CHPRC - REVIEW COMMENT RECORD (RCR)

1. Date	2. Review No.
08/29/2012	RCR-VSR12-025
3. Project No.	Page 1 of 1
100-K	

5. Document Number(s)/Title(s)	6. Program/Project/Building Number	7. Reviewer	8. Organization/Group	9. Location/Phone
VSR12-025 105-KE Water Tunnel & 100-K-79	100-K Remedial Action	JL Hammons	D&D CHPRC	MO-1106 942-3946

17. Comment Submittal Approval

8/29/2012 (Date)

Jennifer Hammons (Organization Manager (optional) (print and sign))

10. Agreement With Indicated Comment Disposition(s)

Reviewer/Point of Contact (print and sign)

Date

Author/Originator (print and sign)

11. CLOSED

Jennifer Hammons

Reviewer/Point of Contact (print and sign)

9/29/12 (Date)

Author/Originator (print and sign)

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

CHPRC - REVIEW COMMENT RECORD (RCR)

1. Date	2. Review No.
8/27/2012	RCR-VSR12-025
3. Project No.	Page 1 of 1
100K	

5. Document Number(s)/Title(s)	6. Program/Project/Building Number	7. Reviewer	8. Organization/Group	9. Location/Phone
VSR12-025. 105-KE Water Tunnel & 100-K-79 Project 100-K	SGRP	SL Huggins	SGRP QA	MO-2216E/A101 373-3630

17. Comment Submittal Approval	10. Agreement With Indicated Comment Disposition(s)	11. CLOSED
8/27/12 (Date)	Date	8/27/12 (Date)
SL Huggins (Organization Manager (optional) (print and sign))	Reviewer/Point of Contact (print and sign)	SL Huggins (Reviewer/Point of Contact (print and sign))
	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	No issues noted					

CHPRC - REVIEW COMMENT RECORD (RCR)

1. Date	2. Review No.
08/29/2012	
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
VSR12-025		Scot Fitzgerald	Analytical Support Group	2753/373-7495

17. Comment Submittal Approval

08/29/2012 (Date)

Scot Fitzgerald (Organization Manager (optional) (print and sign))

10. Agreement With Indicated Comment Disposition(s)

Date

Reviewer/Point of Contact (print and sign)

Author/Originator (print and sign)

11. CLOSED

Scot Fitzgerald (Reviewer/Point of Contact (print and sign))

08/29/2012 (Date)

Author/Originator (print and sign)

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

ANALYTICAL QUALITY ASSOCIATES, INC.

616 Maxine NE
Albuquerque, NM 87123
505-299-5201
www.aqainc.net

Data Validation Report for CH2M Hill
Plateau Remediation Company

VSR12-025
105-KE Water Tunnel & 100-K-79
Project 100-K

Chemical & Radiochemical Validation - Level C

Validation Performed By: Eyda Hergenreder Eyda Hergenreder ***Date: 08-22-12***

Validation reviewed by: ***Date: 08-23-12***

Marcia Hilchey

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Date: 22 August 2012
To: CH2M Hill (technical representative)
From: Analytical Quality Associates, Inc.
Project: 100-K
Subject: Semivolatile Organics - Sample Data Group (SDG) WSCF120970

INTRODUCTION

This memorandum presents the results of data validation for SDG WSCF120970 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
B2LT71	07/26/12	Solid	C	8015
B2LT72	07/26/12	Solid	C	8015
B2LT73	07/26/12	Solid	C	8015
B2LT76	07/26/12	Solid	C	8015
B2LT79	07/26/12	Solid	C	8015
B2LT80	07/26/12	Solid	C	8015

Data validation was conducted in accordance with the CHPRC validation statement of work and the 100 Area Remedial Action Sampling and Analysis Plan, DOE/RL-96-22, Rev. 5, (SAP). Appendices 1 through 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 method 8015B Alcohols/Glycols is analysis within 14 days from sample collection. Sample preservation requires chilling to 4 degrees Celsius.

The samples were extracted and 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

The ethylene glycol laboratory blank result was > the method detection limit (MDL) but < the reporting limit (RL). The ethylene glycol result for sample B2LT72 was < the RL and should be qualified as non-detect at the RL (13000 ug/kg) and flagged "U." All other sample results were non-detects and should not be qualified.

Trip Blanks

No trip blanks were submitted for validation.

Field Blanks

No field blanks were submitted for validation.

Equipment Blanks

The equipment blank result was acceptable.

- **Accuracy**

Accuracy is evaluated by reviewing surrogate results, matrix spike sample results, and laboratory control sample results. According to the SAP, the matrix spike and laboratory control sample accuracy limits are 70% to 130%.

Surrogates

All surrogate recoveries were acceptable.

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

All MS/MSD recoveries were acceptable.

Laboratory Control Samples (LCSs)

The LCS recovery was acceptable.

- **Precision**

Precision is evaluated by reviewing MS/MSD results, field duplicate sample results, 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) limit is ±30%.

MS/MSD Samples

The MS/MSD analyses was acceptable with the following exception.

The ethylene glycol RPD was above the acceptance limit. All associated sample results were either non-detects or qualified non-detects; therefore, should be qualified as estimates and flagged "UJ."

Field Duplicate Samples

The field duplicate results were acceptable.

Field Split Samples

No field splits were submitted for validation.

- **Internal Standards**

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

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

- **Detection Limits**

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

All reported sample MDLs were below the CRDL.

- **Completeness**

SDG WSCF120970 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 blank contamination for sample B2LT72 and MS/MSD infraction for all samples.

REFERENCES

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

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

Appendix 1

Glossary of Data Reporting Qualifiers

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

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

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

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

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

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

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

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

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

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

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

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

Appendix 2

Summary of Data Qualification

Semivolatile Organics Data Qualification Summary			
SDG: WSCF120970	Reviewer: AQA	Project: 100-K	Page 1 of 1
Analyte(s)	**Qualifier**	**Samples Affected**	**Reason**
Ethylene glycol	13000UJ	B2LT72	Laboratory blank contamination and poor MS/MSD precision
Ethylene glycol	UJ	B2LT71, B2LT73, B2LT76, B2LT79, B2LT80	Poor MS & MSD precision

Comments: None

Appendix 3

Annotated Laboratory Reports

WSCF Analytical Results Report

Attention Scot Fitzgerald
Department Organic, Volatiles

Group # WSCF120970

Sample # 120970001
SAF# F12-032
Sample ID B2LT71

Matrix SOIL
Sampled 07/26/12
Received 07/26/12

Test Performed	CAS #	Method	RQ		Result	TP Err	Units	DF	MDL	PQL	Analyzed
Preparation for 8015 (S)											**08/07/12**
SW-846 Method 8015 for GPP											
Ethylene glycol	107-21-1	LA-523-494	U	UJ	<4200		ug/kg	1	4200	1.0E4	08/07/12

MDL = Minimum Detection Limit
RQ = Result Qualifier
TP Err = Total Propagated Error
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 Scot Fitzgerald
Department Organic, Volatiles

Group # WSCF120970

Sample # 120970002
SAF# F12-032
Sample ID B2LT72

Matrix SOIL
Sampled 07/26/12
Received 07/26/12

Test Performed	CAS #	Method	RQ		Result	TP Err	Units	DF	MDL	PQL	Analyzed
Preparation for 8015 (S)											**08/07/12**
SW-846 Method 8015 for GPP											
Ethylene glycol	107-21-1	LA-523-494	JB	13000UJ	7990		ug/kg	1	5200	1.3E4	08/07/12

MDL = Minimum Detection Limit
RQ = Result Qualifier
TP Err = Total Propagated Error
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 Scot Fitzgerald
Department Organic, Volatiles

Group # WSCF120970

Sample # 120970003
SAF# F12-032
Sample ID B2LT73

Matrix SOIL
Sampled 07/26/12
Received 07/26/12

Test Performed	CAS #	Method	RQ		Result	TP Err	Units	DF	MDL	PQL	Analyzed
Preparation for 8015 (S)											**08/07/12**
SW-846 Method 8015 for GPP											
Ethylene glycol	107-21-1	LA-523-494	U	UJ	<5300		ug/kg	1	5300	1.3E4	08/07/12

MDL = Minimum Detection Limit
RQ = Result Qualifier
TP Err = Total Propagated Error
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 Scot Fitzgerald
Department Organic, Volatiles

Group # WSCF120970

Sample # 120970004
SAF# F12-032
Sample ID B2LT76

Matrix SOIL
Sampled 07/26/12
Received 07/26/12

Test Performed	CAS #	Method	RQ		Result	TP Err	Units	DF	MDL	PQL	Analyzed
Preparation for 8015 (S)											**08/07/12**
SW-846 Method 8015 for GPP											
Ethylene glycol	107-21-1	LA-523-494	U	UJ	<4900		ug/kg	1	4900	1.2E4	08/07/12

MDL = Minimum Detection Limit
RQ = Result Qualifier
TP Err = Total Propagated Error
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 Scot Fitzgerald
Department Organic, Volatiles

Group # WSCF120970

Sample # 120970005
SAF# F12-032
Sample ID B2LT79

Matrix SOIL
Sampled 07/26/12
Received 07/26/12

Test Performed	CAS #	Method	RQ		Result	TP Err	Units	DF	MDL	PQL	Analyzed
Preparation for 8015 (S)											**08/07/12**
SW-846 Method 8015 for GPP											
Ethylene glycol	107-21-1	LA-523-494	U	UJ	<4600		ug/kg	1	4600	1.2E4	08/07/12

MDL = Minimum Detection Limit
RQ = Result Qualifier
TP Err = Total Propagated Error
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 Scot Fitzgerald
Department Organic, Volatiles

Group # WSCF120970

Sample # 120970006
SAF# F12-032
Sample ID B2LT80

Matrix SOIL
Sampled 07/26/12
Received 07/26/12

Test Performed	CAS #	Method	RQ		Result	TP Err	Units	DF	MDL	PQL	Analyzed
Preparation for 8015 (S)											**08/07/12**
SW-846 Method 8015 for GPP											
Ethylene glycol	107-21-1	LA-523-494	U	UJ	<5200		ug/kg	1	5200	1.3E4	08/07/12

MDL = Minimum Detection Limit
RQ = Result Qualifier
TP Err = Total Propagated Error
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
WSCF120970

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), Master Contract 39818, Revision 3, "Laboratory Analytical Services to CHPRC Soil and Groundwater Remediation Project."*

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, C, D, J and U) 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.
- **C** – Analyte was detected in the blank and was evaluated. Affected sample results in the batch were C flagged (applies to inorganic and wet chemical analyses).
- **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.
- **B (organic analyses)** – Analyte was detected in the blank and was evaluated. Affected sample results in the batch were B flagged.
- **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

Attachment 2
Narrative
WSCF120970

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):

- Copper was detected in the Blank and evaluated.
- All other applicable QC controls are within the established limits.

Organic Comments

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

- Ethylene Glycol - was detected in the Blank. Affected sample results in this batch were "B" Flagged.
- Samples B2LT72 (120970002), B2LT73 (120970003), B2LT76 (120970004) and the MSD did not meet the acceptance limits for surrogate 2-Methylcyclohexanol. Sample results were not flagged. The quality control report was flagged for surrogate recovery failure.
- Ethylene Glycol did not meet the MSD acceptance limits due to a low spike of Internal Standard. Sample results for this analytes were "T" Flagged.
- Ethylene Glycol did not meet the MS / MSD RPD acceptance limits due to a low spike of Internal Standard. Sample results for this analyte were not flagged. The quality control report was flagged for RPD failure.
- All other applicable QC controls are within the established limits.

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			F12-032-001 PAGE 1 OF 1
COLLECTOR KC Patterson CHPRC	COMPANY CONTACT TRENT, SJ	TELEPHONE NO. 373-5869	PROJECT COORDINATOR TRENT, SJ	PRICE CODE 8C; DATA TURNAROUND
SAMPLING LOCATION 105-KE Water Tunnel Sample #1	PROJECT DESIGNATION 105-KE Water Tunnel and 100-K-79 Verification Soil Sampling		SAF NO. F12-032	AIR QUALITY ☐ 15 Days / 15 Days
ICE CHEST NO. GWS-200	FIELD LOGBOOK NO. HNF-N 507.25	ACTUAL SAMPLE DEPTH 3'-5'	COA 302634ES10	METHOD OF SHIPMENT GOVERNMENT VEHICLE; ORIGINAL
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: 120970

PRESERVATION	Cool~4C	Cool~4C	Cool~4C
HOLDING TIME	14 Days	28 Days	30 Days
TYPE OF CONTAINER	G	G/P	aG
NO. OF CONTAINER(S)	1	1	1
VOLUME	250mL	120mL	60mL
SAMPLE ANALYSIS	SEE ITEM (1) IN SPECIAL INSTRUCTIONS	SEE ITEM (2) IN SPECIAL INSTRUCTIONS	Chromium Hex - 7196;

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME			
B2LT71	SOIL	JUL 26 2012	0737	✓	✓	✓

TRVL- 12- 069

CHAIN OF POSSESSION		SIGN/ PRINT NAMES		SPECIAL INSTRUCTIONS
RELINQUISHED BY/REMOVED FROM: KC Patterson CHPRC	DATE/TIME: JUL 26 2012 0920	RECEIVED BY/STORED IN: TA Fnszla	DATE/TIME: JUL 26 2012 0920	SH 7/25/12 ** ~~The CACN for all analytical work at WSCF laboratory for the 105-KE Water Tunnel and100-K-79 are ctill being determined. They will updated as soon as received.~~ ** The 100 Area S&GRP Characterization and Monitoring Sampling and Analysis GKI applies to this SAF. (1) Alcohols, Glycols, & Ketones - 8015 {Ethylene glycol}; (2) 200.8_HG - ICPMS; ICP/MS - 200.8 (TAL) {Antimony, Barium, Cadmium, Chromium, Cobalt, Copper, Manganese, Nickel, Silver, Vanadium, Zinc}; ICP/MS - 200.8 (Add-on) {Arsenic, Beryllium, Lead, Molybdenum, Selenium, Strontium, Tin, Uranium}; The CACN for WSCF Analytical is 403396E520. SH 7/25/12
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	

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

PRINTED ON 7/2/2012

A-6003-618 (REV 2)

CH2MHill Plateau Remediation Company	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST			F12-032-002	PAGE 1 OF 1
COLLECTOR KC Patterson CHPRC	**COMPANY CONTACT** TRENT, SJ	**TELEPHONE NO.** 373-5869	**PROJECT COORDINATOR** TRENT, SJ	**PRICE CODE** 8C	**DATA TURNAROUND** 15 Days / 15 Days
SAMPLING LOCATION 105-KE Water Tunnel Sample #2	**PROJECT DESIGNATION** 105-KE Water Tunnel and 100-K-79 Verification Soil Sampling		**SAF NO.** F12-032	**AIR QUALITY** ☐	
ICE CHEST NO. GWS-200	**FIELD LOGBOOK NO.** HNF-N-507-25	**ACTUAL SAMPLE DEPTH** 3'-5'	**COA** 302634ES10	**METHOD OF SHIPMENT** GOVERNMENT VEHICLE	**ORIGINAL**
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	Cool~4C	Cool~4C	Cool~4C		
HOLDING TIME	14 Days	28 Days	30 Days		
TYPE OF CONTAINER	G	G/P	aG		
NO. OF CONTAINER(S)	1	1	1		
VOLUME	250mL	120mL	60mL		
SAMPLE ANALYSIS	SEE ITEM (1) IN SPECIAL INSTRUCTIONS	SEE ITEM (2) IN SPECIAL INSTRUCTIONS	Chromium Hex - 7196;		
SAMPLE NO.	**MATRIX***	**SAMPLE DATE**	**SAMPLE TIME**		
B2LT72	2 SOIL	JUL 26 2012	0745	J	J

TRVL 12 - 069

CHAIN OF POSSESSION	SIGN/ PRINT NAMES	
RELINQUISHED BY/REMOVED FROM: KC Patterson CHPRC — DATE/TIME: JUL 26 2012 0920	RECEIVED BY/STORED IN: TA Frazier — DATE/TIME: JUL 26 2012 0920	
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 CACN for all analytical work at WSCF laboratory for the 105-KE Water Tunnel and100-K-79 are still being determined. They will updated as soon as received.~~ ☐☐** The 100 Area S&GRP Characterization and Monitoring Sampling and Analysis GKI applies to this SAF.
(1) Alcohols, Glycols, & Ketones - 8015 {Ethylene glycol};
(2) 200.8_HG - ICPMS; ICP/MS - 200.8 (TAL) {Antimony, Barium, Cadmium, Chromium, Cobalt, Copper, Manganese, Nickel, Silver, Vanadium, Zinc}; ICP/MS - 200.8 (Add-on) {Arsenic, Beryllium, Lead, Molybdenum, Selenium, Strontium, Tin, Uranium};

The CACN for all analytical work at WSCF laboratory is 403396ES20.

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

PRINTED ON 7/2/2012

A-6003-618 (REV 2)

CH2MHill Plateau Remediation Company	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST			F12-032-003	PAGE 1 OF 1
COLLECTOR KC Patterson CHPRC	**COMPANY CONTACT** TRENT, SJ	**TELEPHONE NO.** 373-5889	**PROJECT COORDINATOR** TRENT, SJ	**PRICE CODE** 8C	**DATA TURNAROUND**
SAMPLING LOCATION 105 KE Water Tunnel Sample #3	**PROJECT DESIGNATION** 105-KE Water Tunnel and 100-K-79 Verification Soil Sampling		**SAF NO.** F12-032	**AIR QUALITY** ☐	15 Days / 15 Days
ICE CHEST NO. GWS-200	**FIELD LOGBOOK NO.** HNF-N-507-25	**ACTUAL SAMPLE DEPTH** 3'-5'	**COA** 302534ES10	**METHOD OF SHIPMENT** GOVERNMENT VEHICLE	**ORIGINAL**
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	Cool~4C	Cool~4C	Cool~4C
HOLDING TIME	14 Days	28 Days	30 Days
TYPE OF CONTAINER	G	G/P	aG
NO. OF CONTAINER(S)	1	1	1
VOLUME	250mL	120mL	60mL
SAMPLE ANALYSIS	SEE ITEM (1) IN SPECIAL INSTRUCTIONS	SEE ITEM (2) IN SPECIAL INSTRUCTIONS	Chromium Hex - 7196;
SAMPLE NO. / **MATRIX*** / **SAMPLE DATE** / **SAMPLE TIME**			
B2LT73 3	SOIL	JUL 26 2012 0758	✓	✓	✓

TRVL-12-069

CHAIN OF POSSESSION		SIGN/ PRINT NAMES	
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
KC Patterson CHPRC	JUL 26 2012 0920	TA Frazier	JUL 26 2012 0920
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

9# 7/25/12

~~** The CACN for all analytical work at WSCF laboratory for the 105-KE Water Tunnel and 100-K-79 are still being determined. They will updated as soon as received.~~ ☐☐** The 100 Area S&GRP Characterization and Monitoring Sampling and Analysis GKI applies to this SAF.

(1) Alcohols, Glycols, & Ketones - 8015 {Ethylene glycol};

(2) 200.8_HG - ICPMS; ICP/MS - 200.8 (TAL) {Antimony, Barium, Cadmium, Chromium, Cobalt, Copper, Manganese, Nickel, Silver, Vanadium, Zinc}; ICP/MS - 200.8 (Add-on) {Arsenic, Beryllium, Lead, Molybdenum, Selenium, Strontium, Tin, Uranium};

The CACN for all analytical work at WSCF laboratory is 403390E320.

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

PRINTED ON 7/2/2012

A-6003-618 (REV 2)

CH2MHill Plateau Remediation Company	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		F12-032-006	PAGE 1 OF 1
COLLECTOR: KC Patterson CHPRC	COMPANY CONTACT: TRENT, SJ	TELEPHONE NO.: 373-5869	PROJECT COORDINATOR: TRENT, SJ	PRICE CODE: 8C; DATA TURNAROUND: 15 Days / 15 Days
SAMPLING LOCATION: 100-K-79 Sample #1	PROJECT DESIGNATION: 105-KE Water Tunnel and 100-K-79 Verification Soil Sampling		SAF NO.: F12-032	AIR QUALITY: ☐
ICE CHEST NO.: GW5-200	FIELD LOGBOOK NO.: HNF-N-507-25	ACTUAL SAMPLE DEPTH: SURFACE.	COA: 302677ES10	METHOD OF SHIPMENT: GOVERNMENT VEHICLE; ORIGINAL
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	Cool~4C	Cool~4C	Cool~4C
HOLDING TIME	14 Days	28 Days	30 Days
TYPE OF CONTAINER	G	G/P	aG
NO. OF CONTAINER(S)	1	1	1
VOLUME	250mL	120mL	60mL
SAMPLE ANALYSIS	See ITEM (1) IN SPECIAL INSTRUCTIONS	See ITEM (2) IN SPECIAL INSTRUCTIONS	Chromium Hex - 7196;

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME			
B2LT76 4	SOIL	JUL 26 2012	0811	✓	✓	✓

TRVL-12-069

CHAIN OF POSSESSION		SIGN/ PRINT NAMES	
RELINQUISHED BY/REMOVED FROM: KC Patterson CHPRC	DATE/TIME: JUL 26 2012 0920	RECEIVED BY/STORED IN: TA Frazier	DATE/TIME: JUL 26 2012 0920
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 CACN for all analytical work at WSCF laboratory for the 105-KE Water Tunnel and100-K-79 are still being determined. They will updated as soon as received.☐☐~~** The 100 Area S&GRP Characterization and Monitoring Sampling and Analysis GKI applies to this SAF.
(1) Alcohols, Glycols, & Ketones - 8015 {Ethylene glycol};
(2) 200.8_HG - ICPMS; ICP/MS - 200.8 (TAL) {Antimony, Barium, Cadmium, Chromium, Cobalt, Copper, Manganese, Nickel, Silver, Vanadium, Zinc}; ICP/MS - 200.8 (Add-on) {Arsenic, Beryllium, Lead, Molybdenum, Selenium, Strontium, Tin, Uranium};

The CACN for all analytical work at WSCF laboratory is 402580ES20.

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

PRINTED ON 7/2/2012

A-6003-618 (REV 2)

CH2MHill Plateau Remediation Company	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST			F12-032-009	PAGE 1 OF 1
COLLECTOR: KC Patterson CHPRC	COMPANY CONTACT: TRENT, SJ	TELEPHONE NO.: 373-5869	PROJECT COORDINATOR: TRENT, SJ	PRICE CODE: 8C	DATA TURNAROUND: 15 Days / 15 Days
SAMPLING LOCATION: 105-KE Water Tunnel/100-K-79 Sample #9	PROJECT DESIGNATION: 105-KE Water Tunnel and 100-K-79 Verification Soil Sampling		SAF NO.: F12-032	AIR QUALITY: ☐	
ICE CHEST NO.: GW7 -200	FIELD LOGBOOK NO.: HNF-N-367-25	ACTUAL SAMPLE DEPTH: SURFACE	COA: 302677ES10	METHOD OF SHIPMENT: GOVERNMENT VEHICLE	ORIGINAL
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, SF=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	Cool~4C	Cool~4C	Cool~4C
HOLDING TIME	14 Days	28 Days	30 Days
TYPE OF CONTAINER	G	G/P	aG
NO. OF CONTAINER(S)	1	1	1
VOLUME	250mL	120mL	60mL
SAMPLE ANALYSIS	SEE ITEM (1) IN SPECIAL INSTRUCTIONS	SEE ITEM (2) IN SPECIAL INSTRUCTIONS	Chromium Hex - 7196;

SAMPLE NO.		MATRIX*	SAMPLE DATE	SAMPLE TIME			
B2LT79	5	SOIL	JUL 26 2012	0807	✓	✓	✓

TRVL 12- 069

CHAIN OF POSSESSION	SIGN/ PRINT NAMES	SPECIAL INSTRUCTIONS
RELINQUISHED BY/REMOVED FROM: KC Patterson CHPRC — DATE/TIME: JUL 26 2012 0920	RECEIVED BY/STORED IN: TA Fowler — DATE/TIME: JUL 26 2012 0920	JH 7/25/12 ** ~~The CACN for all analytical work at WSCF laboratory for the 105-KE Water Tunnel and100-K-79 are still being determined. They will updated as soon as received.~~ ☐☐** The 100 Area S&GRP Characterization and Monitoring Sampling and Analysis GKI applies to this SAF. (1) Alcohols, Glycols, & Ketones - 8015 {Ethylene glycol}; (2) 200.8_HG - ICPMS; ICP/MS - 200.8 (TAL) {Antimony, Barium, Cadmium, Chromium, Cobalt, Copper, Manganese, Nickel, Silver, Vanadium, Zinc}; ICP/MS - 200.8 (Add-on) {Arsenic, Beryllium, Lead, Molybdenum, Selenium, Strontium, Tin, Uranium}; The CACN for all analytical work at WSCF laboratory is 402580ES20.
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	

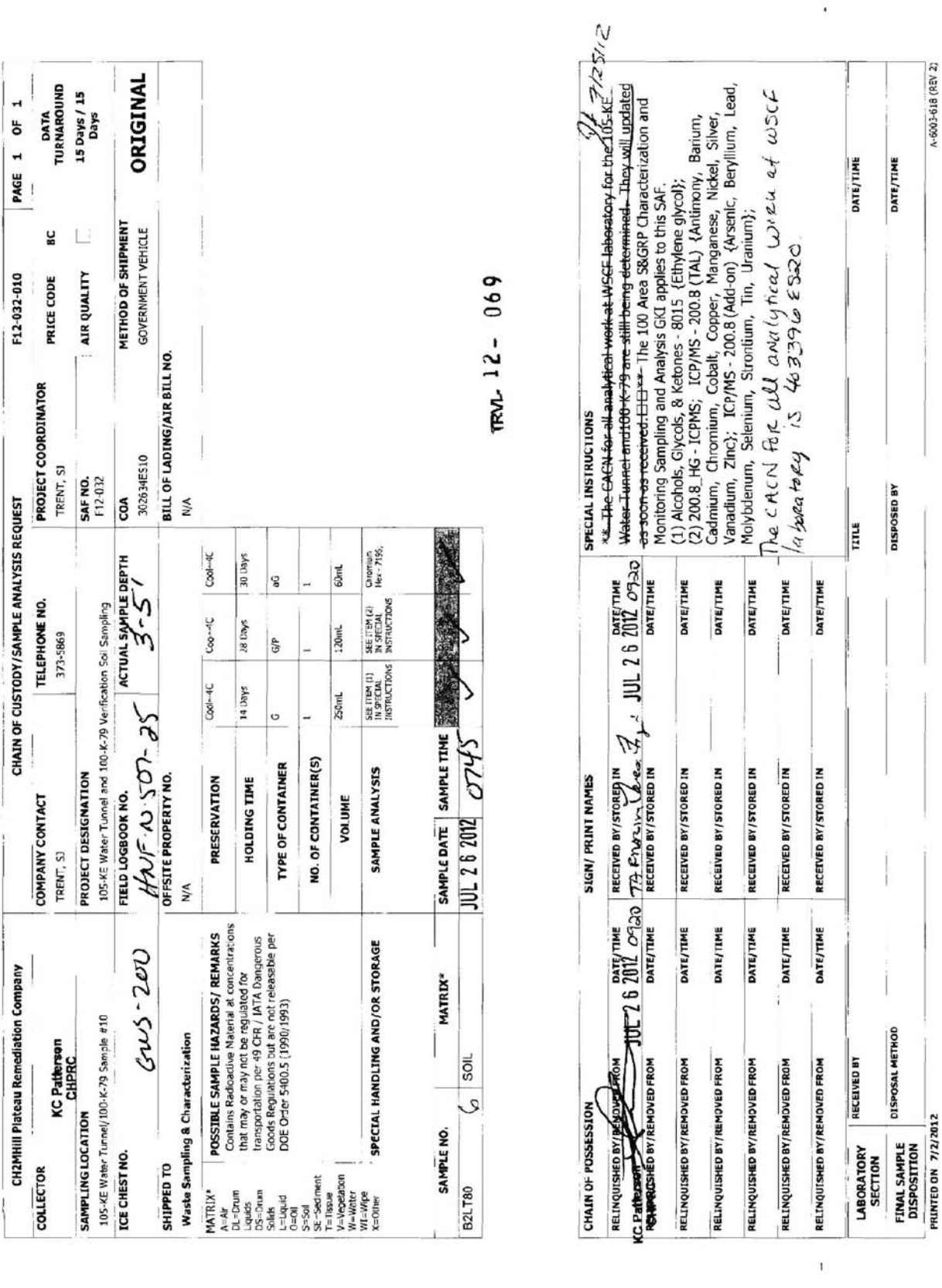
LABORATORY SECTION	RECEIVED BY	TITLE	DATE/TIME
FINAL SAMPLE DISPOSITION	DISPOSAL METHOD	DISPOSED BY	DATE/TIME

PRINTED ON 7/2/2012

A-6003-618 (REV 2)

Sample Receipt

Chain of Custody



CH2MHILL Plateau Remediation Company

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

F12-032-010

PAGE 1 OF 1

COLLECTOR: KC Patterson CHPRC

COMPANY CONTACT: TRENT, SJ

TELEPHONE NO.: 373-5869

PROJECT COORDINATOR: TRENT, SJ

PRICE CODE:

BC:

DATA TURNAROUND: 15 Days / 15 Days

SAMPLING LOCATION: 105-KE Water Tunnel/100-K-79 Sample #10

PROJECT DESIGNATION: 105-KE Water Tunnel and 100-K-79 Verification Soil Sampling

SAF NO.: F12-032

AIR QUALITY:

ICE CHEST NO.: GWS-2010

FIELD LOGBOOK NO.: HNF-N-307-25

ACTUAL SAMPLE DEPTH: 3-5'

COA: 302634ES10

METHOD OF SHIPMENT: GOVERNMENT VEHICLE

ORIGINAL

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)

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME
B2LT80	SOIL	JUL 26 2012	0745

SPECIAL HANDLING AND/OR STORAGE

SAMPLE ANALYSIS

TYPE OF CONTAINER	NO. OF CONTAINER(S)	VOLUME	HOLDING TIME	PRESERVATION
G	1	250mL	14 Days	Cool~4C
G/P	1	120mL	28 Days	Cool~4C
aG	1	60mL	30 Days	Cool~4C
SEE ITEM (2) IN SPECIAL INSTRUCTIONS	SEE ITEM (1) IN SPECIAL INSTRUCTIONS			
Chromium, Hex - 7199;				

TRL-12-069

CHAIN OF POSSESSION

SIGN/ PRINT NAMES

RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
KC Patterson	JUL 26 2012 0930	TA Finucane	JUL 26 2012 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
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 CACN for all analytical work at WSCF laboratory for the 105-KE Water Tunnel and 100-K-79 are still being determined. They will updated as soon as received.~~ ** The 100 Area S&GRP Characterization and Monitoring Sampling and Analysis GKI applies to this SAF.
(1) Alcohols, Glycols, & Ketones - 8015 (Ethylene glycol);
(2) 200.8_HG - ICPMS; ICP/MS - 200.8 (TAL) (Antimony, Barium, Cadmium, Chromium, Cobalt, Copper, Manganese, Nickel, Silver, Vanadium, Zinc); ICP/MS - 200.8 (Add-on) (Arsenic, Beryllium, Lead, Molybdenum, Selenium, Strontium, Tin, Uranium);
The CACN for analytical work at WSCF laboratory is 403396 ESQD

7/25/12

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

PRINTED ON 7/2/2012

A-6003-618 (REV 2)

Appendix 5

Data Validation Supporting Documentation

VALIDATION LEVEL:	A	B	(C)	D	E
PROJECT: 100-K			DATA PACKAGE: VSR12-025		
VALIDATOR: Eyda Hergenreder		LAB: WSCF		DATE: 08-22-2012	
			SDG: WSCF120970		
ANALYSES PERFORMED					
8015 X	8021	8141	8151	8315	
		WTPH-HCID	WTPH-G	WTPH-D	

SAMPLES/MATRIX: Soil samples

SDG WSCF120970: B2LT71; B2LT72, B2LT73; B2LT76; B2LT79; B2LT80

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:

MB: 5940 ug/kg

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:
MS/MSD RPD: ethylene glycol 32%

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:

Comments:

More

Appendix 6

Additional Documentation Requested By Client

Batch QC List

Attention Scot Fitzgerald
Department Organic, Volatiles

Group # WSCF120970

QC Batch	Analytical Batch	S#	Type	Sample #	Client Sample#	Original	Test
205917	205947	1	BLANK	79399	BLANK		SW-846 Method 8015 for GPP
205917	205947	2	LCS	79400	LCS		SW-846 Method 8015 for GPP
205917	205947	3	MS	79401	B2LT71(120970001MS)	120970001	SW-846 Method 8015 for GPP
205917	205947	4	MSD	79402	B2LT71(120970001MSD)	120970001	SW-846 Method 8015 for GPP
205917	205947	5	SAMPLE	120970001	B2LT71		SW-846 Method 8015 for GPP
205917	205947	6	SAMPLE	120970002	B2LT72		SW-846 Method 8015 for GPP
205917	205947	7	SAMPLE	120970003	B2LT73		SW-846 Method 8015 for GPP
205917	205947	8	SAMPLE	120970004	B2LT76		SW-846 Method 8015 for GPP
205917	205947	9	SAMPLE	120970005	B2LT79		SW-846 Method 8015 for GPP
205917	205947	10	SAMPLE	120970006	B2LT80		SW-846 Method 8015 for GPP

Quality Control Report

Attention Scot Fitzgerald
Department Organic, Volatiles

Group # WSCF120970

Analytical Batch 205947 (QC Batch: 205917) **Test** SW-846 Method 8015 for GPP
Associated Samples 120970001, 120970002, 120970003, 120970004, 120970005, 120970006

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit		RQ	Analyzed
BLANK			**QC Sample #79399**								
Ethylene glycol	107-21-1		5940	ug/kg						J	08/07/12
LCS			**QC Sample #79400**								
Ethylene glycol	107-21-1		128000	ug/kg	98.7	70 - 130					08/07/12
MS			**QC Sample #79401**								
			Original 120970001								
Ethylene glycol	107-21-1	<4200	139000	ug/kg	99	70 - 130					08/07/12
MSD			**QC Sample #79402**								
			Original 120970001						**Paired**	**79401**	
Ethylene glycol	107-21-1	<4200	192000	ug/kg	128.3	70 - 130	32.00	30	*	X	08/07/12
SAMPLE			**Sample #120970001**								
2-Methylcyclohexanol	583-59-5			ug/kg	88.8	70 - 130					08/07/12
SAMPLE			**Sample #120970002**								
2-Methylcyclohexanol	583-59-5			ug/kg	49.8	70 - 130				X	08/07/12
SAMPLE			**Sample #120970003**								
2-Methylcyclohexanol	583-59-5			ug/kg	69	70 - 130				X	08/07/12

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

Quality Control Report

Attention Scot Fitzgerald
Department Organic, Volatiles

Group # WSCF120970

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
SAMPLE			**Sample #120970004**							
2-Methylcyclohexanol	583-59-5			ug/kg	58.9	70 - 130			X	08/07/12
SAMPLE			**Sample #120970005**							
2-Methylcyclohexanol	583-59-5			ug/kg	122.7	70 - 130				08/07/12
SAMPLE			**Sample #120970006**							
2-Methylcyclohexanol	583-59-5			ug/kg	85.3	70 - 130				08/07/12
BLANK			**QC Sample #79399**							
2-Methylcyclohexanol	583-59-5			ug/kg	102.7	70 - 130				08/07/12
LCS			**QC Sample #79400**							
2-Methylcyclohexanol	583-59-5			ug/kg	97.7	70 - 130				08/07/12
MS			**QC Sample #79401**							
			Original 120970001							
2-Methylcyclohexanol	583-59-5	36600		ug/kg	105	70 - 130				08/07/12
MSD			**QC Sample #79402**							
			Original 120970001					**Paired**	**79401**	
2-Methylcyclohexanol	583-59-5	36600		ug/kg	135.3	70 - 130	n/a		X	08/07/12

* - QC result out of range

n/a - Not Applicable

Date: 22 August 2012
To: CH2M Hill (technical representative)
From: Analytical Quality Associates, Inc.
Project: 100-K
Subject: Inorganics - Sample Data Group (SDG) WSCF120970

INTRODUCTION

This memorandum presents the results of data validation for SDG WSCF120970 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
B2LT71	07/26/12	Soil	C	200.8
B2LT72	07/26/12	Soil	C	200.8
B2LT73	07/26/12	Soil	C	200.8
B2LT76	07/26/12	Soil	C	200.8
B2LT79	07/26/12	Soil	C	200.8
B2LT80	07/26/12	Soil	C	200.8

Data validation was conducted in accordance with the CHPRC validation statement of work and the 100 Area Remedial Action Sampling and Analysis Plan, DOE/RL-96-22, Rev. 5 (SAP). Appendices 1 through 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 for all analytes 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

The laboratory blank results were acceptable with the following exception.

The Cu laboratory blank result was > the method detection limit (MDL) but < the reporting limit (RL). The Cu result for sample B2LT79 was detect < the RL and should be qualified as non-detects at the RL (0.46 mg/kg) and flagged "U."

Trip Blanks

No trip blanks were submitted for validation.

Field Blanks

No field blanks were submitted for validation.

Equipment Blanks

The equipment blank results were acceptable with the following exceptions. Mn, Ni, Ba, Be, Co, Cu, V, Zn Pb, Mo, Sr, Sn, U and As were detected in equipment blank B2LT79. The Cu result has been flagged "0.46U" due to laboratory blank contamination.

- **Accuracy**

Accuracy is evaluated by reviewing matrix spike sample results, laboratory control sample results, and ICP-AES interference check sample results. According to the SAP, the matrix spike sample and laboratory control sample accuracy limits are 70% to 130%. 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 ±30%. 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

All field duplicate results were acceptable.

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 WSCF120970 was submitted for validation and verified for completeness. Completeness is based on the percentage of data determined to be valid (i.e., not rejected). The completion percentage was 100%.

MAJOR DEFICIENCIES

None found.

MINOR DEFICIENCIES

A minor deficiency leading to the qualification of Cu result for sample B2LT79 as non-detect was due to a laboratory blank infraction.

REFERENCES

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

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

Appendix 1

Glossary of Data Reporting Qualifiers

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

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

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

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

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

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

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

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

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

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

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

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

Appendix 2

Summary of Data Qualification

Inorganic Data Qualification Summary			
SDG: WSCF120970	Reviewer: AQA	Project: 100-K	Page 1 of 1
Analyte(s)	**Qualifier**	**Samples Affected**	**Reason**
Cu	0.46U	B2LT79	Laboratory blank contamination

Comments: None

Appendix 3

Annotated Laboratory Reports

WSCF Analytical Results Report

Attention Scot Fitzgerald
Department Inorganic

Group # WSCF120970

Sample # 120970001
SAF# F12-032
Sample ID B2LT71

Matrix SOIL
Sampled 07/26/12
Received 07/26/12

Test Performed	CAS #	Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
ICPMS Prep (S)										**08/06/12**
ICP-2008 MS All possible metal										
Manganese	7439-96-5	LA-505-412		311		mg/kg	0.5	0.056	0.56	08/06/12
Nickel	7440-02-0	LA-505-412		12.2		mg/kg	0.5	0.056	0.56	08/06/12
Silver	7440-22-4	LA-505-412	B	0.0360		mg/kg	0.5	0.028	0.28	08/06/12
Antimony	7440-36-0	LA-505-412	U	<0.17		mg/kg	0.5	0.17	1.7	08/06/12
Barium	7440-39-3	LA-505-412		62.2		mg/kg	0.5	0.11	1.1	08/06/12
Beryllium	7440-41-7	LA-505-412	B	0.319		mg/kg	0.5	0.056	0.56	08/06/12
Cadmium	7440-43-9	LA-505-412	B	0.0640		mg/kg	0.5	0.028	0.28	08/06/12
Chromium	7440-47-3	LA-505-412		8.20		mg/kg	0.5	0.056	0.56	08/06/12
Cobalt	7440-48-4	LA-505-412		7.93		mg/kg	0.5	0.028	0.14	08/06/12
Copper	7440-50-8	LA-505-412		16.3		mg/kg	0.5	0.056	0.56	08/06/12
Vanadium	7440-62-2	LA-505-412		36.2		mg/kg	0.5	0.11	1.1	08/06/12
Zinc	7440-66-6	LA-505-412		39.8		mg/kg	0.5	0.56	5.6	08/06/12
Lead	7439-92-1	LA-505-412		4.72		mg/kg	0.5	0.028	0.28	08/06/12
Mercury	7439-97-6	LA-505-412	U	<0.028		mg/kg	0.5	0.028	0.11	08/06/12
Molybdenum	7439-98-7	LA-505-412		0.290		mg/kg	0.5	0.028	0.28	08/06/12
Strontium	7440-24-6	LA-505-412		28.1		mg/kg	0.5	0.056	0.56	08/06/12
Tin	7440-31-5	LA-505-412		0.405		mg/kg	0.5	0.028	0.28	08/06/12

MDL = Minimum Detection Limit
RQ = Result Qualifier
TP Err = Total Propagated Error
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 Scot Fitzgerald
Department Inorganic

Group # WSCF120970

Sample # 120970001
SAF# F12-032
Sample ID B2LT71

Matrix SOIL
Sampled 07/26/12
Received 07/26/12

Test Performed	CAS #	Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
Uranium	7440-61-1	LA-505-412		0.493		mg/kg	0.5	0.028	0.14	08/06/12
Arsenic	7440-38-2	LA-505-412		2.46		mg/kg	0.5	0.11	1.1	08/06/12
Selenium	7782-49-2	LA-505-412	U	<0.28		mg/kg	0.5	0.28	2.8	08/06/12
Preparation for Cr6 (SO)										**07/30/12**
Hexavalent chromium										
Hexavalent chromium	18540-29-9	LA-265-403	U	<0.098		ug/g	1	0.098	0.49	07/31/12

MDL = Minimum Detection Limit
RQ = Result Qualifier
TP Err = Total Propagated Error
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 Scot Fitzgerald
Department Inorganic

Group # WSCF120970

Sample # 120970002
SAF# F12-032
Sample ID B2LT72

Matrix SOIL
Sampled 07/26/12
Received 07/26/12

Test Performed	CAS #	Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
ICPMS Prep (S)										**08/06/12**
ICP-2008 MS All possible metal										
Manganese	7439-96-5	LA-505-412		276		mg/kg	0.5	0.058	0.58	08/06/12
Nickel	7440-02-0	LA-505-412		8.22		mg/kg	0.5	0.058	0.58	08/06/12
Silver	7440-22-4	LA-505-412	B	0.0336		mg/kg	0.5	0.029	0.29	08/06/12
Antimony	7440-36-0	LA-505-412		13.0		mg/kg	0.5	0.17	1.7	08/06/12
Barium	7440-39-3	LA-505-412		75.4		mg/kg	0.5	0.12	1.2	08/06/12
Beryllium	7440-41-7	LA-505-412	B	0.321		mg/kg	0.5	0.058	0.58	08/06/12
Cadmium	7440-43-9	LA-505-412	B	0.0423		mg/kg	0.5	0.029	0.29	08/06/12
Chromium	7440-47-3	LA-505-412		7.31		mg/kg	0.5	0.058	0.58	08/06/12
Cobalt	7440-48-4	LA-505-412		10.2		mg/kg	0.5	0.029	0.14	08/06/12
Copper	7440-50-8	LA-505-412		29.1		mg/kg	0.5	0.058	0.58	08/06/12
Vanadium	7440-62-2	LA-505-412		49.5		mg/kg	0.5	0.12	1.2	08/06/12
Zinc	7440-66-6	LA-505-412		85.6		mg/kg	0.5	0.58	5.8	08/06/12
Lead	7439-92-1	LA-505-412		4.60		mg/kg	0.5	0.029	0.29	08/06/12
Mercury	7439-97-6	LA-505-412		0.446		mg/kg	0.5	0.029	0.12	08/06/12
Molybdenum	7439-98-7	LA-505-412		0.837		mg/kg	0.5	0.029	0.29	08/06/12
Strontium	7440-24-6	LA-505-412		53.2		mg/kg	0.5	0.058	0.58	08/06/12
Tin	7440-31-5	LA-505-412		2.39		mg/kg	0.5	0.029	0.29	08/06/12

MDL = Minimum Detection Limit
RQ = Result Qualifier
TP Err = Total Propagated Error
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 Scot Fitzgerald
Department Inorganic

Group # WSCF120970

Sample # 120970002
SAF# F12-032
Sample ID B2LT72

Matrix SOIL
Sampled 07/26/12
Received 07/26/12

Test Performed	CAS #	Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
Uranium	7440-61-1	LA-505-412		0.745		mg/kg	0.5	0.029	0.14	08/06/12
Arsenic	7440-38-2	LA-505-412		23.7		mg/kg	0.5	0.12	1.2	08/06/12
Selenium	7782-49-2	LA-505-412	U	<0.29		mg/kg	0.5	0.29	2.9	08/06/12
Preparation for Cr6 (SO)										**07/30/12**
Hexavalent chromium										
Hexavalent chromium	18540-29-9	LA-265-403		0.761		ug/g	1	0.11	0.54	07/31/12

MDL = Minimum Detection Limit
RQ = Result Qualifier
TP Err = Total Propagated Error
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 Scot Fitzgerald
Department Inorganic

Group # WSCF120970

Sample # 120970003
SAF# F12-032
Sample ID B2LT73

Matrix SOIL
Sampled 07/26/12
Received 07/26/12

Test Performed	CAS #	Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
ICPMS Prep (S)										**08/06/12**
ICP-2008 MS All possible metal										
Manganese	7439-96-5	LA-505-412		272		mg/kg	0.5	0.050	0.50	08/06/12
Nickel	7440-02-0	LA-505-412		8.22		mg/kg	0.5	0.050	0.50	08/06/12
Silver	7440-22-4	LA-505-412	B	0.0261		mg/kg	0.5	0.025	0.25	08/06/12
Antimony	7440-36-0	LA-505-412		2.63		mg/kg	0.5	0.15	1.5	08/06/12
Barium	7440-39-3	LA-505-412		65.5		mg/kg	0.5	0.10	1.0	08/06/12
Beryllium	7440-41-7	LA-505-412	B	0.299		mg/kg	0.5	0.050	0.50	08/06/12
Cadmium	7440-43-9	LA-505-412	B	0.0618		mg/kg	0.5	0.025	0.25	08/06/12
Chromium	7440-47-3	LA-505-412		5.57		mg/kg	0.5	0.050	0.50	08/06/12
Cobalt	7440-48-4	LA-505-412		9.24		mg/kg	0.5	0.025	0.13	08/06/12
Copper	7440-50-8	LA-505-412		19.8		mg/kg	0.5	0.050	0.50	08/06/12
Vanadium	7440-62-2	LA-505-412		48.3		mg/kg	0.5	0.10	1.0	08/06/12
Zinc	7440-66-6	LA-505-412		48.7		mg/kg	0.5	0.50	5.0	08/06/12
Lead	7439-92-1	LA-505-412		4.13		mg/kg	0.5	0.025	0.25	08/06/12
Mercury	7439-97-6	LA-505-412	U	<0.025		mg/kg	0.5	0.025	0.10	08/06/12
Molybdenum	7439-98-7	LA-505-412		0.470		mg/kg	0.5	0.025	0.25	08/06/12
Strontium	7440-24-6	LA-505-412		39.9		mg/kg	0.5	0.050	0.50	08/06/12
Tin	7440-31-5	LA-505-412		0.848		mg/kg	0.5	0.025	0.25	08/06/12

MDL = Minimum Detection Limit
RQ = Result Qualifier
TP Err = Total Propagated Error
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 Scot Fitzgerald
Department Inorganic

Group # WSCF120970

Sample # 120970003
SAF# F12-032
Sample ID B2LT73

Matrix SOIL
Sampled 07/26/12
Received 07/26/12

Test Performed	CAS #	Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
Uranium	7440-61-1	LA-505-412		0.639		mg/kg	0.5	0.025	0.13	08/06/12
Arsenic	7440-38-2	LA-505-412		6.59		mg/kg	0.5	0.10	1.0	08/06/12
Selenium	7782-49-2	LA-505-412	B	0.253		mg/kg	0.5	0.25	2.5	08/06/12
Preparation for Cr6 (SO)										**07/30/12**
Hexavalent chromium										
~~Hexavalent chromium~~	~~18540-29-9~~	~~LA-265-403~~	~~B~~	~~0.442~~		~~ug/g~~	~~1~~	~~0.11~~	~~0.53~~	~~07/31/12~~

MDL = Minimum Detection Limit
RQ = Result Qualifier
TP Err = Total Propagated Error
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 Scot Fitzgerald
Department Inorganic

Group # WSCF120970

Sample # 120970004
SAF# F12-032
Sample ID B2LT76

Matrix SOIL
Sampled 07/26/12
Received 07/26/12

Test Performed	CAS #	Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
ICPMS Prep (S)										**08/06/12**
ICP-2008 MS All possible metal										
Manganese	7439-96-5	LA-505-412		326		mg/kg	0.5	0.050	0.50	08/06/12
Nickel	7440-02-0	LA-505-412		8.64		mg/kg	0.5	0.050	0.50	08/06/12
Silver	7440-22-4	LA-505-412	B	0.0353		mg/kg	0.5	0.025	0.25	08/06/12
Antimony	7440-36-0	LA-505-412	B	0.262		mg/kg	0.5	0.15	1.5	08/06/12
Barium	7440-39-3	LA-505-412		64.8		mg/kg	0.5	0.099	0.99	08/06/12
Beryllium	7440-41-7	LA-505-412	B	0.311		mg/kg	0.5	0.050	0.50	08/06/12
Cadmium	7440-43-9	LA-505-412	B	0.0681		mg/kg	0.5	0.025	0.25	08/06/12
Chromium	7440-47-3	LA-505-412		5.41		mg/kg	0.5	0.050	0.50	08/06/12
Cobalt	7440-48-4	LA-505-412		9.21		mg/kg	0.5	0.025	0.12	08/06/12
Copper	7440-50-8	LA-505-412		15.9		mg/kg	0.5	0.050	0.50	08/06/12
Vanadium	7440-62-2	LA-505-412		49.2		mg/kg	0.5	0.099	0.99	08/06/12
Zinc	7440-66-6	LA-505-412		45.7		mg/kg	0.5	0.50	5.0	08/06/12
Lead	7439-92-1	LA-505-412		4.88		mg/kg	0.5	0.025	0.25	08/06/12
Mercury	7439-97-6	LA-505-412	B	0.0258		mg/kg	0.5	0.025	0.099	08/06/12
Molybdenum	7439-98-7	LA-505-412		0.400		mg/kg	0.5	0.025	0.25	08/06/12
Strontium	7440-24-6	LA-505-412		29.2		mg/kg	0.5	0.050	0.50	08/06/12
Tin	7440-31-5	LA-505-412		0.753		mg/kg	0.5	0.025	0.25	08/06/12

MDL = Minimum Detection Limit
RQ = Result Qualifier
TP Err = Total Propagated Error
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 Scot Fitzgerald
Department Inorganic

Group # WSCF120970

Sample # 120970004
SAF# F12-032
Sample ID B2LT76

Matrix SOIL
Sampled 07/26/12
Received 07/26/12

Test Performed	CAS #	Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
Uranium	7440-61-1	LA-505-412		0.478		mg/kg	0.5	0.025	0.12	08/06/12
Arsenic	7440-38-2	LA-505-412		2.71		mg/kg	0.5	0.099	0.99	08/06/12
Selenium	7782-49-2	LA-505-412	U	<0.25		mg/kg	0.5	0.25	2.5	08/06/12
Preparation for Cr6 (SO)										**07/30/12**
Hexavalent chromium										
Hexavalent chromium	18540-29-9	LA-265-403	U	<0.10		ug/g	1	0.10	0.51	07/31/12

MDL = Minimum Detection Limit
RQ = Result Qualifier
TP Err = Total Propagated Error
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 Scot Fitzgerald
Department Inorganic

Group # WSCF120970

Sample # 120970005
SAF# F12-032
Sample ID B2LT79

Matrix SOIL
Sampled 07/26/12
Received 07/26/12

Test Performed	CAS #	Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
ICPMS Prep (S)										**08/06/12**
ICP-2008 MS All possible metal										
Manganese	7439-96-5	LA-505-412		73.5		mg/kg	0.5	0.046	0.46	08/06/12
Nickel	7440-02-0	LA-505-412	B	0.399		mg/kg	0.5	0.046	0.46	08/06/12
Silver	7440-22-4	LA-505-412	U	<0.023		mg/kg	0.5	0.023	0.23	08/06/12
Antimony	7440-36-0	LA-505-412	U	<0.14		mg/kg	0.5	0.14	1.4	08/06/12
Barium	7440-39-3	LA-505-412		4.98		mg/kg	0.5	0.092	0.92	08/06/12
Beryllium	7440-41-7	LA-505-412	B	0.0686		mg/kg	0.5	0.046	0.46	08/06/12
Cadmium	7440-43-9	LA-505-412	U	<0.023		mg/kg	0.5	0.023	0.23	08/06/12
Chromium	7440-47-3	LA-505-412	U	<0.046		mg/kg	0.5	0.046	0.46	08/06/12
Cobalt	7440-48-4	LA-505-412	B	0.106		mg/kg	0.5	0.023	0.12	08/06/12
Copper	7440-50-8	LA-505-412	BC	0.326	0.46U	mg/kg	0.5	0.046	0.46	08/06/12
Vanadium	7440-62-2	LA-505-412	B	0.774		mg/kg	0.5	0.092	0.92	08/06/12
Zinc	7440-66-6	LA-505-412	B	3.36		mg/kg	0.5	0.46	4.6	08/06/12
Lead	7439-92-1	LA-505-412		0.365		mg/kg	0.5	0.023	0.23	08/06/12
Mercury	7439-97-6	LA-505-412	U	<0.023		mg/kg	0.5	0.023	0.092	08/06/12
Molybdenum	7439-98-7	LA-505-412	B	0.0419		mg/kg	0.5	0.023	0.23	08/06/12
Strontium	7440-24-6	LA-505-412		0.983		mg/kg	0.5	0.046	0.46	08/06/12
Tin	7440-31-5	LA-505-412	B	0.0267		mg/kg	0.5	0.023	0.23	08/06/12

MDL = Minimum Detection Limit
RQ = Result Qualifier
TP Err = Total Propagated Error
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 Scot Fitzgerald
Department Inorganic

Group # WSCF120970

Sample # 120970005
SAF# F12-032
Sample ID B2LT79

Matrix SOIL
Sampled 07/26/12
Received 07/26/12

Test Performed	CAS #	Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
Uranium	7440-61-1	LA-505-412	B	0.119		mg/kg	0.5	0.023	0.12	08/06/12
Arsenic	7440-38-2	LA-505-412	B	0.161		mg/kg	0.5	0.092	0.92	08/06/12
Selenium	7782-49-2	LA-505-412	U	<0.23		mg/kg	0.5	0.23	2.3	08/06/12
Preparation for Cr6 (SO)										**08/02/12**
Hexavalent chromium										
Hexavalent chromium	18540-29-9	LA-265-403	U	<0.097		ug/g	1	0.097	0.49	08/02/12

MDL = Minimum Detection Limit
RQ = Result Qualifier
TP Err = Total Propagated Error
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 Scot Fitzgerald
Department Inorganic

Group # WSCF120970

Sample # 120970006
SAF# F12-032
Sample ID B2LT80

Matrix SOIL
Sampled 07/26/12
Received 07/26/12

Test Performed	CAS #	Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
ICPMS Prep (S)										**08/06/12**
ICP-2008 MS All possible metal										
Manganese	7439-96-5	LA-505-412		264		mg/kg	0.5	0.056	0.56	08/06/12
Nickel	7440-02-0	LA-505-412		8.64		mg/kg	0.5	0.056	0.56	08/06/12
Silver	7440-22-4	LA-505-412	U	<0.028		mg/kg	0.5	0.028	0.28	08/06/12
Antimony	7440-36-0	LA-505-412		12.8		mg/kg	0.5	0.17	1.7	08/06/12
Barium	7440-39-3	LA-505-412		72.2		mg/kg	0.5	0.11	1.1	08/06/12
Beryllium	7440-41-7	LA-505-412	B	0.317		mg/kg	0.5	0.056	0.56	08/06/12
Cadmium	7440-43-9	LA-505-412	B	0.0624		mg/kg	0.5	0.028	0.28	08/06/12
Chromium	7440-47-3	LA-505-412		7.28		mg/kg	0.5	0.056	0.56	08/06/12
Cobalt	7440-48-4	LA-505-412		9.57		mg/kg	0.5	0.028	0.14	08/06/12
Copper	7440-50-8	LA-505-412		28.7		mg/kg	0.5	0.056	0.56	08/06/12
Vanadium	7440-62-2	LA-505-412		43.8		mg/kg	0.5	0.11	1.1	08/06/12
Zinc	7440-66-6	LA-505-412		85.6		mg/kg	0.5	0.56	5.6	08/06/12
Lead	7439-92-1	LA-505-412		4.66		mg/kg	0.5	0.028	0.28	08/06/12
Mercury	7439-97-6	LA-505-412		0.510		mg/kg	0.5	0.028	0.11	08/06/12
Molybdenum	7439-98-7	LA-505-412		0.753		mg/kg	0.5	0.028	0.28	08/06/12
Strontium	7440-24-6	LA-505-412		51.7		mg/kg	0.5	0.056	0.56	08/06/12
Tin	7440-31-5	LA-505-412		2.45		mg/kg	0.5	0.028	0.28	08/06/12

MDL = Minimum Detection Limit
RQ = Result Qualifier
TP Err = Total Propagated Error
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 Scot Fitzgerald
Department Inorganic

Group # WSCF120970

Sample # 120970006
SAF# F12-032
Sample ID B2LT80

Matrix SOIL
Sampled 07/26/12
Received 07/26/12

Test Performed	CAS #	Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
Uranium	7440-61-1	LA-505-412		0.706		mg/kg	0.5	0.028	0.14	08/06/12
Arsenic	7440-38-2	LA-505-412		24.5		mg/kg	0.5	0.11	1.1	08/06/12
Selenium	7782-49-2	LA-505-412	U	<0.28		mg/kg	0.5	0.28	2.8	08/06/12
Preparation for Cr6 (SO)										**08/02/12**
Hexavalent chromium										
Hexavalent chromium	18540-29-9	LA-265-403		0.943		ug/g	1	0.11	0.55	08/02/12

MDL = Minimum Detection Limit
RQ = Result Qualifier
TP Err = Total Propagated Error
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
WSCF120970

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), Master Contract 39818, Revision 3, "Laboratory Analytical Services to CHPRC Soil and Groundwater Remediation Project."*

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, C, D, J and U) 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.
- **C** – Analyte was detected in the blank and was evaluated. Affected sample results in the batch were C flagged (applies to inorganic and wet chemical analyses).
- **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.
- **B (organic analyses)** – Analyte was detected in the blank and was evaluated. Affected sample results in the batch were B flagged.
- **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

Attachment 2
Narrative
WSCF120970

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):

- Copper was detected in the Blank and evaluated.
- All other applicable QC controls are within the established limits.

Organic Comments

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

- Ethylene Glycol - was detected in the Blank. Affected sample results in this batch were "B" Flagged.
- Samples B2LT72 (120970002), B2LT73 (120970003), B2LT76 (120970004) and the MSD did not meet the acceptance limits for surrogate 2-Methylcyclohexanol. Sample results were not flagged. The quality control report was flagged for surrogate recovery failure.
- Ethylene Glycol did not meet the MSD acceptance limits due to a low spike of Internal Standard. Sample results for this analytes were "T" Flagged.
- Ethylene Glycol did not meet the MS / MSD RPD acceptance limits due to a low spike of Internal Standard. Sample results for this analyte were not flagged. The quality control report was flagged for RPD failure.
- All other applicable QC controls are within the established limits.

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			F12-032-001	PAGE 1 OF 1
COLLECTOR: KC Patterson CHPRC	COMPANY CONTACT: TRENT, SJ	TELEPHONE NO.: 373-5869	PROJECT COORDINATOR: TRENT, SJ	PRICE CODE: 8C	DATA TURNAROUND
SAMPLING LOCATION: 105-KE Water Tunnel Sample #1	PROJECT DESIGNATION: 105-KE Water Tunnel and 100-K-79 Verification Soil Sampling		SAF NO.: F12-032	AIR QUALITY: ☐	15 Days / 15 Days
ICE CHEST NO.: GWS-200	FIELD LOGBOOK NO.: HNF-N 507.25	ACTUAL SAMPLE DEPTH: 3'-5'	COA: 302634ES10	METHOD OF SHIPMENT: GOVERNMENT VEHICLE	ORIGINAL
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: 120970

PRESERVATION	Cool~4C	Cool~4C	Cool~4C
HOLDING TIME	14 Days	28 Days	30 Days
TYPE OF CONTAINER	G	G/P	aG
NO. OF CONTAINER(S)	1	1	1
VOLUME	250mL	120mL	60mL
SAMPLE ANALYSIS	SEE ITEM (1) IN SPECIAL INSTRUCTIONS	SEE ITEM (2) IN SPECIAL INSTRUCTIONS	Chromium Hex - 7196;

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME			
B2LT71	SOIL	JUL 26 2012	0737	✓	✓	✓

TRVL-12-069

CHAIN OF POSSESSION		SIGN/ PRINT NAMES		SPECIAL INSTRUCTIONS
RELINQUISHED BY/REMOVED FROM: KC Patterson CHPRC	DATE/TIME: JUL 26 2012 0920	RECEIVED BY/STORED IN: TA Fnszla	DATE/TIME: JUL 26 2012 0920	SH 7/25/12 ** ~~The CACN for all analytical work at WSCF laboratory for the 105-KE Water Tunnel and100-K-79 are ctill being determined. They will updated as soon as received.~~ ☐☐** The 100 Area S&GRP Characterization and Monitoring Sampling and Analysis GKI applies to this SAF. (1) Alcohols, Glycols, & Ketones - 8015 {Ethylene glycol}; (2) 200.8_HG - ICPMS; ICP/MS - 200.8 (TAL) {Antimony, Barium, Cadmium, Chromium, Cobalt, Copper, Manganese, Nickel, Silver, Vanadium, Zinc}; ICP/MS - 200.8 (Add-on) {Arsenic, Beryllium, Lead, Molybdenum, Selenium, Strontium, Tin, Uranium}; The CACN for WSCF Analytical is 403396E520. SH 7/25/12
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	

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

PRINTED ON 7/2/2012

A-6003-618 (REV 2)

CH2MHill Plateau Remediation Company	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST			F12-032-002	PAGE 1 OF 1
COLLECTOR KC Patterson CHPRC	**COMPANY CONTACT** TRENT, SJ	**TELEPHONE NO.** 373-5869	**PROJECT COORDINATOR** TRENT, SJ	**PRICE CODE** 8C	**DATA TURNAROUND** 15 Days / 15 Days
SAMPLING LOCATION 105-KE Water Tunnel Sample #2	**PROJECT DESIGNATION** 105-KE Water Tunnel and 100-K-79 Verification Soil Sampling		**SAF NO.** F12-032	**AIR QUALITY** ☐	
ICE CHEST NO. GWS-200	**FIELD LOGBOOK NO.** HNF-N-507-25	**ACTUAL SAMPLE DEPTH** 3'-5'	**COA** 302634ES10	**METHOD OF SHIPMENT** GOVERNMENT VEHICLE	**ORIGINAL**
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	Cool~4C	Cool~4C	Cool~4C	
HOLDING TIME	14 Days	28 Days	30 Days	
TYPE OF CONTAINER	G	G/P	aG	
NO. OF CONTAINER(S)	1	1	1	
VOLUME	250mL	120mL	60mL	
SAMPLE ANALYSIS	SEE ITEM (1) IN SPECIAL INSTRUCTIONS	SEE ITEM (2) IN SPECIAL INSTRUCTIONS	Chromium Hex - 7196;	
SAMPLE NO.	**MATRIX***	**SAMPLE DATE**	**SAMPLE TIME**			
B2LT72	2 SOIL	JUL 26 2012	0745	J	J	J

TRVL 12 - 069

CHAIN OF POSSESSION	SIGN/ PRINT NAMES	
RELINQUISHED BY/REMOVED FROM: KC Patterson CHPRC — DATE/TIME: JUL 26 2012 0920	RECEIVED BY/STORED IN: TA Fuerza Tecs. Inc. — DATE/TIME: JUL 26 2012 0920	
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 CACN for all analytical work at WSCF laboratory for the 105-KE Water Tunnel and100-K-79 are still being determined. They will updated as soon as received.~~ ☐☐** The 100 Area S&GRP Characterization and Monitoring Sampling and Analysis GKI applies to this SAF.
(1) Alcohols, Glycols, & Ketones - 8015 {Ethylene glycol};
(2) 200.8_HG - ICPMS; ICP/MS - 200.8 (TAL) {Antimony, Barium, Cadmium, Chromium, Cobalt, Copper, Manganese, Nickel, Silver, Vanadium, Zinc}; ICP/MS - 200.8 (Add-on) {Arsenic, Beryllium, Lead, Molybdenum, Selenium, Strontium, Tin, Uranium};
The CACN for all analytical work at WSCF laboratory is 403396 ES20.

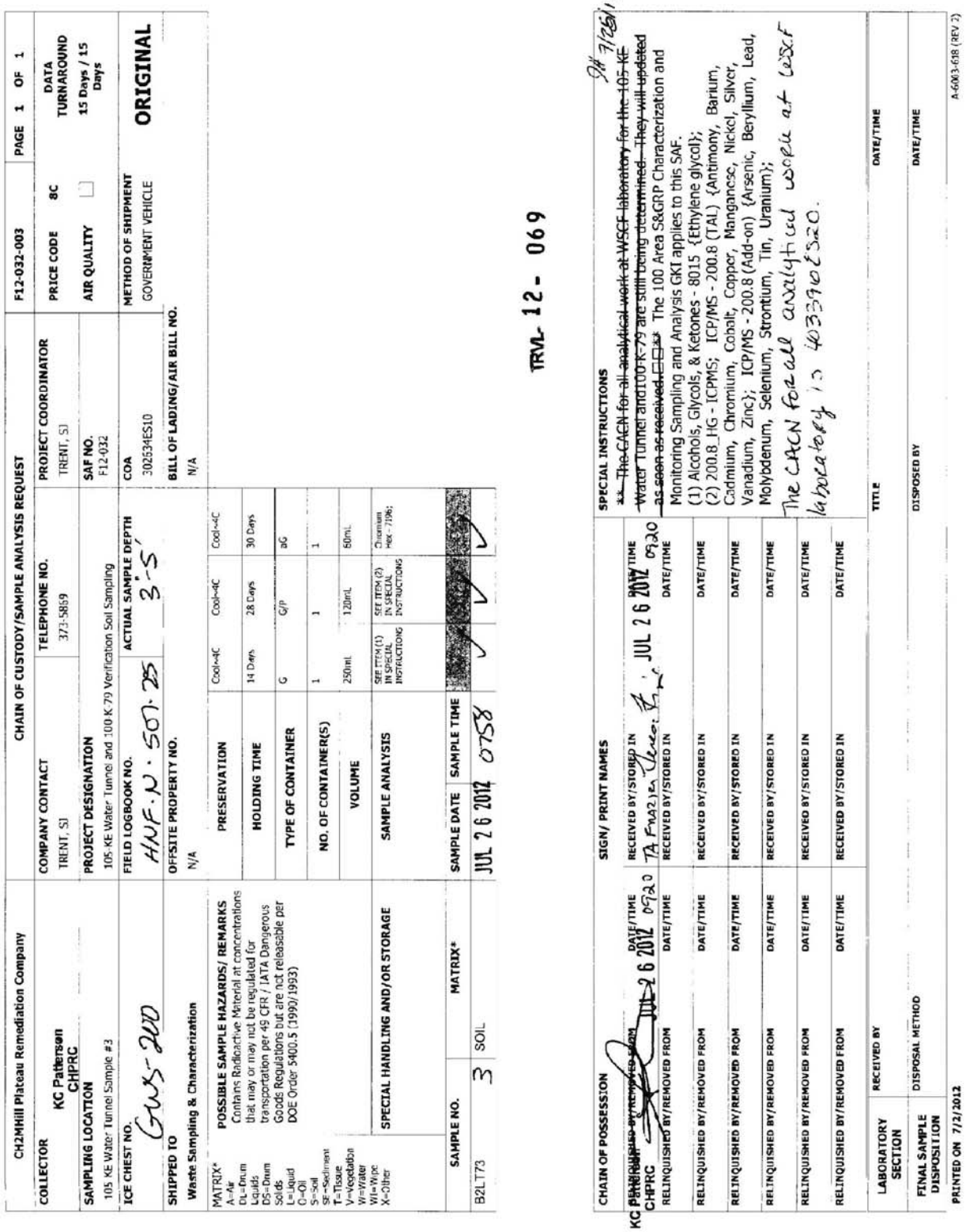
LABORATORY SECTION	**RECEIVED BY**	**TITLE**	**DATE/TIME**
FINAL SAMPLE DISPOSITION	**DISPOSAL METHOD**	**DISPOSED BY**	**DATE/TIME**

PRINTED ON 7/2/2012

A-6003-618 (REV 2)

Sample Receipt

Chain of Custody



CH2MHill Plateau Remediation Company

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

F12-032-003

PAGE 1 OF 1

COLLECTOR: KC Patterson CHPRC

COMPANY CONTACT: TRENT, SJ

TELEPHONE NO.: 373-5869

PROJECT COORDINATOR: TRENT, SJ

PRICE CODE: 8C

DATA TURNAROUND: 15 Days / 15 Days

SAMPLING LOCATION: 105-KE Water Tunnel Sample #3

PROJECT DESIGNATION: 105-KE Water Tunnel and 100-K-79 Verification Soil Sampling

SAF NO.: F12-032

AIR QUALITY: ☐

ICE CHEST NO.: GWS-2UD

FIELD LOGBOOK NO.: HNF-N-507-25

ACTUAL SAMPLE DEPTH: 3-5'

METHOD OF SHIPMENT: GOVERNMENT VEHICLE

ORIGINAL

SHIPPED TO: Waste Sampling & Characterization

OFFSITE PROPERTY NO.: N/A

COA: 302534ES10

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)

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME	PRESERVATION	HOLDING TIME	TYPE OF CONTAINER	NO. OF CONTAINER(S)	VOLUME	SPECIAL HANDLING AND/OR STORAGE	SAMPLE ANALYSIS
B2LT73	3 SOIL	JUL 26 2012	0758	Cool~4C	14 Days	G	1	250mL	SEE ITEM (1) IN SPECIAL INSTRUCTIONS	SEE ITEM (2) IN SPECIAL INSTRUCTIONS
				Cool~4C	28 Days	G/P	1	120mL		
				Cool~4C	30 Days	aG	1	60mL		Chromium Hex - 7196;

TRL-12-069

CHAIN OF POSSESSION

SIGN/ PRINT NAMES

SPECIAL INSTRUCTIONS

~~** The CACN for all analytical work at WSCF laboratory for the 105-KE Water Tunnel and 100-K-79 are still being determined. They will updated as soon as received.~~ ☐☐☐ The 100 Area S&GRP Characterization and Monitoring Sampling and Analysis GK1 applies to this SAF.
(1) Alcohols, Glycols, & Ketones - 8015 {Ethylene glycol};
(2) 200.8_HG - ICPMS; ICP/MS - 200.8 (TAL) {Antimony, Barium, Cadmium, Chromium, Cobalt, Copper, Manganese, Nickel, Silver, Vanadium, Zinc}; ICP/MS - 200.8 (Add-on) {Arsenic, Beryllium, Lead, Molybdenum, Selenium, Strontium, Tin, Uranium};
The CACN for all analytical work at WSCF laboratory is #339025820.

7/26/12

KC Patterson CHPRC — RELINQUISHED BY/REMOVED FROM — DATE/TIME: JUL 26 2012 0930 — RECEIVED BY/STORED IN: TA Frazier Trent SJ — DATE/TIME: JUL 26 2012 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

RELINQUISHED BY/REMOVED FROM — DATE/TIME — RECEIVED BY/STORED IN — DATE/TIME

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RELINQUISHED BY/REMOVED FROM — DATE/TIME — RECEIVED BY/STORED IN — DATE/TIME

RELINQUISHED BY/REMOVED FROM — DATE/TIME — RECEIVED BY/STORED IN — DATE/TIME

LABORATORY SECTION: RECEIVED BY — TITLE — DATE/TIME

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

PRINTED ON 7/2/2012

A-6003-618 (REV 2)

CH2MHill Plateau Remediation Company	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		F12-032-006	PAGE 1 OF 1
COLLECTOR: KC Patterson CHPRC	COMPANY CONTACT: TRENT, SJ	TELEPHONE NO.: 373-5869	PROJECT COORDINATOR: TRENT, SJ	PRICE CODE: 8C; DATA TURNAROUND: 15 Days / 15 Days
SAMPLING LOCATION: 100-K-79 Sample #1	PROJECT DESIGNATION: 105-KE Water Tunnel and 100-K-79 Verification Soil Sampling		SAF NO.: F12-032	AIR QUALITY: ☐
ICE CHEST NO.: GW5-200	FIELD LOGBOOK NO.: HNF-N-507-25	ACTUAL SAMPLE DEPTH: SURFACE.	COA: 302677ES10	METHOD OF SHIPMENT: GOVERNMENT VEHICLE; ORIGINAL
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

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME	PRESERVATION	HOLDING TIME	TYPE OF CONTAINER	NO. OF CONTAINER(S)	VOLUME	SAMPLE ANALYSIS
				Cool~4C	14 Days	G	1	250mL	See ITEM (1) IN SPECIAL INSTRUCTIONS
				Cool~4C	28 Days	G/P	1	120mL	See ITEM (2) IN SPECIAL INSTRUCTIONS
				Cool~4C	30 Days	aG	1	60mL	Chromium Hex - 7196;
B2LT76 4	SOIL	JUL 26 2012	0811	✓	✓	✓			

TRVL-12-069

CHAIN OF POSSESSION	SIGN/ PRINT NAMES	
RELINQUISHED BY/REMOVED FROM: KC Patterson CHPRC — DATE/TIME: JUL 26 2012 0920	RECEIVED BY/STORED IN: TA Frazier — DATE/TIME: JUL 26 2012 0920	
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 CACN for all analytical work at WSCF laboratory for the 105-KE Water Tunnel and100-K-79 are still being determined. They will updated as soon as received.☐☐~~** The 100 Area S&GRP Characterization and Monitoring Sampling and Analysis GKI applies to this SAF.
(1) Alcohols, Glycols, & Ketones - 8015 {Ethylene glycol};
(2) 200.8_HG - ICPMS; ICP/MS - 200.8 (TAL) {Antimony, Barium, Cadmium, Chromium, Cobalt, Copper, Manganese, Nickel, Silver, Vanadium, Zinc}; ICP/MS - 200.8 (Add-on) {Arsenic, Beryllium, Lead, Molybdenum, Selenium, Strontium, Tin, Uranium};
The CACN for all analytical work at WSCF laboratory is 402580ES20.

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

PRINTED ON 7/2/2012

A-6003-618 (REV 2)

CH2MHill Plateau Remediation Company	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST			F12-032-009	PAGE 1 OF 1
COLLECTOR: KC Patterson CHPRC	COMPANY CONTACT: TRENT, SJ	TELEPHONE NO.: 373-5869	PROJECT COORDINATOR: TRENT, SJ	PRICE CODE: 8C	DATA TURNAROUND: 15 Days / 15 Days
SAMPLING LOCATION: 105-KE Water Tunnel/100-K-79 Sample #9	PROJECT DESIGNATION: 105-KE Water Tunnel and 100-K-79 Verification Soil Sampling		SAF NO.: F12-032	AIR QUALITY: ☐	
ICE CHEST NO.: GW7 -200	FIELD LOGBOOK NO.: HNF-N-357-25	ACTUAL SAMPLE DEPTH: SURFACE	COA: 302677ES10	METHOD OF SHIPMENT: GOVERNMENT VEHICLE	ORIGINAL
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, SF=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	Cool~4C	Cool~4C	Cool~4C
HOLDING TIME	14 Days	28 Days	30 Days
TYPE OF CONTAINER	G	G/P	aG
NO. OF CONTAINER(S)	1	1	1
VOLUME	250mL	120mL	60mL
SAMPLE ANALYSIS	SEE ITEM (1) IN SPECIAL INSTRUCTIONS	SEE ITEM (2) IN SPECIAL INSTRUCTIONS	Chromium Hex - 7196;

SAMPLE NO.		MATRIX*	SAMPLE DATE	SAMPLE TIME			
B2LT79	5	SOIL	JUL 26 2012	0807	✓	✓	✓

TRVL 12- 069

CHAIN OF POSSESSION	SIGN/ PRINT NAMES	SPECIAL INSTRUCTIONS
RELINQUISHED BY/REMOVED FROM: KC Patterson CHPRC — DATE/TIME: JUL 26 2012 0920	RECEIVED BY/STORED IN: TA Frazier — DATE/TIME: JUL 26 2012 0920	JH 7/25/12 ** ~~The CACN for all analytical work at WSCF laboratory for the 105-KE Water Tunnel and 100-K-79 are still being determined. They will updated as soon as received.~~ ☐☐** The 100 Area S&GRP Characterization and Monitoring Sampling and Analysis GKI applies to this SAF. (1) Alcohols, Glycols, & Ketones - 8015 {Ethylene glycol}; (2) 200.8_HG - ICPMS; ICP/MS - 200.8 (TAL) {Antimony, Barium, Cadmium, Chromium, Cobalt, Copper, Manganese, Nickel, Silver, Vanadium, Zinc}; ICP/MS - 200.8 (Add-on) {Arsenic, Beryllium, Lead, Molybdenum, Selenium, Strontium, Tin, Uranium}; The CACN for all analytical work at WSCF laboratory is 402580ES20.
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	

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

PRINTED ON 7/2/2012

A-6003-618 (REV 2)

CH2MHill Plateau Remediation Company	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		F12-032-010	PAGE 1 OF 1
COLLECTOR: KC Patterson CHPRC	COMPANY CONTACT: TRENT, SJ	TELEPHONE NO.: 373-5869	PROJECT COORDINATOR: TRENT, SJ	PRICE CODE: 8C; DATA TURNAROUND: 15 Days / 15 Days
SAMPLING LOCATION: 105-KE Water Tunnel/100-K-79 Sample #10	PROJECT DESIGNATION: 105-KE Water Tunnel and 100-K-79 Verification Soil Sampling		SAF NO.: F12-032	AIR QUALITY: ☐
ICE CHEST NO.: GWS-200	FIELD LOGBOOK NO.: HNF-N-507-25	ACTUAL SAMPLE DEPTH: 3-5'	COA: 302634ES10	METHOD OF SHIPMENT: GOVERNMENT VEHICLE; ORIGINAL
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	Cool~4C	Coo~4C	Cool~4C
HOLDING TIME	14 Days	28 Days	30 Days
TYPE OF CONTAINER	G	G/P	aG
NO. OF CONTAINER(S)	1	1	1
VOLUME	250mL	120mL	60mL
SAMPLE ANALYSIS	SEE ITEM (1) IN SPECIAL INSTRUCTIONS	SEE ITEM (2) IN SPECIAL INSTRUCTIONS	Chromium Hex - 7196,

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME			
B2LT80 6	SOIL	JUL 26 2012	0745	✓	✓	✓

TRVL 12- 069

CHAIN OF POSSESSION	SIGN/ PRINT NAMES	
RELINQUISHED BY/REMOVED FROM: KC Patterson CHPRC — DATE/TIME: JUL 26 2012 0920	RECEIVED BY/STORED IN: TA Engrm Tech Trainee — DATE/TIME: JUL 26 2012 0920	
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 CACN for all analytical work at WSCF laboratory for the 105-KE Water Tunnel and100-K-79 are still being determined. They will updated as soon as received.~~ ☐☐** The 100 Area S&GRP Characterization and Monitoring Sampling and Analysis GKI applies to this SAF.
(1) Alcohols, Glycols, & Ketones - 8015 {Ethylene glycol};
(2) 200.8_HG - ICPMS; ICP/MS - 200.8 (TAL) {Antimony, Barium, Cadmium, Chromium, Cobalt, Copper, Manganese, Nickel, Silver, Vanadium, Zinc}; ICP/MS - 200.8 (Add-on) {Arsenic, Beryllium, Lead, Molybdenum, Selenium, Strontium, Tin, Uranium};
The CACN for all analytical work at WSCF laboratory is 403396ES20

7/25/12

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

PRINTED ON 7/2/2012

A-6003-618 (REV 2)

Appendix 5

Data Validation Supporting Documentation

VALIDATION LEVEL:	A	B	(C)	D	E
PROJECT: 100-K			DATA PACKAGE: VSR12-025		
VALIDATOR: Eyda Hergenreder		LAB: WSCF		DATE: 08-22-2012	
			SDG: WSCF120970		
ANALYSES PERFORMED					
SW-846/ICP	SW-846/GFAA	SW-846/Hg		EPA 200.8 X	
SAMPLES/MATRIX Soil samples SDG WSCF120970: B2LT71, B2LT72, B2LT73, B2LT76, B2LT79, B2LT80					

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:

MB: Cu 0.150 mg/kg
EB sample B2LT79 (all in mg/kg): Mn 73.5; Ni 0.399; Ba 4.98; Be 0.0686; Co 0.106; Cu 0.326; V 0.774; Zn 3.36; Pb 0.365; Mo 0.0419; Sr 0.983; Sn 0.0267; U 0.119; As 0.161

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

Comments (attach additional sheets as necessary):

More

Appendix 6

Additional Documentation Requested By Client

Batch QC List

Attention Scot Fitzgerald
Department Inorganic

Group # WSCF120970

QC Batch	Analytical Batch	S#	Type	Sample #	Client Sample#	Original	Test
205419	205501	3	BLANK	79109	BLANK		Hexavalent chromium
205419	205501	4	LCS	79110	LCS		Hexavalent chromium
205419	205501	5	DUP	79111	B2LWH7(120938004DUP	120938004	Hexavalent chromium
205419	205501	6	MS	79112	B2LWH7(120938004MS)	120938004	Hexavalent chromium
205419	205501	7	PSTSPK	79113	PSTSPK		Hexavalent chromium
205419	205501	8	IMS	79114	B2LWH7(120938004IMS)	120938004	Hexavalent chromium
205419	205501	26	SAMPLE	120970001	B2LT71		Hexavalent chromium
205419	205501	27	SAMPLE	120970002	B2LT72		Hexavalent chromium
205419	205501	28	SAMPLE	120970003	B2LT73		Hexavalent chromium
205419	205501	29	SAMPLE	120970004	B2LT76		Hexavalent chromium
205707	205811	4	BLANK	79246	BLANK		ICP-2008 MS All possible metal
205707	205811	5	LCS	79247	LCS		ICP-2008 MS All possible metal
205707	205811	7	MS	79248	B2LWJ9(120950010MS)	120950010	ICP-2008 MS All possible metal
205707	205811	8	MSD	79249	B2LWJ9(120950010MSD)	120950010	ICP-2008 MS All possible metal
205707	205811	11	SAMPLE	120970001	B2LT71		ICP-2008 MS All possible metal
205707	205811	12	SAMPLE	120970002	B2LT72		ICP-2008 MS All possible metal
205707	205811	13	SAMPLE	120970003	B2LT73		ICP-2008 MS All possible metal
205707	205811	14	SAMPLE	120970004	B2LT76		ICP-2008 MS All possible metal
205707	205811	15	SAMPLE	120970005	B2LT79		ICP-2008 MS All possible metal
205707	205811	16	SAMPLE	120970006	B2LT80		ICP-2008 MS All possible metal
205707	205820	6	MSD	79249	B2LWJ9(120950010MSD)	120950010	ICP-2008 MS All possible metal
205707	205820	7	MS	79248	B2LWJ9(120950010MS)	120950010	ICP-2008 MS All possible metal
205707	205820	9	LCS	79247	LCS		ICP-2008 MS All possible metal

Batch QC List

Attention Scot Fitzgerald
Department Inorganic

Group # WSCF120970

QC Batch	Analytical Batch	S#	Type	Sample #	Client Sample#	Original	Test
205707	205820	10	BLANK	79246	BLANK		ICP-2008 MS All possible metal
205707	205820	12	SAMPLE	120970006	B2LT80		ICP-2008 MS All possible metal
205707	205820	13	SAMPLE	120970005	B2LT79		ICP-2008 MS All possible metal
205707	205820	14	SAMPLE	120970004	B2LT76		ICP-2008 MS All possible metal
205707	205820	15	SAMPLE	120970003	B2LT73		ICP-2008 MS All possible metal
205707	205820	16	SAMPLE	120970002	B2LT72		ICP-2008 MS All possible metal
205707	205820	17	SAMPLE	120970001	B2LT71		ICP-2008 MS All possible metal
205709	205710	3	BLANK	79253	BLANK		Hexavalent chromium
205709	205710	4	LCS	79254	LCS		Hexavalent chromium
205709	205710	5	DUP	79255	B2LT79(120970005DUP)	120970005	Hexavalent chromium
205709	205710	6	MS	79256	B2LT79(120970005MS)	120970005	Hexavalent chromium
205709	205710	7	PSTSPK	79257	PSTSPK		Hexavalent chromium
205709	205710	8	IMS	79258	B2LT79(120970005IMS)	120970005	Hexavalent chromium
205709	205710	9	SAMPLE	120970005	B2LT79		Hexavalent chromium
205709	205710	10	SAMPLE	120970006	B2LT80		Hexavalent chromium

Quality Control Report

Attention Scot Fitzgerald
Department Inorganic

Group # WSCF120970

Analytical Batch 205811 (QC Batch: 205707) **Test** ICP-2008 MS All possible metal
Associated Samples 120970001, 120970002, 120970003, 120970004, 120970005, 120970006

Analyte	CAS #	Original Found	QC Found	Units	% Recov Limits	RPD	RPD Limit	RQ	Analyzed
BLANK			**QC Sample #79246**						
Manganese	7439-96-5		<0.050	ug/L				U	08/06/12
Nickel	7440-02-0		<0.050	ug/L				U	08/06/12
Silver	7440-22-4		<0.025	ug/L				U	08/06/12
Antimony	7440-36-0		<0.15	ug/L				U	08/06/12
Barium	7440-39-3		<0.10	ug/L				U	08/06/12
Beryllium	7440-41-7		<0.050	ug/L				U	08/06/12
Cadmium	7440-43-9		<0.025	ug/L				U	08/06/12
Chromium	7440-47-3		<0.050	ug/L				U	08/06/12
Cobalt	7440-48-4		<0.025	ug/L				U	08/06/12
Copper	7440-50-8		0.150	ug/L				B	08/06/12
Vanadium	7440-62-2		<0.10	ug/L				U	08/06/12
Zinc	7440-66-6		<0.50	ug/L				U	08/06/12
Lead	7439-92-1		<0.025	ug/L				U	08/06/12
Mercury	7439-97-6		<0.025	ug/L				U	08/06/12
Molybdenum	7439-98-7		<0.025	ug/L				U	08/06/12
Strontium	7440-24-6		<0.050	ug/L				U	08/06/12
Tin	7440-31-5		<0.025	ug/L				U	08/06/12

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

Quality Control Report

Attention Scot Fitzgerald
Department Inorganic

Group # WSCF120970

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
Uranium	7440-61-1		<0.025	ug/L					U	08/06/12
Arsenic	7440-38-2		<0.10	ug/L					U	08/06/12
LCS			**QC Sample #79247**							
Manganese	7439-96-5		265	mg/kg	92.5	75 - 121				08/06/12
Nickel	7440-02-0		57.4	mg/kg	97.1	74 - 122				08/06/12
Silver	7440-22-4		34.3	mg/kg	99.7	83 - 127				08/06/12
Antimony	7440-36-0		133	mg/kg	108.9	62 - 205				08/06/12
Barium	7440-39-3		162	mg/kg	95.9	78 - 118				08/06/12
Beryllium	7440-41-7		64.7	mg/kg	103.7	77 - 120				08/06/12
Cadmium	7440-43-9		62.8	mg/kg	101.7	76 - 129				08/06/12
Chromium	7440-47-3		67.6	mg/kg	94.8	68 - 119				08/06/12
Cobalt	7440-48-4		102	mg/kg	99	77 - 122				08/06/12
Copper	7440-50-8		77.6	mg/kg	95.5	67 - 120				08/06/12
Vanadium	7440-62-2		55.9	mg/kg	94.5	67 - 122				08/06/12
Zinc	7440-66-6		142	mg/kg	100.9	73 - 131				08/06/12
Lead	7439-92-1		91.3	mg/kg	98.8	79 - 124				08/06/12
Mercury	7439-97-6		3.92	mg/kg	104	69 - 124				08/06/12
Molybdenum	7439-98-7		45.2	mg/kg	106	80 - 125				08/06/12
Strontium	7440-24-6		67.0	mg/kg	92.5	78 - 119				08/06/12
Tin	7440-31-5		115	mg/kg	107.3	84 - 130				08/06/12
Uranium	7440-61-1		386	mg/kg	102.4	86 - 113				08/06/12
Arsenic	7440-38-2		97.4	mg/kg	105.1	79 - 125				08/06/12

* - QC result out of range

n/a - Not Applicable

Quality Control Report

Attention Scot Fitzgerald
Department Inorganic

Group # WSCF120970

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
MS			**QC Sample #79248**							
			Original 120950010							
Manganese	7439-96-5		102	mg/kg	103.3	70 - 130				08/06/12
Nickel	7440-02-0		94.4	mg/kg	95.3	70 - 130				08/06/12
Silver	7440-22-4		98.1	mg/kg	98.9	70 - 130				08/06/12
Antimony	7440-36-0		93.8	mg/kg	94.7	70 - 130				08/06/12
Barium	7440-39-3		99.7	mg/kg	100.6	70 - 130				08/06/12
Beryllium	7440-41-7		102	mg/kg	103.2	70 - 130				08/06/12
Cadmium	7440-43-9		99.8	mg/kg	100.7	70 - 130				08/06/12
Chromium	7440-47-3		96.7	mg/kg	97.6	70 - 130				08/06/12
Cobalt	7440-48-4		96.6	mg/kg	97.5	70 - 130				08/06/12
Copper	7440-50-8		94.9	mg/kg	95.8	70 - 130				08/06/12
Vanadium	7440-62-2		104	mg/kg	105.4	70 - 130				08/06/12
Zinc	7440-66-6		105	mg/kg	106	70 - 130				08/06/12
Lead	7439-92-1		99.1	mg/kg	100	70 - 130				08/06/12
Mercury	7439-97-6		2.13	mg/kg	107.5	70 - 130				08/06/12
Molybdenum	7439-98-7		108	mg/kg	109.5	70 - 130				08/06/12
Strontium	7440-24-6		105	mg/kg	105.8	70 - 130				08/06/12
Tin	7440-31-5		103	mg/kg	103.6	70 - 130				08/06/12
Uranium	7440-61-1		103	mg/kg	103.5	70 - 130				08/06/12
Arsenic	7440-38-2		102	mg/kg	102.5	70 - 130				08/06/12
MSD			**QC Sample #79249**							
			Original 120950010						**Paired 79248**	
Manganese	7439-96-5		103	mg/kg	97.3	70 - 130	0.00	30		08/06/12

* - QC result out of range

n/a - Not Applicable

Quality Control Report

Attention Scot Fitzgerald
Department Inorganic

Group # WSCF120970

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
Nickel	7440-02-0		101	mg/kg	95.6	70 - 130	5.60	30		08/06/12
Silver	7440-22-4		106	mg/kg	100.7	70 - 130	7.70	30		08/06/12
Antimony	7440-36-0		103	mg/kg	97.7	70 - 130	8.70	30		08/06/12
Barium	7440-39-3		106	mg/kg	100.2	70 - 130	3.70	30		08/06/12
Beryllium	7440-41-7		108	mg/kg	102.6	70 - 130	5.70	30		08/06/12
Cadmium	7440-43-9		107	mg/kg	101.4	70 - 130	6.90	30		08/06/12
Chromium	7440-47-3		102	mg/kg	96.7	70 - 130	4.60	30		08/06/12
Cobalt	7440-48-4		103	mg/kg	97.6	70 - 130	5.60	30		08/06/12
Copper	7440-50-8		102	mg/kg	97.1	70 - 130	7.10	30		08/06/12
Vanadium	7440-62-2		113	mg/kg	107.4	70 - 130	5.30	30		08/06/12
Zinc	7440-66-6		112	mg/kg	106.7	70 - 130	4.70	30		08/06/12
Lead	7439-92-1		105	mg/kg	100	70 - 130	5.50	30		08/06/12
Mercury	7439-97-6		2.27	mg/kg	108	70 - 130	6.40	30		08/06/12
Molybdenum	7439-98-7		116	mg/kg	110.3	70 - 130	7.10	30		08/06/12
Strontium	7440-24-6		111	mg/kg	105.2	70 - 130	4.50	30		08/06/12
Tin	7440-31-5		111	mg/kg	105.2	70 - 130	7.50	30		08/06/12
Uranium	7440-61-1		109	mg/kg	104	70 - 130	6.60	30		08/06/12
Arsenic	7440-38-2		109	mg/kg	103.3	70 - 130	7.40	30		08/06/12

* - QC result out of range

n/a - Not Applicable

Quality Control Report

Attention Scot Fitzgerald
Department Inorganic

Group # WSCF120970

Analytical Batch 205820 (QC Batch: 205707) **Test** ICP-2008 MS All possible metal
Associated Samples 120970001, 120970002, 120970003, 120970004, 120970005, 120970006

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
BLANK			**QC Sample #79246**							
Selenium	7782-49-2		<0.50	ug/L					U	08/06/12
LCS			**QC Sample #79247**							
Selenium	7782-49-2		102	mg/kg	114.3	82 - 133				08/06/12
MS			**QC Sample #79248**							
			Original 120950010							
Selenium	7782-49-2		103	mg/kg	104.3	70 - 130				08/06/12
MSD			**QC Sample #79249**							
			Original 120950010					**Paired 79248**		
Selenium	7782-49-2		117	mg/kg	111.1	70 - 130	12.70	30		08/06/12

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

Date: 22 August 2012
To: CH2M Hill (technical representative)
From: Analytical Quality Associates, Inc.
Project: 100-K
Subject: General Chemistry - Sample Data Group (SDG) WSCF120970

INTRODUCTION

This memorandum presents the results of data validation for SDG WSCF120970 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
B2LT71	07/26/12	Soil	C	7196A (Cr VI)
B2LT72	07/26/12	Soil	C	7196A (Cr VI)
B2LT73	07/26/12	Soil	C	7196A (Cr VI)
B2LT76	07/26/12	Soil	C	7196A (Cr VI)
B2LT79	07/26/12	Soil	C	7196A (Cr VI)
B2LT80	07/26/12	Soil	C	7196A (Cr VI)

Data validation was conducted in accordance with the CHPRC validation statement of work and the 100 Area Remedial Action Sampling and Analysis Plan, DOE/RL-96-22, Rev. 5, (SAP). Appendices 1 through 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 chromium(VI) are extraction and analysis within 30 days 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

The 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

The equipment blank result was acceptable.

- **Accuracy**

Accuracy is evaluated by reviewing matrix spike sample results and laboratory control sample results. According to the SAP, the matrix spike sample and laboratory control sample accuracy limits are 70% to 130%.

Matrix Spike (MS) Sample

All MS recoveries were acceptable.

Laboratory Control Samples (LCSs)

All LCS recoveries were acceptable.

- **Precision**

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

Laboratory Duplicate Samples

All laboratory duplicate results were acceptable.

Field Duplicate Samples

The field duplicate results were acceptable.

Field Split Samples

No field splits were submitted for validation.

- **Detection Limits**

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

All reported sample MDLs were below the CRDLs.

- **Completeness**

SDG WSCF120970 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-96-22, Rev. 5, *100 Area Remedial Action Sampling and Analysis Plan*, September 2009.

Appendix 1

Glossary of Data Reporting Qualifiers

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

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

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

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

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

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

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

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

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

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

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

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

Appendix 2

Summary of Data Qualification

General Chemistry Data Qualification Summary			
SDG: WSCF120970	Reviewer: AQA	Project: 100-K	Page 1 of 1
Analyte(s)	**Qualifier**	**Samples Affected**	**Reason**
Cr(VI)	None	N/A	N/A

Comments: None

Appendix 3

Annotated Laboratory Reports

WSCF Analytical Results Report

Attention Scot Fitzgerald
Department Inorganic

Group # WSCF120970

Sample # 120970001
SAF# F12-032
Sample ID B2LT71

Matrix SOIL
Sampled 07/26/12
Received 07/26/12

Test Performed	CAS #	Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
Uranium	7440-61-1	LA-505-412		0.493		mg/kg	0.5	0.028	0.14	08/06/12
Arsenic	7440-38-2	LA-505-412		2.46		mg/kg	0.5	0.11	1.1	08/06/12
Selenium	7782-49-2	LA-505-412	U	<0.28		mg/kg	0.5	0.28	2.8	08/06/12
Preparation for Cr6 (SO)										**07/30/12**
Hexavalent chromium										
Hexavalent chromium	18540-29-9	LA-265-403	U	<0.098		ug/g	1	0.098	0.49	07/31/12

MDL = Minimum Detection Limit
RQ = Result Qualifier
TP Err = Total Propagated Error
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 Scot Fitzgerald
Department Inorganic

Group # WSCF120970

Sample # 120970002
SAF# F12-032
Sample ID B2LT72

Matrix SOIL
Sampled 07/26/12
Received 07/26/12

Test Performed	CAS #	Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
Uranium	7440-61-1	LA-505-412		0.745		mg/kg	0.5	0.029	0.14	08/06/12
Arsenic	7440-38-2	LA-505-412		23.7		mg/kg	0.5	0.12	1.2	08/06/12
Selenium	7782-49-2	LA-505-412	U	<0.29		mg/kg	0.5	0.29	2.9	08/06/12
Preparation for Cr6 (SO)										**07/30/12**
Hexavalent chromium										
Hexavalent chromium	18540-29-9	LA-265-403		0.761		ug/g	1	0.11	0.54	07/31/12

MDL = Minimum Detection Limit
RQ = Result Qualifier
TP Err = Total Propagated Error
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 Scot Fitzgerald
Department Inorganic

Group # WSCF120970

Sample # 120970003
SAF# F12-032
Sample ID B2LT73

Matrix SOIL
Sampled 07/26/12
Received 07/26/12

Test Performed	CAS #	Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
Uranium	7440-61-1	LA-505-412		0.639		mg/kg	0.5	0.025	0.13	08/06/12
Arsenic	7440-38-2	LA-505-412		6.59		mg/kg	0.5	0.10	1.0	08/06/12
Selenium	7782-49-2	LA-505-412	B	0.253		mg/kg	0.5	0.25	2.5	08/06/12
Preparation for Cr6 (SO)										**07/30/12**
Hexavalent chromium										
Hexavalent chromium	18540-29-9	LA-265-403	B	0.442		ug/g	1	0.11	0.53	07/31/12

MDL = Minimum Detection Limit
RQ = Result Qualifier
TP Err = Total Propagated Error
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 Scot Fitzgerald
Department Inorganic

Group # WSCF120970

Sample # 120970004
SAF# F12-032
Sample ID B2LT76

Matrix SOIL
Sampled 07/26/12
Received 07/26/12

Test Performed	CAS #	Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
Uranium	7440-61-1	LA-505-412		0.478		mg/kg	0.5	0.025	0.12	08/06/12
Arsenic	7440-38-2	LA-505-412		2.71		mg/kg	0.5	0.099	0.99	08/06/12
Selenium	7782-49-2	LA-505-412	U	<0.25		mg/kg	0.5	0.25	2.5	08/06/12
Preparation for Cr6 (SO)										**07/30/12**
Hexavalent chromium										
Hexavalent chromium	18540-29-9	LA-265-403	U	<0.10		ug/g	1	0.10	0.51	07/31/12

MDL = Minimum Detection Limit
RQ = Result Qualifier
TP Err = Total Propagated Error
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 Scot Fitzgerald
Department Inorganic

Group # WSCF120970

Sample # 120970005
SAF# F12-032
Sample ID B2LT79

Matrix SOIL
Sampled 07/26/12
Received 07/26/12

Test Performed	CAS #	Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
Uranium	7440-61-1	LA-505-412	B	0.119		mg/kg	0.5	0.023	0.12	08/06/12
Arsenic	7440-38-2	LA-505-412	B	0.161		mg/kg	0.5	0.092	0.92	08/06/12
Selenium	7782-49-2	LA-505-412	U	<0.23		mg/kg	0.5	0.23	2.3	08/06/12
Preparation for Cr6 (SO)										**08/02/12**
Hexavalent chromium										
Hexavalent chromium	18540-29-9	LA-265-403	U	<0.097		ug/g	1	0.097	0.49	08/02/12

MDL = Minimum Detection Limit
RQ = Result Qualifier
TP Err = Total Propagated Error
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 Scot Fitzgerald
Department Inorganic

Group # WSCF120970

Sample # 120970006
SAF# F12-032
Sample ID B2LT80

Matrix SOIL
Sampled 07/26/12
Received 07/26/12

Test Performed	CAS #	Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
Uranium	7440-61-1	LA-505-412		0.706		mg/kg	0.5	0.028	0.14	08/06/12
Arsenic	7440-38-2	LA-505-412		24.5		mg/kg	0.5	0.11	1.1	08/06/12
Selenium	7782-49-2	LA-505-412	U	<0.28		mg/kg	0.5	0.28	2.8	08/06/12
Preparation for Cr6 (SO)										**08/02/12**
Hexavalent chromium										
Hexavalent chromium	18540-29-9	LA-265-403		0.943		ug/g	1	0.11	0.55	08/02/12

MDL = Minimum Detection Limit
RQ = Result Qualifier
TP Err = Total Propagated Error
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
WSCF120970

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), Master Contract 39818, Revision 3, "Laboratory Analytical Services to CHPRC Soil and Groundwater Remediation Project."*

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, C, D, J and U) 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.
- **C** – Analyte was detected in the blank and was evaluated. Affected sample results in the batch were C flagged (applies to inorganic and wet chemical analyses).
- **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.
- **B (organic analyses)** – Analyte was detected in the blank and was evaluated. Affected sample results in the batch were B flagged.
- **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

Attachment 2
Narrative
WSCF120970

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):

- Copper was detected in the Blank and evaluated.
- All other applicable QC controls are within the established limits.

Organic Comments

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

- Ethylene Glycol - was detected in the Blank. Affected sample results in this batch were "B" Flagged.
- Samples B2LT72 (120970002), B2LT73 (120970003), B2LT76 (120970004) and the MSD did not meet the acceptance limits for surrogate 2-Methylcyclohexanol. Sample results were not flagged. The quality control report was flagged for surrogate recovery failure.
- Ethylene Glycol did not meet the MSD acceptance limits due to a low spike of Internal Standard. Sample results for this analytes were "T" Flagged.
- Ethylene Glycol did not meet the MS / MSD RPD acceptance limits due to a low spike of Internal Standard. Sample results for this analyte were not flagged. The quality control report was flagged for RPD failure.
- All other applicable QC controls are within the established limits.

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			F12-032-001	PAGE 1 OF 1
COLLECTOR: KC Patterson CHPRC	COMPANY CONTACT: TRENT, SJ	TELEPHONE NO.: 373-5869	PROJECT COORDINATOR: TRENT, SJ	PRICE CODE: 8C	DATA TURNAROUND
SAMPLING LOCATION: 105-KE Water Tunnel Sample #1	PROJECT DESIGNATION: 105-KE Water Tunnel and 100-K-79 Verification Soil Sampling		SAF NO.: F12-032	AIR QUALITY: ☐	15 Days / 15 Days
ICE CHEST NO.: GWS-200	FIELD LOGBOOK NO.: HNF-N 507.25	ACTUAL SAMPLE DEPTH: 3'-5'	COA: 302634ES10	METHOD OF SHIPMENT: GOVERNMENT VEHICLE	ORIGINAL
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: 120970

PRESERVATION	Cool~4C	Cool~4C	Cool~4C
HOLDING TIME	14 Days	28 Days	30 Days
TYPE OF CONTAINER	G	G/P	aG
NO. OF CONTAINER(S)	1	1	1
VOLUME	250mL	120mL	60mL
SAMPLE ANALYSIS	SEE ITEM (1) IN SPECIAL INSTRUCTIONS	SEE ITEM (2) IN SPECIAL INSTRUCTIONS	Chromium Hex - 7196;

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME			
B2LT71	SOIL	JUL 26 2012	0737	✓	✓	✓

TRVL-12-069

CHAIN OF POSSESSION		SIGN/ PRINT NAMES		SPECIAL INSTRUCTIONS
RELINQUISHED BY/REMOVED FROM: KC Patterson CHPRC	DATE/TIME: JUL 26 2012 0920	RECEIVED BY/STORED IN: TA Fnszla	DATE/TIME: JUL 26 2012 0920	SH 7/25/12 ** ~~The CACN for all analytical work at WSCF laboratory for the 105-KE Water Tunnel and100-K-79 are ctill being determined. They will updated as soon as received.~~ ☐☐** The 100 Area S&GRP Characterization and Monitoring Sampling and Analysis GKI applies to this SAF. (1) Alcohols, Glycols, & Ketones - 8015 {Ethylene glycol}; (2) 200.8_HG - ICPMS; ICP/MS - 200.8 (TAL) {Antimony, Barium, Cadmium, Chromium, Cobalt, Copper, Manganese, Nickel, Silver, Vanadium, Zinc}; ICP/MS - 200.8 (Add-on) {Arsenic, Beryllium, Lead, Molybdenum, Selenium, Strontium, Tin, Uranium}; The CACN for WSCF Analytical is 403396E520. SH 7/25/12
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	

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

PRINTED ON 7/2/2012

A-6003-618 (REV 2)

CH2MHill Plateau Remediation Company	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		F12-032-002	PAGE 1 OF 1
COLLECTOR: KC Patterson CHPRC	COMPANY CONTACT: TRENT, SJ	TELEPHONE NO.: 373-5869	PROJECT COORDINATOR: TRENT, SJ	PRICE CODE: 8C; DATA TURNAROUND: 15 Days / 15 Days
SAMPLING LOCATION: 105-KE Water Tunnel Sample #2	PROJECT DESIGNATION: 105-KE Water Tunnel and 100-K-79 Verification Soil Sampling		SAF NO.: F12-032	AIR QUALITY: ☐
ICE CHEST NO.: GWS-200	FIELD LOGBOOK NO.: HNF-N-507-25	ACTUAL SAMPLE DEPTH: 3'-5'	COA: 302634ES10	METHOD OF SHIPMENT: GOVERNMENT VEHICLE; ORIGINAL
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	Cool~4C	Cool~4C	Cool~4C		
HOLDING TIME	14 Days	28 Days	30 Days		
TYPE OF CONTAINER	G	G/P	aG		
NO. OF CONTAINER(S)	1	1	1		
VOLUME	250mL	120mL	60mL		
SAMPLE ANALYSIS	SEE ITEM (1) IN SPECIAL INSTRUCTIONS	SEE ITEM (2) IN SPECIAL INSTRUCTIONS	Chromium Hex - 7196;		
SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME		
B2LT72	2 SOIL	JUL 26 2012	0745	✓	✓ ✓

TRVL 12 - 069

CHAIN OF POSSESSION		SIGN/ PRINT NAMES	
RELINQUISHED BY/REMOVED FROM: KC Patterson CHPRC	DATE/TIME: JUL 26 2012 0920	RECEIVED BY/STORED IN: TA Fuerza Tess. Fz	DATE/TIME: JUL 26 2012 0920
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 CACN for all analytical work at WSCF laboratory for the 105-KE Water Tunnel and100-K-79 are stilll being determined. They will updated as soon as received.~~ ☐☐** The 100 Area S&GRP Characterization and Monitoring Sampling and Analysis GKI applies to this SAF.
(1) Alcohols, Glycols, & Ketones - 8015 {Ethylene glycol};
(2) 200.8_HG - ICPMS; ICP/MS - 200.8 (TAL) {Antimony, Barium, Cadmium, Chromium, Cobalt, Copper, Manganese, Nickel, Silver, Vanadium, Zinc}; ICP/MS - 200.8 (Add-on) {Arsenic, Beryllium, Lead, Molybdenum, Selenium, Strontium, Tin, Uranium};
The CACN for all analytical work at WSCF laboratory is 403396 E520.

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

PRINTED ON 7/2/2012

A-6003-618 (REV 2)

CH2MHill Plateau Remediation Company	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST			F12-032-003	PAGE 1 OF 1
COLLECTOR KC Patterson CHPRC	**COMPANY CONTACT** TRENT, SJ	**TELEPHONE NO.** 373-5889	**PROJECT COORDINATOR** TRENT, SJ	**PRICE CODE** 8C	**DATA TURNAROUND**
SAMPLING LOCATION 105 KE Water Tunnel Sample #3	**PROJECT DESIGNATION** 105-KE Water Tunnel and 100-K-79 Verification Soil Sampling		**SAF NO.** F12-032	**AIR QUALITY** ☐	15 Days / 15 Days
ICE CHEST NO. GWS-200	**FIELD LOGBOOK NO.** HNF-N-507-25	**ACTUAL SAMPLE DEPTH** 3'-5'	**COA** 302534ES10	**METHOD OF SHIPMENT** GOVERNMENT VEHICLE	**ORIGINAL**
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	Cool~4C	Cool~4C	Cool~4C
HOLDING TIME	14 Days	28 Days	30 Days
TYPE OF CONTAINER	G	G/P	aG
NO. OF CONTAINER(S)	1	1	1
VOLUME	250mL	120mL	60mL
SAMPLE ANALYSIS	SEE ITEM (1) IN SPECIAL INSTRUCTIONS	SEE ITEM (2) IN SPECIAL INSTRUCTIONS	Chromium Hex - 7196;
SAMPLE NO. / **MATRIX*** / **SAMPLE DATE** / **SAMPLE TIME**			
B2LT73 3	SOIL	JUL 26 2012 0758	✓	✓	✓

TRVL-12-069

CHAIN OF POSSESSION		SIGN/ PRINT NAMES	
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
KC Patterson CHPRC	JUL 26 2012 0920	TA Frazier	JUL 26 2012 0920
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

9# 7/25/12

~~** The CACN for all analytical work at WSCF laboratory for the 105-KE Water Tunnel and 100-K-79 are still being determined. They will updated as soon as received.~~ ☐☐** The 100 Area S&GRP Characterization and Monitoring Sampling and Analysis GKI applies to this SAF.

(1) Alcohols, Glycols, & Ketones - 8015 {Ethylene glycol};

(2) 200.8_HG - ICPMS; ICP/MS - 200.8 (TAL) {Antimony, Barium, Cadmium, Chromium, Cobalt, Copper, Manganese, Nickel, Silver, Vanadium, Zinc}; ICP/MS - 200.8 (Add-on) {Arsenic, Beryllium, Lead, Molybdenum, Selenium, Strontium, Tin, Uranium};

The CACN for all analytical work at WSCF laboratory is 403390E320.

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

PRINTED ON 7/2/2012

A-6003-618 (REV 2)

CH2MHill Plateau Remediation Company	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		F12-032-006	PAGE 1 OF 1
COLLECTOR: KC Patterson CHPRC	COMPANY CONTACT: TRENT, SJ	TELEPHONE NO.: 373-5869	PROJECT COORDINATOR: TRENT, SJ	PRICE CODE: 8C; DATA TURNAROUND: 15 Days / 15 Days
SAMPLING LOCATION: 100-K-79 Sample #1	PROJECT DESIGNATION: 105-KE Water Tunnel and 100-K-79 Verification Soil Sampling		SAF NO.: F12-032	AIR QUALITY: ☐
ICE CHEST NO.: GWS-200	FIELD LOGBOOK NO.: HNF-N-507-25	ACTUAL SAMPLE DEPTH: SURFACE.	COA: 302677ES10	METHOD OF SHIPMENT: GOVERNMENT VEHICLE; ORIGINAL
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	Cool~4C	Cool~4C	Cool~4C	
HOLDING TIME	14 Days	28 Days	30 Days	
TYPE OF CONTAINER	G	G/P	aG	
NO. OF CONTAINER(S)	1	1	1	
VOLUME	250mL	120mL	60mL	
SAMPLE ANALYSIS	See ITEM (1) IN SPECIAL INSTRUCTIONS	See ITEM (2) IN SPECIAL INSTRUCTIONS	Chromium Hex - 7196;	
SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME	
B2LT76 4	SOIL	JUL 26 2012	0811	✓ ✓ ✓

TRVL-12-069

CHAIN OF POSSESSION		SIGN/ PRINT NAMES	
RELINQUISHED BY/REMOVED FROM: KC Patterson CHPRC	DATE/TIME: JUL 26 2012 0920	RECEIVED BY/STORED IN: TA Frazier	DATE/TIME: JUL 26 2012 0920
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 CACN for all analytical work at WSCF laboratory for the 105-KE Water Tunnel and 100-K-79 are still being determined. They will updated as soon as received.☐☐~~** The 100 Area S&GRP Characterization and Monitoring Sampling and Analysis GKI applies to this SAF.
(1) Alcohols, Glycols, & Ketones - 8015 {Ethylene glycol};
(2) 200.8_HG - ICPMS; ICP/MS - 200.8 (TAL) {Antimony, Barium, Cadmium, Chromium, Cobalt, Copper, Manganese, Nickel, Silver, Vanadium, Zinc}; ICP/MS - 200.8 (Add-on) {Arsenic, Beryllium, Lead, Molybdenum, Selenium, Strontium, Tin, Uranium};

The CACN for all analytical work at WSCF laboratory is 402580ES20.

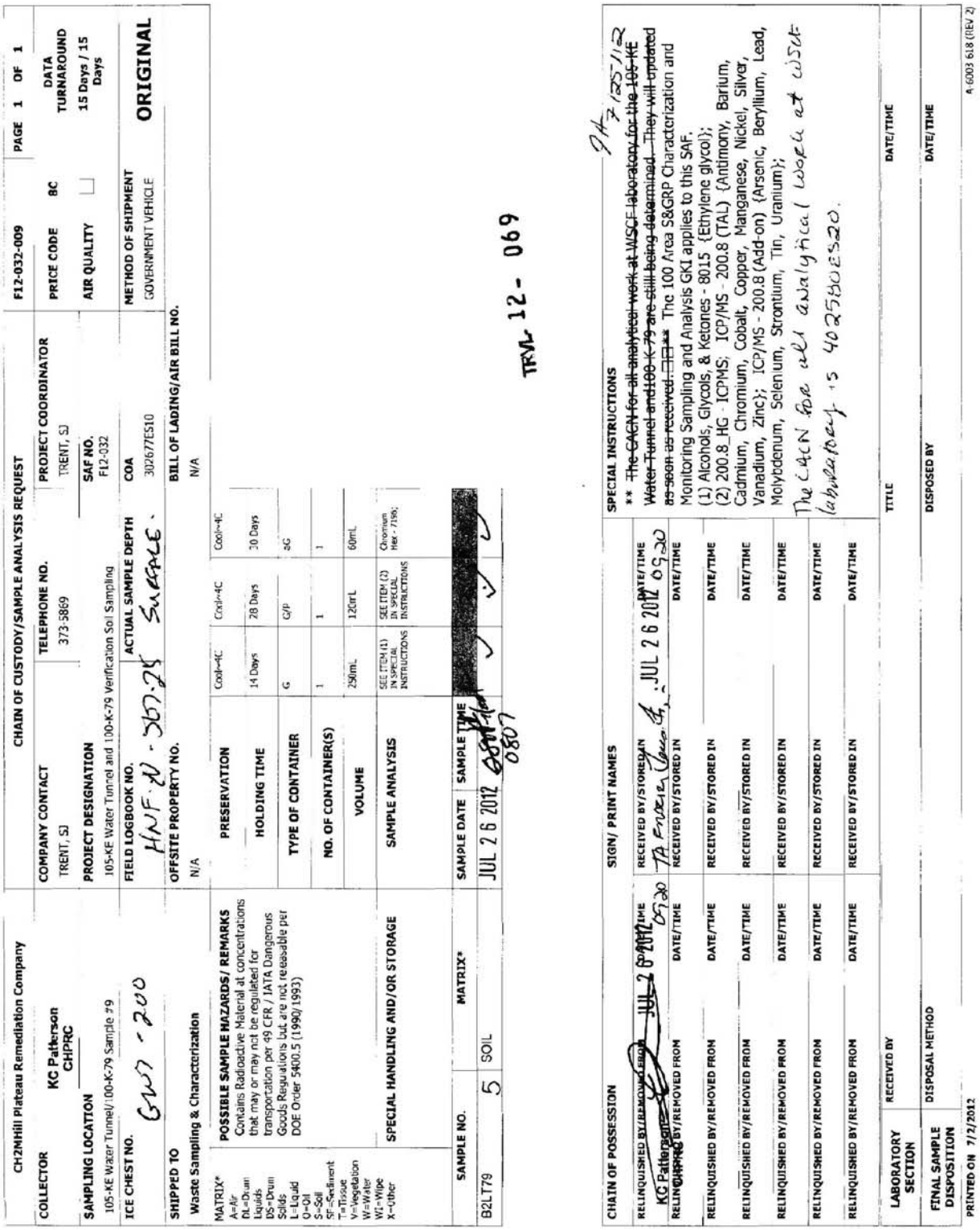
LABORATORY SECTION	RECEIVED BY	TITLE	DATE/TIME
FINAL SAMPLE DISPOSITION	DISPOSAL METHOD	DISPOSED BY	DATE/TIME

PRINTED ON 7/2/2012

A-6003-618 (REV 2)

Sample Receipt

Chain of Custody



CH2NHill Plateau Remediation Company

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

F12-032-009

PAGE 1 OF 1

COLLECTOR: KC Patterson CHPRC

COMPANY CONTACT: TRENT, SJ

TELEPHONE NO.: 373-5869

PROJECT COORDINATOR: TRENT, SJ

PRICE CODE: 8C

DATA TURNAROUND: 15 Days / 15 Days

SAMPLING LOCATION: 105-KE Water Tunnel/ 100-K-79 Sample #9

PROJECT DESIGNATION: 105-KE Water Tunnel and 100-K-79 Verification Soil Sampling

SAF NO.: F12-032

AIR QUALITY: ☐

ICE CHEST NO.: Grab - 200

FIELD LOGBOOK NO.: HNF-W-357-25

ACTUAL SAMPLE DEPTH: Surface.

COA: 302677ES10

METHOD OF SHIPMENT: GOVERNMENT VEHICLE

ORIGINAL

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)

	PRESERVATION	Cool=4C	Cool=4C	Cool=4C	
	HOLDING TIME	14 Days	28 Days	30 Days	
	TYPE OF CONTAINER	G	G/P	AG	
	NO. OF CONTAINER(S)	1	1	1	
	VOLUME	250mL	125mL	60mL	
SPECIAL HANDLING AND/OR STORAGE	SAMPLE ANALYSIS	SEE ITEM (1) IN SPECIAL INSTRUCTIONS	SEE ITEM (2) IN SPECIAL INSTRUCTIONS	Chromium Hex - 7199;	

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME			
B2LT79	5 SOIL	JUL 26 2012	0807	[redacted]	✓	✓

TRK 12-069

CHAIN OF POSSESSION

SIGN/ PRINT NAMES

RELINQUISHED BY/REMOVED FROM KC Patterson	DATE/TIME JUL 26 2012 0930	RECEIVED BY/STORED IN TA Ernest Chase	DATE/TIME JUL 26 2012 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
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 CACN for all analytical work at WSCF laboratory for the 105-KE Water Tunnel and 100-K-79 are still being determined. They will updated as soon as received.~~ **** The 100 Area S&GRP Characterization and Monitoring Sampling and Analysis GKI applies to this SAF.
(1) Alcohols, Glycols, & Ketones - 8015 {Ethylene glycol};
(2) 200.8_HG - ICPMS; ICP/MS - 200.8 (TAL) {Antimony, Barium, Cadmium, Chromium, Cobalt, Copper, Manganese, Nickel, Silver, Vanadium, Zinc}; ICP/MS - 200.8 (Add-on) {Arsenic, Beryllium, Lead, Molybdenum, Selenium, Strontium, Tin, Uranium};
The CACN for analytical work at WSCF laboratory is 402530E520.

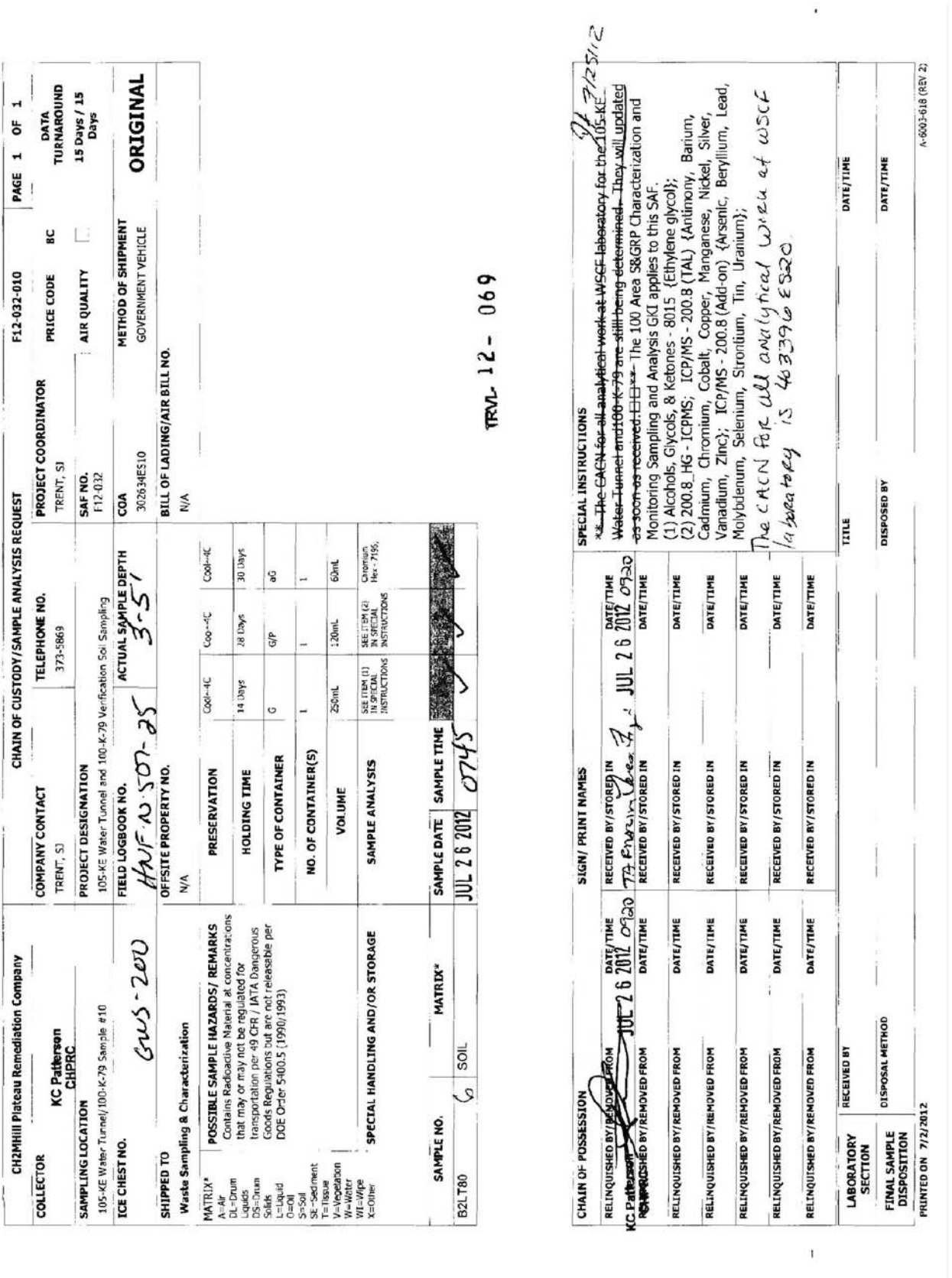
LABORATORY SECTION	RECEIVED BY	TITLE	DATE/TIME
FINAL SAMPLE DISPOSITION	DISPOSAL METHOD	DISPOSED BY	DATE/TIME

PRINTED ON 7/2/2012

A-6003-618 (REV 2)

Sample Receipt

Chain of Custody



CH2MHill Plateau Remediation Company

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

F12-032-010

PAGE 1 OF 1

COLLECTOR: KC Patterson CHPRC

COMPANY CONTACT: TRENT, SJ

TELEPHONE NO.: 373-5869

PROJECT COORDINATOR: TRENT, SJ

PRICE CODE:

BC:

DATA TURNAROUND: 15 Days / 15 Days

SAMPLING LOCATION: 105-KE Water Tunnel/100-K-79 Sample #10

PROJECT DESIGNATION: 105-KE Water Tunnel and 100-K-79 Verification Soil Sampling

SAF NO.: F12-032

AIR QUALITY:

ICE CHEST NO.: GWS-2010

FIELD LOGBOOK NO.: HNF-N-307-25

ACTUAL SAMPLE DEPTH: 3-5'

COA: 302634ES10

METHOD OF SHIPMENT: GOVERNMENT VEHICLE

ORIGINAL

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)

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME	PRESERVATION	HOLDING TIME	TYPE OF CONTAINER	NO. OF CONTAINER(S)	VOLUME	SAMPLE ANALYSIS
B2LT80	S SOIL	JUL 26 2012	0745	Cool--4C	14 Days	G	1	250mL	SEE ITEM (1) IN SPECIAL INSTRUCTIONS
				Cool--4C	28 Days	G/P	1	120mL	SEE ITEM (2) IN SPECIAL INSTRUCTIONS
				Cool--4C	30 Days	aG	1	60mL	Chromium, Hex - 7196;

SPECIAL HANDLING AND/OR STORAGE

TRU-12-069

CHAIN OF POSSESSION

SIGN/ PRINT NAMES

RELINQUISHED BY/REMOVED FROM: KC Patterson — DATE/TIME: JUL 26 2012 0930

RECEIVED BY/STORED IN: TA Enyinya Ukea — DATE/TIME: JUL 26 2012 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

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 CACN for all analytical work at WSCF laboratory for the 105-KE Water Tunnel and 100-K-79 are still being determined. They will updated as soon as received.~~ ** The 100 Area S&GRP Characterization and Monitoring Sampling and Analysis GKI applies to this SAF.

(1) Alcohols, Glycols, & Ketones - 8015 (Ethylene glycol);
(2) 200.8_HG - ICPMS; ICP/MS - 200.8 (TAL) (Antimony, Barium, Cadmium, Chromium, Cobalt, Copper, Manganese, Nickel, Silver, Vanadium, Zinc); ICP/MS - 200.8 (Add-on) (Arsenic, Beryllium, Lead, Molybdenum, Selenium, Strontium, Tin, Uranium);

The CACN for analytical work at WSCF laboratory is 403396 ESQD

LABORATORY SECTION: RECEIVED BY — TITLE — DATE/TIME

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

PRINTED ON 7/2/2012

A-6003-618 (REV 2)

Appendix 5

Data Validation Supporting Documentation

Data Validation for Chemical Analyses

Published Date: 08/16/10 Effective Date: 08/16/10

VALIDATION LEVEL:	A	B	(C)	D	E
PROJECT: 100-K			DATA PACKAGE: VSR12-025		
VALIDATOR: Eyda Hergenreder		LAB: WSCF		DATE: 08-22-2012	
			SDG: WSCF120970		
ANALYSES PERFORMED					
Anions/IC	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 Soil samples

SDG WSCF120970: B2LT71; B2LT72; B2LT73; B2LT76; B2LT79; B2LT80

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

More

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:

Comments (attach additional sheets as necessary):

More

Appendix 6

Additional Documentation Requested By Client

Batch QC List

Attention Scot Fitzgerald
Department Inorganic

Group # WSCF120970

QC Batch	Analytical Batch	S#	Type	Sample #	Client Sample#	Original	Test
205419	205501	3	BLANK	79109	BLANK		Hexavalent chromium
205419	205501	4	LCS	79110	LCS		Hexavalent chromium
205419	205501	5	DUP	79111	B2LWH7(120938004DUP	120938004	Hexavalent chromium
205419	205501	6	MS	79112	B2LWH7(120938004MS)	120938004	Hexavalent chromium
205419	205501	7	PSTSPK	79113	PSTSPK		Hexavalent chromium
205419	205501	8	IMS	79114	B2LWH7(120938004IMS)	120938004	Hexavalent chromium
205419	205501	26	SAMPLE	120970001	B2LT71		Hexavalent chromium
205419	205501	27	SAMPLE	120970002	B2LT72		Hexavalent chromium
205419	205501	28	SAMPLE	120970003	B2LT73		Hexavalent chromium
205419	205501	29	SAMPLE	120970004	B2LT76		Hexavalent chromium
205707	205811	4	BLANK	79246	BLANK		ICP-2008 MS All possible metal
205707	205811	5	LCS	79247	LCS		ICP-2008 MS All possible metal
205707	205811	7	MS	79248	B2LWJ9(120950010MS)	120950010	ICP-2008 MS All possible metal
205707	205811	8	MSD	79249	B2LWJ9(120950010MSD)	120950010	ICP-2008 MS All possible metal
205707	205811	11	SAMPLE	120970001	B2LT71		ICP-2008 MS All possible metal
205707	205811	12	SAMPLE	120970002	B2LT72		ICP-2008 MS All possible metal
205707	205811	13	SAMPLE	120970003	B2LT73		ICP-2008 MS All possible metal
205707	205811	14	SAMPLE	120970004	B2LT76		ICP-2008 MS All possible metal
205707	205811	15	SAMPLE	120970005	B2LT79		ICP-2008 MS All possible metal
205707	205811	16	SAMPLE	120970006	B2LT80		ICP-2008 MS All possible metal
205707	205820	6	MSD	79249	B2LWJ9(120950010MSD)	120950010	ICP-2008 MS All possible metal
205707	205820	7	MS	79248	B2LWJ9(120950010MS)	120950010	ICP-2008 MS All possible metal
205707	205820	9	LCS	79247	LCS		ICP-2008 MS All possible metal

Batch QC List

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QC Batch	Analytical Batch	S#	Type	Sample #	Client Sample#	Original	Test
205707	205820	10	BLANK	79246	BLANK		ICP-2008 MS All possible metal
205707	205820	12	SAMPLE	120970006	B2LT80		ICP-2008 MS All possible metal
205707	205820	13	SAMPLE	120970005	B2LT79		ICP-2008 MS All possible metal
205707	205820	14	SAMPLE	120970004	B2LT76		ICP-2008 MS All possible metal
205707	205820	15	SAMPLE	120970003	B2LT73		ICP-2008 MS All possible metal
205707	205820	16	SAMPLE	120970002	B2LT72		ICP-2008 MS All possible metal
205707	205820	17	SAMPLE	120970001	B2LT71		ICP-2008 MS All possible metal
205709	205710	3	BLANK	79253	BLANK		Hexavalent chromium
205709	205710	4	LCS	79254	LCS		Hexavalent chromium
205709	205710	5	DUP	79255	B2LT79(120970005DUP)	120970005	Hexavalent chromium
205709	205710	6	MS	79256	B2LT79(120970005MS)	120970005	Hexavalent chromium
205709	205710	7	PSTSPK	79257	PSTSPK		Hexavalent chromium
205709	205710	8	IMS	79258	B2LT79(120970005IMS)	120970005	Hexavalent chromium
205709	205710	9	SAMPLE	120970005	B2LT79		Hexavalent chromium
205709	205710	10	SAMPLE	120970006	B2LT80		Hexavalent chromium

Quality Control Report

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Group # WSCF120970

Analytical Batch 205501 (QC Batch: 205419) **Test** Hexavalent chromium
Associated Samples 120970001, 120970002, 120970003, 120970004

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit		RQ	Analyzed
BLANK			**QC Sample #79109**								
Hexavalent chromium	18540-29-9		<0.098	ug/g						U	07/31/12
LCS			**QC Sample #79110**								
Hexavalent chromium	18540-29-9		3.89	ug/g	99.9	80 - 120					07/31/12
DUP			**QC Sample #79111**								
			Original 120938004								
Hexavalent chromium	18540-29-9		<0.099	ug/g			57.70	30	*	U	07/31/12
MS			**QC Sample #79112**								
			Original 120938004								
Hexavalent chromium	18540-29-9		3.18	ug/g	81.6	75 - 125					07/31/12
PSTSPK			**QC Sample #79113**								
Hexavalent chromium	18540-29-9		0.0496	ug/g	99.2	85 - 115					07/31/12
IMS			**QC Sample #79114**								
			Original 120938004								
Hexavalent chromium	18540-29-9		382	ug/g	84.1	75 - 125				D	07/31/12

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

Quality Control Report

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Group # WSCF120970

Analytical Batch 205710 (QC Batch: 205709) **Test** Hexavalent chromium
Associated Samples 120970005, 120970006

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
BLANK			**QC Sample #79253**							
Hexavalent chromium	18540-29-9		<0.097	ug/g					U	08/02/12
LCS			**QC Sample #79254**							
Hexavalent chromium	18540-29-9		3.93	ug/g	101.9	80 - 120				08/02/12
DUP			**QC Sample #79255**							
			Original 120970005							
Hexavalent chromium	18540-29-9	<0.097	<0.097	ug/g			26.80	30	U	08/02/12
MS			**QC Sample #79256**							
			Original 120970005							
Hexavalent chromium	18540-29-9	<0.097	3.95	ug/g	101.9	75 - 125				08/02/12
PSTSPK			**QC Sample #79257**							
Hexavalent chromium	18540-29-9		0.0483	ug/g	96.6	85 - 115				08/02/12
IMS			**QC Sample #79258**							
			Original 120970005							
Hexavalent chromium	18540-29-9	<0.097	359	ug/g	94.7	75 - 125			D	08/02/12

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