-73-2				81	25 - 105	8.00			01/26/11