CHPRC - REVIEW COMMENT RECORD (RCR)

1. Date	03/30/2011
2. Review No.	
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
VSR11-036		Scot Fitzgerald	Analytical Support Group	2753/373-7495

17. Comment Submittal Approval	10. Agreement With Indicated Comment Disposition(s)	11. CLOSED
Date:	Scot Fitzgerald Reviewer/Point of Contact (print and sign)	Scot Fitzgerald Reviewer/Point of Contact (print and sign)
Organization Manager (optional) (print and sign)	03/30/2011 Date	03/30/2011 Date
	Author/Originator (print and sign)	Author/Originator (print and sign)

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

REVIEW COMMENT RECORD (RCR)

1. Date	2. Review No.
03/30/2011	
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
VSR11-036, Data Validation Report for CHPRC - Project 100 Area RI/FS, Chemical Validation - Level C	S&GRP Sample Data Groups (SDGs); H4502 and WSCF111428	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 /JA Edwards Reviewer/Point of Contact (print and sign)	JA Edwards /JA Edwards Reviewer/Point of Contact (print and sign)
	03/30/2011 Date	03/30/2011 Date
	Author/Originator (print and sign)	Author/Originator (print and sign)

12. Item	13a. Comments	13b. Basis	13c. Recommendation	14. Reviewer Concurrence Required (Y or N)	15. Disposition (provide justification if **NOT** accepted)	16. Status
1	There were no issues found in this review	N/A	No additional items found	N	N/A	Closed

Documents:

GRP-GD-002, Rev. 0, Change 0, *Data Validation for Radiochemical Analyses*, August 2010
GRP-GD-003, Rev. 0, Change 0, *Data Validation for Chemical Analyses*, August 2010
DOE/RL-2009-44, Rev. 0, *Sampling and Analysis Plan for the 100-BC-1, 100-BC-2 and 100-BC-5 Operable Units Remedial Investigation/Feasibility Study*, March 2010
TPA-CN-348, Change Notice Form for DOE/RL-2009-44, Rev. 0, April 2010
LA-265-403: Hexavalent Chromium Anaysis By Spectrophotometer or Discrete Analyzer
LA-505-412: Inductively Coupled Plasma-Mass Spectrometry (ICP/MS) for Trace Elements in Water and Solids
LA-523-427: Polychlorinated Biphenyls (PCBs) By Gas Chromatography
LA-220-406: Strontium-89 and 90 in Aqueous Samples by Sr-Spec Separation
LA-508-415: Operation Of The Protean 2-Inch Alpha/Beta Counting System For Gross Alpha/ Gross Beta Samples
LA-508-421: Operation of the Tri-Carb Model 2500TR Liquid Scintillation Analyzer
LA-508-481: Gamma Energy Analysis Using Procount Software
LA-523-493: NWTPH-Dx, Extractible Diesel and Petroleum Products Analysis in Soil and Water

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Data Validation Report for CH2M Hill Plateau Remediation Company

VSR11-036
Project 100 Area RI/FS

Chemical & Radiochemical Validation - Level C

Validation Performed By: Eyda Hergenreder **Date:** 3-29-2011

Validation Reviewed By: Carl Schlosser **Date:** 3-29-2011

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Date: 29 March 2011
To: CH2M Hill (technical representative)
From: Analytical Quality Associates, Inc.
Project: 100 Area RI/FS
Subject: Volatile Organics - Sample Data Group (SDG) WSCF111428

INTRODUCTION

This memorandum presents the results of data validation for SDG WSCF111428 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
B26RV3	02/04/11	Water	C	8260B
B26RV4	02/04/11	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-BC-1, 100-BC-2 and 100-BC-5 Operable Units Remedial Investigation/Feasibility Study, DOE/RL-2009-44, Rev. 0/TPA-CN-348 (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

No trip blanks were submitted for validation.

Field Blanks

No field blanks were submitted for validation.

Equipment Blanks

No equipment blanks were submitted for validation.

- **Accuracy**

Accuracy is evaluated by reviewing surrogate results, matrix spike sample results, and laboratory control sample results. According to the SAP, the 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.

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 1,1-dichloroethene and trichloroethene were below the lower acceptance limit. All sample results associated with these target analytes *except for* trichloroethene were non-detects and should be qualified as estimates and flagged "UJ." The trichloroethene results were detects and should be qualified as estimates and flagged “J.” See the table in Appendix 2 for a listing of all affected sample results.

The only MS/MSD analytes reported were 1,1-dichloroethene, trichloroethene, benzene, toluene and chlorobenzene. Reported analytes not represented in the MS/MSD 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.”

Laboratory Control Samples (LCSs)

All LCS recoveries were acceptable with the following exceptions.

The LCS recoveries for 1,1-dichloroethane and trichloroethene were below the lower acceptance limit. All sample results associated with these target analytes *except for* trichloroethene were non-detects and should be qualified as estimates and flagged "UJ." The trichloroethene results were detects and should be qualified as estimates and flagged "J." See the table in Appendix 2 for a listing of all affected sample results.

The only LCS analytes reported were 1,1-dichloroethene, trichloroethene, benzene, toluene and chlorobenzene. Reported analytes not represented in the LCS 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."

- **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 WSCF111428 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 non-represented QC data for multiple analytes and low MS/MSD and LCS recoveries. See the table in Appendix 2 for a listing of all affected sample results.

REFERENCES

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

DOE/RL-2009-44, Rev. 0, *Sampling and Analysis Plan for the 100-BC-1, 100-BC-2 and 100-BC-5 Operable Units Remedial Investigation/Feasibility Study*, March 2010.

TPA-CN-348, Change Notice Form for DOE/RL-2009-44, Rev 0, April 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: WSCF111428	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	B26RV3, B26RV4	Non-represented MS/MSD and LCS data
1,1-dichloroethene 1,1-dichloroethane 1,2-dichloroethane dibromochloromethane tetrachloroethene total 1,2-dichloroethene carbon tetrachloride chloroform 1,1,1-trichloroethane bromomethane chloromethane chloroethane vinyl chloride methylene chloride bromoform 1,2-dichloropropane 1,1,2-trichloroethane 1,1,2,2-tetrachloroethane trans-1,2-dichloroethene cis-1,2-dichloroethene	UJ	B26RV3, B26RV4	Low MS/MSD and LCS recoveries
trichloroethene	J	B26RV3, B26RV4	Low MS/MSD and LCS recoveries

Comments: None

Appendix 3

Annotated Laboratory Reports

WSCF Analytical Results Report

Attention Michael Neely
Department Organic, Volatiles

Group # WSCF111428

Sample # 111428001
SAF# F10-226
Sample ID B26RV3

Matrix WATER
Sampled 02/04/11
Received 02/04/11

Test Performed	CAS #		Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
8260 Prep											**02/10/11**
SW-846 8260B											
1,1-Dichloroethene	75-35-4	UJ	LA-523-455	U	<1		ug/L	1	1	5	02/15/11
Trichloroethene	79-01-6	J	LA-523-455	J	1.7		ug/L	1	1	5	02/15/11
Benzene	71-43-2		LA-523-455	U	<1		ug/L	1	1	5	02/15/11
Toluene	108-88-3		LA-523-455	U	<1		ug/L	1	1	5	02/15/11
Chlorobenzene	108-90-7		LA-523-455	U	<1		ug/L	1	1	5	02/15/11
1,1-Dichloroethane	75-34-3	UJ	LA-523-455	U	<1		ug/L	1	1	5	02/15/11
Ethylbenzene	100-41-4		LA-523-455	U	<1		ug/L	1	1	5	02/15/11
Styrene	100-42-5		LA-523-455	U	<1		ug/L	1	1	5	02/15/11
cis-1,3-Dichloropropene	10061-01-5	UJ	LA-523-455	U	<1		ug/L	1	1	5	02/15/11
trans-1,3-Dichloropropene	10061-02-6	UJ	LA-523-455	U	<1		ug/L	1	1	5	02/15/11
1,2-Dichloroethane	107-06-2	UJ	LA-523-455	U	<1		ug/L	1	1	5	02/15/11
Methyl isobutyl ketone	108-10-1	UJ	LA-523-455	U	<1		ug/L	1	1	5	02/15/11
Dibromochloromethane	124-48-1	UJ	LA-523-455	U	<1		ug/L	1	1	5	02/15/11
Tetrachloroethene	127-18-4	UJ	LA-523-455	U	<1		ug/L	1	1	5	02/15/11
Total Xylenes	1330-20-7		LA-523-455	U	<1		ug/L	1	1	5	02/15/11
Total 1,2-Dichloroethene	540-59-0	UJ	LA-523-455	U	<1		ug/L	1	1	5	02/15/11

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 # WSCF111428

Sample # 111428001
SAF# F10-226
Sample ID B26RV3

Matrix WATER
Sampled 02/04/11
Received 02/04/11

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	02/15/11
2-Hexanone	591-78-6	UJ	LA-523-455	U	<1		ug/L	1	1	5	02/15/11
Acetone	67-64-1	UJ	LA-523-455	U	<1		ug/L	1	1	5	02/15/11
Chloroform	67-66-3	UJ	LA-523-455	U	<1		ug/L	1	1	5	02/15/11
1,1,1-Trichloroethane	71-55-6	UJ	LA-523-455	U	<1		ug/L	1	1	5	02/15/11
Bromomethane	74-83-9	UJ	LA-523-455	U	<1		ug/L	1	1	5	02/15/11
Chloromethane	74-87-3	UJ	LA-523-455	U	<1		ug/L	1	1	5	02/15/11
Chloroethane	75-00-3	UJ	LA-523-455	U	<1		ug/L	1	1	5	02/15/11
Vinyl chloride	75-01-4	UJ	LA-523-455	U	<1		ug/L	1	1	5	02/15/11
Methylene chloride	75-09-2	UJ	LA-523-455	U	<1		ug/L	1	1	5	02/15/11
Carbon disulfide	75-15-0	UJ	LA-523-455	U	<1		ug/L	1	1	5	02/15/11
Bromoform	75-25-2	UJ	LA-523-455	U	<1		ug/L	1	1	5	02/15/11
Bromodichloromethane	75-27-4	UJ	LA-523-455	U	<1		ug/L	1	1	5	02/15/11
1,2-Dichloropropane	78-87-5	UJ	LA-523-455	U	<1		ug/L	1	1	5	02/15/11
Methyl ethyl ketone	78-93-3	UJ	LA-523-455	U	<1		ug/L	1	1	5	02/15/11
1,1,2-Trichloroethane	79-00-5	UJ	LA-523-455	U	<1		ug/L	1	1	5	02/15/11
1,1,2,2-Tetrachloroethane	79-34-5	UJ	LA-523-455	U	<1		ug/L	1	1	5	02/15/11
trans-1,2-Dichloroethene	156-60-5	UJ	LA-523-455	U	<1		ug/L	1	1	5	02/15/11

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 # WSCF111428

Sample # 111428001
SAF# F10-226
Sample ID B26RV3

Matrix WATER
Sampled 02/04/11
Received 02/04/11

Test Performed	CAS #		Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
cis-1,2-Dichloroethene	156-59-2	UJ	LA-523-455	U	<1		ug/L	1	1	5	02/15/11

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 # WSCF111428

Sample # 111428002
SAF# F10-226
Sample ID B26RV4

Matrix WATER
Sampled 02/04/11
Received 02/04/11

Test Performed	CAS #		Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
8260 Prep											**02/10/11**
SW-846 8260B											
1,1-Dichloroethene	75-35-4	UJ	LA-523-455	U	<1		ug/L	1	1	5	02/15/11
Trichloroethene	79-01-6	J	LA-523-455	J	1.5		ug/L	1	1	5	02/15/11
Benzene	71-43-2		LA-523-455	U	<1		ug/L	1	1	5	02/15/11
Toluene	108-88-3		LA-523-455	U	<1		ug/L	1	1	5	02/15/11
Chlorobenzene	108-90-7		LA-523-455	U	<1		ug/L	1	1	5	02/15/11
1,1-Dichloroethane	75-34-3	UJ	LA-523-455	U	<1		ug/L	1	1	5	02/15/11
Ethylbenzene	100-41-4		LA-523-455	U	<1		ug/L	1	1	5	02/15/11
Styrene	100-42-5		LA-523-455	U	<1		ug/L	1	1	5	02/15/11
cis-1,3-Dichloropropene	10061-01-5	UJ	LA-523-455	U	<1		ug/L	1	1	5	02/15/11
trans-1,3-Dichloropropene	10061-02-6	UJ	LA-523-455	U	<1		ug/L	1	1	5	02/15/11
1,2-Dichloroethane	107-06-2	UJ	LA-523-455	U	<1		ug/L	1	1	5	02/15/11
Methyl isobutyl ketone	108-10-1	UJ	LA-523-455	U	<1		ug/L	1	1	5	02/15/11
Dibromochloromethane	124-48-1	UJ	LA-523-455	U	<1		ug/L	1	1	5	02/15/11
Tetrachloroethene	127-18-4	UJ	LA-523-455	U	<1		ug/L	1	1	5	02/15/11
Total Xylenes	1330-20-7		LA-523-455	U	<1		ug/L	1	1	5	02/15/11
Total 1,2-Dichloroethene	540-59-0	UJ	LA-523-455	U	<1		ug/L	1	1	5	02/15/11

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 # WSCF111428

Sample # 111428002
SAF# F10-226
Sample ID B26RV4

Matrix WATER
Sampled 02/04/11
Received 02/04/11

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	02/15/11
2-Hexanone	591-78-6	UJ	LA-523-455	U	<1		ug/L	1	1	5	02/15/11
Acetone	67-64-1	UJ	LA-523-455	U	<1		ug/L	1	1	5	02/15/11
Chloroform	67-66-3	UJ	LA-523-455	U	<1		ug/L	1	1	5	02/15/11
1,1,1-Trichloroethane	71-55-6	UJ	LA-523-455	U	<1		ug/L	1	1	5	02/15/11
Bromomethane	74-83-9	UJ	LA-523-455	U	<1		ug/L	1	1	5	02/15/11
Chloromethane	74-87-3	UJ	LA-523-455	U	<1		ug/L	1	1	5	02/15/11
Chloroethane	75-00-3	UJ	LA-523-455	U	<1		ug/L	1	1	5	02/15/11
Vinyl chloride	75-01-4	UJ	LA-523-455	U	<1		ug/L	1	1	5	02/15/11
Methylene chloride	75-09-2	UJ	LA-523-455	U	<1		ug/L	1	1	5	02/15/11
Carbon disulfide	75-15-0	UJ	LA-523-455	U	<1		ug/L	1	1	5	02/15/11
Bromoform	75-25-2	UJ	LA-523-455	U	<1		ug/L	1	1	5	02/15/11
Bromodichloromethane	75-27-4	UJ	LA-523-455	U	<1		ug/L	1	1	5	02/15/11
1,2-Dichloropropane	78-87-5	UJ	LA-523-455	U	<1		ug/L	1	1	5	02/15/11
Methyl ethyl ketone	78-93-3	UJ	LA-523-455	U	<1		ug/L	1	1	5	02/15/11
1,1,2-Trichloroethane	79-00-5	UJ	LA-523-455	U	<1		ug/L	1	1	5	02/15/11
1,1,2,2-Tetrachloroethane	79-34-5	UJ	LA-523-455	U	<1		ug/L	1	1	5	02/15/11
trans-1,2-Dichloroethene	156-60-5	UJ	LA-523-455	U	<1		ug/L	1	1	5	02/15/11

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 # WSCF111428

Sample # 111428002
SAF# F10-226
Sample ID B26RV4

Matrix WATER
Sampled 02/04/11
Received 02/04/11

Test Performed	CAS #		Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
cis-1,2-Dichloroethene	156-59-2	UJ	LA-523-455	U	<1		ug/L	1	1	5	02/15/11

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
WSCF111428

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.

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
WSCF111428

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

TPHD-WA – 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.

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.

- Gamma Energy Analysis:
  - All applicable QC controls are within the established limits.
- Gross Alpha / Gross Beta:
  - Batch QC 176549
    - Gross Beta Duplicate Relative Percent Difference(s) (RPD) did not meet the established laboratory limits. Duplicate Relative Percent Difference (RPD) does not apply to results below 5X the minimum detectable activity. No flags issued.
    - All other applicable QC controls are within the established limits.

2

Narrative

- Tritium:
  - All applicable QC controls are within the established limits.
- Strontium-89/90:
  - 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.

CH2MHill Plateau Remediation Company	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	F10-226-232	PAGE 1 OF 2

COLLECTOR	COMPANY CONTACT	TELEPHONE NO.	PROJECT COORDINATOR	PRICE CODE	7N	DATA TURNAROUND
BAILEY	DYEKMAN, DL	373-2530	RADLOFF, AW	AIR QUALITY	☐	45 Days / 45 Days
SAMPLING LOCATION	PROJECT DESIGNATION		SAF NO.			
C8244 (199-B5-8); I-027	100 Area Remedial Investigation/Feasibility Analysis - 100-BC Groundwater		F10-226			
ICE CHEST NO.	FIELD LOGBOOK NO.	ACTUAL SAMPLE DEPTH	COA	METHOD OF SHIPMENT		
N/A	HNF-N-585-15/53	175.3'	300078ES10	GOVERNMENT VEHICLE		
SHIPPED TO	OFFSITE PROPERTY NO.		BILL OF LADING/AIR BILL NO.			
Waste Sampling & Characterization	N/A		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)

111428

SPECIAL HANDLING AND/OR STORAGE

PRESERVATION	HCl or H2SO4 to pH <2/(Cool~4C	HCl to pH <2	HCl to pH <2/Cool~4C	Cool~4C	HNO3 to pH <2	HNO3 to pH <2	Cool~4C	HNO3 to pH <2	HNO3 to pH <2	None
HOLDING TIME	14 Days	6 Months	14/40 Days	24 Hours	28 Days	6 Months	48 Hours	6 Months	6 Months	6 Months
TYPE OF CONTAINER	aGs	G/P	aG	aG	G	G	P	G/P	G/P	G
NO. OF CONTAINER(S)	3	2	3	1	1	1	1	1	2	1
VOLUME	40mL	1L	1000mL	500mL	500mL	500mL	500mL	500mL	1L	250mL
SAMPLE ANALYSIS	VOA - 8260 (TCL 100 Area RI/FS);	Technetium-99;	TPH-Diesel Range - WTPH-D;	Chromium Hex - 7196;	200.8_HG - ICPMS (100 Area RI/FS);	SEE ITEM (1) IN SPECIAL INSTRUCTIONS	IC Anions - 300.0 (100 Area RI/FS);	SEE ITEM (2) IN SPECIAL INSTRUCTIONS	Strontium-89,90 -- Total Sr;	Tritium - Ion Ex;

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME										
B26RV3	WATER	2-4-11	0755	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

CHAIN OF POSSESSION		SIGN/ PRINT NAMES	
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
JEBAILEY	2-4-11/1340	TA FARZIM	2-4-11/1340
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 401736ES20.☐** The 100 Area S&GRP Characterization and Monitoring Sampling and Analysis GKI applies to this SAF.
(1) ICP/MS - 200.8 (Add-on) {Uranium}; ICP/MS - 200.8 (100 Area RI/FS);
(2) Gross Alpha {Gross alpha}; Gross Beta {Gross beta};

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

A-6003-618 (REV 2)

Chain of Custody

CH2MHill Plateau Remediation Company	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	F10-226-232	PAGE 2 OF 2
COLLECTOR: BAILEY	COMPANY CONTACT: DYEKMAN, DL	TELEPHONE NO.: 373-2530	PROJECT COORDINATOR: RADLOFF, AW
PRICE CODE: 7N	DATA TURNAROUND: 45 Days / 45 Days	SAMPLING LOCATION: C8244 (199-B5-8); I-027	PROJECT DESIGNATION: 100 Area Remedial Investigation/Feasibility Analysis - 100-BC Groundwater
SAF NO.: F10-226	AIR QUALITY: ☐	ICE CHEST NO.: N/A	FIELD LOGBOOK NO.: HNF-N-585-15/53
ACTUAL SAMPLE DEPTH: 175.3'	COA: 300078ES10	METHOD OF SHIPMENT: GOVERNMENT VEHICLE	SHIPPED TO: Waste Sampling & Characterization
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)

SPECIAL HANDLING AND/OR STORAGE

PRESERVATION	HNO3 to pH <2
HOLDING TIME	6 Months
TYPE OF CONTAINER	G/P
NO. OF CONTAINER(S)	1
VOLUME	500mL
SAMPLE ANALYSIS	SEE ITEM (3) IN SPECIAL INSTRUCTIONS

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME	
B26RV3	WATER	2-4-11	0755	✓

CHAIN OF POSSESSION		SIGN/ PRINT NAMES	
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
JKBAILEY / JKB	2-4-11 / 1340	TAPAZIN	2-4-11 / 1340
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 401736ES20.☐** The 100 Area S&GRP Characterization and Monitoring Sampling and Analysis GKI applies to this SAF.

(3) Gamma Spectroscopy (100 Area RI/FS); Gamma Spec - Add-on {Radium-228};

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

A-6003-618 (REV 2)

Chain of Custody

CH2MHill Plateau Remediation Company — **CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST** — F10-226-235 — PAGE 1 OF 2

COLLECTOR	BAILEY
SAMPLING LOCATION	C8244 (199-B5-8); I-028
ICE CHEST NO.	N/A
SHIPPED TO	Waste Sampling & Characterization
COMPANY CONTACT	DYEKMAN, DL
TELEPHONE NO.	373-2530
PROJECT DESIGNATION	100 Area Remedial Investigation/Feasibility Analysis - 100-BC Groundwater
FIELD LOGBOOK NO.	HNF-N-585-15/53
ACTUAL SAMPLE DEPTH	180.5'
OFFSITE PROPERTY NO.	N/A
PROJECT COORDINATOR	RADLOFF, AW
SAF NO.	F10-226
COA	300078ES10
BILL OF LADING/AIR BILL NO.	N/A
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	HCl to pH <2	HCl to pH <2/Cool~4C	Cool~4C	HNO3 to pH <2	HNO3 to pH <2	Cool~4C	HNO3 to pH <2	HNO3 to pH <2	None
HOLDING TIME	14 Days	6 Months	14/40 Days	24 Hours	28 Days	6 Months	48 Hours	6 Months	6 Months	6 Months
TYPE OF CONTAINER	aGs	G/P	aG	aG	G	G	P	G/P	G/P	G
NO. OF CONTAINER(S)	3	2	3	1	1	1	1	1	2	1
VOLUME	40mL	1L	1000mL	500mL	500mL	500mL	500mL	500mL	1L	250mL
SAMPLE ANALYSIS	VOA - 8260 (TCL 100 Area RI/FS);	Technetium-99;	TPH-Diesel Range WTPH-D;	Chromium Hex - 7196;	200.8_HG - ICPMS (100 Area RI/FS);	SEE ITEM (1) IN SPECIAL INSTRUCTIONS	IC Anions - 300.0 (100 Area RI/FS);	SEE ITEM (2) IN SPECIAL INSTRUCTIONS	Strontium-89,90 Total Sr;	Tritium - Iso tox;

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME										
B26RV4	2 WATER	2-4-11	1255	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

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

RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
JKBailey/JKB	2-4-11/1340	TA Marion	2-4-11/1340

SPECIAL INSTRUCTIONS

** The laboratory is to report all TICs for Method 8260.☐☐** The CACN for all analytical work at WSCF laboratory is 401736ES20.☐** The 100 Area S&GRP Characterization and Monitoring Sampling and Analysis GKI applies to this SAF.

(1) ICP/MS - 200.8 (Add-on) {Uranium}; ICP/MS - 200.8 (100 Area RI/FS);

(2) Gross Alpha {Gross alpha}; Gross Beta {Gross beta};

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			F10-226-235	PAGE 2 OF 2
COLLECTOR: BAILEY	COMPANY CONTACT: DYEKMAN, DL	TELEPHONE NO.: 373-2530	PROJECT COORDINATOR: RADLOFF, AW	PRICE CODE: 7N	DATA TURNAROUND: 45 Days / 45 Days
SAMPLING LOCATION: C8244 (199-B5-8); I-028	PROJECT DESIGNATION: 100 Area Remedial Investigation/Feasibility Analysis - 100-BC Groundwater		SAF NO.: F10-226	AIR QUALITY: ☐	
ICE CHEST NO.: N/A	FIELD LOGBOOK NO.: HNF-N-585-15/53	ACTUAL SAMPLE DEPTH: 180.5'	COA: 300078ES10	METHOD OF SHIPMENT: GOVERNMENT VEHICLE	
SHIPPED TO: Waste Sampling & Characterization	OFFSITE PROPERTY NO.: N/A		BILL OF LADING/AIR BILL NO.: N/A		

MATRIX*	POSSIBLE SAMPLE HAZARDS/ REMARKS	PRESERVATION	HNO3 to pH <2
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	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)	HOLDING TIME	6 Months
		TYPE OF CONTAINER	G/P
		NO. OF CONTAINER(S)	1
		VOLUME	500mL
	SPECIAL HANDLING AND/OR STORAGE	SAMPLE ANALYSIS	SEE ITEM (3) IN SPECIAL INSTRUCTIONS

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME	
B26RV4	WATER	2-4-11	1255	✓

CHAIN OF POSSESSION		SIGN/ PRINT NAMES	
RELINQUISHED BY/REMOVED FROM: JKBAILEY/JKB	DATE/TIME: 2-4-11/1340	RECEIVED BY/STORED IN: TA FRAZIER	DATE/TIME: 2-4-11/1340
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 401736ES20.☐** The 100 Area S&GRP Characterization and Monitoring Sampling and Analysis GKI applies to this SAF.

(3) Gamma Spectroscopy (100 Area RI/FS); Gamma Spec - Add-on {Radium-228};

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: VSR11-036		
VALIDATOR: Eyda Hergenreder		LAB: WSCF		DATE: 03-29-2011	
			SDG: WSCF111428		
ANALYSES PERFORMED					
SW-846 8260 X		SW-846 8260 (TCLP)	SW-846 8270		SW-846 8270 (TCLP)
SAMPLES/MATRIX Water samples SDG WSCF111428: B26RV3, B26RV4					

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:

LCS %R: 1,1-dichloroethene 76%; trichloroethene 76%
MS/MSD %R: 1,1-dichloroethene 77%/78%: trichloroethene 75%/76%

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 # WSCF111428

QC Batch 176481
Associated Samples 111428001, 111428002

Test SW-846 8260B Volatiles, separate prep

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
BLANK			**QC Sample #48832**							
1,1-Dichloroethene	75-35-4		<1	ug/L					U	02/14/11
Trichloroethene	79-01-6		<1	ug/L					U	02/14/11
Benzene	71-43-2		<1	ug/L					U	02/14/11
Toluene	108-88-3		<1	ug/L					U	02/14/11
Chlorobenzene	108-90-7		<1	ug/L					U	02/14/11
1,1-Dichloroethane	75-34-3		<1	ug/L					U	02/14/11
Ethylbenzene	100-41-4		<1	ug/L					U	02/14/11
Styrene	100-42-5		<1	ug/L					U	02/14/11
cis-1,3-Dichloropropene	10061-01-5		<1	ug/L					U	02/14/11
trans-1,3-Dichloropropene	10061-02-6		<1	ug/L					U	02/14/11
1,2-Dichloroethane	107-06-2		<1	ug/L					U	02/14/11
Methyl isobutyl ketone	108-10-1		<1	ug/L					U	02/14/11
Dibromochloromethane	124-48-1		<1	ug/L					U	02/14/11
Tetrachloroethene	127-18-4		<1	ug/L					U	02/14/11
Total Xylenes	1330-20-7		<1	ug/L					U	02/14/11
Total 1,2-Dichloroethene	540-59-0		<1	ug/L					U	02/14/11
Carbon tetrachloride	56-23-5		<1	ug/L					U	02/14/11

Quality Control Report

Attention Michael Neely
Department Organic, Volatiles

Group # WSCF111428

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
2-Hexanone	591-78-6		<1	ug/L					U	02/14/11
Acetone	67-64-1		<1	ug/L					U	02/14/11
Chloroform	67-66-3		<1	ug/L					U	02/14/11
1,1,1-Trichloroethane	71-55-6		<1	ug/L					U	02/14/11
Bromomethane	74-83-9		<1	ug/L					U	02/14/11
Chloromethane	74-87-3		<1	ug/L					U	02/14/11
Chloroethane	75-00-3		<1	ug/L					U	02/14/11
Vinyl chloride	75-01-4		<1	ug/L					U	02/14/11
Methylene chloride	75-09-2		<1	ug/L					U	02/14/11
Carbon disulfide	75-15-0		<1	ug/L					U	02/14/11
Bromoform	75-25-2		<1	ug/L					U	02/14/11
Bromodichloromethane	75-27-4		<1	ug/L					U	02/14/11
1,2-Dichloropropane	78-87-5		<1	ug/L					U	02/14/11
Methyl ethyl ketone	78-93-3		<1	ug/L					U	02/14/11
1,1,2-Trichloroethane	79-00-5		<1	ug/L					U	02/14/11
1,1,2,2-Tetrachloroethane	79-34-5		<1	ug/L					U	02/14/11
trans-1,2-Dichloroethene	156-60-5		<1	ug/L					U	02/14/11
cis-1,2-Dichloroethene	156-59-2		<1	ug/L					U	02/14/11
LCS			**QC Sample #48833**							
1,1-Dichloroethene	75-35-4		19	ug/L	75.9	75 - 125				02/15/11
Trichloroethene	79-01-6		19	ug/L	75.5	75 - 125				02/15/11
Benzene	71-43-2		23	ug/L	92.1	75 - 125				02/15/11

Quality Control Report

Attention Michael Neely
Department Organic, Volatiles

Group # WSCF111428

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
Toluene	108-88-3		24	ug/L	94.2	75 - 125				02/15/11
Chlorobenzene	108-90-7		26	ug/L	103.3	75 - 125				02/15/11
MS			**QC Sample #48834**							
			Original 111427001							
1,1-Dichloroethene	75-35-4		19	ug/L	76.5	75 - 125				02/15/11
Trichloroethene	79-01-6		19	ug/L	75.3	75 - 125				02/15/11
Benzene	71-43-2		23	ug/L	92.6	75 - 125				02/15/11
Toluene	108-88-3		22	ug/L	88.6	75 - 125				02/15/11
Chlorobenzene	108-90-7		25	ug/L	99.9	75 - 125				02/15/11
MSD			**QC Sample #48835**							
			Original 111427001					**Paired**	**48834**	
1,1-Dichloroethene	75-35-4		20	ug/L	78	75 - 125	1.90	20		02/15/11
Trichloroethene	79-01-6		19	ug/L	76.4	75 - 125	1.50	20		02/15/11
Benzene	71-43-2		23	ug/L	90.5	75 - 125	2.30	20		02/15/11
Toluene	108-88-3		22	ug/L	86.9	75 - 125	1.90	20		02/15/11
Chlorobenzene	108-90-7		25	ug/L	101	75 - 125	1.10	20		02/15/11

Quality Control Report

Attention Michael Neely
Department Organic, Volatiles

Group # WSCF111428

QC Batch 176481
Associated Samples 111428001, 111428002

Test SW-846 8260B Volatiles, separate prep

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
SAMPLE			**Sample #111428001**							
1,2-Dichloroethane-d4	17060-07-0				105.8	75 - 125				02/15/11
Toluene-d8	2037-26-5				97.7	75 - 125				02/15/11
4-Bromofluorobenzene	460-00-4				83.8	75 - 125				02/15/11
SAMPLE			**Sample #111428002**							
1,2-Dichloroethane-d4	17060-07-0				104.7	75 - 125				02/15/11
Toluene-d8	2037-26-5				99.2	75 - 125				02/15/11
4-Bromofluorobenzene	460-00-4				85.6	75 - 125				02/15/11
BLANK			**QC Sample #48832**							
1,2-Dichloroethane-d4	17060-07-0				103.5	75 - 125				02/14/11
Toluene-d8	2037-26-5				96.3	75 - 125				02/14/11
4-Bromofluorobenzene	460-00-4				84.2	75 - 125				02/14/11
LCS			**QC Sample #48833**							
4-Bromofluorobenzene	460-00-4				110.8	75 - 125				02/15/11
1,2-Dichloroethane-d4	17060-07-0				101.2	75 - 125				02/15/11

Quality Control Report

Attention Michael Neely
Department Organic, Volatiles

Group # WSCF111428

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
Toluene-d8	2037-26-5				104.6	75 - 125				02/15/11
MS			**QC Sample #48834**							
			Original	**111427001**						
1,2-Dichloroethane-d4	17060-07-0				98.1	75 - 125				02/15/11
Toluene-d8	2037-26-5				104.4	75 - 125				02/15/11
4-Bromofluorobenzene	460-00-4				108.4	75 - 125				02/15/11
MSD			**QC Sample #48835**							
			Original	**111427001**					**Paired**	**48834**
1,2-Dichloroethane-d4	17060-07-0				96.6	75 - 125	1.50	20		02/15/11
Toluene-d8	2037-26-5				103.1	75 - 125	1.30	20		02/15/11
4-Bromofluorobenzene	460-00-4				110.6	75 - 125	2.00	20		02/15/11

Date: 29 March 2011
To: CH2M Hill (technical representative)
From: Analytical Quality Associates, Inc.
Project: 100 Area RI/FS
Subject: Semivolatile Organics - Sample Data Group (SDG) WSCF111428

INTRODUCTION

This memorandum presents the results of data validation for SDG WSCF111428 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
B26RV3	02/04/11	Water	C	WTPH-D
B26RV4	02/04/11	Water	C	WTPH-D

Data validation was conducted in accordance with the CHPRC validation statement of work and the Sampling and Analysis Plan for the 100-BC-1, 100-BC-2 and 100-BC-5 Operable Units Remedial Investigation/Feasibility Study, DOE/RL-2009-44, Rev. 0/TPA-CN-348 (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 WTPH-D are extraction within 14 days of sample collection and analysis within 40 days of sample extraction. Sample preservation requires chilling to 4 degrees Celsius and acid preservation with hydrochloric acid to pH <2.

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

- **Blanks**

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

Laboratory Blanks

All laboratory blank results were acceptable.

Trip Blanks

No trip blanks were submitted for validation.

Field Blanks

No field blanks were submitted for validation.

Equipment Blanks

No equipment blanks were submitted for validation.

- **Accuracy**

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

Surrogates

All surrogate recoveries were acceptable.

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

The MS/MSD recoveries were acceptable.

Laboratory Control Samples (LCSs)

The LCS recovery was acceptable.

- **Precision**

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

MS/MSD Samples

The MS/MSD relative percent difference value was 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 WSCF111428 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-2009-44, Rev. 0, *Sampling and Analysis Plan for the 100-BC-2, 100-BC-2 and 100-BC-5 Operable Units Remedial Investigation/Feasibility Study*, March 2010.

TPA-CN-348, Change Notice Form for DOE/RL-2009-44, Rev. 0, April 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: WSCF111428	Reviewer: AQA	Project: 100 Area RI/FS	Page 1 of 1
Analyte(s)	**Qualifier**	**Samples Affected**	**Reason**
WTPH-D	None	N/A	N/A

Comments: None

Appendix 3

Annotated Laboratory Reports

WSCF Analytical Results Report

Attention Michael Neely
Department Organic, Semivolatiles

Group # WSCF111428

Sample # 111428001
SAF# F10-226
Sample ID B26RV3

Matrix WATER
Sampled 02/04/11
Received 02/04/11

Test Performed	CAS #	Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
Prep for Water										**02/10/11**
TPHDWA										
Diesel	TPHDIESEL	LA-523-493	U	<70		ug/L	1	70	100	02/17/11

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 # WSCF111428

Sample # 111428002
SAF# F10-226
Sample ID B26RV4

Matrix WATER
Sampled 02/04/11
Received 02/04/11

Test Performed	CAS #	Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
Prep for Water										**02/10/11**
TPHDWA										
Diesel	TPHDIESEL	LA-523-493	U	<80		ug/L	1	80	100	02/17/11

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)

Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

Attachment 2
Narrative
WSCF111428

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.

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
WSCF111428

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

TPHD-WA – 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.

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.

- Gamma Energy Analysis:
  - All applicable QC controls are within the established limits.
- Gross Alpha / Gross Beta:
  - Batch QC 176549
    - Gross Beta Duplicate Relative Percent Difference(s) (RPD) did not meet the established laboratory limits. Duplicate Relative Percent Difference (RPD) does not apply to results below 5X the minimum detectable activity. No flags issued.
    - All other applicable QC controls are within the established limits.

Narrative

- Tritium:
  - All applicable QC controls are within the established limits.
- Strontium-89/90:
  - 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.

CH2MHill Plateau Remediation Company	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	F10-226-232	PAGE 1 OF 2

COLLECTOR: BAILEY	COMPANY CONTACT: DYEKMAN, DL	TELEPHONE NO.: 373-2530	PROJECT COORDINATOR: RADLOFF, AW
PRICE CODE: 7N	DATA TURNAROUND: 45 Days / 45 Days	AIR QUALITY: ☐	
SAMPLING LOCATION: C8244 (199-B5-8); I-027	PROJECT DESIGNATION: 100 Area Remedial Investigation/Feasibility Analysis - 100-BC Groundwater	SAF NO.: F10-226	
ICE CHEST NO.: N/A	FIELD LOGBOOK NO.: HNF-N-585-15/53	ACTUAL SAMPLE DEPTH: 175.3'	COA: 300078ES10
METHOD OF SHIPMENT: GOVERNMENT VEHICLE	SHIPPED TO: Waste Sampling & Characterization	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)

111428

SPECIAL HANDLING AND/OR STORAGE

PRESERVATION	HCl or H2SO4 to pH <2/(Cool~4C	HCl to pH <2	HCl to pH <2/Cool~4C	Cool~4C	HNO3 to pH <2	HNO3 to pH <2	Cool~4C	HNO3 to pH <2	HNO3 to pH <2	None
HOLDING TIME	14 Days	6 Months	14/40 Days	24 Hours	28 Days	6 Months	48 Hours	6 Months	6 Months	6 Months
TYPE OF CONTAINER	aGs	G/P	aG	aG	G	G	P	G/P	G/P	G
NO. OF CONTAINER(S)	3	2	3	1	1	1	1	1	2	1
VOLUME	40mL	1L	1000mL	500mL	500mL	500mL	500mL	500mL	1L	250mL
SAMPLE ANALYSIS	VOA - 8260 (TCL 100 Area RI/FS);	Technetium-99;	TPH-Diesel Range - WTPH-D;	Chromium Hex - 7196;	200.8_HG - ICPMS (100 Area RI/FS);	SEE ITEM (1) IN SPECIAL INSTRUCTIONS	IC Anions - 300.0 (100 Area RI/FS);	SEE ITEM (2) IN SPECIAL INSTRUCTIONS	Strontium-89,90 -- Total Sr;	Tritium - Ion Ex;

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME										
B26RV3	WATER	2-4-11	0755	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

CHAIN OF POSSESSION		SIGN/ PRINT NAMES	
RELINQUISHED BY/REMOVED FROM: JEBAILEY	DATE/TIME: 2-4-11/1340	RECEIVED BY/STORED IN: TA FARZIM	DATE/TIME: 2-4-11/1340
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 401736ES20.☐** The 100 Area S&GRP Characterization and Monitoring Sampling and Analysis GKI applies to this SAF.
(1) ICP/MS - 200.8 (Add-on) {Uranium}; ICP/MS - 200.8 (100 Area RI/FS);
(2) Gross Alpha {Gross alpha}; Gross Beta {Gross beta};

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

A-6003-618 (REV 2)

Chain of Custody

CH2MHill Plateau Remediation Company	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	F10-226-232	PAGE 2 OF 2
COLLECTOR: BAILEY	COMPANY CONTACT: DYEKMAN, DL	TELEPHONE NO.: 373-2530	PROJECT COORDINATOR: RADLOFF, AW
PRICE CODE: 7N	DATA TURNAROUND: 45 Days / 45 Days	SAMPLING LOCATION: C8244 (199-B5-8); I-027	PROJECT DESIGNATION: 100 Area Remedial Investigation/Feasibility Analysis - 100-BC Groundwater
SAF NO.: F10-226	AIR QUALITY: ☐	ICE CHEST NO.: N/A	FIELD LOGBOOK NO.: HNF-N-585-15/53
ACTUAL SAMPLE DEPTH: 175.3'	COA: 300078ES10	METHOD OF SHIPMENT: GOVERNMENT VEHICLE	SHIPPED TO: Waste Sampling & Characterization
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)

SPECIAL HANDLING AND/OR STORAGE

PRESERVATION	HNO3 to pH <2
HOLDING TIME	6 Months
TYPE OF CONTAINER	G/P
NO. OF CONTAINER(S)	1
VOLUME	500mL
SAMPLE ANALYSIS	SEE ITEM (3) IN SPECIAL INSTRUCTIONS

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME	
B26RV3	WATER	2-4-11	0755	✓

CHAIN OF POSSESSION		SIGN/ PRINT NAMES	
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
JKBAILEY / JKB	2-4-11 / 1340	TAPAZIN	2-4-11 / 1340
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 401736ES20.☐** The 100 Area S&GRP Characterization and Monitoring Sampling and Analysis GKI applies to this SAF.

(3) Gamma Spectroscopy (100 Area RI/FS); Gamma Spec - Add-on {Radium-228};

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** — F10-226-235 — PAGE 1 OF 2

COLLECTOR: BAILEY	COMPANY CONTACT: DYEKMAN, DL	TELEPHONE NO.: 373-2530	PROJECT COORDINATOR: RADLOFF, AW
PRICE CODE: 7N	DATA TURNAROUND: 45 Days / 45 Days	AIR QUALITY:	
SAMPLING LOCATION: C8244 (199-B5-8); I-028	PROJECT DESIGNATION: 100 Area Remedial Investigation/Feasibility Analysis - 100-BC Groundwater	SAF NO.: F10-226	
ICE CHEST NO.: N/A	FIELD LOGBOOK NO.: HNF-N-585-15/53	ACTUAL SAMPLE DEPTH: 180.5'	COA: 300078ES10
METHOD OF SHIPMENT: GOVERNMENT VEHICLE			
SHIPPED TO: Waste Sampling & Characterization	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)

SPECIAL HANDLING AND/OR STORAGE

PRESERVATION	HCl or H2SO4 to pH <2/Cool~4C	HCl to pH <2	HCl to pH <2/Cool~4C	Cool~4C	HNO3 to pH <2	HNO3 to pH <2	Cool~4C	HNO3 to pH <2	HNO3 to pH <2	None
HOLDING TIME	14 Days	6 Months	14/40 Days	24 Hours	28 Days	6 Months	48 Hours	6 Months	6 Months	6 Months
TYPE OF CONTAINER	aGs	G/P	aG	aG	G	G	P	G/P	G/P	G
NO. OF CONTAINER(S)	3	2	3	1	1	1	1	1	2	1
VOLUME	40mL	1L	1000mL	500mL	500mL	500mL	500mL	500mL	1L	250mL
SAMPLE ANALYSIS	VOA - 8260 (TCL 100 Area RI/FS);	Technetium-99;	TPH-Diesel Range WTPH-D;	Chromium Hex - 7196;	200.8_HG - ICPMS (100 Area RI/FS);	SEE ITEM (1) IN SPECIAL INSTRUCTIONS	IC Anions - 300.0 (100 Area RI/FS);	SEE ITEM (2) IN SPECIAL INSTRUCTIONS	Strontium-89,90 Total Sr;	Tritium - Iso tax;

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME										
B26RV4	2 WATER	2-4-11	1255	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

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

RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
JKBailey/JKB	2-4-11/1340	TA Marion	2-4-11/1340

SPECIAL INSTRUCTIONS

** The laboratory is to report all TICs for Method 8260.□□** The CACN for all analytical work at WSCF laboratory is 401736ES20.□** The 100 Area S&GRP Characterization and Monitoring Sampling and Analysis GKI applies to this SAF.
(1) ICP/MS - 200.8 (Add-on) {Uranium}; ICP/MS - 200.8 (100 Area RI/FS);
(2) Gross Alpha {Gross alpha}; Gross Beta {Gross beta};

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

A-6003-618 (REV 2)

Chain of Custody

CH2MHill Plateau Remediation Company	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST			F10-226-235	PAGE 2 OF 2
COLLECTOR: BAILEY	COMPANY CONTACT: DYEKMAN, DL	TELEPHONE NO.: 373-2530	PROJECT COORDINATOR: RADLOFF, AW	PRICE CODE: 7N	DATA TURNAROUND: 45 Days / 45 Days
SAMPLING LOCATION: C8244 (199-B5-8); I-028	PROJECT DESIGNATION: 100 Area Remedial Investigation/Feasibility Analysis - 100-BC Groundwater		SAF NO.: F10-226	AIR QUALITY: ☐	
ICE CHEST NO.: N/A	FIELD LOGBOOK NO.: HNF-N-585-15/53	ACTUAL SAMPLE DEPTH: 180.5'	COA: 300078ES10	METHOD OF SHIPMENT: GOVERNMENT VEHICLE	
SHIPPED TO: Waste Sampling & Characterization	OFFSITE PROPERTY NO.: N/A		BILL OF LADING/AIR BILL NO.: N/A		

MATRIX*	POSSIBLE SAMPLE HAZARDS/ REMARKS	PRESERVATION	HNO3 to pH <2
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	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)	HOLDING TIME	6 Months
		TYPE OF CONTAINER	G/P
		NO. OF CONTAINER(S)	1
		VOLUME	500mL
	SPECIAL HANDLING AND/OR STORAGE	SAMPLE ANALYSIS	SEE ITEM (3) IN SPECIAL INSTRUCTIONS

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME	
B26RV4	WATER	2-4-11	1255	✓

CHAIN OF POSSESSION		SIGN/ PRINT NAMES	
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
JK BAILEY / JK Bailey	2-4-11/1340	TA FRAZIER / Terry Frazier	2-4-11/1340
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 401736ES20.☐** The 100 Area S&GRP Characterization and Monitoring Sampling and Analysis GKI applies to this SAF.

(3) Gamma Spectroscopy (100 Area RI/FS); Gamma Spec - Add-on {Radium-228};

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: VSR11-036		
VALIDATOR: Eyda Hergenreder		LAB: WSCF		DATE: 03-29-2011	
			SDG: WSCF111428		
ANALYSES PERFORMED					
8015	8021	8141	8151	8315	
		WTPH-HCID	WTPH-G	WTPH-D X	

SAMPLES/MATRIX: Water samples

SDG WSCF111428: B26RV3, B26RV4

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)

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 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. COMPOUND IDENTIFICATION, 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

8. SAMPLE CLEANUP (Levels D and E)

Fluorisil ® (or other absorbent) cleanup performed? ..... Yes No N/A

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

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

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

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

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

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

Comments:

Appendix 6

Additional Documentation Requested By Client

Quality Control Report

Attention Michael Neely
Department Organic, Semivolatiles

Group # WSCF111428

QC Batch 176956
Associated Samples 111428001, 111428002

Test Extractable Diesel and Petroleum

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
BLANK			**QC Sample #49095**							
Diesel	TPHDIESEL		<80	ug/L					U	02/11/11
LCS			**QC Sample #49096**							
Diesel	TPHDIESEL		2800	ug/L	111	65 - 128				02/22/11
MS			**QC Sample #49097**							
			Original 111470001							
Diesel	TPHDIESEL		2600	ug/L	108.8	73 - 123				02/17/11
MSD			**QC Sample #49098**							
			Original 111470001					**Paired**	**49097**	
Diesel	TPHDIESEL		2800	ug/L	120.8	73 - 123	10.50	20		02/22/11

Quality Control Report

Attention Michael Neely
Department Organic, Semivolatiles

Group # WSCF111428

QC Batch 176956
Associated Samples 111428001, 111428002

Test Extractable Diesel and Petroleum

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
SAMPLE			**Sample #111428001**							
o-Terphenyl	84-15-1				116.2	70 - 130				02/17/11
SAMPLE			**Sample #111428002**							
o-Terphenyl	84-15-1				109.9	70 - 130				02/17/11
BLANK			**QC Sample #49095**							
o-Terphenyl	84-15-1				82.4	70 - 130				02/11/11
LCS			**QC Sample #49096**							
o-Terphenyl	84-15-1				115.4	70 - 130				02/22/11
MS			**QC Sample #49097**							
			Original 111470001							
o-Terphenyl	84-15-1				116.1	70 - 130				02/17/11
MSD			**QC Sample #49098**							
			Original 111470001						**Paired 49097**	
o-Terphenyl	84-15-1				125.2	70 - 130	7.50	20		02/22/11

Date: 29 March 2011
To: CH2M Hill (technical representative)
From: Analytical Quality Associates, Inc.
Project: 100 Area RI/FS
Subject: Inorganics - Sample Data Group (SDG) WSCF111428

INTRODUCTION

This memorandum presents the results of data validation for SDG WSCF111428 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
B26RV3	02/04/11	Water	C	200.8
B26RV4	02/04/11	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-BC-1, 100-BC-2 and 100-BC-5 Operable Units Remedial Investigation/Feasibility Study, DOE/RL-2009-44, Rev. 0/TPA-CN-348 (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 samples were analyzed within the prescribed holding times and properly preserved.

- **Blanks**

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

Laboratory Blanks

All laboratory blank results were acceptable.

Trip Blanks

No trip blanks were submitted for validation.

Field Blanks

No field blanks were submitted for validation.

Equipment Blanks

No equipment blanks were submitted for validation.

- **Accuracy**

Accuracy is evaluated by reviewing matrix spike sample results, laboratory control sample and ICP-AES interference check sample results. According to the SAP, the laboratory control sample and matrix spike 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, 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 WSCF111428 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-2009-44, Rev. 0, *Sampling and Analysis Plan for the 100-BC-1, 100-BC-2 and 100-BC-5 Operable Units Remedial Investigation/Feasibility Study*, March 2010.

TPA-CN-348, Change Notice Form for DOE/RL-2009-44, Rev. 0, April 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: WSCF111428	Reviewer: AQA	Project: 100 Area RI/FS	Page 1 of 1
Analyte(s)	**Qualifier**	**Samples Affected**	**Reason**
Metals	None	N/A	N/A

Comments: None

Appendix 3

Annotated Laboratory Reports

WSCF Analytical Results Report

Attention Michael Neely
Department Inorganic

Group # WSCF111428

Sample # 111428001
SAF# F10-226
Sample ID B26RV3

Matrix WATER
Sampled 02/04/11
Received 02/04/11

Test Performed	CAS #	Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
Anions by IC										**02/04/11**
Anions by IC										
Fluoride	16984-48-8	LA-533-410	BD	0.310		ug/mL	2	0.088	0.40	02/04/11
Chloride	16887-00-6	LA-533-410	D	4.96		ug/mL	2	0.084	0.80	02/04/11
Nitrite-N	NO2-N	LA-533-410	UD	<0.036		ug/mL	2	0.036	0.20	02/04/11
Bromide	24959-67-9	LA-533-410	UD	<0.11		ug/mL	2	0.11	1.0	02/04/11
Nitrate-N	NO3-N	LA-533-410	D	0.921		ug/mL	2	0.019	0.20	02/04/11
Phosphate-P	PO4-P	LA-533-410	UD	<0.14		ug/mL	2	0.14	0.80	02/04/11
Sulfate	14808-79-8	LA-533-410	D	25.6		ug/mL	2	0.17	2.0	02/04/11
Cr(VI)										**02/04/11**
Cr(VI)										
Hexavalent chromium	18540-29-9	LA-265-403	U	<0.0020		mg/L	1	0.0020	0.0050	02/04/11
ICPMS Prep										**02/16/11**
ICP-MS										
Aluminum	7429-90-5	LA-505-412	BD	28.0		ug/L	2	10	200	02/16/11
Manganese	7439-96-5	LA-505-412	D	18.0		ug/L	2	0.20	2.0	02/16/11
Nickel	7440-02-0	LA-505-412	BD	0.740		ug/L	2	0.40	4.0	02/16/11
Silver	7440-22-4	LA-505-412	UD	<0.20		ug/L	2	0.20	2.0	02/16/11
Antimony	7440-36-0	LA-505-412	UD	<0.60		ug/L	2	0.60	6.0	02/16/11

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 # WSCF111428

Sample # 111428001
SAF# F10-226
Sample ID B26RV3

Matrix WATER
Sampled 02/04/11
Received 02/04/11

Test Performed	CAS #	Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
Barium	7440-39-3	LA-505-412	D	15.2		ug/L	2	0.40	4.0	02/16/11
Beryllium	7440-41-7	LA-505-412	UD	<0.10		ug/L	2	0.10	1.0	02/16/11
Cadmium	7440-43-9	LA-505-412	UD	<0.20		ug/L	2	0.20	2.0	02/16/11
Chromium	7440-47-3	LA-505-412	BD	4.39		ug/L	2	1.0	10	02/16/11
Cobalt	7440-48-4	LA-505-412	BD	0.128		ug/L	2	0.10	0.50	02/16/11
Copper	7440-50-8	LA-505-412	BD	0.562		ug/L	2	0.20	2.0	02/16/11
Vanadium	7440-62-2	LA-505-412	D	11.4		ug/L	2	0.40	4.0	02/16/11
Zinc	7440-66-6	LA-505-412	D	15.7		ug/L	2	1.6	10	02/16/11
Lead	7439-92-1	LA-505-412	UD	<0.20		ug/L	2	0.20	2.0	02/16/11
Mercury	7439-97-6	LA-505-412	UD	<0.10		ug/L	2	0.10	0.40	02/16/11
Thallium	7440-28-0	LA-505-412	UD	<0.10		ug/L	2	0.10	1.0	02/16/11
Uranium	7440-61-1	LA-505-412	D	1.64		ug/L	2	0.10	0.40	02/16/11
Arsenic	7440-38-2	LA-505-412	BD	2.54		ug/L	2	0.80	8.0	02/16/11
Selenium	7782-49-2	LA-505-412	UD	<0.60		ug/L	2	0.60	6.0	02/16/11

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 # WSCF111428

Sample # 111428002
SAF# F10-226
Sample ID B26RV4

Matrix WATER
Sampled 02/04/11
Received 02/04/11

Test Performed	CAS #	Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
Anions by IC										**02/04/11**
Anions by IC										
Fluoride	16984-48-8	LA-533-410	BD	0.368		ug/mL	2	0.088	0.40	02/04/11
Chloride	16887-00-6	LA-533-410	D	5.10		ug/mL	2	0.084	0.80	02/04/11
Nitrite-N	NO2-N	LA-533-410	UD	<0.036		ug/mL	2	0.036	0.20	02/04/11
Bromide	24959-67-9	LA-533-410	UD	<0.11		ug/mL	2	0.11	1.0	02/04/11
Nitrate-N	NO3-N	LA-533-410	D	0.934		ug/mL	2	0.019	0.20	02/04/11
Phosphate-P	PO4-P	LA-533-410	UD	<0.14		ug/mL	2	0.14	0.80	02/04/11
Sulfate	14808-79-8	LA-533-410	D	25.7		ug/mL	2	0.17	2.0	02/04/11
Cr(VI)										**02/04/11**
Cr(VI)										
Hexavalent chromium	18540-29-9	LA-265-403	U	<0.0020		mg/L	1	0.0020	0.0050	02/04/11
ICPMS Prep										**02/16/11**
ICP-MS										
Aluminum	7429-90-5	LA-505-412	BD	29.5		ug/L	2	10	200	02/16/11
Manganese	7439-96-5	LA-505-412	D	23.3		ug/L	2	0.20	2.0	02/16/11
Nickel	7440-02-0	LA-505-412	BD	0.630		ug/L	2	0.40	4.0	02/16/11
Silver	7440-22-4	LA-505-412	UD	<0.20		ug/L	2	0.20	2.0	02/16/11
Antimony	7440-36-0	LA-505-412	UD	<0.60		ug/L	2	0.60	6.0	02/16/11

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 # WSCF111428

Sample # 111428002
SAF# F10-226
Sample ID B26RV4

Matrix WATER
Sampled 02/04/11
Received 02/04/11

Test Performed	CAS #	Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
Barium	7440-39-3	LA-505-412	D	12.0		ug/L	2	0.40	4.0	02/16/11
Beryllium	7440-41-7	LA-505-412	UD	<0.10		ug/L	2	0.10	1.0	02/16/11
Cadmium	7440-43-9	LA-505-412	UD	<0.20		ug/L	2	0.20	2.0	02/16/11
Chromium	7440-47-3	LA-505-412	BD	2.81		ug/L	2	1.0	10	02/16/11
Cobalt	7440-48-4	LA-505-412	BD	0.175		ug/L	2	0.10	0.50	02/16/11
Copper	7440-50-8	LA-505-412	BD	0.392		ug/L	2	0.20	2.0	02/16/11
Vanadium	7440-62-2	LA-505-412	D	9.76		ug/L	2	0.40	4.0	02/16/11
Zinc	7440-66-6	LA-505-412	D	12.6		ug/L	2	1.6	10	02/16/11
Lead	7439-92-1	LA-505-412	UD	<0.20		ug/L	2	0.20	2.0	02/16/11
Mercury	7439-97-6	LA-505-412	UD	<0.10		ug/L	2	0.10	0.40	02/16/11
Thallium	7440-28-0	LA-505-412	UD	<0.10		ug/L	2	0.10	1.0	02/16/11
Uranium	7440-61-1	LA-505-412	D	1.49		ug/L	2	0.10	0.40	02/16/11
Arsenic	7440-38-2	LA-505-412	BD	2.44		ug/L	2	0.80	8.0	02/16/11
Selenium	7782-49-2	LA-505-412	BD	1.10		ug/L	2	0.60	6.0	02/16/11

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
WSCF111428

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.

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
WSCF111428

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

TPHD-WA – 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.

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.

- Gamma Energy Analysis:
  - All applicable QC controls are within the established limits.
- Gross Alpha / Gross Beta:
  - Batch QC 176549
    - Gross Beta Duplicate Relative Percent Difference(s) (RPD) did not meet the established laboratory limits. Duplicate Relative Percent Difference (RPD) does not apply to results below 5X the minimum detectable activity. No flags issued.
    - All other applicable QC controls are within the established limits.

Narrative

- Tritium:
  - All applicable QC controls are within the established limits.
- Strontium-89/90:
  - 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.

CH2MHill Plateau Remediation Company — **CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST** — F10-226-232 — PAGE 1 OF 2

COLLECTOR: BAILEY	COMPANY CONTACT: DYEKMAN, DL	TELEPHONE NO.: 373-2530	PROJECT COORDINATOR: RADLOFF, AW
PRICE CODE: 7N	DATA TURNAROUND: 45 Days / 45 Days	AIR QUALITY: ☐	
SAMPLING LOCATION: C8244 (199-B5-8); I-027	PROJECT DESIGNATION: 100 Area Remedial Investigation/Feasibility Analysis - 100-BC Groundwater	SAF NO.: F10-226	
ICE CHEST NO.: N/A	FIELD LOGBOOK NO.: HNF-N-585-15/53	ACTUAL SAMPLE DEPTH: 175.3'	COA: 300078ES10
METHOD OF SHIPMENT: GOVERNMENT VEHICLE	SHIPPED TO: Waste Sampling & Characterization	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)

111428

SPECIAL HANDLING AND/OR STORAGE

PRESERVATION	HCl or H2SO4 to pH <2/(Cool~4C	HCl to pH <2	HCl to pH <2/Cool~4C	Cool~4C	HNO3 to pH <2	HNO3 to pH <2	Cool~4C	HNO3 to pH <2	HNO3 to pH <2	None
HOLDING TIME	14 Days	6 Months	14/40 Days	24 Hours	28 Days	6 Months	48 Hours	6 Months	6 Months	6 Months
TYPE OF CONTAINER	aGs	G/P	aG	aG	G	G	P	G/P	G/P	G
NO. OF CONTAINER(S)	3	2	3	1	1	1	1	1	2	1
VOLUME	40mL	1L	1000mL	500mL	500mL	500mL	500mL	500mL	1L	250mL
SAMPLE ANALYSIS	VOA - 8260 (TCL 100 Area RI/FS);	Technetium-99;	TPH-Diesel Range - WTPH-D;	Chromium Hex - 7196;	200.8_HG - ICPMS (100 Area RI/FS);	SEE ITEM (1) IN SPECIAL INSTRUCTIONS	IC Anions - 300.0 (100 Area RI/FS);	SEE ITEM (2) IN SPECIAL INSTRUCTIONS	Strontium-89,90 -- Total Sr;	Tritium - Ion Ex;

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME										
B26RV3	WATER	2-4-11	0755	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

CHAIN OF POSSESSION		SIGN/ PRINT NAMES	
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
JBAILEY	2-4-11/1340	TA FARZIM	2-4-11/1340
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 401736ES20.☐** The 100 Area S&GRP Characterization and Monitoring Sampling and Analysis GKI applies to this SAF.
(1) ICP/MS - 200.8 (Add-on) {Uranium}; ICP/MS - 200.8 (100 Area RI/FS);
(2) Gross Alpha {Gross alpha}; Gross Beta {Gross beta};

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		F10-226-232		PAGE 2 OF 2
COLLECTOR: BAILEY	COMPANY CONTACT: DYEKMAN, DL	TELEPHONE NO.: 373-2530	PROJECT COORDINATOR: RADLOFF, AW	PRICE CODE: 7N	DATA TURNAROUND: 45 Days / 45 Days
SAMPLING LOCATION: C8244 (199-B5-8); I-027	PROJECT DESIGNATION: 100 Area Remedial Investigation/Feasibility Analysis - 100-BC Groundwater		SAF NO.: F10-226	AIR QUALITY: ☐	
ICE CHEST NO.: N/A	FIELD LOGBOOK NO.: HNF-N-585-15/53	ACTUAL SAMPLE DEPTH: 175.3'	COA: 300078ES10	METHOD OF SHIPMENT: GOVERNMENT VEHICLE	
SHIPPED TO: Waste Sampling & Characterization	OFFSITE PROPERTY NO.: N/A		BILL OF LADING/AIR BILL NO.: N/A		

MATRIX*	POSSIBLE SAMPLE HAZARDS/ REMARKS		
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	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)	PRESERVATION	HNO3 to pH <2
		HOLDING TIME	6 Months
		TYPE OF CONTAINER	G/P
		NO. OF CONTAINER(S)	1
		VOLUME	500mL
	SPECIAL HANDLING AND/OR STORAGE	SAMPLE ANALYSIS	SEE ITEM (3) IN SPECIAL INSTRUCTIONS

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME	
B26RV3	WATER	2-4-11	0755	✓

CHAIN OF POSSESSION		SIGN/ PRINT NAMES	
RELINQUISHED BY/REMOVED FROM: JKBAILEY / JKB	DATE/TIME: 2-4-11 / 1340	RECEIVED BY/STORED IN: TAPAZIN	DATE/TIME: 2-4-11 / 1340
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 401736ES20.☐** The 100 Area S&GRP Characterization and Monitoring Sampling and Analysis GKI applies to this SAF.

(3) Gamma Spectroscopy (100 Area RI/FS); Gamma Spec - Add-on {Radium-228};

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** — F10-226-235 — PAGE 1 OF 2

COLLECTOR: BAILEY	COMPANY CONTACT: DYEKMAN, DL	TELEPHONE NO.: 373-2530	PROJECT COORDINATOR: RADLOFF, AW
PRICE CODE: 7N	DATA TURNAROUND: 45 Days / 45 Days	AIR QUALITY:	
SAMPLING LOCATION: C8244 (199-B5-8); I-028	PROJECT DESIGNATION: 100 Area Remedial Investigation/Feasibility Analysis - 100-BC Groundwater	SAF NO.: F10-226	
ICE CHEST NO.: N/A	FIELD LOGBOOK NO.: HNF-N-585-15/53	ACTUAL SAMPLE DEPTH: 180.5'	COA: 300078ES10
METHOD OF SHIPMENT: GOVERNMENT VEHICLE			
SHIPPED TO: Waste Sampling & Characterization	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)

SPECIAL HANDLING AND/OR STORAGE

PRESERVATION	HCl or H2SO4 to pH <2/Cool~4C	HCl to pH <2	HCl to pH <2/Cool~4C	Cool~4C	HNO3 to pH <2	HNO3 to pH <2	Cool~4C	HNO3 to pH <2	HNO3 to pH <2	None
HOLDING TIME	14 Days	6 Months	14/40 Days	24 Hours	28 Days	6 Months	48 Hours	6 Months	6 Months	6 Months
TYPE OF CONTAINER	aGs	G/P	aG	aG	G	G	P	G/P	G/P	G
NO. OF CONTAINER(S)	3	2	3	1	1	1	1	1	2	1
VOLUME	40mL	1L	1000mL	500mL	500mL	500mL	500mL	500mL	1L	250mL
SAMPLE ANALYSIS	VOA - 8260 (TCL 100 Area RI/FS);	Technetium-99;	TPH-Diesel Range WTPH-D;	Chromium Hex - 7196;	200.8_HG - ICPMS (100 Area RI/FS);	SEE ITEM (1) IN SPECIAL INSTRUCTIONS	IC Anions - 300.0 (100 Area RI/FS);	SEE ITEM (2) IN SPECIAL INSTRUCTIONS	Strontium-89,90 Total Sr;	Tritium - Iso tax;

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME										
B26RV4	2 WATER	2-4-11	1255	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

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

RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
JKBailey/JKB	2-4-11/1340	TA Marion	2-4-11/1340

SPECIAL INSTRUCTIONS

** The laboratory is to report all TICs for Method 8260.☐☐** The CACN for all analytical work at WSCF laboratory is 401736ES20.☐** The 100 Area S&GRP Characterization and Monitoring Sampling and Analysis GKI applies to this SAF.

(1) ICP/MS - 200.8 (Add-on) {Uranium}; ICP/MS - 200.8 (100 Area RI/FS);

(2) Gross Alpha {Gross alpha}; Gross Beta {Gross beta};

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			F10-226-235	PAGE 2 OF 2
COLLECTOR: BAILEY	COMPANY CONTACT: DYEKMAN, DL	TELEPHONE NO.: 373-2530	PROJECT COORDINATOR: RADLOFF, AW	PRICE CODE: 7N	DATA TURNAROUND: 45 Days / 45 Days
SAMPLING LOCATION: C8244 (199-B5-8); I-028	PROJECT DESIGNATION: 100 Area Remedial Investigation/Feasibility Analysis - 100-BC Groundwater		SAF NO.: F10-226	AIR QUALITY: ☐	
ICE CHEST NO.: N/A	FIELD LOGBOOK NO.: HNF-N-585-15/53	ACTUAL SAMPLE DEPTH: 180.5'	COA: 300078ES10	METHOD OF SHIPMENT: GOVERNMENT VEHICLE	
SHIPPED TO: Waste Sampling & Characterization	OFFSITE PROPERTY NO.: N/A		BILL OF LADING/AIR BILL NO.: N/A		

MATRIX*	POSSIBLE SAMPLE HAZARDS/ REMARKS	PRESERVATION	HNO3 to pH <2
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	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)	HOLDING TIME	6 Months
		TYPE OF CONTAINER	G/P
		NO. OF CONTAINER(S)	1
		VOLUME	500mL
	SPECIAL HANDLING AND/OR STORAGE	SAMPLE ANALYSIS	SEE ITEM (3) IN SPECIAL INSTRUCTIONS

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME	
B26RV4	WATER	2-4-11	1255	✓

CHAIN OF POSSESSION		SIGN/ PRINT NAMES	
RELINQUISHED BY/REMOVED FROM: JK BAILEY / JKB	DATE/TIME: 2-4-11 / 1340	RECEIVED BY/STORED IN: TA FRAZIER / TAF	DATE/TIME: 2-4-11 / 1340
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 401736ES20.☐** The 100 Area S&GRP Characterization and Monitoring Sampling and Analysis GKI applies to this SAF.

(3) Gamma Spectroscopy (100 Area RI/FS); Gamma Spec - Add-on {Radium-228};

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: VSR11-036		
VALIDATOR: Eyda Hergenreder		LAB: WSCF		DATE: 03-29-2011	
			SDG: WSCF111428		
ANALYSES PERFORMED					
SW-846/ICP	SW-846/GFAA	SW-846/Hg		EPA 200.8 X	
SAMPLES/MATRIX Water samples SDG WSCF111428: B26RV3, B26RV4					

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 # WSCF111428

QC Batch 177087
Associated Samples 111428001, 111428002

Test ICP-2008 MS All possible metal

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
BLANK			**QC Sample #49221**							
Aluminum	7429-90-5		<5.0	ug/L					U	02/16/11
Manganese	7439-96-5		<0.10	ug/L					U	02/16/11
Nickel	7440-02-0		<0.20	ug/L					U	02/16/11
Silver	7440-22-4		<0.10	ug/L					U	02/16/11
Antimony	7440-36-0		<0.30	ug/L					U	02/16/11
Barium	7440-39-3		<0.20	ug/L					U	02/16/11
Beryllium	7440-41-7		<0.10	ug/L					U	02/16/11
Cadmium	7440-43-9		<0.10	ug/L					U	02/16/11
Chromium	7440-47-3		<0.50	ug/L					U	02/16/11
Cobalt	7440-48-4		<0.050	ug/L					U	02/16/11
Copper	7440-50-8		<0.10	ug/L					U	02/16/11
Vanadium	7440-62-2		<0.20	ug/L					U	02/16/11
Zinc	7440-66-6		<0.80	ug/L					U	02/16/11
Lead	7439-92-1		<0.10	ug/L					U	02/16/11
Mercury	7439-97-6		<0.050	ug/L					U	02/16/11
Thallium	7440-28-0		<0.050	ug/L					U	02/16/11
Uranium	7440-61-1		<0.050	ug/L					U	02/16/11
Arsenic	7440-38-2		<0.40	ug/L					U	02/16/11
Selenium	7782-49-2		<0.30	ug/L					U	02/16/11

Quality Control Report

Attention Michael Neely
Department Inorganic

Group # WSCF111428

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
LCS			**QC Sample #49222**							
Aluminum	7429-90-5		415	ug/L	103.8	85 - 115				02/16/11
Manganese	7439-96-5		40.4	ug/L	101.1	85 - 115				02/16/11
Nickel	7440-02-0		39.7	ug/L	99.3	85 - 115				02/16/11
Silver	7440-22-4		41.8	ug/L	104.6	85 - 115				02/16/11
Antimony	7440-36-0		38.9	ug/L	97.2	85 - 115				02/16/11
Barium	7440-39-3		39.1	ug/L	97.7	85 - 115				02/16/11
Beryllium	7440-41-7		44.1	ug/L	110.2	85 - 115				02/16/11
Cadmium	7440-43-9		38.8	ug/L	97	85 - 115				02/16/11
Chromium	7440-47-3		41.3	ug/L	103.3	85 - 115				02/16/11
Cobalt	7440-48-4		40.8	ug/L	101.9	85 - 115				02/16/11
Copper	7440-50-8		40.3	ug/L	100.7	85 - 115				02/16/11
Vanadium	7440-62-2		40.4	ug/L	100.9	85 - 115				02/16/11
Zinc	7440-66-6		37.5	ug/L	93.8	85 - 115				02/16/11
Lead	7439-92-1		41.3	ug/L	103.2	85 - 115				02/16/11
Mercury	7439-97-6		1.90	ug/L	95	85 - 115				02/16/11
Thallium	7440-28-0		40.9	ug/L	102.2	85 - 115				02/16/11
Uranium	7440-61-1		40.7	ug/L	101.8	85 - 115				02/16/11
Arsenic	7440-38-2		38.0	ug/L	94.9	85 - 115				02/16/11
Selenium	7782-49-2		36.9	ug/L	92.4	85 - 115				02/16/11
MS			**QC Sample #49223**							
			Original 111414001							
Aluminum	7429-90-5		401	ug/L	100.2	70 - 130				02/16/11
Manganese	7439-96-5		42.9	ug/L	107.2	70 - 130				02/16/11

Quality Control Report

Attention Michael Neely
Department Inorganic

Group # WSCF111428

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
Nickel	7440-02-0		38.1	ug/L	95.3	70 - 130				02/16/11
Silver	7440-22-4		40.6	ug/L	101.5	70 - 130				02/16/11
Antimony	7440-36-0		40.5	ug/L	101.2	70 - 130				02/16/11
Barium	7440-39-3		39.5	ug/L	98.7	70 - 130				02/16/11
Beryllium	7440-41-7		44.3	ug/L	110.6	70 - 130				02/16/11
Cadmium	7440-43-9		39.5	ug/L	98.8	70 - 130				02/16/11
Chromium	7440-47-3		40.4	ug/L	101.1	70 - 130				02/16/11
Cobalt	7440-48-4		38.9	ug/L	97.1	70 - 130				02/16/11
Copper	7440-50-8		37.6	ug/L	94	70 - 130				02/16/11
Vanadium	7440-62-2		39.9	ug/L	99.8	70 - 130				02/16/11
Zinc	7440-66-6		36.9	ug/L	92.3	70 - 130				02/16/11
Lead	7439-92-1		41.3	ug/L	103.2	70 - 130				02/16/11
Mercury	7439-97-6		1.94	ug/L	97.2	70 - 130				02/16/11
Thallium	7440-28-0		42.3	ug/L	105.7	70 - 130				02/16/11
Uranium	7440-61-1		42.3	ug/L	105.8	70 - 130				02/16/11
Arsenic	7440-38-2		39.6	ug/L	99.1	70 - 130				02/16/11
Selenium	7782-49-2		38.0	ug/L	94.9	70 - 130				02/16/11
MSD			**QC Sample #49224**							
			Original 111414001						**Paired 49223**	
Aluminum	7429-90-5		391	ug/L	97.7	70 - 130	2.50	20		02/16/11
Manganese	7439-96-5		41.2	ug/L	102.9	70 - 130	4.10	20		02/16/11
Nickel	7440-02-0		36.9	ug/L	92.4	70 - 130	3.10	20		02/16/11
Silver	7440-22-4		40.0	ug/L	99.9	70 - 130	1.60	20		02/16/11
Antimony	7440-36-0		39.4	ug/L	98.4	70 - 130	2.80	20		02/16/11
Barium	7440-39-3		38.6	ug/L	96.6	70 - 130	2.20	20		02/16/11

Quality Control Report

Attention Michael Neely
Department Inorganic

Group # WSCF111428

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
Beryllium	7440-41-7		42.1	ug/L	105.2	70 - 130	5.00	20		02/16/11
Cadmium	7440-43-9		38.9	ug/L	97.4	70 - 130	1.40	20		02/16/11
Chromium	7440-47-3		39.2	ug/L	98	70 - 130	3.10	20		02/16/11
Cobalt	7440-48-4		37.7	ug/L	94.3	70 - 130	2.90	20		02/16/11
Copper	7440-50-8		36.5	ug/L	91.2	70 - 130	3.00	20		02/16/11
Vanadium	7440-62-2		38.8	ug/L	97.1	70 - 130	2.70	20		02/16/11
Zinc	7440-66-6		36.0	ug/L	90	70 - 130	2.50	20		02/16/11
Lead	7439-92-1		40.8	ug/L	102	70 - 130	1.20	20		02/16/11
Mercury	7439-97-6		1.92	ug/L	95.9	70 - 130	1.30	20		02/16/11
Thallium	7440-28-0		41.6	ug/L	103.9	70 - 130	1.70	20		02/16/11
Uranium	7440-61-1		42.3	ug/L	105.8	70 - 130	0.00	20		02/16/11
Arsenic	7440-38-2		39.4	ug/L	98.5	70 - 130	0.60	20		02/16/11
Selenium	7782-49-2		36.3	ug/L	90.8	70 - 130	4.40	20		02/16/11

Date: 29 March 2011
To: CH2M Hill (technical representative)
From: Analytical Quality Associates, Inc.
Project: 100 Area RI/FS
Subject: General Chemistry - Sample Data Group (SDG) WSCF111428

INTRODUCTION

This memorandum presents the results of data validation for SDG WSCF111428 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
B26RV3	02/04/11	Water	C	300.0 & 7196
B26RV4	02/04/11	Water	C	300.0 & 7196

Data validation was conducted in accordance with the CHPRC validation statement of work and the Sampling and Analysis Plan for the 100-BC-1, 100-BC-2 and 100-BC-5 Operable Units Remedial Investigation/Feasibility Study, DOE/RL-2009-44, Rev. 0/TPA-CN-348 (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 are as follows:

- All anions except nitrate, nitrite, and phosphate – analysis within 28 days of sample collection
- Nitrate, nitrite, and phosphate – analysis within 48 hours of sample collection
- Hexavalent chromium – analysis within 24 hours of sample collection

Sample preservation requires chilling to 4 degrees Celsius.

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

- **Blanks**

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

Laboratory Blanks

All laboratory blank results were acceptable.

Trip Blanks

No trip blanks were submitted for validation.

Field Blanks

No field blanks were submitted for validation.

Equipment Blanks

No equipment blanks were submitted for validation.

- **Accuracy**

Accuracy is evaluated by reviewing matrix spike sample results and laboratory control sample results. According to the SAP, the matrix spike and laboratory control sample accuracy limits are 80% to 120% for all anion analytes. For hexavalent chromium the matrix spike sample accuracy limit is 80% to 120% and the laboratory control sample accuracy limit is the one 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%.

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 WSCF111428 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-2009-44, Rev. 0, *Sampling and Analysis Plan for the 100-BC-1, 100-BC-2 and 100-BC-4 Operable Units Remedial Investigation/Feasibility Study*, March 2010.

TPA-CN-348, Change Notice Form for DOE/RL-2009-44, Rev. 0, April 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: WSCF111428	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 # WSCF111428

Sample # 111428001
SAF# F10-226
Sample ID B26RV3

Matrix WATER
Sampled 02/04/11
Received 02/04/11

Test Performed	CAS #	Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
Anions by IC										**02/04/11**
Anions by IC										
Fluoride	16984-48-8	LA-533-410	BD	0.310		ug/mL	2	0.088	0.40	02/04/11
Chloride	16887-00-6	LA-533-410	D	4.96		ug/mL	2	0.084	0.80	02/04/11
Nitrite-N	NO2-N	LA-533-410	UD	<0.036		ug/mL	2	0.036	0.20	02/04/11
Bromide	24959-67-9	LA-533-410	UD	<0.11		ug/mL	2	0.11	1.0	02/04/11
Nitrate-N	NO3-N	LA-533-410	D	0.921		ug/mL	2	0.019	0.20	02/04/11
Phosphate-P	PO4-P	LA-533-410	UD	<0.14		ug/mL	2	0.14	0.80	02/04/11
Sulfate	14808-79-8	LA-533-410	D	25.6		ug/mL	2	0.17	2.0	02/04/11
Cr(VI)										**02/04/11**
Cr(VI)										
Hexavalent chromium	18540-29-9	LA-265-403	U	<0.0020		mg/L	1	0.0020	0.0050	02/04/11
ICPMS Prep										**02/16/11**
ICP-MS										
Aluminum	7429-90-5	LA-505-412	BD	28.0		ug/L	2	10	200	02/16/11
Manganese	7439-96-5	LA-505-412	D	18.0		ug/L	2	0.20	2.0	02/16/11
Nickel	7440-02-0	LA-505-412	BD	0.740		ug/L	2	0.40	4.0	02/16/11
Silver	7440-22-4	LA-505-412	UD	<0.20		ug/L	2	0.20	2.0	02/16/11
Antimony	7440-36-0	LA-505-412	UD	<0.60		ug/L	2	0.60	6.0	02/16/11

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 # WSCF111428

Sample # 111428002
SAF# F10-226
Sample ID B26RV4

Matrix WATER
Sampled 02/04/11
Received 02/04/11

Test Performed	CAS #	Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
Anions by IC										**02/04/11**
Anions by IC										
Fluoride	16984-48-8	LA-533-410	BD	0.368		ug/mL	2	0.088	0.40	02/04/11
Chloride	16887-00-6	LA-533-410	D	5.10		ug/mL	2	0.084	0.80	02/04/11
Nitrite-N	NO2-N	LA-533-410	UD	<0.036		ug/mL	2	0.036	0.20	02/04/11
Bromide	24959-67-9	LA-533-410	UD	<0.11		ug/mL	2	0.11	1.0	02/04/11
Nitrate-N	NO3-N	LA-533-410	D	0.934		ug/mL	2	0.019	0.20	02/04/11
Phosphate-P	PO4-P	LA-533-410	UD	<0.14		ug/mL	2	0.14	0.80	02/04/11
Sulfate	14808-79-8	LA-533-410	D	25.7		ug/mL	2	0.17	2.0	02/04/11
Cr(VI)										**02/04/11**
Cr(VI)										
Hexavalent chromium	18540-29-9	LA-265-403	U	<0.0020		mg/L	1	0.0020	0.0050	02/04/11
ICPMS Prep										**02/16/11**
ICP-MS										
Aluminum	7429-90-5	LA-505-412	BD	29.5		ug/L	2	10	200	02/16/11
Manganese	7439-96-5	LA-505-412	D	23.3		ug/L	2	0.20	2.0	02/16/11
Nickel	7440-02-0	LA-505-412	BD	0.630		ug/L	2	0.40	4.0	02/16/11
Silver	7440-22-4	LA-505-412	UD	<0.20		ug/L	2	0.20	2.0	02/16/11
Antimony	7440-36-0	LA-505-412	UD	<0.60		ug/L	2	0.60	6.0	02/16/11

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
WSCF111428

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.

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
WSCF111428

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

TPHD-WA – 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.

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.

- Gamma Energy Analysis:
  - All applicable QC controls are within the established limits.
- Gross Alpha / Gross Beta:
  - Batch QC 176549
    - Gross Beta Duplicate Relative Percent Difference(s) (RPD) did not meet the established laboratory limits. Duplicate Relative Percent Difference (RPD) does not apply to results below 5X the minimum detectable activity. No flags issued.
    - All other applicable QC controls are within the established limits.

- Tritium:
  - All applicable QC controls are within the established limits.
- Strontium-89/90:
  - 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.

CH2MHill Plateau Remediation Company	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	F10-226-232	PAGE 1 OF 2

COLLECTOR: BAILEY	COMPANY CONTACT: DYEKMAN, DL	TELEPHONE NO.: 373-2530	PROJECT COORDINATOR: RADLOFF, AW
PRICE CODE: 7N	DATA TURNAROUND: 45 Days / 45 Days	AIR QUALITY: ☐	
SAMPLING LOCATION: C8244 (199-B5-8); I-027	PROJECT DESIGNATION: 100 Area Remedial Investigation/Feasibility Analysis - 100-BC Groundwater	SAF NO.: F10-226	
ICE CHEST NO.: N/A	FIELD LOGBOOK NO.: HNF-N-585-15/53	ACTUAL SAMPLE DEPTH: 175.3'	COA: 300078ES10
METHOD OF SHIPMENT: GOVERNMENT VEHICLE	SHIPPED TO: Waste Sampling & Characterization	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)

111428

SPECIAL HANDLING AND/OR STORAGE

PRESERVATION	HCl or H2SO4 to pH <2/(Cool~4C	HCl to pH <2	HCl to pH <2/Cool~4C	Cool~4C	HNO3 to pH <2	HNO3 to pH <2	Cool~4C	HNO3 to pH <2	HNO3 to pH <2	None
HOLDING TIME	14 Days	6 Months	14/40 Days	24 Hours	28 Days	6 Months	48 Hours	6 Months	6 Months	6 Months
TYPE OF CONTAINER	aGs	G/P	aG	aG	G	G	P	G/P	G/P	G
NO. OF CONTAINER(S)	3	2	3	1	1	1	1	1	2	1
VOLUME	40mL	1L	1000mL	500mL	500mL	500mL	500mL	500mL	1L	250mL
SAMPLE ANALYSIS	VOA - 8260 (TC) 100 Area RI/FS);	Technetium-99;	TPH-Diesel Range - WTPH-D;	Chromium Hex - 7196;	200.8 HG - ICPMS (100 Area RI/FS);	SEE ITEM (1) IN SPECIAL INSTRUCTIONS	IC Anions - 300.0 (100 Area RI/FS);	SEE ITEM (2) IN SPECIAL INSTRUCTIONS	Strontium-89,90 -- Total Sr;	Tritium - Ion Ex;

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME										
B26RV3	WATER	2-4-11	0755	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

CHAIN OF POSSESSION		SIGN/ PRINT NAMES	
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
JBAILEY	2-4-11/1340	TA Farzim	2-4-11/1340
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 401736ES20.☐** The 100 Area S&GRP Characterization and Monitoring Sampling and Analysis GKI applies to this SAF.
(1) ICP/MS - 200.8 (Add-on) {Uranium}; ICP/MS - 200.8 (100 Area RI/FS);
(2) Gross Alpha {Gross alpha}; Gross Beta {Gross beta};

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

A-6003-618 (REV 2)

Chain of Custody

CH2MHill Plateau Remediation Company	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	F10-226-232	PAGE 2 OF 2
COLLECTOR: BAILEY	COMPANY CONTACT: DYEKMAN, DL	TELEPHONE NO.: 373-2530	PROJECT COORDINATOR: RADLOFF, AW
PRICE CODE: 7N	DATA TURNAROUND: 45 Days / 45 Days	SAMPLING LOCATION: C8244 (199-B5-8); I-027	PROJECT DESIGNATION: 100 Area Remedial Investigation/Feasibility Analysis - 100-BC Groundwater
SAF NO.: F10-226	AIR QUALITY: ☐	ICE CHEST NO.: N/A	FIELD LOGBOOK NO.: HNF-N-585-15/53
ACTUAL SAMPLE DEPTH: 175.3'	COA: 300078ES10	METHOD OF SHIPMENT: GOVERNMENT VEHICLE	SHIPPED TO: Waste Sampling & Characterization
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)

SPECIAL HANDLING AND/OR STORAGE

PRESERVATION	HNO3 to pH <2
HOLDING TIME	6 Months
TYPE OF CONTAINER	G/P
NO. OF CONTAINER(S)	1
VOLUME	500mL
SAMPLE ANALYSIS	SEE ITEM (3) IN SPECIAL INSTRUCTIONS

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME	
B26RV3	WATER	2-4-11	0755	✓

CHAIN OF POSSESSION		SIGN/ PRINT NAMES	
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
JKBAILEY / JKB	2-4-11 / 1340	TAPAZIN	2-4-11 / 1340
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 401736ES20.☐** The 100 Area S&GRP Characterization and Monitoring Sampling and Analysis GKI applies to this SAF.

(3) Gamma Spectroscopy (100 Area RI/FS); Gamma Spec - Add-on {Radium-228};

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** — F10-226-235 — PAGE 1 OF 2

COLLECTOR: BAILEY	COMPANY CONTACT: DYEKMAN, DL	TELEPHONE NO.: 373-2530	PROJECT COORDINATOR: RADLOFF, AW
PRICE CODE: 7N	DATA TURNAROUND: 45 Days / 45 Days	AIR QUALITY:	
SAMPLING LOCATION: C8244 (199-B5-8); I-028	PROJECT DESIGNATION: 100 Area Remedial Investigation/Feasibility Analysis - 100-BC Groundwater	SAF NO.: F10-226	
ICE CHEST NO.: N/A	FIELD LOGBOOK NO.: HNF-N-585-15/53	ACTUAL SAMPLE DEPTH: 180.5'	COA: 300078ES10
METHOD OF SHIPMENT: GOVERNMENT VEHICLE			
SHIPPED TO: Waste Sampling & Characterization	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)

SPECIAL HANDLING AND/OR STORAGE

PRESERVATION	HCl or H2SO4 to pH <2/Cool~4C	HCl to pH <2	HCl to pH <2/Cool~4C	Cool~4C	HNO3 to pH <2	HNO3 to pH <2	Cool~4C	HNO3 to pH <2	HNO3 to pH <2	None
HOLDING TIME	14 Days	6 Months	14/40 Days	24 Hours	28 Days	6 Months	48 Hours	6 Months	6 Months	6 Months
TYPE OF CONTAINER	aGs	G/P	aG	aG	G	G	P	G/P	G/P	G
NO. OF CONTAINER(S)	3	2	3	1	1	1	1	1	2	1
VOLUME	40mL	1L	1000mL	500mL	500mL	500mL	500mL	500mL	1L	250mL
SAMPLE ANALYSIS	VOA - 8260 (TCL 100 Area RI/FS);	Technetium-99;	TPH-Diesel Range WTPH-D;	Chromium Hex - 7196;	200.8_HG - ICPMS (100 Area RI/FS);	SEE ITEM (1) IN SPECIAL INSTRUCTIONS	IC Anions - 300.0 (100 Area RI/FS);	SEE ITEM (2) IN SPECIAL INSTRUCTIONS	Strontium-89,90 Total Sr;	Tritium - Iso tox;

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME										
B26RV4	2 WATER	2-4-11	1255	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

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

RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
JKBailey/JKB	2-4-11/1340	TA Marion	2-4-11/1340

SPECIAL INSTRUCTIONS

** The laboratory is to report all TICs for Method 8260.□□** The CACN for all analytical work at WSCF laboratory is 401736ES20.□** The 100 Area S&GRP Characterization and Monitoring Sampling and Analysis GKI applies to this SAF.
(1) ICP/MS - 200.8 (Add-on) {Uranium}; ICP/MS - 200.8 (100 Area RI/FS);
(2) Gross Alpha {Gross alpha}; Gross Beta {Gross beta};

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			F10-226-235	PAGE 2 OF 2
COLLECTOR: BAILEY	COMPANY CONTACT: DYEKMAN, DL	TELEPHONE NO.: 373-2530	PROJECT COORDINATOR: RADLOFF, AW	PRICE CODE: 7N	DATA TURNAROUND: 45 Days / 45 Days
SAMPLING LOCATION: C8244 (199-B5-8); I-028	PROJECT DESIGNATION: 100 Area Remedial Investigation/Feasibility Analysis - 100-BC Groundwater		SAF NO.: F10-226	AIR QUALITY: ☐	
ICE CHEST NO.: N/A	FIELD LOGBOOK NO.: HNF-N-585-15/53	ACTUAL SAMPLE DEPTH: 180.5'	COA: 300078ES10	METHOD OF SHIPMENT: GOVERNMENT VEHICLE	
SHIPPED TO: Waste Sampling & Characterization	OFFSITE PROPERTY NO.: N/A		BILL OF LADING/AIR BILL NO.: N/A		

MATRIX*	POSSIBLE SAMPLE HAZARDS/ REMARKS	PRESERVATION	HNO3 to pH <2
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	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)	HOLDING TIME	6 Months
		TYPE OF CONTAINER	G/P
		NO. OF CONTAINER(S)	1
		VOLUME	500mL
	SPECIAL HANDLING AND/OR STORAGE	SAMPLE ANALYSIS	SEE ITEM (3) IN SPECIAL INSTRUCTIONS

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME	
B26RV4	WATER	2-4-11	1255	✓

CHAIN OF POSSESSION		SIGN/ PRINT NAMES	
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
JE BAILEY / JE Bailey	2-4-11/1340	TA FRAZIER / TA Frazier	2-4-11/1340
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 401736ES20.☐** The 100 Area S&GRP Characterization and Monitoring Sampling and Analysis GKI applies to this SAF.

(3) Gamma Spectroscopy (100 Area RI/FS); Gamma Spec - Add-on {Radium-228};

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: VSR11-036		
VALIDATOR: Eyda Hergenreder		LAB: WSCF		DATE: 03-29-2011	
			SDG: WSCF111428		
ANALYSES PERFORMED					
Anions/IC X	TOC	TOX	TPH-418.1	Oil and Grease	Alkalinity
Ammonia	BOD/COD	Chloride	Chromium-VI X	pH	NO_3/NO_2
Sulfate	TDS	TKN	Phosphate	Cyanide	

SAMPLES/MATRIX Water samples

SDG WSCF111428: B26RV3, B26RV4

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 # WSCF111428

QC Batch 176062
Associated Samples 111428001, 111428002

Test Anions by Ion Chromatography (Water)

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
BLANK			**QC Sample #48407**							
Fluoride	16984-48-8		<0.044	ug/mL					U	02/04/11
Chloride	16887-00-6		<0.042	ug/mL					U	02/04/11
Nitrite-N	NO2-N		<0.018	ug/mL					U	02/04/11
Bromide	24959-67-9		<0.054	ug/mL					U	02/04/11
Nitrate-N	NO3-N		<9.7E-3	ug/mL					U	02/04/11
Phosphate-P	PO4-P		<0.072	ug/mL					U	02/04/11
Sulfate	14808-79-8		<0.083	ug/mL					U	02/04/11
LCS			**QC Sample #48408**							
Fluoride	16984-48-8		0.950	ug/mL	96	90 - 110				02/04/11
Chloride	16887-00-6		1.93	ug/mL	97.5	90 - 110				02/04/11
Nitrite-N	NO2-N		0.933	ug/mL	95.3	90 - 110				02/04/11
Bromide	24959-67-9		3.78	ug/mL	96.5	90 - 110				02/04/11
Nitrate-N	NO3-N		0.873	ug/mL	98.6	90 - 110				02/04/11
Phosphate-P	PO4-P		1.93	ug/mL	100.8	90 - 110				02/04/11
Sulfate	14808-79-8		3.91	ug/mL	99.7	90 - 110				02/04/11
DUP			**QC Sample #48409**							
			Original 111427001							
Fluoride	16984-48-8		0.130	ug/mL			12.20	20	BD	02/04/11

Quality Control Report

Attention Michael Neely
Department Inorganic

Group # WSCF111428

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
Chloride	16887-00-6		2.37	ug/mL			0.00	20	D	02/04/11
Nitrite-N	NO2-N		<0.036	ug/mL			0.00	20	UD	02/04/11
Bromide	24959-67-9		<0.11	ug/mL			0.00	20	UD	02/04/11
Nitrate-N	NO3-N		0.593	ug/mL			3.60	20	D	02/04/11
Phosphate-P	PO4-P		<0.14	ug/mL			0.00	20	UD	02/04/11
Sulfate	14808-79-8		18.0	ug/mL			0.60	20	D	02/04/11
MS			**QC Sample #48410**							
			Original 111427001							
Fluoride	16984-48-8		0.948	ug/mL	94.8	80 - 120			D	02/04/11
Chloride	16887-00-6		2.19	ug/mL	109.5	80 - 120			D	02/04/11
Nitrite-N	NO2-N		0.992	ug/mL	100.4	80 - 120			D	02/04/11
Bromide	24959-67-9		4.10	ug/mL	103.6	80 - 120			D	02/04/11
Nitrate-N	NO3-N		0.874	ug/mL	97.7	80 - 120			D	02/04/11
Phosphate-P	PO4-P		1.91	ug/mL	98.9	80 - 120			D	02/04/11
Sulfate	14808-79-8		3.61	ug/mL	91	80 - 120			D	02/04/11
MSD			**QC Sample #48411**							
			Original 111427001					**Paired**	**48410**	
Fluoride	16984-48-8		0.949	ug/mL	94.9	80 - 120	0.10	20	D	02/04/11
Chloride	16887-00-6		2.17	ug/mL	108.5	80 - 120	0.90	20	D	02/04/11
Nitrite-N	NO2-N		0.921	ug/mL	93.2	80 - 120	7.40	20	D	02/04/11
Bromide	24959-67-9		4.05	ug/mL	102.2	80 - 120	1.40	20	D	02/04/11
Nitrate-N	NO3-N		0.913	ug/mL	102.1	80 - 120	4.40	20	D	02/04/11
Phosphate-P	PO4-P		1.92	ug/mL	99.2	80 - 120	0.30	20	D	02/04/11
Sulfate	14808-79-8		3.79	ug/mL	95.8	80 - 120	5.10	20	D	02/04/11

Quality Control Report

Attention Michael Neely
Department Inorganic

Group # WSCF111428

QC Batch 176064
Associated Samples 111428001, 111428002

Test Hexavalent chromium Discrete Analyzer

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
BLANK			**QC Sample #48420**							
Hexavalent chromium	18540-29-9		<0.0020	mg/L					U	02/04/11
LCS			**QC Sample #48422**							
Hexavalent chromium	18540-29-9		0.0529	mg/L	105.8	90 - 110				02/04/11
DUP			**QC Sample #48423**							
			Original 111422001							
Hexavalent chromium	18540-29-9		<0.0020	mg/L			-6.90	20	U	02/04/11
MS			**QC Sample #48424**							
			Original 111422001							
Hexavalent chromium	18540-29-9		0.0412	mg/L	103	85 - 115				02/04/11

Date: 29 March 2011
To: CH2M Hill (technical representative)
From: Analytical Quality Associates, Inc.
Project: 100 Area RI/FS
Subject: Radiochemical - Sample Data Groups (SDGs) WSCF111428 and H4502

INTRODUCTION

This memorandum presents the results of data validation for SDG WSCF111428 prepared by WSCF Analytical Laboratories and SDG H4502 prepared by Eberline Services. 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
B26RV3	02/04/11	Water	C	Gross αβ, Gamma, H-3, Sr-89/90 & Tc-99
B26RV4	02/04/11	Water	C	Gross αβ, Gamma, H-3, Sr-89/90 & Tc-99
B26RM6	01/20/11	Water	C	C14, Ni-63, I-129 & U
B26RM7	01/20/11	Water	C	C14, Ni-63, I-129 & U
B27500	01/20/11	Water	C	C14, Ni-63 & I-129

Data validation was conducted in accordance with the CHPRC validation statement of work and the Sampling and Analysis Plan for the 100-BC-1, 100-BC-2 and 100-BC-5 Operable Units Remedial Investigation/Feasibility Study, DOE/RL-2009-44, Rev. 0/TPA-CN-348 (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 water samples for all analyses except tritium, C-14 and I-129 requires acid preservation with nitric acid to pH <2.

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

- **Blanks**

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

Laboratory Blanks

All laboratory blank results were acceptable.

Trip Blanks

No trip blanks were submitted for validation.

Field Blanks

No field blanks were submitted for validation.

Equipment Blanks

No equipment blanks were submitted for validation.

- **Accuracy**

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

All MS recoveries were acceptable.

Laboratory Control Samples (LCSs)

All LCS recoveries were acceptable.

Carrier/Tracer Recovery Factors

All carrier/tracer recovery factors were acceptable with the following exception.

For SDG H4502, the carrier recovery for Ni-63 associated with sample B26RM7 was >105%. The Ni-63 sample result was a non-detect and should not be qualified.

- **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

All field duplicates results were acceptable.

Field Split Samples

No field splits were submitted for validation.

- **Detection Limits**

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

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

The Cs-134 and Be-7 MDCs for samples B26RV3 and B26RV4 and the Eu-155 MDC for sample B26RV3 were > the CRDLs.

The I-129 MDCs for samples B26RM6, B26RM7 and B27500 were > the CRDLs.

- **Completeness**

SDGs WSCF111428 and H4502 were submitted for validation and verified for completeness. Completeness is based on the percentage of data determined to be valid (i.e., not rejected). The completion percentage was 100%.

MAJOR DEFICIENCIES

None found.

MINOR DEFICIENCIES

None found.

REFERENCES

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

DOE/RL-2009-44, Rev. 0, *Sampling and Analysis Plan for the 100-BC-1, 100-BC-2 and 100-BC-5 Operable Units Remedial Investigation/Feasibility Study*, March 2010.

TPA-CN-348, Change Notice Form for DOE/RL-2009-44, Rev. 0, April 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			
SDGs: WSCF111428 and H4502	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 # WSCF111428

Sample # 111428001
SAF# F10-226
Sample ID B26RV3

Matrix WATER
Sampled 02/04/11
Received 02/04/11

Test Performed	CAS #	Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
Alpha/Beta Prep										**02/17/11**
Gross Alpha/Beta										
Gross Alpha	12587-46-1	LA-508-415	U	1.4	1.2	pCi/L	1	1.8		02/28/11
Gross Beta	12587-47-2	LA-508-415		9.7	2.4	pCi/L	1	2.9		02/28/11
GEA Prep										**02/15/11**
GEA										
Antimony-125	14234-35-6	LA-508-481	U	8.2	24	pCi/L	1	44		03/03/11
Cesium-134	13967-70-9	LA-508-481	U	-30	57	pCi/L	1	87		03/03/11
Cesium-137	10045-97-3	LA-508-481	U	-0.73	10	pCi/L	1	16		03/03/11
Cobalt-60	10198-40-0	LA-508-481	U	-1.2	8.1	pCi/L	1	14		03/03/11
Europium-152	14683-23-9	LA-508-481	U	25	30	pCi/L	1	47		03/03/11
Europium-154	15585-10-1	LA-508-481	U	-3.9	29	pCi/L	1	43		03/03/11
Europium-155	14391-16-3	LA-508-481	U	14	32	pCi/L	1	54		03/03/11
Potassium-40	13966-00-2	LA-508-481	U	-49	130	pCi/L	1	240		03/03/11
Radium-228	15262-20-1	LA-508-481	U	41	34	pCi/L	1	65		03/03/11
Ruthenium-106	13967-48-1	LA-508-481	U	-51	120	pCi/L	1	160		03/03/11
Beryllium-7	13966-02-4	LA-508-481	U	64	100	pCi/L	1	180		03/03/11
H3 EICHROM										**02/08/11**
TRI-CARB LSC										

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.

WSCF Analytical Results Report

Attention Michael Neely
Department Radiochemistry

Group # WSCF111428

Sample # 111428001
SAF# F10-226
Sample ID B26RV3

Matrix WATER
Sampled 02/04/11
Received 02/04/11

Test Performed	CAS #	Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
Tritium	10028-17-8	LA-508-421		480	210	pCi/L	1	300		02/20/11
SR-89/90										**02/09/11**
SR-89/90										
Strontium-89/90	SR-RAD	LA-220-406	U	-2.1	3.6	pCi/L	1	1.7		02/23/11
Tc-99										**02/11/11**
TRI-CARB LSC										
Technetium-99	14133-76-7	LA-508-421	U	2.8	4.6	pCi/L	1	7.6		02/23/11

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.

WSCF Analytical Results Report

Attention Michael Neely
Department Radiochemistry

Group # WSCF111428

Sample # 111428002
SAF# F10-226
Sample ID B26RV4

Matrix WATER
Sampled 02/04/11
Received 02/04/11

Test Performed	CAS #	Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
Alpha/Beta Prep										**02/22/11**
Gross Alpha/Beta										
Gross Alpha	12587-46-1	LA-508-415	U	-0.45	1.2	pCi/L	1	2.5		02/28/11
Gross Beta	12587-47-2	LA-508-415		9.7	2.6	pCi/L	1	3.3		02/28/11
GEA Prep										**02/15/11**
GEA										
Antimony-125	14234-35-6	LA-508-481	U	-7.6	13	pCi/L	1	23		03/03/11
Cesium-134	13967-70-9	LA-508-481	U	-16	41	pCi/L	1	51		03/03/11
Cesium-137	10045-97-3	LA-508-481	U	-4.5	5.2	pCi/L	1	8.3		03/03/11
Cobalt-60	10198-40-0	LA-508-481	U	-2.1	4.4	pCi/L	1	7.5		03/03/11
Europium-152	14683-23-9	LA-508-481	U	2.0	15	pCi/L	1	26		03/03/11
Europium-154	15585-10-1	LA-508-481	U	-2.3	14	pCi/L	1	24		03/03/11
Europium-155	14391-16-3	LA-508-481	U	-7.1	19	pCi/L	1	32		03/03/11
Potassium-40	13966-00-2	LA-508-481	U	-13	95	pCi/L	1	140		03/03/11
Radium-228	15262-20-1	LA-508-481		30	31	pCi/L	1	25		03/03/11
Ruthenium-106	13967-48-1	LA-508-481	U	-7.1	50	pCi/L	1	85		03/03/11
Beryllium-7	13966-02-4	LA-508-481	U	-11	57	pCi/L	1	97		03/03/11
H3 EICHROM										**02/11/11**
TRI-CARB LSC										

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.

WSCF Analytical Results Report

Attention Michael Neely
Department Radiochemistry

Group # WSCF111428

Sample # 111428002
SAF# F10-226
Sample ID B26RV4

Matrix WATER
Sampled 02/04/11
Received 02/04/11

Test Performed	CAS #	Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
Tritium	10028-17-8	LA-508-421		400	210	pCi/L	1	300		02/22/11
SR-89/90										**02/09/11**
SR-89/90										
Strontium-89/90	SR-RAD	LA-220-406	U	-5.4	3.3	pCi/L	1	1.6		02/23/11
Tc-99										**02/11/11**
TRI-CARB LSC										
Technetium-99	14133-76-7	LA-508-421	U	-2.5	4.5	pCi/L	1	7.6		02/23/11

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.

EBERLINE SERVICES/RICHMOND

SAMPLE DELIVERY GROUP H4502

7400-001 B26RM6

DATA SHEET

SDG	7400	Client/Case no	CHPRC	SDG_H4502
Contact	N. Joseph Verville	Contract	No. 33677	
Lab sample id	S101269-01	Client sample id	B26RM6	
Dept sample id	7400-001	Location/Matrix	C8244(199-B5-8);I-014	WATER
Received	01/25/11	Collected/Volume	01/20/11 09:35	6.25 L
		Custody/SAF No	F10-226-399	F10-226

ANALYTE	CAS NO	RESULT pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI-FIERS	TEST
Carbon 14	14762-75-5	-4.52	32	54.2	200	U	C
Nickel 63	13981-37-8	0.071	1.6	2.73	15.0	U	NI_L
Iodine 129	15046-84-1	-0.802	2.5	3.32	5.00	U	I
Total Uranium (ug/L)	7440-61-1	1.24	0.14	0.025	1.00		U_T

100 Area Remedial Investigation/Feasibility Analysis - 100-BC Groundwater

Lab id	EBRLNE
Protocol	CHPRC
Version	Ver 1.0
Form	DVD-DS
Version	3.06
Report date	03/11/11

EBERLINE SERVICES/RICHMOND

SAMPLE DELIVERY GROUP H4502

7400-002 B26RM7

DATA SHEET

SDG	7400	Client/Case no	CHPRC	SDG_H4502
Contact	N. Joseph Verville	Contract	No. 33677	
Lab sample id	S101269-02	Client sample id	B26RM7	
Dept sample id	7400-002	Location/Matrix	C8244(199-B5-8);I-014DUP	WATER
Received	01/25/11	Collected/Volume	01/20/11 09:35	6.25 L
		Custody/SAF No	F10-226-196	F10-226

ANALYTE	CAS NO	RESULT pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI-FIERS	TEST
Carbon 14	14762-75-5	3.66	33	54.8	200	U	C
Nickel 63	13981-37-8	-0.768	1.4	2.40	15.0	U	NI_L
Iodine 129	15046-84-1	-0.243	2.4	3.24	5.00	U	I
Total Uranium (ug/L)	7440-61-1	1.22	0.14	0.025	1.00		U_T

100 Area Remedial Investigation/Feasibility Analysis - 100-BC Groundwater

Lab id	EBRLNE
Protocol	CHPRC
Version	Ver 1.0
Form	DVD-DS
Version	3.06
Report date	03/11/11

EBERLINE SERVICES/RICHMOND

SAMPLE DELIVERY GROUP H4502

7400-003 B27500

DATA SHEET

SDG	7400	Client/Case no	CHPRC	SDG H4502
Contact	N. Joseph Verville	Contract	No. 33677	
Lab sample id	S101269-03	Client sample id	B27500	
Dept sample id	7400-003	Location/Matrix	C7785(199-B3-51);I-013	WATER
Received	01/25/11	Collected/Volume	01/20/11 11:10	6.0 L
		Custody/SAF No	F10-226-319	F10-226

ANALYTE	CAS NO	RESULT pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI-FIERS	TEST
Carbon 14	14762-75-5	-30.5	34	58.0	200	U	C
Nickel 63	13981-37-8	-0.878	1.6	2.75	15.0	U	NI_L
Iodine 129	15046-84-1	-0.871	2.4	3.20	5.00	U	I

100 Area Remedial Investigation/Feasibility Analysis - 100-BC Groundwater

Lab id	EBRLNE
Protocol	CHPRC
Version	Ver 1.0
Form	DVD-DS
Version	3.06
Report date	03/11/11

Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

Attachment 2
Narrative
WSCF111428

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.

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
WSCF111428

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

TPHD-WA – 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.

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.

- Gamma Energy Analysis:
  - All applicable QC controls are within the established limits.
- Gross Alpha / Gross Beta:
  - Batch QC 176549
    - Gross Beta Duplicate Relative Percent Difference(s) (RPD) did not meet the established laboratory limits. Duplicate Relative Percent Difference (RPD) does not apply to results below 5X the minimum detectable activity. No flags issued.
    - All other applicable QC controls are within the established limits.

- Tritium:
  - All applicable QC controls are within the established limits.
- Strontium-89/90:
  - 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.

CH2MHill Plateau Remediation Company	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	F10-226-232	PAGE 1 OF 2
COLLECTOR: BAILEY	COMPANY CONTACT: DYEKMAN, DL; TELEPHONE NO.: 373-2530	PROJECT COORDINATOR: RADLOFF, AW	PRICE CODE: 7N; AIR QUALITY: ☐	DATA TURNAROUND: 45 Days / 45 Days
SAMPLING LOCATION: C8244 (199-B5-8); I-027	PROJECT DESIGNATION: 100 Area Remedial Investigation/Feasibility Analysis - 100-BC Groundwater	SAF NO.: F10-226	
ICE CHEST NO.: N/A	FIELD LOGBOOK NO.: HNF-N-585-15/53; ACTUAL SAMPLE DEPTH: 175.3'	COA: 300078ES10	METHOD OF SHIPMENT: GOVERNMENT VEHICLE
SHIPPED TO: Waste Sampling & Characterization	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)

111428

SPECIAL HANDLING AND/OR STORAGE

PRESERVATION	HCl or H2SO4 to pH <2/(Cool~4C	HCl to pH <2	HCl to pH <2/Cool~4C	Cool~4C	HNO3 to pH <2	HNO3 to pH <2	Cool~4C	HNO3 to pH <2	HNO3 to pH <2	None
HOLDING TIME	14 Days	6 Months	14/40 Days	24 Hours	28 Days	6 Months	48 Hours	6 Months	6 Months	6 Months
TYPE OF CONTAINER	aGs	G/P	aG	aG	G	G	P	G/P	G/P	G
NO. OF CONTAINER(S)	3	2	3	1	1	1	1	1	2	1
VOLUME	40mL	1L	1000mL	500mL	500mL	500mL	500mL	500mL	1L	250mL
SAMPLE ANALYSIS	VOA - 8260 (TCL 100 Area RI/FS);	Technetium-99;	TPH-Diesel Range - WTPH-D;	Chromium Hex - 7196;	200.8 HG - ICPMS (100 Area RI/FS);	SEE ITEM (1) IN SPECIAL INSTRUCTIONS	IC Anions - 300.0 (100 Area RI/FS);	SEE ITEM (2) IN SPECIAL INSTRUCTIONS	Strontium-89,90 -- Total Sr;	Tritium - Ion Ex;

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME										
B26RV3	1 WATER	2-4-11	0755	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

CHAIN OF POSSESSION		SIGN/ PRINT NAMES	
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
JBAILEY	2-4-11/1340	TA Farzim	2-4-11/1340
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 401736ES20.☐** The 100 Area S&GRP Characterization and Monitoring Sampling and Analysis GKI applies to this SAF.
(1) ICP/MS - 200.8 (Add-on) {Uranium}; ICP/MS - 200.8 (100 Area RI/FS);
(2) Gross Alpha {Gross alpha}; Gross Beta {Gross beta};

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		F10-226-232		PAGE 2 OF 2
COLLECTOR: BAILEY	COMPANY CONTACT: DYEKMAN, DL	TELEPHONE NO.: 373-2530	PROJECT COORDINATOR: RADLOFF, AW	PRICE CODE: 7N	DATA TURNAROUND: 45 Days / 45 Days
SAMPLING LOCATION: C8244 (199-B5-8); I-027	PROJECT DESIGNATION: 100 Area Remedial Investigation/Feasibility Analysis - 100-BC Groundwater		SAF NO.: F10-226	AIR QUALITY: ☐	
ICE CHEST NO.: N/A	FIELD LOGBOOK NO.: HNF-N-585-15/53	ACTUAL SAMPLE DEPTH: 175.3'	COA: 300078ES10	METHOD OF SHIPMENT: GOVERNMENT VEHICLE	
SHIPPED TO: Waste Sampling & Characterization	OFFSITE PROPERTY NO.: N/A		BILL OF LADING/AIR BILL NO.: N/A		

MATRIX*	POSSIBLE SAMPLE HAZARDS/ REMARKS		
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	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)	PRESERVATION	HNO3 to pH <2
		HOLDING TIME	6 Months
		TYPE OF CONTAINER	G/P
		NO. OF CONTAINER(S)	1
		VOLUME	500mL
	SPECIAL HANDLING AND/OR STORAGE	SAMPLE ANALYSIS	SEE ITEM (3) IN SPECIAL INSTRUCTIONS

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME	
B26RV3	WATER	2-4-11	0755	✓

CHAIN OF POSSESSION		SIGN/ PRINT NAMES	
RELINQUISHED BY/REMOVED FROM: JKBAILEY / JKB	DATE/TIME: 2-4-11 / 1340	RECEIVED BY/STORED IN: TAPAZIN	DATE/TIME: 2-4-11 / 1340
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 401736ES20.☐** The 100 Area S&GRP Characterization and Monitoring Sampling and Analysis GKI applies to this SAF.
(3) Gamma Spectroscopy (100 Area RI/FS); Gamma Spec - Add-on {Radium-228};

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** — F10-226-235 — PAGE 1 OF 2

COLLECTOR: BAILEY	COMPANY CONTACT: DYEKMAN, DL	TELEPHONE NO.: 373-2530	PROJECT COORDINATOR: RADLOFF, AW
PRICE CODE: 7N	DATA TURNAROUND: 45 Days / 45 Days	AIR QUALITY:	
SAMPLING LOCATION: C8244 (199-B5-8); I-028	PROJECT DESIGNATION: 100 Area Remedial Investigation/Feasibility Analysis - 100-BC Groundwater	SAF NO.: F10-226	
ICE CHEST NO.: N/A	FIELD LOGBOOK NO.: HNF-N-585-15/53	ACTUAL SAMPLE DEPTH: 180.5'	COA: 300078ES10
METHOD OF SHIPMENT: GOVERNMENT VEHICLE			
SHIPPED TO: Waste Sampling & Characterization	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)

SPECIAL HANDLING AND/OR STORAGE

PRESERVATION	HCl or H2SO4 to pH <2/Cool~4C	HCl to pH <2	HCl to pH <2/Cool~4C	Cool~4C	HNO3 to pH <2	HNO3 to pH <2	Cool~4C	HNO3 to pH <2	HNO3 to pH <2	None
HOLDING TIME	14 Days	6 Months	14/40 Days	24 Hours	28 Days	6 Months	48 Hours	6 Months	6 Months	6 Months
TYPE OF CONTAINER	aGs	G/P	aG	aG	G	G	P	G/P	G/P	G
NO. OF CONTAINER(S)	3	2	3	1	1	1	1	1	2	1
VOLUME	40mL	1L	1000mL	500mL	500mL	500mL	500mL	500mL	1L	250mL
SAMPLE ANALYSIS	VOA - 8260 (TCL 100 Area RI/FS);	Technetium-99;	TPH-Diesel Range WTPH-D;	Chromium Hex - 7196;	200.8_HG - ICPMS (100 Area RI/FS);	SEE ITEM (1) IN SPECIAL INSTRUCTIONS	IC Anions - 300.0 (100 Area RI/FS);	SEE ITEM (2) IN SPECIAL INSTRUCTIONS	Strontium-89,90 Total Sr;	Tritium - Iso tox;

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME										
B26RV4	2 WATER	2-4-11	1255	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

CHAIN OF POSSESSION		SIGN/ PRINT NAMES	
RELINQUISHED BY/REMOVED FROM: JKBailey/JKB	DATE/TIME: 2-4-11/1340	RECEIVED BY/STORED IN: TA Marion	DATE/TIME: 2-4-11/1340
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 401736ES20.□** The 100 Area S&GRP Characterization and Monitoring Sampling and Analysis GKI applies to this SAF.
(1) ICP/MS - 200.8 (Add-on) {Uranium}; ICP/MS - 200.8 (100 Area RI/FS);
(2) Gross Alpha {Gross alpha}; Gross Beta {Gross beta};

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			F10-226-235	PAGE 2 OF 2
COLLECTOR: BAILEY	COMPANY CONTACT: DYEKMAN, DL	TELEPHONE NO.: 373-2530	PROJECT COORDINATOR: RADLOFF, AW	PRICE CODE: 7N	DATA TURNAROUND: 45 Days / 45 Days
SAMPLING LOCATION: C8244 (199-B5-8); I-028	PROJECT DESIGNATION: 100 Area Remedial Investigation/Feasibility Analysis - 100-BC Groundwater		SAF NO.: F10-226	AIR QUALITY: ☐	
ICE CHEST NO.: N/A	FIELD LOGBOOK NO.: HNF-N-585-15/53	ACTUAL SAMPLE DEPTH: 180.5'	COA: 300078ES10	METHOD OF SHIPMENT: GOVERNMENT VEHICLE	
SHIPPED TO: Waste Sampling & Characterization	OFFSITE PROPERTY NO.: N/A		BILL OF LADING/AIR BILL NO.: N/A		

MATRIX*	POSSIBLE SAMPLE HAZARDS/ REMARKS	PRESERVATION	HNO3 to pH <2
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	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)	HOLDING TIME	6 Months
		TYPE OF CONTAINER	G/P
		NO. OF CONTAINER(S)	1
		VOLUME	500mL
	SPECIAL HANDLING AND/OR STORAGE	SAMPLE ANALYSIS	SEE ITEM (3) IN SPECIAL INSTRUCTIONS

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME	
B26RV4	WATER	2-4-11	1255	✓

CHAIN OF POSSESSION		SIGN/ PRINT NAMES	
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
JK BAILEY / JK Bailey	2-4-11/1340	TA FRAZIER / Terra Frazier	2-4-11/1340
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 401736ES20.☐** The 100 Area S&GRP Characterization and Monitoring Sampling and Analysis GKI applies to this SAF.

(3) Gamma Spectroscopy (100 Area RI/FS); Gamma Spec - Add-on {Radium-228};

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

A-6003-618 (REV 2)

1.0 GENERAL

CH2M Hill Plateau Remediation Company (CHPRC) Sample Delivery Group H4502 was composed of three water samples designated under SAF No. F10-226 with a Project Designation of: 100 Area Remedial Investigation/Feasibility Analysis – 100-BC Groundwater.

The sample was received as stated on the chain-of-custody document. Any discrepancies are noted on the Eberline Analytical Sample Receipt Checklist.

2.0 ANALYSIS NOTES

2.1 Carbon-14 Analysis

No problems were encountered during the course of the analyses. The carbon-14 QC MS analysis data sheet denotes an "X" qualifier, which indicates that some data was manually entered and may need to be double checked; in this case the "added amount" was manually entered, and subsequently double checked. The results for both the original and duplicate analyses were less than their respective MDA's, therefore no RPD is calculated, and there is no associated control limit.

2.2 Nickel-63 Analysis

No problems were encountered during the course of the analyses. The results for both the original and duplicate analyses were less than their respective MDA's, therefore no RPD is calculated, and there is no associated control limit.

2.3 Iodine-129 Analysis

No problems were encountered during the course of the analyses. The results for both the original and duplicate analyses were less than their respective MDA's, therefore no RPD is calculated, and there is no associated control limit.

2.4 Total Uranium Analysis

No problems were encountered during the course of the analyses.

3.0 Case Narrative Certification Statement

"I 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 obtained in this hard copy data package has been authorized by the Laboratory Manager or a designee, as verified by the following signature."

N. Joseph Verville
N. Joseph Verville
Client Services Manager

3/14/11
Date

CH2MHill Plateau Remediation Company	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	F10-226-399	PAGE 1 OF 1

COLLECTOR	COMPANY CONTACT	TELEPHONE NO.	PROJECT COORDINATOR	PRICE CODE 7N	DATA TURNAROUND
BAILEY	DYEKMAN, DL H4502	373-2530 (7400)	RADLOFF, AW	AIR QUALITY ☐	45 Days / 45 Days
SAMPLING LOCATION	**PROJECT DESIGNATION**		**SAF NO.**		
C8244 (199-B5-8); I-014	100 Area Remedial Investigation/Feasibility Analysis - 100-BC Groundwater		F10-226		
ICE CHEST NO.	**FIELD LOGBOOK NO.**	**ACTUAL SAMPLE DEPTH**	**COA**	**METHOD OF SHIPMENT**	
GWS-07-505	HNF-N-585-15/41	119.4'	300078ES10	FEDERAL EXPRESS	
SHIPPED TO	**OFFSITE PROPERTY NO.**		**BILL OF LADING/AIR BILL NO.**		
Eberline Services	SEE PTR		SEE PTR 2111 7943-4353-7862		

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	HNO3 to pH <2	HNO3 to pH <2	None	None
HOLDING TIME	6 Months	6 Months	6 Months	6 Months
TYPE OF CONTAINER	G/P	G/P	G/P	G/P
NO. OF CONTAINER(S)	2	1	1	4
VOLUME	1000mL	125mL	125mL	1000mL
SAMPLE ANALYSIS	Nickel-63;	Total Uranium;	Carbon-14;	I-129 (Low-energy Photon) {Iodine-129};

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME				
B26RM6	WATER	1-20-11	0935	✓	✓	✓	✓

CHAIN OF POSSESSION		SIGN/ PRINT NAMES	
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
JKBAILEY / JKB	1-20-11 / 1500	M0413 SSU RY	1-20-11 / 1500
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
Pablo Cruz 334247	1-21-11 0750	Pablo Cruz	1-21-11 0750
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
Pablo Cruz	1-21-11 0752	VED EX	
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
UPS		M. WATANABE	01/25/11 0930
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 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)

CH2MHill Plateau Remediation Company	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	F10-226-196	PAGE 1 OF 1

COLLECTOR BAILEY	**COMPANY CONTACT** DYEKMAN, DL H4502	**TELEPHONE NO.** 373-2530 (7400)	**PROJECT COORDINATOR** RADLOFF, AW
SAMPLING LOCATION C8244 (199-B5-8); I-014 DUP	**PROJECT DESIGNATION** 100 Area Remedial Investigation/Feasibility Analysis - 100-BC Groundwater		**SAF NO.** F10-226
ICE CHEST NO. WWO-07-005	**FIELD LOGBOOK NO.** HNF N-585-15/41	**ACTUAL SAMPLE DEPTH** 119.4'	**COA** 300078ES10
SHIPPED TO Eberline Services	**OFFSITE PROPERTY NO.** SEE PTR		**BILL OF LADING/AIR BILL NO.** SEE PTR 2111 7943-4353-7862

PRICE CODE 7N

AIR QUALITY ☐

DATA TURNAROUND 45 Days / 45 Days

METHOD OF SHIPMENT FEDERAL EXPRESS

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 [redacted]eleasable per DOE Order 5400.5 (1990/1993)

SPECIAL HANDLING AND/OR STORAGE

PRESERVATION				HNO3 to pH <2	HNO3 to pH <2	None	None
HOLDING TIME				6 Months	6 Months	6 Months	6 Months
TYPE OF CONTAINER				G/P	G/P	G/P	G/P
NO. OF CONTAINER(S)				2	1	1	4
VOLUME				1000mL	125mL	125mL	1000mL
SAMPLE ANALYSIS				Nickel-63;	Total Uranium;	Carbon-14;	I-129 (Low-energy Photon) {Iodine-129};
SAMPLE NO.	**MATRIX***	**SAMPLE DATE**	**SAMPLE TIME**				
B26RM7	WATER	1-20-11	0935	✓	✓	✓	✓

CHAIN OF POSSESSION		SIGN/ PRINT NAMES	
RELINQUISHED BY/REMOVED FROM JE BAILEY / SSW R4	DATE/TIME 1-20-11 / 1500	RECEIVED BY/STORED IN MW0413 SSW R4	DATE/TIME 1-20-11 / 1500
RELINQUISHED BY/REMOVED FROM SSW R4	DATE/TIME 1-21-11 0755	RECEIVED BY/STORED IN PA16 Lm	DATE/TIME 1-21-11 0755
RELINQUISHED BY/REMOVED FROM PA16 Lm / PA16	DATE/TIME 1-21-11 0758	RECEIVED BY/STORED IN FED EX	DATE/TIME
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
RELINQUISHED BY/REMOVED FROM UPS	DATE/TIME	RECEIVED BY/STORED IN [illegible] / [illegible]	DATE/TIME 01/25/11 0930
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 CACN for all analytical work at WSCF laboratory is 401736ES20.☐** 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)

CH2MHill Plateau Remediation Company	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	F10-226-319	PAGE 1 OF 1

COLLECTOR	COMPANY CONTACT	TELEPHONE NO.	PROJECT COORDINATOR	PRICE CODE 7N	DATA TURNAROUND
Crow	DYEKMAN, DL H4502	373-2530 (7400)	DYEKMAN, DL	AIR QUALITY ☐	45 Days / 45 Days
SAMPLING LOCATION	**PROJECT DESIGNATION**		**SAF NO.**		
C7785 (199-B3-51); I-013	100 Area Remedial Investigation/Feasibility Analysis - 100-BC Groundwater		F10-226		
ICE CHEST NO.	**FIELD LOGBOOK NO.**	**ACTUAL SAMPLE DEPTH**	**COA**	**METHOD OF SHIPMENT**	
GWO-07-003	HNF-N-585 15	59.6'	300078ES10	FEDERAL EXPRESS	
SHIPPED TO	**OFFSITE PROPERTY NO.**		**BILL OF LADING/AIR BILL NO.**		
Eberline Services	SEE PTR		SEE PTR 2111 7903 7353 7862		

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	HNO3 to pH <2	None	None
HOLDING TIME	6 Months	6 Months	6 Months
TYPE OF CONTAINER	G/P	G/P	G/P
NO. OF CONTAINER(S)	2	1	4
VOLUME	1000mL	125mL	1000mL
SAMPLE ANALYSIS	Nickel-63;	Carbon-14;	I-129 (Low-energy Photon) (Iodine-129);

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME			
B27500	WATER	1-20-11	1110	/	/	/

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Page 154 of 178

CHAIN OF POSSESSION		SIGN/ PRINT NAMES	
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
R. Crow / R Crow	1-20-11 1220	MO-413 SSU-R4	1-20-11 1220
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
SSU-R4	1-21-11 0725	Paul Crow	1-21-11 0725
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
Paul Crow	1-21-11 0726	FED EX	
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
UPS		RF-MATTAR	01/25/11 0930
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 401736ES20.☐** The 100 Area S&GRP Characterization and Monitoring Sampling and Analysis GKI applies to this SAF.

ORIGINAL

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

A-6003-618(01/06)

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: VSR11-036		
VALIDATOR: Eyda Hergenreder		LAB: WSCF, Eberline		DATE: 03-29-2011	
			SDG: WSCF111428, H4502		
ANALYSES PERFORMED					
Gross Alpha/Beta X	Strontium-90 X	Technetium-99 X	Alpha Spectroscopy	Gamma Spectroscopy X	
Total Uranium X	Radium-22	Tritium X	C-14 X	I-129 X	Ni 63 X

SAMPLES/MATRIX Water samples

SDG WSCF111428: B26RV3, B26RV4

SDG H4502: B26RM6, B26RM7, B27500

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:

SDG H4502: B26RM7 nickel carrier %R = 114%

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:

MDCs > CRDLs for associated non-detect sample results

WSCF111428: Cs-134 CRDL = 15 pCi/L, B26RV3 MDC = 87 pCi/L, B26RV4 MDC = 51 pCi/L
Eu-155 CRDL = 50 pCi/L, B26RV3 MDC = 54 pCi/L
Be-7 CRDL = 50 pCi/L; B26RV3 MDC = 180 pCi/L; B26RV4 MDC = 97 pCi/L

H4502: I-129 CRDL = 1 pCi/L; B26RM6 MDC = 3.3 pCi/L; B26RM7 MDC = 3.2 pCi/L; B27500 MDC = 3.2 pCi/L

Appendix 6

Additional Documentation Requested By Client

Quality Control Report

Attention Michael Neely
Department Radiochemistry

Group # WSCF111428

QC Batch 176172
Associated Samples 111428001, 111428002

Test Strontium 89/90 (GPC/GEA)

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit		RQ	Analyzed
BLANK			**QC Sample #48507**								
Strontium-89/90	SR-RAD		-1.2	pCi/L						U	02/23/11
LCS			**QC Sample #48508**								
Strontium-89/90	SR-RAD		86	pCi/L	92.8	80 - 120					02/23/11
DUP			**QC Sample #48509**								
			Original 111405001								
Strontium-89/90	SR-RAD		-3.3	pCi/L			-46.50	20	*	U	02/23/11

Quality Control Report

Attention Michael Neely
Department Radiochemistry

Group # WSCF111428

QC Batch 176277
Associated Samples 111428001

Test Tritium by LSC

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
BLANK			**QC Sample #48607**							
Tritium	10028-17-8		-2.7	pCi/L					U	02/20/11
LCS			**QC Sample #48608**							
Tritium	10028-17-8		3200	pCi/L	102.5	80 - 120				02/20/11
DUP			**QC Sample #48609**							
			Original 111411006							
Tritium	10028-17-8		380	pCi/L			17.10	20		02/20/11
MS			**QC Sample #48610**							
			Original 111411006							
Tritium	10028-17-8		17000	pCi/L	85.4	75 - 125				02/20/11

Quality Control Report

Attention Michael Neely
Department Radiochemistry

Group # WSCF111428

QC Batch 176549
Associated Samples 111428001

Test Gross Alpha/Gross Beta

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit		RQ	Analyzed
BLANK			**QC Sample #48845**								
Gross Alpha	12587-46-1		4.5E-3	pCi/L						U	02/28/11
Gross Beta	12587-47-2		0.67	pCi/L						U	02/28/11
LCS			**QC Sample #48846**								
Gross Alpha	12587-46-1		79	pCi/L	97.5	80 - 120					02/28/11
Gross Beta	12587-47-2		250	pCi/L	117.1	80 - 120					02/28/11
DUP			**QC Sample #48847**								
			Original 111400002								
Gross Alpha	12587-46-1		0.11	pCi/L			0.00	20		U	02/28/11
Gross Beta	12587-47-2		11	pCi/L			35.30	20	*	X	02/28/11

Quality Control Report

Attention Michael Neely
Department Radiochemistry

Group # WSCF111428

QC Batch 176550
Associated Samples 111428002

Test Gross Alpha/Gross Beta

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit		RQ	Analyzed
BLANK			**QC Sample #48848**								
Gross Alpha	12587-46-1		4.5E-3	pCi/L						U	02/28/11
Gross Beta	12587-47-2		4.5E-3	pCi/L						U	02/28/11
LCS			**QC Sample #48849**								
Gross Alpha	12587-46-1		74	pCi/L	91	80 - 120					02/28/11
Gross Beta	12587-47-2		250	pCi/L	114.3	80 - 120					02/28/11
DUP			**QC Sample #48850**								
			Original 111428002								
Gross Alpha	12587-46-1	-0.45	0.91	pCi/L			591.30	20	*	U	02/28/11
Gross Beta	12587-47-2	9.7	8.3	pCi/L			15.60	20			02/28/11

Quality Control Report

Attention Michael Neely
Department Radiochemistry

Group # WSCF111428

QC Batch 176760
Associated Samples 111428001, 111428002

Test TC99 by Liquid Scintillation

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit		RQ	Analyzed
BLANK			**QC Sample #48933**								
Technetium-99	14133-76-7		-6.1	pCi/L						U	02/23/11
LCS			**QC Sample #48934**								
Technetium-99	14133-76-7		230	pCi/L	106.1	80 - 120					02/23/11
DUP			**QC Sample #48935**								
			Original 111419001								
Technetium-99	14133-76-7		-5.6	pCi/L			-38.80	20	*	U	02/23/11
MS			**QC Sample #48936**								
			Original 111419001								
Technetium-99	14133-76-7		930	pCi/L	107.1	75 - 125					02/23/11

Quality Control Report

Attention Michael Neely
Department Radiochemistry

Group # WSCF111428

QC Batch 176772
Associated Samples 111428002

Test Tritium by LSC

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
BLANK			**QC Sample #48953**							
Tritium	10028-17-8		110	pCi/L					U	02/22/11
LCS			**QC Sample #48954**							
Tritium	10028-17-8		2800	pCi/L	89.5	80 - 120				02/22/11
DUP			**QC Sample #48955**							
			Original 111428002							
Tritium	10028-17-8	400	400	pCi/L			0.00	20		02/22/11
MS			**QC Sample #48956**							
			Original 111428002							
Tritium	10028-17-8	400	18000	pCi/L	90.5	75 - 125				02/22/11

Quality Control Report

Attention Michael Neely
Department Radiochemistry

Group # WSCF111428

QC Batch 177073
Associated Samples 111428001, 111428002

Test Gamma Energy Analysis-general

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit		RQ	Analyzed
IBLANK			**QC Sample #49197**								
Antimony-125	14234-35-6		0.33	pCi/L						U	03/07/11
Cesium-134	13967-70-9		49	pCi/L						U	03/07/11
Cesium-137	10045-97-3		3.1	pCi/L						U	03/07/11
Cobalt-60	10198-40-0		8.6	pCi/L						U	03/07/11
Europium-152	14683-23-9		-2.6	pCi/L						U	03/07/11
Europium-154	15585-10-1		21	pCi/L						U	03/07/11
Europium-155	14391-16-3		-3.6	pCi/L						U	03/07/11
Potassium-40	13966-00-2		-89	pCi/L						U	03/07/11
Radium-228	15262-20-1		11	pCi/L						U	03/07/11
Ruthenium-106	13967-48-1		-86	pCi/L						U	03/07/11
Beryllium-7	13966-02-4		82	pCi/L						U	03/07/11
LCS			**QC Sample #49198**								
Cesium-137	10045-97-3		6500	pCi/sample	107.2	80 - 120					02/23/11
Cobalt-60	10198-40-0		10000	pCi/sample	102.7	80 - 120					02/23/11
DUP			**QC Sample #49199**								
			Original 111400002								
Antimony-125	14234-35-6		9.0	pCi/L			57.10	20	*	U	03/03/11
Cesium-134	13967-70-9		-2.8	pCi/L			-172.50	20	*	U	03/03/11

Quality Control Report

Attention Michael Neely
Department Radiochemistry

Group # WSCF111428

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit		RQ	Analyzed
Cesium-137	10045-97-3		-0.80	pCi/L			-2085.70	20	*	U	03/03/11
Cobalt-60	10198-40-0		-6.7	pCi/L			-154.50	20	*	U	03/03/11
Europium-152	14683-23-9		16	pCi/L			61.20	20	*	U	03/03/11
Europium-154	15585-10-1		-8.8	pCi/L			-58.10	20	*	U	03/03/11
Europium-155	14391-16-3		-4.3	pCi/L			303.00	20	*	U	03/03/11
Potassium-40	13966-00-2		59	pCi/L			-662.70	20	*	U	03/03/11
Radium-228	15262-20-1		-8.6	pCi/L			-173.90	20	*	U	03/03/11
Ruthenium-106	13967-48-1		40	pCi/L			179.10	20	*	U	03/03/11
Beryllium-7	13966-02-4		17	pCi/L			69.20	20	*	U	03/03/11

Quality Control Report

Attention Michael Neely
Department Radiochemistry

Group # WSCF111428

QC Batch 176172
Associated Samples 111428001, 111428002

Test Strontium 89/90 (GPC/GEA)

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
SAMPLE			**Sample #111428001**							
Strontium-85	13967-73-2				82.5	25 - 105				02/23/11
SAMPLE			**Sample #111428002**							
Strontium-85	13967-73-2				84.1	25 - 105				02/23/11
BLANK			**QC Sample #48507**							
Strontium-85	13967-73-2				88.6	25 - 105				02/23/11
LCS			**QC Sample #48508**							
Strontium-85	13967-73-2				94.6	25 - 105				02/23/11
DUP			**QC Sample #48509**							
			Original 111405001							
Strontium-85	13967-73-2				86.4	25 - 105	0.00			02/23/11

EBERLINE SERVICES/RICHMOND

SAMPLE DELIVERY GROUP H4502

7400-005 Method Blank

METHOD BLANK

SDG	7400	Client/Case no	CHPRC	SDG_H4502	
Contact	N. Joseph Verville	Contract	No. 33677		
Lab sample id	S101269-05	Client sample id	Method Blank		
Dept sample id	7400-005	Material/Matrix		WATER	
		SAF No	F10-226		

ANALYTE	CAS NO	RESULT pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI-FIERS	TEST
Carbon 14	14762-75-5	-36.4	47	80.6	200	U	C
Nickel 63	13981-37-8	0.710	1.7	2.89	15.0	U	NI_L
Iodine 129	15046-84-1	-0.945	2.6	3.39	5.00	U	I
Total Uranium (ug/L)	7440-61-1	0	0.011	0.025	1.00	U	U_T

QC-BLANK 77209

Lab id	EBRLNE
Protocol	CHPRC
Version	Ver 1.0
Form	DVD-DS
Version	3.06
Report date	03/11/11

EBERLINE SERVICES/RICHMOND

SAMPLE DELIVERY GROUP H4502

7400-004

Lab Control Sample

LAB CONTROL SAMPLE

SDG 7400
Contact N. Joseph Verville

Client/Case no CHPRC SDG H4502
Contract No. 33677

Lab sample id S101269-04
Dept sample id 7400-004

Client sample id Lab Control Sample
Material/Matrix WATER
SAF No F10-226

ANALYTE	RESULT pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI-FIERS	TEST	ADDED pCi/L	2σ ERR pCi/L	REC %	3σ LMTS (TOTAL)	PROTOCOL LIMITS
Carbon 14	12600	190	83.2	200		C	12000	480	105	83-117	80-120
Nickel 63	194	5.5	2.76	15.0		NI_L	216	8.6	90	83-117	80-120
Iodine 129	252	7.8	3.70	5.00		I	232	9.3	109	67-133	80-120
Total Uranium (ug/L)	72.5	8.6	0.246	1.00		U_T	82.5	3.3	88	83-117	80-120

QC-LCS 77208

Lab id EBRLNE
Protocol CHPRC
Version Ver 1.0
Form DVD-LCS
Version 3.06
Report date 03/11/11

EBERLINE SERVICES/RICHMOND

SAMPLE DELIVERY GROUP H4502

7400-006 B26RM6

DUPLICATE

SDG 7400
Contact N. Joseph Verville

Client/Case no CHPRC SDG H4502
Contract No. 33677

DUPLICATE
Lab sample id S101269-06
Dept sample id 7400-006

ORIGINAL
Lab sample id S101269-01
Dept sample id 7400-001
Received 01/25/11

Client sample id B26RM6
Location/Matrix C8244(199-B5-8);I-014 WATER
Collected/Volume 01/20/11 09:35 6.25 L
Custody/SAF No F10-226-399 F10-226

ANALYTE	DUPLICATE pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI-FIERS	TEST	ORIGINAL pCi/L	2σ ERR (COUNT)	MDA pCi/L	QUALI-FIERS	RPD %	3σ TOT	DER σ
Carbon 14	-2.42	34	57.9	200	U	C	-4.52	32	54.2	U	-		0.1
Nickel 63	0.318	1.6	2.74	15.0	U	NI_L	0.071	1.6	2.73	U	-		0.2
Iodine 129	-1.63	2.6	3.35	5.00	U	I	-0.802	2.5	3.32	U	-		0.5
Total Uranium (ug/L)	1.26	0.14	0.025	1.00		U_T	1.24	0.14	0.025		2	24	0.2

QC-DUP#1 77210

100 Area Remedial Investigation/Feasibility Analysis - 100-BC Groundwater

Lab id EBRLNE
Protocol CHPRC
Version Ver 1.0
Form DVD-DUP
Version 3.06
Report date 03/11/11

DUPLICATES
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Page 10

EBERLINE SERVICES/RICHMOND

SAMPLE DELIVERY GROUP H4502

7400-007 B26RM7

MATRIX SPIKE

SDG	7400			Client/Case no	CHPRC SDG H4502
Contact	N. Joseph Verville			Contract	No. 33677
	MATRIX SPIKE		ORIGINAL		
Lab sample id	S101269-07	Lab sample id	S101269-02	Client sample id	B26RM7
Dept sample id	7400-007	Dept sample id	7400-002	Location/Matrix	C8244(199-B5-8);I-014DUP WATER
		Received	01/25/11	Collected/Volume	01/20/11 09:35 6.25 L
				Custody/SAF No	F10-226-196 F10-226

ANALYTE	SPIKE pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI-FIERS	TEST	ADDED pCi/L	2σ ERR pCi/L	ORIGINAL pCi/L	2σ ERR (COUNT)	REC %	3σ LMTS (TOTAL)	PROTOCOL LIMITS
Carbon 14	24800	270	82.3	200	X	C	23900	960	3.66	33	104	83-117	60-140

QC-MS#2 77211

100 Area Remedial Investigation/Feasibility Analysis - 100-BC Groundwater

Lab id	EBRLNE
Protocol	CHPRC
Version	Ver 1.0
Form	DVD-MS
Version	3.06
Report date	03/11/11

MATRIX SPIKES
Page 1
SUMMARY DATA SECTION
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EBERLINE SERVICES/RICHMOND

SAMPLE DELIVERY GROUP H4502

Test I Matrix WATER
SDG 7400
Contact N. Joseph Verville

LAB METHOD SUMMARY

IODINE 129 IN WATER
GAMMA SPECTROSCOPY

Client CHPRC
Contract No. 33677
Contract SDG H4502

RESULTS

LAB SAMPLE ID	RAW TEST	SUF-FIX	PLANCHET	CLIENT SAMPLE ID	Iodine 129	
Preparation batch 7294-029						
S101269-01			7400-001	B26RM6	U	
S101269-02			7400-002	B26RM7	U	
S101269-03			7400-003	B27500	U	
S101269-04			7400-004	Lab Control Sample	ok	
S101269-05			7400-005	Method Blank	U	
S101269-06			7400-006	Duplicate (S101269-01)	-	U
Nominal values and limits from method				RDLs (pCi/L)	5.00	

METHOD PERFORMANCE

LAB SAMPLE ID	RAW TEST	SUF-FIX	CLIENT SAMPLE ID	MDA pCi/L	ALIQ L	PREP FAC	DILU-TION	YIELD %	EFF %	COUNT min	FWHM keV	DRIFT KeV	DAYS HELD	PREPARED	ANAL-YZED	DETECTOR
Preparation batch 7294-029			2σ prep error 19.4 % Reference Lab Notebook No. 7294 pg. 29													
S101269-01			B26RM6	3.32	0.500			87		400			29	02/18/11	02/18	GRB-221
S101269-02			B26RM7	3.24	0.500			80		400			29	02/18/11	02/18	GRB-222
S101269-03			B27500	3.20	0.500			86		400			29	02/18/11	02/18	GRB-223
S101269-04			Lab Control Sample	3.70	0.500			93		400				02/18/11	02/18	GRB-224
S101269-05			Method Blank	3.39	0.500			92		400				02/18/11	02/18	GRB-225
S101269-06			Duplicate (S101269-01)	3.35	0.500			87		400			29	02/18/11	02/18	GRB-227
Nominal values and limits from method				5.00	0.500			40-110		200	100		180			

PROCEDURES	REFERENCE	
	I129_SEP_LEPS_GS	
	SPP-007	Aqueous Sample Receipt by Chemistry Laboratory, rev 1
	SPP-062	Sample Aliquoting, rev 1
	CP-530	Iodine-129 Purification, rev 6

AVERAGES ± 2 SD FOR 6 SAMPLES				
MDA	3.37	±	0.355
YIELD	88	±	9

Lab id EBRLNE
Protocol CHPRC
Version Ver 1.0
Form DVD-LMS
Version 3.06
Report date 03/11/11

METHOD SUMMARIES
Page 1
SUMMARY DATA SECTION
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EBERLINE SERVICES/RICHMOND

SAMPLE DELIVERY GROUP H4502

Test C Matrix WATER
SDG 7400
Contact N. Joseph Verville

LAB METHOD SUMMARY

CARBON 14 IN WATER

LIQUID SCINTILLATION COUNTING

Client CHPRC
Contract No. 33677
Contract SDG H4502

RESULTS

LAB SAMPLE ID	RAW TEST	SUF-FIX	PLANCHET	CLIENT SAMPLE ID	Carbon 14	
Preparation batch 7294-029						
S101269-01			7400-001	B26RM6	U	
S101269-02			7400-002	B26RM7	U	
S101269-03			7400-003	B27500	U	
S101269-04			7400-004	Lab Control Sample	ok	
S101269-05			7400-005	Method Blank	U	
S101269-06			7400-006	Duplicate (S101269-01)	-	U
S101269-07			7400-007	Spike (S101269-02)	ok	X

Nominal values and limits from method RDLs (pCi/L) 200

METHOD PERFORMANCE

LAB SAMPLE ID	RAW TEST	SUF-FIX	CLIENT SAMPLE ID	MDA pCi/L	ALIQ L	PREP FAC	DILU-TION	YIELD %	EFF %	COUNT min	FWHM keV	DRIFT KeV	DAYS HELD	PREPARED	ANAL-YZED	DETECTOR
Preparation batch 7294-029			2σ prep error 10.0 % Reference Lab Notebook No. 7294 pg. 29													
S101269-01			B26RM6	54.2	0.0300			100		50			43	03/03/11	03/04	LSC-004
S101269-02			B26RM7	54.8	0.0300			100		50			43	03/03/11	03/04	LSC-004
S101269-03			B27500	58.0	0.0300			100		50			43	03/03/11	03/04	LSC-004
S101269-04			Lab Control Sample	83.2	0.0200			100		50				03/03/11	03/04	LSC-004
S101269-05			Method Blank	80.6	0.0200			100		50				03/03/11	03/04	LSC-004
S101269-06			Duplicate (S101269-01)	57.9	0.0300			100		50			43	03/03/11	03/04	LSC-004
S101269-07			Spike (S101269-02)	82.3	0.0200			100		50			43	03/03/11	03/04	LSC-004
Nominal values and limits from method				200	0.0200					50			180			

PROCEDURES REFERENCE C14_CHEM_LSC
CP-241 Carbon-14 in Aqueous Samples, rev 8

AVERAGES ± 2 SD MDA 67.3 ± 27.8
FOR 7 SAMPLES YIELD 100 ± 0

Lab id EBRLNE
Protocol CHPRC
Version Ver 1.0
Form DVD-LMS
Version 3.06
Report date 03/11/11

EBERLINE SERVICES/RICHMOND

SAMPLE DELIVERY GROUP H4502

Test NI L Matrix WATER
SDG 7400
Contact N. Joseph Verville

LAB METHOD SUMMARY

NICKEL-63 IN LIQUID

LIQUID SCINTILLATION COUNTING

Client CHPRC
Contract No. 33677
Contract SDG H4502

RESULTS

LAB SAMPLE ID	RAW TEST	SUF-FIX	PLANCHET	CLIENT SAMPLE ID	Nickel 63	
Preparation batch 7294-029						
S101269-01			7400-001	B26RM6	U	
S101269-02			7400-002	B26RM7	U	
S101269-03			7400-003	B27500	U	
S101269-04			7400-004	Lab Control Sample	ok	
S101269-05			7400-005	Method Blank	U	
S101269-06			7400-006	Duplicate (S101269-01)	-	U
Nominal values and limits from method				RDLs (pCi/L)	15.0	

METHOD PERFORMANCE

LAB SAMPLE ID	RAW TEST	SUF-FIX	CLIENT SAMPLE ID	MDA pCi/L	ALIQ L	PREP FAC	DILU-TION	YIELD %	EFF %	COUNT min	FWHM keV	DRIFT KeV	DAYS HELD	PREPARED	ANAL-YZED	DETECTOR
Preparation batch 7294-029			2σ prep error 11.2 % Reference Lab Notebook No. 7294 pg. 29													
S101269-01			B26RM6	2.73	0.500			101		50			42	03/02/11	03/03	LSC-004
S101269-02			B26RM7	2.40	0.500			114		50			43	03/02/11	03/04	LSC-004
S101269-03			B27500	2.75	0.500			101		50			43	03/02/11	03/04	LSC-004
S101269-04			Lab Control Sample	2.76	0.500			99		50				03/02/11	03/03	LSC-004
S101269-05			Method Blank	2.89	0.500			95		50				03/02/11	03/03	LSC-004
S101269-06			Duplicate (S101269-01)	2.74	0.500			101		50			42	03/02/11	03/03	LSC-004
Nominal values and limits from method				15.0	0.500			40-110		50			180			

PROCEDURES	REFERENCE	NI63_LSC
	SPP-040	Environmental Water Dissolution, rev 2
	CP-280	Nickel-63 Purification, rev 5

AVERAGES ± 2 SD FOR 6 SAMPLES
MDA 2.71 ± 0.327
YIELD 102 ± 13

Lab id EBRLNE
Protocol CHPRC
Version Ver 1.0
Form DVD-LMS
Version 3.06
Report date 03/11/11