

NOVEMBER 21, 2013

WSCF Laboratory

PO Box 650 S3-30
Richland, WA 99352



November 21, 2013

Scot Fitzgerald
CH2M-HILL PRC
PO Box 1600
Richland, WA 99352

Dear Scot Fitzgerald,

FINAL RESULT FOR SAMPLE DELIVERY GROUP WSCF131201

Reference: (1) SOW, Mod 2, #36587, Release 3
(2) MSC-SD-CD-QAPP-017, current version, Waste Sampling & Characterization Facility Quality Assurance Program Plan

This letter contains the following information for sample delivery group WSCF131201

- * Cover Sheet (Attachment 1)
- * Narrative (Attachment 2)
- * Analytical Results (Attachment 3)
- * Sample Receipt Information (Attachment 4)

Very truly yours,

A handwritten signature in black ink, appearing to read "Joseph Hale", is positioned above the typed name.

Electronically signed by Joseph Hale

For Lab Manager, Dan T. Smith

WSCF Analytical Lab

(509) 373-4804

Attachments 4

CC: w/Attachments

File/LB

ATTACHMENT 1

COVER SHEET

Consisting of 2 pages
Including cover page

WSCF SAF Number Cross Reference

Group # WSCF131201
Data Deliverable Date 11/25/13

SAF #	Sample ID	Sample #	Matrix	Sampled	Received
X14-001	B2RCP0	131201001	WATER	10/22/13	10/22/13
X14-001	B2RCN9	131201002	WATER	10/22/13	10/22/13
X14-001	B2RCP1	131201003	WATER	10/22/13	10/22/13
X14-001	B2RCP2	131201004	WATER	10/22/13	10/22/13

ATTACHMENT 2

NARRATIVE

Consisting of 3 pages
Including cover page

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), to Contract 39818, Revision 4, "WSCF ANALYTICAL SERVICES FOR GROUNDWATER."*

The narrative (Attachment 2) will address sample characteristics, analyses requested and general information in performance of the analytical methods. A Data Summary Report (Attachment 3) includes analytical results, a comment report detailing method abnormalities, tentatively identified peaks if applicable, method references, and Laboratory QC information as applicable. Copies of the chain of custody and sample receipt documentation are included as Attachment 4.

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

The following generic data qualifiers (i.e., B, 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.
- **o** – LCS recovery outside established laboratory acceptance limits.

Analytical Methodology for Requested Analyses

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

Inorganic Comments

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

- All applicable QC controls are within the established limits.

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

- All applicable QC controls are within the established limits.

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

- All applicable QC controls are within the established limits.

Radiochemistry Comments

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

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

Strontium-89/90:

- All applicable QC controls are within the established limits.

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

ATTACHMENT 3

ANALYTICAL RESULTS

Consisting of 23 pages
Including cover page

NOVEMBER 21, 2013

WSCF ANALYTICAL RESULTS REPORT

For

CH2M Hill Plateau Remediation

PO Box 1600
Richland, WA 99352

Attention: Scot Fitzgerald

Contract # MOA-FH-CHPRC-2008
Group # WSCF131201
Report Date November 21, 2013

Analytical: Electronically signed by Joseph Hale

Client Services: Electronically signed by Heather Medley

Solid samples results that have a 'Percent Solid' test are reported on a "dry weight basis", except results of TCLP, Percent Solid, and Total Activity. If no 'Percent Solid' test is reported then the results are reported on an "as received" basis.

This information is intended for the use of the addressee only. If the reader of this report is not the intended recipient or is not authorized by the recipient to receive the report, you are hereby notified that any dissemination, distribution or copying of this report is strictly prohibited. If you have received this report in error, please notify WSCF Laboratory immediately by telephone at (509) 373-7005. Information designation of this report is the responsibility of the customer.

Batch QC List

Attention Scot Fitzgerald
 Department Inorganic

Group # WSCF131201

QC Batch	Analytical Batch	S#	Type	Sample #	Client Sample#	Original	Test
222544	222544	1	BLANK	99851	BLANK		Hexavalent chromium Discrete Analyzer
222544	222544	3	LCS	99853	LCS		Hexavalent chromium Discrete Analyzer
222544	222544	4	DUP	99854	B2RCP0(131201001DUP)	131201001	Hexavalent chromium Discrete Analyzer
222544	222544	5	MS	99855	B2RCP0(131201001MS)	131201001	Hexavalent chromium Discrete Analyzer
222544	222544	6	SAMPLE	131201001	B2RCP0		Hexavalent chromium Discrete Analyzer
222554	222720	5	BLANK	99874	BLANK		ICP-6010 - All possible metals
222554	222720	7	LCS	99876	LCS		ICP-6010 - All possible metals
222554	222720	9	MS	99877	B2R5C2(131199005MS)	131199005	ICP-6010 - All possible metals
222554	222720	10	MSD	99878	B2R5C2(131199005MSD)	131199005	ICP-6010 - All possible metals
222554	222720	26	SAMPLE	131201003	B2RCP1		ICP-6010 - All possible metals
222554	222720	27	SAMPLE	131201004	B2RCP2		ICP-6010 - All possible metals
222568	222568	2	BLANK	99912	BLANK		Anions by Ion Chromatography (Water)
222568	222568	3	LCS	99913	LCS		Anions by Ion Chromatography (Water)
222568	222568	4	MS	99914	B2RCN9(131201002MS)	131201002	Anions by Ion Chromatography (Water)
222568	222568	5	MSD	99915	B2RCN9(131201002MSD)	131201002	Anions by Ion Chromatography (Water)
222568	222568	12	SAMPLE	131201002	B2RCN9		Anions by Ion Chromatography (Water)

Batch QC List

Attention Scot Fitzgerald
 Department Radiochemistry

Group # WSCF131201

QC Batch	Analytical Batch	S#	Type	Sample #	Client Sample#	Original	Test
222565	223394	1	BLANK	99905	BLANK		Strontium 89/90 (GPC/GEA)
222565	223394	2	LCS	99906	LCS		Strontium 89/90 (GPC/GEA)
222565	223394	3	DUP	99907	B2R504(131199015DUP)	131199015	Strontium 89/90 (GPC/GEA)
222565	223394	6	SAMPLE	131201003	B2RCP1		Strontium 89/90 (GPC/GEA)

Batch QC List

Attention Scot Fitzgerald
 Department Wet Chemistry

Group # WSCF131201

QC Batch	Analytical Batch	S#	Type	Sample #	Client Sample#	Original	Test
222589	222589	1	LCS	100000	LCS		Total Alkalinity as mg/L CaCO3 (Water)
222589	222589	2	DUP	100001	B2R571(131199010DUP)	131199010	Total Alkalinity as mg/L CaCO3 (Water)
222589	222589	6	SAMPLE	131201003	B2RCP1		Total Alkalinity as mg/L CaCO3 (Water)
222589	222589	13	LCS	100002	LCS		Total Alkalinity as mg/L CaCO3 (Water)
222589	222589	19	LCS	100003	LCS		Total Alkalinity as mg/L CaCO3 (Water)

Method Reference

Attention Scot Fitzgerald
 Department Inorganic

Group # WSCF131201

The results provided in this report were generated using the following WSCF Laboratory procedures. For your convenience, this table provides a listing of the regulatory, industry methods or HEIS methods that are referenced by each of these WSCF procedures. Please note that the most recent version of the regulatory or industry method is listed here even though WSCF procedure may reference an older version of the method. Also, a reference to a regulatory or industry method here does not necessarily indicate a verbatim implementation of that method.

LA-265-403	Hexavalent Chromium Analysis		
	EPA SW-846	7196A	Hexavalent Chromium
	HEIS	7196_CR6	Hexavalent Chromium
LA-505-411	Elemental Analysis by ICP Atomic Emission Spectroscopy (ICP AES)		
	EPA SW-846	6010C	Inductively Coupled Plasma-Atomic Emmission Spectrometry
	HEIS	6010_METALS_ICP	Inductively Coupled Plasma-Atomic Emmission Spectrometry
LA-533-410	Anion Analysis by Ion Chromatography		
	EPA-600/R-94-111	300.0	Determination of Inorganic Anions by Ion Chromatography
	HEIS	300.0_ANIONS_IC	Determination of Inorganic Anions by Ion Chromatography

Note: A complete list of WSCF analytical procedures and reference regulatory or industry methods is available online at <http://www7.rl.gov/rapidweb/AS-DOL/index.cfm>

Method Reference

Attention Scot Fitzgerald
 Department Radiochemistry

Group # WSCF131201

The results provided in this report were generated using the following WSCF Laboratory procedures. For your convenience, this table provides a listing of the regulatory, industry methods or HEIS methods that are referenced by each of these WSCF procedures. Please note that the most recent version of the regulatory or industry method is listed here even though WSCF procedure may reference an older version of the method. Also, a reference to a regulatory or industry method here does not necessarily indicate a verbatim implementation of that method.

LA-220-406	Strontium-89 and 90 in Aqueous Samples by SR-SPEC Separation
	HEIS SRTOT_SEP_PRECIP_GPC Strontium 89/90, by Sr-Spec Sep.

Note: A complete list of WSCF analytical procedures and reference regulatory or industry methods is available online at <http://www7.rl.gov/rapidweb/AS-DOL/index.cfm>

Method Reference

Attention Scot Fitzgerald
Department Wet Chemistry

Group # WSCF131201

The results provided in this report were generated using the following WSCF Laboratory procedures. For your convenience, this table provides a listing of the regulatory, industry methods or HEIS methods that are referenced by each of these WSCF procedures. Please note that the most recent version of the regulatory or industry method is listed here even though WSCF procedure may reference an older version of the method. Also, a reference to a regulatory or industry method here does not necessarily indicate a verbatim implementation of that method.

LA-531-411	Alkalinity		
	SM	2320	Alkalinity
	HEIS	2320_ALKALINITY	Alkalinity

Note: A complete list of WSCF analytical procedures and reference regulatory or industry methods is available online at <http://www7.rl.gov/rapidweb/AS-DOL/index.cfm>

Attention Scot Fitzgerald
 Department Inorganic

Group # WSCF131201

Sample # 131201001
 SAF# X14-001
 Sample ID B2RCP0

Matrix WATER
 Sampled 10/22/13
 Received 10/22/13

Test Performed	CAS #	Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
										10/22/13
Hexavalent chromium Discrete Analyzer										
Hexavalent chromium	18540-29-9	LA-265-403	B	0.00320		mg/L	1	0.0020	0.0050	10/22/13

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 dilution 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)
 o - LCS recovery outside established laboratory acceptance limits.
 o - LCS recovery outside established laboratory acceptance limits.

Attention Scot Fitzgerald
 Department Inorganic

Group # WSCF131201

Sample # 131201002
 SAF# X14-001
 Sample ID B2RCN9

Matrix WATER
 Sampled 10/22/13
 Received 10/22/13

Test Performed	CAS #	Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
10/23/13										
Anions by Ion Chromatography (Water)										
Fluoride	16984-48-8	LA-533-410	UD	<0.050		ug/mL	2	0.050	1.0	10/23/13
Chloride	16887-00-6	LA-533-410	D	1.15		ug/mL	2	0.12	0.80	10/23/13
Nitrite-N	NO2-N	LA-533-410	UD	<0.040		ug/mL	2	0.040	0.20	10/23/13
Nitrate-N	NO3-N	LA-533-410	D	0.416		ug/mL	2	0.040	0.20	10/23/13
Sulfate	14808-79-8	LA-533-410	D	12.3		ug/mL	2	0.22	1.1	10/23/13

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 dilution 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)
 o - LCS recovery outside established laboratory acceptance limits.
 o - LCS recovery outside established laboratory acceptance limits.

Attention Scot Fitzgerald
 Department Inorganic

Group # WSCF131201

Sample # 131201003
 SAF# X14-001
 Sample ID B2RCP1

Matrix WATER
 Sampled 10/22/13
 Received 10/22/13

Test Performed	CAS #	Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
ICPAES Prep (W)										
ICP-6010 - All possible metals										
Iron	7439-89-6	LA-505-411	B	55.4		ug/L	1	20	100	10/30/13
Magnesium	7439-95-4	LA-505-411		4100		ug/L	1	6.0	30	10/30/13
Manganese	7439-96-5	LA-505-411	B	7.20		ug/L	1	4.0	20	10/30/13
Nickel	7440-02-0	LA-505-411	U	<5.0		ug/L	1	5.0	25	10/30/13
Potassium	7440-09-7	LA-505-411		2250		ug/L	1	90	450	10/30/13
Silver	7440-22-4	LA-505-411	U	<4.0		ug/L	1	4.0	20	10/30/13
Sodium	7440-23-5	LA-505-411		3270		ug/L	1	15	75	10/30/13
Antimony	7440-36-0	LA-505-411	U	<20		ug/L	1	20	100	10/30/13
Barium	7440-39-3	LA-505-411		29.4		ug/L	1	4.0	20	10/30/13
Cadmium	7440-43-9	LA-505-411	U	<4.0		ug/L	1	4.0	20	10/30/13
Chromium	7440-47-3	LA-505-411	U	<5.0		ug/L	1	5.0	25	10/30/13
Cobalt	7440-48-4	LA-505-411	U	<4.0		ug/L	1	4.0	20	10/30/13
Copper	7440-50-8	LA-505-411	U	<4.0		ug/L	1	4.0	20	10/30/13
Vanadium	7440-62-2	LA-505-411	U	<10		ug/L	1	10	50	10/30/13
Zinc	7440-66-6	LA-505-411	U	<5.0		ug/L	1	5.0	25	10/30/13
Calcium	7440-70-2	LA-505-411		27900		ug/L	1	30	150	10/30/13
Arsenic	7440-38-2	LA-505-411	U	<30		ug/L	1	30	150	10/30/13

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 dilution 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)
 o - LCS recovery outside established laboratory acceptance limits.
 o - LCS recovery outside established laboratory acceptance limits.

Attention Scot Fitzgerald
 Department Inorganic

Group # WSCF131201

Sample # 131201004
 SAF# X14-001
 Sample ID B2RCP2

Matrix WATER
 Sampled 10/22/13
 Received 10/22/13

Test Performed	CAS #	Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
ICPAES Prep (W)										10/28/13
ICP-6010 - All possible metals										
Iron	7439-89-6	LA-505-411	U	<20		ug/L	1	20	100	10/30/13
Magnesium	7439-95-4	LA-505-411		4120		ug/L	1	6.0	30	10/30/13
Manganese	7439-96-5	LA-505-411	U	<4.0		ug/L	1	4.0	20	10/30/13
Nickel	7440-02-0	LA-505-411	U	<5.0		ug/L	1	5.0	25	10/30/13
Potassium	7440-09-7	LA-505-411		2250		ug/L	1	90	450	10/30/13
Silver	7440-22-4	LA-505-411	U	<4.0		ug/L	1	4.0	20	10/30/13
Sodium	7440-23-5	LA-505-411		3300		ug/L	1	15	75	10/30/13
Antimony	7440-36-0	LA-505-411	U	<20		ug/L	1	20	100	10/30/13
Barium	7440-39-3	LA-505-411		28.3		ug/L	1	4.0	20	10/30/13
Cadmium	7440-43-9	LA-505-411	U	<4.0		ug/L	1	4.0	20	10/30/13
Chromium	7440-47-3	LA-505-411	U	<5.0		ug/L	1	5.0	25	10/30/13
Cobalt	7440-48-4	LA-505-411	U	<4.0		ug/L	1	4.0	20	10/30/13
Copper	7440-50-8	LA-505-411	U	<4.0		ug/L	1	4.0	20	10/30/13
Vanadium	7440-62-2	LA-505-411	U	<10		ug/L	1	10	50	10/30/13
Zinc	7440-66-6	LA-505-411	U	<5.0		ug/L	1	5.0	25	10/30/13
Calcium	7440-70-2	LA-505-411		28200		ug/L	1	30	150	10/30/13
Arsenic	7440-38-2	LA-505-411	U	<30		ug/L	1	30	150	10/30/13

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 dilution 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)
 o - LCS recovery outside established laboratory acceptance limits.
 o - LCS recovery outside established laboratory acceptance limits.

Attention Scot Fitzgerald
 Department Radiochemistry

Group # WSCF131201

Sample # 131201003
 SAF# X14-001
 Sample ID B2RCP1

Matrix WATER
 Sampled 10/22/13
 Received 10/22/13

Test Performed	CAS #	Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
Strontium 89/90 WATER/LIQUID PREP										11/12/13
Strontium 89/90 (GPC/GEA)										
Strontium-89_90	SR-RAD	LA-220-406	U	0.56	.72	pCi/L	1	1.2		11/16/13

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

o - LCS recovery outside established laboratory acceptance limits.

Attention Scot Fitzgerald
 Department Wet Chemistry

Group # WSCF131201

Sample # 131201003
 SAF# X14-001
 Sample ID B2RCP1

Matrix WATER
 Sampled 10/22/13
 Received 10/22/13

Test Performed	CAS #	Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
										10/24/13
Total Alkalinity as mg/L CaCO3 (Water)										
Total Alkalinity as CaCO3	ALKALINITY	LA-531-411		80		mg/L	1	1	10	10/24/13

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

B - Analyte < the RDL but >= the IDL/MDL.
 C - Analyte was found in the Associated Blank. (Inorganic)
 D - Analyte was reported at a secondary dilution factor.
 N - MS and/or MSD sample recovery outside control limits.
 U - Analyzed for but not detected above limiting criteria.

N - Spike Recovery is Outside Control Limits.
 X,Y or Z - See comment detail and/or narrative.
 PQL is equivalent to Estimated Quantitation Limit (EQL)
 o - LCS recovery outside established laboratory acceptance limits.
 Ignitability: <20C listed in the result field indicates sample ignited at room temperature. Maximum temperature tested for ignitability is at 100C

Quality Control Report

Attention Scot Fitzgerald
 Department Inorganic

Group # WSCF131201

Analytical Batch 222544 (QC Batch: 222544) Test Hexavalent chromium Discrete Analyzer
 Associated Samples 131201001

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
BLANK										
			QC Sample #99851							
Hexavalent chromium	18540-29-9		<0.0020	mg/L					U	10/22/13
LCS			QC Sample #99853							
Hexavalent chromium	18540-29-9		0.0520	mg/L	104	90 - 110				10/22/13
DUP			QC Sample #99854							
			Original 131201001							
Hexavalent chromium	18540-29-9	0.00320	0.00300	mg/L			6.50	20	B	10/22/13
MS			QC Sample #99855							
			Original 131201001							
Hexavalent chromium	18540-29-9	0.00320	0.0397	mg/L	99.2	85 - 115				10/22/13

* - QC result out of range

n/a - Not Applicable

Quality Control Report

Attention Scot Fitzgerald
 Department Wet Chemistry

Group # WSCF131201

Analytical Batch 222589 (QC Batch: 222589) Test Total Alkalinity as mg/L CaCO3 (Water)
 Associated Samples 131201003

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
LCS			QC Sample #100000							
Total Alkalinity as CaCO3	ALKALINITY	96		mg/L	95.7	80 - 120				10/24/13
DUP			QC Sample #100001							
			Original 131199010							
Total Alkalinity as CaCO3	ALKALINITY	89		mg/L			0.00	20		10/24/13
LCS			QC Sample #100002							
Total Alkalinity as CaCO3	ALKALINITY	100		mg/L	99.6	80 - 120				10/24/13
LCS			QC Sample #100003							
Total Alkalinity as CaCO3	ALKALINITY	99		mg/L	99.3	80 - 120				10/24/13

* - QC result out of range

n/a - Not Applicable

Quality Control Report

Attention Scot Fitzgerald
 Department Inorganic

Group # WSCF131201

Analytical Batch 222720 (QC Batch: 222554) Test ICP-6010 - All possible metals
 Associated Samples 131201003, 131201004

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
BLANK		QC Sample #99874								
Iron	7439-89-6	<20		ug/L					U	10/30/13
Magnesium	7439-95-4	<6.0		ug/L					U	10/30/13
Manganese	7439-96-5	<4.0		ug/L					U	10/30/13
Nickel	7440-02-0	<5.0		ug/L					U	10/30/13
Potassium	7440-09-7	<90		ug/L					U	10/30/13
Silver	7440-22-4	<4.0		ug/L					U	10/30/13
Sodium	7440-23-5	<15		ug/L					U	10/30/13
Antimony	7440-36-0	<20		ug/L					U	10/30/13
Barium	7440-39-3	<4.0		ug/L					U	10/30/13
Cadmium	7440-43-9	<4.0		ug/L					U	10/30/13
Chromium	7440-47-3	<5.0		ug/L					U	10/30/13
Cobalt	7440-48-4	<4.0		ug/L					U	10/30/13
Copper	7440-50-8	<4.0		ug/L					U	10/30/13
Vanadium	7440-62-2	<10		ug/L					U	10/30/13
Zinc	7440-66-6	<5.0		ug/L					U	10/30/13
Calcium	7440-70-2	<30		ug/L					U	10/30/13
Arsenic	7440-38-2	<30		ug/L					U	10/30/13

* - QC result out of range

n/a - Not Applicable

Quality Control Report

Attention Scot Fitzgerald
 Department Inorganic

Group # WSCF131201

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
LCS		QC Sample #99876								
Iron	7439-89-6		959	ug/L	95.9	80 - 120				10/30/13
Magnesium	7439-95-4		9650	ug/L	96.5	80 - 120				10/30/13
Manganese	7439-96-5		972	ug/L	97.2	80 - 120				10/30/13
Nickel	7440-02-0		927	ug/L	92.7	80 - 120				10/30/13
Potassium	7440-09-7		9960	ug/L	99.6	80 - 120				10/30/13
Silver	7440-22-4		966	ug/L	96.6	80 - 120				10/30/13
Sodium	7440-23-5		9770	ug/L	97.7	80 - 120				10/30/13
Antimony	7440-36-0		939	ug/L	93.9	80 - 120				10/30/13
Barium	7440-39-3		976	ug/L	97.6	80 - 120				10/30/13
Cadmium	7440-43-9		941	ug/L	94.1	80 - 120				10/30/13
Chromium	7440-47-3		954	ug/L	95.4	80 - 120				10/30/13
Cobalt	7440-48-4		939	ug/L	93.9	80 - 120				10/30/13
Copper	7440-50-8		958	ug/L	95.8	80 - 120				10/30/13
Vanadium	7440-62-2		961	ug/L	96.1	80 - 120				10/30/13
Zinc	7440-66-6		959	ug/L	95.9	80 - 120				10/30/13
Calcium	7440-70-2		19600	ug/L	98.1	80 - 120				10/30/13
Arsenic	7440-38-2		951	ug/L	95.1	80 - 120				10/30/13
MS		QC Sample #99877								
		Original 131199005								
Iron	7439-89-6		1010	ug/L	101	75 - 125				10/30/13
Magnesium	7439-95-4		9370	ug/L	93.7	75 - 125				10/30/13
Manganese	7439-96-5		981	ug/L	98.1	75 - 125				10/30/13

* - QC result out of range

n/a - Not Applicable

Quality Control Report

Attention Scot Fitzgerald
 Department Inorganic

Group # WSCF131201

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
Nickel	7440-02-0		935	ug/L	93.5	75 - 125				10/30/13
Potassium	7440-09-7		9900	ug/L	99	75 - 125				10/30/13
Silver	7440-22-4		982	ug/L	98.2	75 - 125				10/30/13
Sodium	7440-23-5		9640	ug/L	96.4	75 - 125				10/30/13
Antimony	7440-36-0		985	ug/L	98.5	75 - 125				10/30/13
Barium	7440-39-3		985	ug/L	98.5	75 - 125				10/30/13
Cadmium	7440-43-9		980	ug/L	98	75 - 125				10/30/13
Chromium	7440-47-3		968	ug/L	96.8	75 - 125				10/30/13
Cobalt	7440-48-4		954	ug/L	95.4	75 - 125				10/30/13
Copper	7440-50-8		959	ug/L	95.9	75 - 125				10/30/13
Vanadium	7440-62-2		989	ug/L	98.9	75 - 125				10/30/13
Zinc	7440-66-6		992	ug/L	99.2	75 - 125				10/30/13
Calcium	7440-70-2		19000	ug/L	94.8	75 - 125				10/30/13
Arsenic	7440-38-2		1000	ug/L	100.5	75 - 125				10/30/13
MSD			QC Sample #99878							
			Original	131199005					Paired	99877
Iron	7439-89-6		1010	ug/L	101	75 - 125	0.00	20		10/30/13
Magnesium	7439-95-4		9700	ug/L	97	75 - 125	1.10	20		10/30/13
Manganese	7439-96-5		975	ug/L	97.5	75 - 125	0.60	20		10/30/13
Nickel	7440-02-0		921	ug/L	92.1	75 - 125	1.60	20		10/30/13
Potassium	7440-09-7		10000	ug/L	100.4	75 - 125	0.90	20		10/30/13
Silver	7440-22-4		981	ug/L	98.1	75 - 125	0.10	20		10/30/13
Sodium	7440-23-5		9940	ug/L	99.4	75 - 125	1.60	20		10/30/13

* - QC result out of range

n/a - Not Applicable

Quality Control Report

Attention Scot Fitzgerald
 Department Inorganic

Group # WSCF131201

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
Antimony	7440-36-0		990	ug/L	99	75 - 125	0.50	20		10/30/13
Barium	7440-39-3		987	ug/L	98.7	75 - 125	0.20	20		10/30/13
Cadmium	7440-43-9		968	ug/L	96.8	75 - 125	1.20	20		10/30/13
Chromium	7440-47-3		963	ug/L	96.3	75 - 125	0.60	20		10/30/13
Cobalt	7440-48-4		947	ug/L	94.7	75 - 125	0.70	20		10/30/13
Copper	7440-50-8		956	ug/L	95.6	75 - 125	0.30	20		10/30/13
Vanadium	7440-62-2		988	ug/L	98.8	75 - 125	0.20	20		10/30/13
Zinc	7440-66-6		980	ug/L	98	75 - 125	1.20	20		10/30/13
Calcium	7440-70-2		19900	ug/L	99.3	75 - 125	0.90	20		10/30/13
Arsenic	7440-38-2		992	ug/L	99.2	75 - 125	1.30	20		10/30/13

* - QC result out of range

n/a - Not Applicable

Quality Control Report

Attention Scot Fitzgerald
 Department Radiochemistry

Group # WSCF131201

Analytical Batch 223394 (QC Batch: 222565) Test Strontium 89/90 (GPC/GEA)
 Associated Samples 131201003

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
BLANK										
Strontium-89_90	SR-RAD		-0.29	pCi/L					U	11/16/13
LCS										
Strontium-89_90	SR-RAD		100	pCi/L	107	80 - 120				11/16/13
DUP										
Strontium-89_90	SR-RAD		0.20	pCi/L			12.20	20	U	11/16/13
SAMPLE										
Strontium Nitrate	10042-76-9			mg	75.2	25 - 105				11/16/13
BLANK										
Strontium Nitrate	10042-76-9			mg	78.5	25 - 105				11/16/13
LCS										
Strontium Nitrate	10042-76-9			mg	76.9	25 - 105				11/16/13
DUP										
Strontium Nitrate	10042-76-9			mg	76.9	25 - 105	n/a			11/16/13

* - QC result out of range

n/a - Not Applicable

ATTACHMENT4

SAMPLE RECEIPT

Consisting of 5 pages
Including cover page

Waste Sampling and Characterization Facility
P.O. Box 650 S3-30, Richland WA 99352
Phone: (509) 373-7005/FAX: (509) 372-0456

ACKNOWLEDGEMENT OF SAMPLES RECEIVED

WSCF Laboratory

PO Box 650 S3-30
 Richland, WA 99352

ATTN: Scot Fitzgerald

Customer Code: CHPRC
 CACN: 403899
 Work Order #: 131201
 Customer Work ID: X14-001-301
 Due Date: 11/25/2013

The following samples were received from you on 10/22/2013 1:20:00 PM. They have been scheduled for the tests listed below each sample. If this information is incorrect, please contact WSCF Client Services. Thank you for using Waste Sampling and Characterization Facility.

Sample #	Sample ID	Matrix	Collected	Received
131201001	B2RCP0	WATER	10/22/2013 11:54	10/22/2013 13:20
Procedure		Compound List		
Hexavalent chromium Discrete Analyzer		Cr6		
Sample #	Sample ID	Matrix	Collected	Received
131201002	B2RCN9	WATER	10/22/2013 11:54	10/22/2013 13:20
Procedure		Compound List		
Anions by Ion Chromatography (Water)		F,Cl,NO2,NO3,SO4		
Sample #	Sample ID	Matrix	Collected	Received
131201003	B2RCP1	WATER	10/22/2013 11:54	10/22/2013 13:20
Procedure		Compound List		
ICP-6010 - All possible metals		6010 ICP Common		
Strontium 89/90 (GPC/GEA)		SR89/90		
Total Alkalinity as mg/L CaCO3 (Water)		Alkalinity		
Sample #	Sample ID	Matrix	Collected	Received
131201004	B2RCP2	WATER	10/22/2013 11:54	10/22/2013 13:20
Procedure		Compound List		
ICP-6010 - All possible metals		6010 ICP Common		

Chain of Custody

CH2M Hill Plateau Remediation Company		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		C.O.C. # X14-001-301
Collector <i>J. Aguilar</i>		Contact/Requester Karen Waters-Irusted	Telephone No. 509-376-4650	Page 1 of 1
SAF No. X14-001	Sampling Origin Hanford Site	Logbook No. HNF-N-506.59 / 26	Purchase Order/Charge Code 303064ES20	
Project Title AQUIFER TUBES, OCTOBER 2013	Method of Shipment GOVERNMENT VEHICLE	Priority: 31 Days	Ice Chest No. N/A	
Shipped To (Lab) Waste Sampling & Characterization	Method of Shipment GOVERNMENT VEHICLE	Priority: 31 Days	Bill of Lading/Air Bill No. N/A	
Protocol SURV	Method of Shipment GOVERNMENT VEHICLE	Priority: 31 Days	Offsite Property No. N/A	
POSSIBLE SAMPLE HAZARDS/REMARKS *** Contains Radioactive Material at concentrations that are not regulated for transportation per 49 CFR but are not releasable per DOE Order 5400.5 (1990/1993)				
SPECIAL INSTRUCTIONS Hold Time Total Activity Exemption: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Site Wide Generator Knowledge Information Form applies. The CACN for all analytical work at WSCF is 403899. FY13 and FY14 samples cannot be in the same SDG.				
Sample No. B2RCP0 / 1	Filter N	Date 10-22-13	Time 1154	No/Type Container 1x500-mL aG
Sample Analysis 7195_CR6: COMMON		Holding Time 24 Hours	Preservative Cool-4C	

Relinquished By <i>J. Aguilar</i>	Received By TA B...	Date/Time 10-22-13 1320	Date/Time 10-22-13 1320	Sign <i>[Signature]</i>	Matrix *
Relinquished By	Received By	Date/Time	Date/Time	Sign	S - Soil SE - Sediment SO - Solid SL - Sludge W - Water O - Oil A - Air
Relinquished By	Received By	Date/Time	Date/Time	Sign	DS - Drum Solids DL - Drum Liquids T - Tissue WI - Wipe L - Liquid V - Vegetation X - Other
Relinquished By	Received By	Date/Time	Date/Time	Sign	
FINAL SAMPLE DISPOSITION Disposal Method (e.g., Return to customer, per lab procedure, used in process)					
Disposed By					
Date/Time					

A-6004-84Z (REV 2)

PRINTED ON 10/10/2013

Chain of Custody

CH2M Hill Plateau Remediation Company		C.O.C. # X14-001-300 Page 1 of 1	
CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST			
Collector J. Aguilar SAF No. X14-001	Contact/Requester Karen Waters-Husted Sampling Origin Hanford Site	Telephone No. 509-376-4650 Purchase Order/Charge Code 303064ES20	
Project Title AQUIFER TUBES, OCTOBER 2013 Shipped To (Lab) Waste Sampling & Characterization	Logbook No. HNF-N-506 59/26 Method of Shipment GOVERNMENT VEHICLE	Ice Chest No. N/A Bill of Lading/Air Bill No. N/A	
Protocol SURY	Priority: 31 Days PRIORITY	Offsite Property No. N/A	
POSSIBLE SAMPLE HAZARDS/REMARKS *** Contains Radioactive Material at concentrations that are not regulated for transportation per 49 CFR but are not releasable per DOE Order 3400.5 (1990/1993)			
SPECIAL INSTRUCTIONS Hold Time Total Activity Exemption: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Site Wide Generator Knowledge Information Form applies The CACN for all analytical work at WSCF is 403859. FY13 and FY14 samples cannot be in the same SDG.			
Sample No. B2RCN9 / 2	Filter N	Date 10-22-13	Time 1154
No./Type Container 1x500-mL P	Sample Analysis 300.0_ANIONS_IC: COMMON	Holding Time 48 Hours	Preservative Cool-4C

Relinquished By J. Aguilar Relinquished By Date 10-22-13	Received By JA Prazin Received By Date 10-22-13	Date/Time 1320	Matrix * S - Soil DS - Down Solids SE - Sediment DL - Down Liquids SO - Solid T - Tissue SL - Sludge WI - Wipe W - Water L - Liquid O - Oil V - Vegetation A - Air X - Other
Relinquished By Relinquished By Date/Time	Received By Received By Date/Time	Date/Time	
Relinquished By Relinquished By Date/Time	Received By Received By Date/Time	Date/Time	
Disposal Method (e.g., Return to customer, per lab procedure, used in process)			Date/Time
FINAL SAMPLE DISPOSITION			Disposed By

A-6004-842 (REV 2)

PRINTED ON 10/20/2013

Chain of Custody

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		C.O.C. # X14-001-299 Page 1 of 1							
CH2M Hill Plateau Remediation Company Collector: <i>J. Aguilar</i> SAF No. X14-001 Project Title: AQUIFER TUBES, OCTOBER 2013 Shipped To (Lab): Waste Sampling & Characterization Protocol: SURV		Telephone No. 509-376-4650 Purchase Order/Charge Code 303064ES20 Ice Chest No. N/A Bill of Lading/Air Bill No. N/A Offsite Property No. N/A							
Contact/Requester: Karen Waters-Husted Sampling Origin: Hanford Site Logbook No. HNF-N-506.59 / 24 Method of Shipment: GOVERNMENT VEHICLE Priority: 31 Days SPECIAL INSTRUCTIONS: PRIORITY Site Wide Generator Knowledge Information Form applies. The SACCN for all analytical work at WSCF is 403999. FY13 and FY14 samples cannot be in the same SDO.	Hold Time: 14 Days Total Activity Exemption: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>								
POSSIBLE SAMPLE HAZARDS/REMARKS ** Contains Radioactive Material at concentrations that are not regulated for transportation per 49 CFR but are not releasable per DOE Order 5400.5 (1990/1993)	Sample Analysis Sample No. Filter + Date Time No/Type Container Holding Time Preservative								
B2RCP1	3	N	W	10-22-13	1154	1x250-mL GP	2320_ALKALINITY: COMMON	14 Days	Cool-4C
B2RCP1	1	N	W	10-22-13	1154	1x500-mL GP	6010_METALS_ICP: COMMON	6 Months	HNO3 to pH <2
B2RCP1	4	N	W	10-22-13	1154	1x1-L GP	SRTOT_SEP_PRECIP_GPC: COMMON	6 Months	HNO3 to pH <2
B2RCP2	4	Y	W	10-22-13	1154	1x500-mL GP	6010_METALS_ICP: COMMON	6 Months	HNO3 to pH <2

Requisitioned By: <i>J. Aguilar</i> Requisitioned By: <i>J. Aguilar</i> Requisitioned By: Requisitioned By:	Date/Time: 10-22-13 1320 Date/Time: 10-22-13 1320 Date/Time: Date/Time:	Sign: <i>J. Aguilar</i> Sign: <i>J. Aguilar</i> Sign: Sign:	Date/Time: 10-22-13 1320 Date/Time: Date/Time: Date/Time:	Matrix * S = Soil DS = Drum Solids SL = Sediment DI = Drum Liquids SO = Solid T = Tissue W = Sludge WI = Wipe O = Water L = Liquid A = Oil V = Vegetation X = Air X = Other
Disposal Method (e.g., Return to customer, per lab procedure, used in process)		Disposed By:		Date/Time:
PRINTED ON 10/10/2013				

A-6004-842 (REV 2)