

June 03, 2014

Rev. 1

**WSCF Laboratory**

PO Box 650 S3-30  
Richland, WA 99352



June 3, 2014

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

Dear Scot Fitzgerald,

REVISED131506 - 866794 [Report ID: 131506]

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 WSCF131506

- \* 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

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ATTACHMENT 1

**COVER SHEET**

Consisting of 2 pages  
Including cover page

**WSCF SAF Number Cross Reference**

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Group # WSCF131506  
Data Deliverable Date 01/13/14

<b>SAF #</b>	<b>Sample ID</b>	<b>Sample #</b>	<b>Matrix</b>	<b>Sampled</b>	<b>Received</b>
I14-005	B2RVF4	131506001	WATER	12/12/13	12/12/13
I14-005	B2RVF3	131506002	WATER	12/12/13	12/12/13
I14-005	B2RVF6	131506003	WATER	12/12/13	12/12/13
I14-005	B2RVF2	131506004	WATER	12/12/13	12/12/13

ATTACHMENT 2

**NARRATIVE**

Consisting of 4 pages  
Including cover page

Attachment 2  
Narrative Rev1  
WSCF131506

**Revision 1: This case narrative replaces the prior in its entirety. This revision is correcting the Gross Alpha Total Propagated Error.**

**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**

Attachment 2  
Narrative Rev1  
WSCF131506

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):

- Chloride and Nitrate – Exceeded spiking levels by a factor of 4. Spike recoveries and associated RPDs are not valid.
- All other 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):

- Potassium and Sodium were detected in the Blank and evaluated.
- All other 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, Matrix Spike (Matrix Spikes apply only to Technetium & Tritium), Blank and Laboratory Control Sample were analyzed with this delivery group. Analytical Note(s):

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

### **Gamma Energy Analysis:**

- All applicable QC controls are within the established limits.

### **Gross Alpha / Gross Beta:**

Attachment 2  
Narrative Rev1  
WSCF131506

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

**Strontium-89/90:**

- All applicable QC controls are within the established limits.

**Tritium:**

- All applicable QC controls are within the established limits.

**Technetium-99:**

- All applicable QC controls are within the established limits.

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

ATTACHMENT 3

**ANALYTICAL RESULTS**

Consisting of 36 pages  
Including cover page

## WSCF ANALYTICAL RESULTS REPORT

For

CH2M Hill Plateau Remediation

PO Box 1600  
Richland, WA 99352

Attention: Scot Fitzgerald

**Contract #** MOA-FH-CHPRC-2008  
**Group #** WSCF131506  
**Report Date** June 3, 2014

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.

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## Batch QC List

Attention Scot Fitzgerald  
 Department Inorganic

Group # WSCF131506

QC Batch	Analytical Batch	S#	Type	Sample #	Client Sample#	Original	Test
224802	224802	2	BLANK	102506	BLANK		Anions by Ion Chromatography (Water)
224802	224802	3	LCS	102507	LCS		Anions by Ion Chromatography (Water)
224802	224802	4	MS	102508	B2RVF3(131506002MS)	131506002	Anions by Ion Chromatography (Water)
224802	224802	5	MSD	102509	B2RVF3(131506002MSD)	131506002	Anions by Ion Chromatography (Water)
224802	224802	6	SAMPLE	131506002	B2RVF3		Anions by Ion Chromatography (Water)
224807	224807	1	BLANK	102527	BLANK		Hexavalent chromium Discrete Analyzer
224807	224807	3	LCS	102529	LCS		Hexavalent chromium Discrete Analyzer
224807	224807	4	DUP	102530	B2RHK7(131507002DUP)	131507002	Hexavalent chromium Discrete Analyzer
224807	224807	5	MS	102531	B2RHK7(131507002MS)	131507002	Hexavalent chromium Discrete Analyzer
224807	224807	7	SAMPLE	131506001	B2RVF4		Hexavalent chromium Discrete Analyzer
225254	225461	5	BLANK	102927	BLANK		ICP-6010 - All possible metals
225254	225461	7	LCS	102929	LCS		ICP-6010 - All possible metals
225254	225461	9	MS	102930	B2TRY0(131502001MS)	131502001	ICP-6010 - All possible metals
225254	225461	10	MSD	102931	B2TRY0(131502001MSD)	131502001	ICP-6010 - All possible metals
225254	225461	13	SAMPLE	131506003	B2RVF6		ICP-6010 - All possible metals
225254	225461	14	SAMPLE	131506004	B2RVF2		ICP-6010 - All possible metals

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## Batch QC List

Attention Scot Fitzgerald  
 Department Radiochemistry

Group # WSCF131506

QC Batch	Analytical Batch	S#	Type	Sample #	Client Sample#	Original	Test
224899	225420	1	BLANK	102584	BLANK		Tritium by LSC
224899	225420	2	LCS	102585	LCS		Tritium by LSC
224899	225420	4	DUP	102586	B2THP3(131525005DUP)	131525005	Tritium by LSC
224899	225420	5	MSPK	102587	B2R4M1(131512001MSP)		Tritium by LSC
224899	225420	6	SAMPLE	131506004	B2RVF2		Tritium by LSC
224902	225226	1	BLANK	102588	BLANK		TC99 by Liquid Scintillation
224902	225226	2	LCS	102589	LCS		TC99 by Liquid Scintillation
224902	225226	4	DUP	102590	B2THW0(131504020DUP)	131504020	TC99 by Liquid Scintillation
224902	225226	5	MS	102591	B2THW0(131504020MS)	131504020	TC99 by Liquid Scintillation
224902	225226	8	SAMPLE	131506004	B2RVF2		TC99 by Liquid Scintillation
224909	225409	1	BLANK	102612	BLANK		Strontium 89/90 (GPC/GEA)
224909	225409	2	LCS	102613	LCS		Strontium 89/90 (GPC/GEA)
224909	225409	3	DUP	102614	B2THL2(131504022DUP)	131504022	Strontium 89/90 (GPC/GEA)
224909	225409	5	SAMPLE	131506004	B2RVF2		Strontium 89/90 (GPC/GEA)
224914	225106	1	IBLANK	102632	IBLANK		Gamma Energy Analysis-general
224914	225106	2	LCS	102633	LCS		Gamma Energy Analysis-general
224914	225106	3	DUP	102634	B2TKK4(131489011DUP)	131489011	Gamma Energy Analysis-general
224914	225106	5	SAMPLE	131506004	B2RVF2		Gamma Energy Analysis-general
225466	225513	1	BLANK	103196	BLANK		GAB Discrete analysis Alpha only
225466	225513	2	LCS	103197	LCS		GAB Discrete analysis Alpha only
225466	225513	4	DUP	103198	B2THB6(131504017DUP)	131504017	GAB Discrete analysis Alpha only
225466	225513	5	SAMPLE	131506004	B2RVF2		GAB Discrete analysis Alpha only
225466	225514	1	BLANK	103196	BLANK		GAB Discrete analysis Beta only

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## Batch QC List

Attention Scot Fitzgerald  
Department Radiochemistry

Group # WSCF131506

QC Batch	Analytical Batch	S#	Type	Sample #	Client Sample#	Original	Test
225466	225514	2	LCS	103197	LCS		GAB Discrete analysis Beta only
225466	225514	4	DUP	103198	B2THB6(131504017DUP)	131504017	GAB Discrete analysis Beta only
225466	225514	5	SAMPLE	131506004	B2RVF2		GAB Discrete analysis Beta only

Batch QC List

Attention Scot Fitzgerald  
 Department Wet Chemistry

Group # WSCF131506

QC Batch	Analytical Batch	S#	Type	Sample #	Client Sample#	Original	Test
224819	224819	1	LCS	102573	LCS		Total Alkalinity as mg/L CaCO3 (Water)
224819	224819	2	DUP	102574	B2RHK5(131507004DUP)	131507004	Total Alkalinity as mg/L CaCO3 (Water)
224819	224819	7	SAMPLE	131506004	B2RVF2		Total Alkalinity as mg/L CaCO3 (Water)
224819	224819	13	LCS	102575	LCS		Total Alkalinity as mg/L CaCO3 (Water)
224819	224819	17	LCS	102576	LCS		Total Alkalinity as mg/L CaCO3 (Water)

**Method Reference**

**Attention** Scot Fitzgerald  
**Department** Inorganic

**Group #** WSCF131506

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.

<b>LA-265-403</b>	Hexavalent Chromium Analysis		
	EPA SW-846	7196A	Hexavalent Chromium
	HEIS	7196_CR6	Hexavalent Chromium
<b>LA-505-411</b>	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
<b>LA-533-410</b>	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 #** WSCF131506

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.

<b>LA-218-413</b>	Tritium By Ion Removal Using Eichrom Resin Columns (Prep)	
	N/A	PREP METHOD
<b>LA-220-406</b>	Strontium-89 and 90 in Aqueous Samples by SR-SPEC Separation	
	HEIS	SRTOT_SEP_PRECIP_GPC Strontium 89/90, by Sr-Spec Sep.
<b>LA-508-481</b>	Gamma Energy Analysis using the Canberra Genie Ssystem	
	HEIS	GAMMA_GS Gamma Energy Analysis
<b>LA-438-402</b>	Determination of Technetium-99 by RAD Disk Filtration & Liquid Scintillation Counting	
	N/A	PREP METHOD
<b>LA-508-421</b>	Operation of the Tri-Carb Model 2500TR Liquid Scintillation Analyzer	
	HEIS	ALPHA_LSC A/B Liquid Scintillation
	HEIS	BETA_LSC A/B Liquid Scintillation
	HEIS	TC99_3MDSK_LSC TC99 by Liquid Scintillation
	HEIS	TRITIUM_EIE_LSC Tritium, by Eichrome ion exchange, LSC
<b>LA-548-401</b>	Alpha and Beta in Liquid and Solid Samples - WSCF	
	N/A	PREP METHOD
<b>LA-548-421(LSC)</b>	Preparation of Sample Mounts For Gamma Energy Analysis	
	N/A	PREP METHOD
<b>LA-508-415</b>	Operation Of The Protean 2-Inch Alpha/Beta Counting System For Gross Alpha/ Beta Samples	
	HEIS	ALPHA_GPC Gross Alpha by GPC
	HEIS	BETA_GPC Gross Beta by GPC
	HEIS	SRTOT_SEP_PRECIP_GPC Strontium beta isotopic, GPC

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 # WSCF131506

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 # WSCF131506

Sample # 131506001  
 SAF# 114-005  
 Sample ID B2RVF4

Matrix WATER  
 Sampled 12/12/13  
 Received 12/12/13

Test Performed	CAS #	Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
										12/12/13
<b>Hexavalent chromium Discrete Analyzer</b>										
Hexavalent chromium	18540-29-9	LA-265-403		0.00770		mg/L	1	0.0020	0.0050	12/12/13

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.

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Attention Scot Fitzgerald  
 Department Inorganic

Group # WSCF131506

Sample # 131506002  
 SAF# 114-005  
 Sample ID B2RVF3

Matrix WATER  
 Sampled 12/12/13  
 Received 12/12/13

Test Performed	CAS #	Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
<b>12/12/13</b>										
<b>Anions by Ion Chromatography (Water)</b>										
Fluoride	16984-48-8	LA-533-410	BD	0.139		ug/mL	2	0.050	1.0	12/12/13
Chloride	16887-00-6	LA-533-410	D	31.7		ug/mL	2	0.12	0.80	12/12/13
Nitrite-N	NO2-N	LA-533-410	UD	<0.040		ug/mL	2	0.040	0.20	12/12/13
Nitrate-N	NO3-N	LA-533-410	D	5.62		ug/mL	2	0.040	0.20	12/12/13
Sulfate	14808-79-8	LA-533-410	D	22.6		ug/mL	2	0.22	1.1	12/12/13

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.

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Attention Scot Fitzgerald  
 Department Inorganic

Group # WSCF131506

Sample # 131506003  
 SAF# 114-005  
 Sample ID B2RVF6

Matrix WATER  
 Sampled 12/12/13  
 Received 12/12/13

Test Performed	CAS #	Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
<b>ICPAES Prep (W)</b>										<b>12/30/13</b>
<b>ICP-6010 - All possible metals</b>										
Iron	7439-89-6	LA-505-411	U	<20		ug/L	1	20	100	12/31/13
Magnesium	7439-95-4	LA-505-411		11400		ug/L	1	6.0	30	12/31/13
Manganese	7439-96-5	LA-505-411	U	<4.0		ug/L	1	4.0	20	12/31/13
Nickel	7440-02-0	LA-505-411	U	<5.0		ug/L	1	5.0	25	12/31/13
Potassium	7440-09-7	LA-505-411	C	5940		ug/L	1	90	450	12/31/13
Silver	7440-22-4	LA-505-411	U	<4.0		ug/L	1	4.0	20	12/31/13
Sodium	7440-23-5	LA-505-411		11500		ug/L	1	15	75	12/31/13
Antimony	7440-36-0	LA-505-411	U	<20		ug/L	1	20	100	12/31/13
Barium	7440-39-3	LA-505-411		31.3		ug/L	1	4.0	20	12/31/13
Cadmium	7440-43-9	LA-505-411	U	<4.0		ug/L	1	4.0	20	12/31/13
Chromium	7440-47-3	LA-505-411	B	5.70		ug/L	1	5.0	25	12/31/13
Cobalt	7440-48-4	LA-505-411	U	<4.0		ug/L	1	4.0	20	12/31/13
Copper	7440-50-8	LA-505-411	U	<4.0		ug/L	1	4.0	20	12/31/13
Vanadium	7440-62-2	LA-505-411	U	<10		ug/L	1	10	50	12/31/13
Zinc	7440-66-6	LA-505-411	U	<5.0		ug/L	1	5.0	25	12/31/13
Calcium	7440-70-2	LA-505-411		47600		ug/L	1	30	150	12/31/13
Strontium	7440-24-6	LA-505-411		225		ug/L	1	10	50	12/31/13

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.

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Attention Scot Fitzgerald  
 Department Inorganic

Group # WSCF131506

Sample # 131506003  
 SAF# 114-005  
 Sample ID B2RVF6

Matrix WATER  
 Sampled 12/12/13  
 Received 12/12/13

Test Performed	CAS #	Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
Arsenic	7440-38-2	LA-505-411	U	<30		ug/L	1	30	150	12/31/13
Beryllium	7440-41-7	LA-505-411	U	<4.0		ug/L	1	4.0	20	12/31/13

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)  
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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.

REVISED131506 -

Attention Scot Fitzgerald  
 Department Inorganic

Group # WSCF131506

Sample # 131506004  
 SAF# 114-005  
 Sample ID B2RVF2

Matrix WATER  
 Sampled 12/12/13  
 Received 12/12/13

Test Performed	CAS #	Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
<b>ICPAES Prep (W)</b>										<b>12/30/13</b>
<b>ICP-6010 - All possible metals</b>										
Iron	7439-89-6	LA-505-411	U	<20		ug/L	1	20	100	12/31/13
Magnesium	7439-95-4	LA-505-411		11800		ug/L	1	6.0	30	12/31/13
Manganese	7439-96-5	LA-505-411	U	<4.0		ug/L	1	4.0	20	12/31/13
Nickel	7440-02-0	LA-505-411	U	<5.0		ug/L	1	5.0	25	12/31/13
Potassium	7440-09-7	LA-505-411	C	6220		ug/L	1	90	450	12/31/13
Silver	7440-22-4	LA-505-411	U	<4.0		ug/L	1	4.0	20	12/31/13
Sodium	7440-23-5	LA-505-411		12100		ug/L	1	15	75	12/31/13
Antimony	7440-36-0	LA-505-411	U	<20		ug/L	1	20	100	12/31/13
Barium	7440-39-3	LA-505-411		32.2		ug/L	1	4.0	20	12/31/13
Cadmium	7440-43-9	LA-505-411	U	<4.0		ug/L	1	4.0	20	12/31/13
Chromium	7440-47-3	LA-505-411	B	8.10		ug/L	1	5.0	25	12/31/13
Cobalt	7440-48-4	LA-505-411	U	<4.0		ug/L	1	4.0	20	12/31/13
Copper	7440-50-8	LA-505-411	U	<4.0		ug/L	1	4.0	20	12/31/13
Vanadium	7440-62-2	LA-505-411	U	<10		ug/L	1	10	50	12/31/13
Zinc	7440-66-6	LA-505-411	U	<5.0		ug/L	1	5.0	25	12/31/13
Calcium	7440-70-2	LA-505-411		49400		ug/L	1	30	150	12/31/13
Strontium	7440-24-6	LA-505-411		236		ug/L	1	10	50	12/31/13

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.

REVISED131506 -

Attention Scot Fitzgerald  
 Department Inorganic

Group # WSCF131506

Sample # 131506004  
 SAF# 114-005  
 Sample ID B2RVF2

Matrix WATER  
 Sampled 12/12/13  
 Received 12/12/13

Test Performed	CAS #	Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
Arsenic	7440-38-2	LA-505-411	U	<30		ug/L	1	30	150	12/31/13
Beryllium	7440-41-7	LA-505-411	U	<4.0		ug/L	1	4.0	20	12/31/13

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.

REVISED131506 -

Attention Scot Fitzgerald  
 Department Radiochemistry

Group # WSCF131506

Sample # 131506004  
 SAF# 114-005  
 Sample ID B2RVF2

Matrix WATER  
 Sampled 12/12/13  
 Received 12/12/13

Test Performed	CAS #	Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
<b>GAB Prep for Discrete Analysis (W)</b>										<b>12/31/13</b>
<b>GAB Discrete analysis Alpha only</b>										
Gross Alpha	12587-46-1	LA-508-415		3.2	2	pCi/L	1	1.8		01/06/14
<b>GAB Discrete analysis Beta only</b>										
Gross Beta	12587-47-2	LA-508-415		12	2.7	pCi/L	1	3.2		01/06/14
<b>Preparation for GEA (W)</b>										<b>12/16/13</b>
<b>Gamma Energy Analysis-general</b>										
Antimony-125	14234-35-6	LA-508-481	U	-2.6	20	pCi/L	1	35		12/18/13
Cesium-134	13967-70-9	LA-508-481	U	-22	41	pCi/L	1	69		12/18/13
Cesium-137	10045-97-3	LA-508-481	U	0.38	7	pCi/L	1	13		12/18/13
Cobalt-60	10198-40-0	LA-508-481	U	12	14	pCi/L	1	15		12/18/13
Europium-152	14683-23-9	LA-508-481	U	-11	21	pCi/L	1	35		12/18/13
Europium-154	15585-10-1	LA-508-481	U	6.9	20	pCi/L	1	38		12/18/13
Europium-155	14391-16-3	LA-508-481	U	14	21	pCi/L	1	39		12/18/13
Potassium-40	13966-00-2	LA-508-481	U	-8.8	110	pCi/L	1	220		12/18/13
Ruthenium-106	13967-48-1	LA-508-481	U	-22	64	pCi/L	1	110		12/18/13
Beryllium-7	13966-02-4	LA-508-481	U	-14	62	pCi/L	1	100		12/18/13
<b>Strontium 89/90 WATER/LIQUID PREP</b>										<b>12/19/13</b>
<b>Strontium 89/90 (GPC/GEA)</b>										

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

B - The associated QC sample Blank has a result > or = the MDA  
 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.

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Attention Scot Fitzgerald  
 Department Radiochemistry

Group # WSCF131506

Sample # 131506004  
 SAF# 114-005  
 Sample ID B2RVF2

Matrix WATER  
 Sampled 12/12/13  
 Received 12/12/13

Test Performed	CAS #	Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
Strontium-89_90	SR-RAD	LA-220-406	U	0.71	.57	pCi/L	1	0.88		12/24/13
<b>TC99 by Liquid Scin. WATER/LIQUID PREP</b>										<b>12/16/13</b>
<b>TC99 by Liquid Scintillation</b>										
Technetium-99	14133-76-7	LA-508-421		10	4.8	pCi/L	1	6.9		12/17/13
<b>Tritium by LSC EICHROM WA/LIQ PREP</b>										<b>12/19/13</b>
<b>Tritium by LSC</b>										
Tritium	10028-17-8	LA-508-421		9500	2000	pCi/L	1	300		12/24/13

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

B - The associated QC sample Blank has a result > or = the MDA  
 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.

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Attention Scot Fitzgerald  
 Department Wet Chemistry

Group # WSCF131506

Sample # 131506004  
 SAF# 114-005  
 Sample ID B2RVF2

Matrix WATER  
 Sampled 12/12/13  
 Received 12/12/13

Test Performed	CAS #	Method	RQ	Result	TP Err	Units	DF	MDL	PQL	Analyzed
<b>12/13/13</b>										
<b>Total Alkalinity as mg/L CaCO3 (Water)</b>										
Total Alkalinity as CaCO3	ALKALINITY	LA-531-411		100		mg/L	1	1	10	12/13/13
Carbonate	CO3ALKALINI	LA-531-411	U	<1		mg/L	1	1		12/13/13
Bicarbonate	71-52-3	LA-531-411		100		mg/L	1	1		12/13/13
Hydroxyl ion	84625-61-6	LA-531-411	U	<1		mg/L	1	1		12/13/13

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

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Attention Scot Fitzgerald  
 Department Inorganic

Group # WSCF131506

Analytical Batch 224802 (QC Batch: 224802) Test Anions by Ion Chromatography (Water)  
 Associated Samples 131506002

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
<b>BLANK</b>		<b>QC Sample #102506</b>								
Fluoride	16984-48-8	<0.025		ug/mL					U	12/12/13
Chloride	16887-00-6	<0.060		ug/mL					U	12/12/13
Nitrite-N	NO2-N	<0.020		ug/mL					U	12/12/13
Nitrate-N	NO3-N	<0.020		ug/mL					U	12/12/13
Sulfate	14808-79-8	<0.11		ug/mL					U	12/12/13
<b>LCS</b>		<b>QC Sample #102507</b>								
Fluoride	16984-48-8	0.952		ug/mL	96.1	90 - 110				12/12/13
Chloride	16887-00-6	1.86		ug/mL	94.2	90 - 110				12/12/13
Nitrite-N	NO2-N	1.00		ug/mL	102.3	90 - 110				12/12/13
Nitrate-N	NO3-N	0.860		ug/mL	97.1	90 - 110				12/12/13
Sulfate	14808-79-8	3.86		ug/mL	98.4	90 - 110				12/12/13
<b>MS</b>		<b>QC Sample #102508</b>								
		<b>Original 131506002</b>								
Fluoride	16984-48-8	0.139	0.943	ug/mL	94.3	80 - 120			D	12/12/13
Chloride	16887-00-6	31.7	0.798	ug/mL	39.9	80 - 120			DX	12/12/13
Nitrite-N	NO2-N	<0.040	0.863	ug/mL	87.3	80 - 120			D	12/12/13
Nitrate-N	NO3-N	5.62	0.686	ug/mL	76.7	80 - 120			DX	12/12/13

\* - QC result out of range

n/a - Not Applicable

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Attention Scot Fitzgerald  
 Department Inorganic

Group # WSCF131506

Analytical Batch 224807 (QC Batch: 224807) Test Hexavalent chromium Discrete Analyzer  
 Associated Samples 131506001

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
<b>BLANK</b>										
			<b>QC Sample #102527</b>							
Hexavalent chromium	18540-29-9	<0.0020		mg/L					U	12/12/13
<b>LCS</b>			<b>QC Sample #102529</b>							
Hexavalent chromium	18540-29-9	0.0506		mg/L	101.2	90 - 110				12/12/13
<b>DUP</b>			<b>QC Sample #102530</b>							
			<b>Original 131507002</b>							
Hexavalent chromium	18540-29-9	0.0210		mg/L			1.00	20		12/12/13
<b>MS</b>			<b>QC Sample #102531</b>							
			<b>Original 131507002</b>							
Hexavalent chromium	18540-29-9	0.0406		mg/L	101.5	85 - 115				12/12/13

\* - QC result out of range

n/a - Not Applicable

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Attention Scot Fitzgerald  
 Department Wet Chemistry

Group # WSCF131506

Analytical Batch 224819 (QC Batch: 224819) Test Total Alkalinity as mg/L CaCO3 (Water)  
 Associated Samples 131506004

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
<b>LCS</b>			<b>QC Sample #102573</b>							
Total Alkalinity as CaCO3	ALKALINITY	95		mg/L	94.9	80 - 120				12/13/13
<b>DUP</b>			<b>QC Sample #102574</b>							
			<b>Original 131507004</b>							
Total Alkalinity as CaCO3	ALKALINITY	100		mg/L			2.90	20		12/13/13
<b>LCS</b>			<b>QC Sample #102575</b>							
Total Alkalinity as CaCO3	ALKALINITY	98		mg/L	97.9	80 - 120				12/13/13
<b>LCS</b>			<b>QC Sample #102576</b>							
Total Alkalinity as CaCO3	ALKALINITY	99		mg/L	98.7	80 - 120				12/13/13

\* - QC result out of range

n/a - Not Applicable

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Attention Scot Fitzgerald  
 Department Radiochemistry

Group # WSCF131506

Analytical Batch 225106 (QC Batch: 224914) Test Gamma Energy Analysis-general  
 Associated Samples 131506004

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
<b>IBLANK</b>		<b>QC Sample #102632</b>								
Antimony-125	14234-35-6	-16		pCi/L					U	12/18/13
Cesium-134	13967-70-9	1.2		pCi/L					U	12/18/13
Cesium-137	10045-97-3	2.8		pCi/L					U	12/18/13
Cobalt-60	10198-40-0	-1.3		pCi/L					U	12/18/13
Europium-152	14683-23-9	-25		pCi/L					U	12/18/13
Europium-154	15585-10-1	15		pCi/L					U	12/18/13
Europium-155	14391-16-3	6.1		pCi/L					U	12/18/13
Potassium-40	13966-00-2	87		pCi/L					U	12/18/13
Ruthenium-106	13967-48-1	-50		pCi/L					U	12/18/13
Beryllium-7	13966-02-4	30		pCi/L					U	12/18/13
<b>LCS</b>		<b>QC Sample #102633</b>								
Cesium-137	10045-97-3	6400		pCi/sample	106.7	80 - 120				12/19/13
Cobalt-60	10198-40-0	11000		pCi/sample	107	80 - 120				12/19/13
<b>DUP</b>		<b>QC Sample #102634</b>								
		<b>Original 131489011</b>								
Antimony-125	14234-35-6	1.8		pCi/L			165.30	20	* U	12/18/13
Cesium-134	13967-70-9	-36		pCi/L			-169.80	20	* U	12/18/13

\* - QC result out of range

n/a - Not Applicable

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**Attention** Scot Fitzgerald  
**Department** Radiochemistry

**Group #** WSCF131506

Analyte	CAS #	Original Found	QC Found	Units	% RecovLimits	RPD	RPD Limit	RQ	Analyzed
Cesium-137	10045-97-3		-3.3	pCi/L		508.40	20	* U	12/18/13
Cobalt-60	10198-40-0		11	pCi/L		110.80	20	* U	12/18/13
Europium-152	14683-23-9		16	pCi/L		17.70	20	U	12/18/13
Europium-154	15585-10-1		-18	pCi/L		-169.30	20	* U	12/18/13
Europium-155	14391-16-3		3.8	pCi/L		146.30	20	* U	12/18/13
Potassium-40	13966-00-2		110	pCi/L		549.30	20	* U	12/18/13
Ruthenium-106	13967-48-1		83	pCi/L		1471.40	20	* U	12/18/13
Beryllium-7	13966-02-4		240	pCi/L		182.20	20	* U	12/18/13

\* - QC result out of range

n/a - Not Applicable

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Attention Scot Fitzgerald  
 Department Radiochemistry

Group # WSCF131506

Analytical Batch 225226 (QC Batch: 224902) Test TC99 by Liquid Scintillation  
 Associated Samples 131506004

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
<b>BLANK</b>										
Technetium-99	14133-76-7		0.76	pCi/L					U	12/17/13
<b>LCS</b>										
Technetium-99	14133-76-7		270	pCi/L	103.5	80 - 120				12/17/13
<b>DUP</b>										
Technetium-99	14133-76-7		-0.030	pCi/L			-125.00	20	* U	12/17/13
<b>MS</b>										
Technetium-99	14133-76-7		1100	pCi/L	102.3	75 - 125				12/17/13

\* - QC result out of range

n/a - Not Applicable

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Attention Scot Fitzgerald  
 Department Radiochemistry

Group # WSCF131506

Analytical Batch 225409 (QC Batch: 224909) Test Strontium 89/90 (GPC/GEA)  
 Associated Samples 131506004

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
<b>BLANK</b>		<b>QC Sample #102612</b>								
Strontium-89_90	SR-RAD		0.17	pCi/L					U	12/24/13
<b>LCS</b>		<b>QC Sample #102613</b>								
Strontium-89_90	SR-RAD		88	pCi/L	89.8	80 - 120				12/24/13
<b>DUP</b>		<b>QC Sample #102614</b>								
		<b>Original 131504022</b>								
Strontium-89_90	SR-RAD		0.84	pCi/L			16.70	20	U	12/24/13

\* - QC result out of range

n/a - Not Applicable

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Attention Scot Fitzgerald  
 Department Radiochemistry

Group # WSCF131506

Analytical Batch 225420 (QC Batch: 224899) Test Tritium by LSC  
 Associated Samples 131506004

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
<b>BLANK</b>										
			<b>QC Sample #102584</b>							
Tritium <b>LCS</b>	10028-17-8		-39	pCi/L					U	12/24/13
			<b>QC Sample #102585</b>							
Tritium <b>DUP</b>	10028-17-8		3200	pCi/L	97	80 - 120				12/24/13
			<b>QC Sample #102586</b>							
			<b>Original 131525005</b>							
Tritium <b>MSPK</b>	10028-17-8		1100	pCi/L			1.90	20		12/24/13
			<b>QC Sample #102587</b>							
Tritium	10028-17-8		20000	pCi/L	91.2	75 - 125				12/24/13

\* - QC result out of range

n/a - Not Applicable

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Attention Scot Fitzgerald  
 Department Inorganic

Group # WSCF131506

Analytical Batch 225461 (QC Batch: 225254) Test ICP-6010 - All possible metals  
 Associated Samples 131506003, 131506004

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
<b>BLANK</b>		<b>QC Sample #102927</b>								
Iron	7439-89-6	<20		ug/L					U	12/31/13
Magnesium	7439-95-4	<6.0		ug/L					U	12/31/13
Manganese	7439-96-5	<4.0		ug/L					U	12/31/13
Nickel	7440-02-0	<5.0		ug/L					U	12/31/13
Potassium	7440-09-7	749		ug/L						12/31/13
Silver	7440-22-4	<4.0		ug/L					U	12/31/13
Sodium	7440-23-5	222		ug/L						12/31/13
Antimony	7440-36-0	<20		ug/L					U	12/31/13
Barium	7440-39-3	<4.0		ug/L					U	12/31/13
Cadmium	7440-43-9	<4.0		ug/L					U	12/31/13
Chromium	7440-47-3	<5.0		ug/L					U	12/31/13
Cobalt	7440-48-4	<4.0		ug/L					U	12/31/13
Copper	7440-50-8	<4.0		ug/L					U	12/31/13
Vanadium	7440-62-2	<10		ug/L					U	12/31/13
Zinc	7440-66-6	<5.0		ug/L					U	12/31/13
Calcium	7440-70-2	<30		ug/L					U	12/31/13
Strontium	7440-24-6	<10		ug/L					U	12/31/13

\* - QC result out of range

n/a - Not Applicable

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Attention Scot Fitzgerald  
 Department Inorganic

Group # WSCF131506

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
Arsenic	7440-38-2		<30	ug/L					U	12/31/13
Beryllium	7440-41-7		<4.0	ug/L					U	12/31/13
<b>LCS</b>			<b>QC Sample #102929</b>							
Iron	7439-89-6		980	ug/L	98	80 - 120				12/31/13
Magnesium	7439-95-4		9870	ug/L	98.7	80 - 120				12/31/13
Manganese	7439-96-5		997	ug/L	99.7	80 - 120				12/31/13
Nickel	7440-02-0		976	ug/L	97.6	80 - 120				12/31/13
Potassium	7440-09-7		10600	ug/L	105.9	80 - 120				12/31/13
Silver	7440-22-4		973	ug/L	97.3	80 - 120				12/31/13
Sodium	7440-23-5		10200	ug/L	101.9	80 - 120				12/31/13
Antimony	7440-36-0		963	ug/L	96.3	80 - 120				12/31/13
Barium	7440-39-3		995	ug/L	99.5	80 - 120				12/31/13
Cadmium	7440-43-9		976	ug/L	97.6	80 - 120				12/31/13
Chromium	7440-47-3		979	ug/L	97.9	80 - 120				12/31/13
Cobalt	7440-48-4		970	ug/L	97	80 - 120				12/31/13
Copper	7440-50-8		974	ug/L	97.4	80 - 120				12/31/13
Vanadium	7440-62-2		979	ug/L	97.9	80 - 120				12/31/13
Zinc	7440-66-6		989	ug/L	98.9	80 - 120				12/31/13
Calcium	7440-70-2		20200	ug/L	100.8	80 - 120				12/31/13
Strontium	7440-24-6		984	ug/L	98.4	80 - 120				12/31/13
Arsenic	7440-38-2		992	ug/L	99.2	80 - 120				12/31/13
Beryllium	7440-41-7		1110	ug/L	110.9	80 - 120				12/31/13

\* - QC result out of range

n/a - Not Applicable

REVISED131506 -

Quality Control Report

June 03, 2014

Rev. 1

Attention Scot Fitzgerald  
 Department Inorganic

Group # WSCF131506

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
<b>MS</b>		<b>QC Sample #102930</b>								
		<b>Original 131502001</b>								
Iron	7439-89-6	981		ug/L	98.1	75 - 125				12/31/13
Magnesium	7439-95-4	9930		ug/L	99.3	75 - 125				12/31/13
Manganese	7439-96-5	991		ug/L	99.1	75 - 125				12/31/13
Nickel	7440-02-0	944		ug/L	94.4	75 - 125				12/31/13
Potassium	7440-09-7	10100		ug/L	101.2	75 - 125				12/31/13
Silver	7440-22-4	983		ug/L	98.3	75 - 125				12/31/13
Sodium	7440-23-5	10200		ug/L	102	75 - 125				12/31/13
Antimony	7440-36-0	952		ug/L	95.2	75 - 125				12/31/13
Barium	7440-39-3	1000		ug/L	100.5	75 - 125				12/31/13
Cadmium	7440-43-9	951		ug/L	95.1	75 - 125				12/31/13
Chromium	7440-47-3	972		ug/L	97.2	75 - 125				12/31/13
Cobalt	7440-48-4	944		ug/L	94.4	75 - 125				12/31/13
Copper	7440-50-8	981		ug/L	98.1	75 - 125				12/31/13
Vanadium	7440-62-2	974		ug/L	97.4	75 - 125				12/31/13
Zinc	7440-66-6	965		ug/L	96.5	75 - 125				12/31/13
Calcium	7440-70-2	19800		ug/L	98.8	75 - 125				12/31/13
Strontium	7440-24-6	962		ug/L	96.2	75 - 125				12/31/13
Arsenic	7440-38-2	959		ug/L	95.9	75 - 125				12/31/13
Beryllium	7440-41-7	1110		ug/L	110.6	75 - 125				12/31/13
<b>MSD</b>		<b>QC Sample #102931</b>								
		<b>Original 131502001</b>								
		<b>Paired 102930</b>								
Iron	7439-89-6	1020		ug/L	101.5	75 - 125	3.40	20		12/31/13

\* - QC result out of range

n/a - Not Applicable

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**Quality Control Report**

June 03, 2014

Rev. 1

Attention Scot Fitzgerald  
 Department Inorganic

Group # WSCF131506

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
Magnesium	7439-95-4		10300	ug/L	103.1	75 - 125	3.80	20		12/31/13
Manganese	7439-96-5		1030	ug/L	102.8	75 - 125	3.70	20		12/31/13
Nickel	7440-02-0		984	ug/L	98.4	75 - 125	4.10	20		12/31/13
Potassium	7440-09-7		10500	ug/L	105.3	75 - 125	3.80	20		12/31/13
Silver	7440-22-4		1010	ug/L	101.4	75 - 125	3.10	20		12/31/13
Sodium	7440-23-5		10500	ug/L	105.2	75 - 125	3.00	20		12/31/13
Antimony	7440-36-0		990	ug/L	99	75 - 125	3.90	20		12/31/13
Barium	7440-39-3		1040	ug/L	103.7	75 - 125	3.10	20		12/31/13
Cadmium	7440-43-9		992	ug/L	99.2	75 - 125	4.20	20		12/31/13
Chromium	7440-47-3		1010	ug/L	101.1	75 - 125	4.00	20		12/31/13
Cobalt	7440-48-4		986	ug/L	98.6	75 - 125	4.40	20		12/31/13
Copper	7440-50-8		1010	ug/L	101.3	75 - 125	3.20	20		12/31/13
Vanadium	7440-62-2		1010	ug/L	101.3	75 - 125	3.90	20		12/31/13
Zinc	7440-66-6		1010	ug/L	100.6	75 - 125	4.10	20		12/31/13
Calcium	7440-70-2		20600	ug/L	103.1	75 - 125	4.20	20		12/31/13
Strontium	7440-24-6		1010	ug/L	100.6	75 - 125	4.50	20		12/31/13
Arsenic	7440-38-2		1020	ug/L	102.3	75 - 125	6.50	20		12/31/13
Beryllium	7440-41-7		1150	ug/L	115.1	75 - 125	4.00	20		12/31/13

\* - QC result out of range

n/a - Not Applicable

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Attention Scot Fitzgerald  
 Department Radiochemistry

Group # WSCF131506

Analytical Batch 225513 (QC Batch: 225466)  
 Associated Samples 131506004

Test GAB Discrete analysis Alpha only

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
<b>BLANK</b>		<b>QC Sample #103196</b>								
Gross Alpha <b>LCS</b>	12587-46-1		4.5E-3	pCi/L					U	01/06/14
		<b>QC Sample #103197</b>								
Gross Alpha <b>DUP</b>	12587-46-1		52	pCi/L	87.9	80 - 120				01/06/14
		<b>QC Sample #103198</b>								
		<b>Original 131504017</b>								
Gross Alpha	12587-46-1		2.3	pCi/L			52.20	20	* X	01/06/14

\* - QC result out of range

n/a - Not Applicable

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Attention Scot Fitzgerald  
 Department Radiochemistry

Group # WSCF131506

Analytical Batch 225514 (QC Batch: 225466) Test GAB Discrete analysis Beta only  
 Associated Samples 131506004

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
<b>BLANK</b>		<b>QC Sample #103196</b>								
Gross Beta	12587-47-2		1.2	pCi/L					U	01/06/14
<b>LCS</b>		<b>QC Sample #103197</b>								
Gross Beta	12587-47-2		230	pCi/L	94.7	80 - 120				01/06/14
<b>DUP</b>		<b>QC Sample #103198</b>								
		<b>Original 131504017</b>								
Gross Beta	12587-47-2		11	pCi/L			37.70	20	* X	01/06/14

\* - QC result out of range

n/a - Not Applicable

REVISED131506 -

Quality Control Report

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Attention Scot Fitzgerald  
 Department Radiochemistry

Group # WSCF131506

Analytical Batch 225409 (QC Batch: 224909) Test Strontium 89/90 (GPC/GEA)  
 Associated Samples 131506004

Analyte	CAS #	Original Found	QC Found	Units	% Recov	Limits	RPD	RPD Limit	RQ	Analyzed
<b>BLANK</b>										
			<b>QC Sample #102612</b>							
Strontium Nitrate	10042-76-9			mg	74.4	25 - 105				12/24/13
<b>LCS</b>			<b>QC Sample #102613</b>							
Strontium Nitrate	10042-76-9			mg	74.4	25 - 105				12/24/13
<b>DUP</b>			<b>QC Sample #102614</b>							
			<b>Original 131504022</b>							
Strontium Nitrate	10042-76-9			mg	83.5	25 - 105	n/a			12/24/13
<b>SAMPLE</b>			<b>Sample #131506004</b>							
Strontium Nitrate	10042-76-9			mg	80.2	25 - 105				12/24/13

\* - QC result out of range

n/a - Not Applicable

REVISED131506 -

Attention: Scot Fitzgerald

Group #

WSCF131506

**Quality Control Comments**

Department Inorganic

102508 B2RVF3(131506002MS)

**Analyte** Chloride - Anions by Ion Chromatography (Water)

[1] X5: Sample concentration exceed spiking level by a factor of 4. Spike recoveries are not valid.

**Analyte** Nitrate-N - Anions by Ion Chromatography (Water)

[1] X5: Sample concentration exceed spiking level by a factor of 4. Spike recoveries are not valid.

102509 B2RVF3(131506002MSD)

**Analyte** Chloride - Anions by Ion Chromatography (Water)

[1] X5: Sample concentration exceed spiking level by a factor of 4. Spike recoveries are not valid.

**Analyte** Nitrate-N - Anions by Ion Chromatography (Water)

[1] X5: Sample concentration exceed spiking level by a factor of 4. Spike recoveries are not valid.

Attention: Scot Fitzgerald

Group #

WSCF131506

**Quality Control Comments**

Department Radiochemistry

103198

B2THB6(131504017DUP)

**Analyte** Gross Alpha - GAB Discrete analysis Alpha only

[1] The duplicate is outside of default RPD limits. RPD limit does not apply to results less than 5X the Minimum Detectable Concentration.

**Analyte** Gross Beta - GAB Discrete analysis Beta only

[1] The duplicate is outside of default RPD limits. RPD limit does not apply to results less than 5X the Minimum Detectable Concentration.

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  
**CA CN:** 401647  
**Work Order #:** 131506  
**Customer Work ID:** I14-005-310  
**Due Date:** 01/13/2014

The following samples were received from you on 12/12/2013 12:50:00 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
131506001	B2RVF4	WATER	12/12/2013 10:13	12/12/2013 12:50
<b>Procedure</b>		<b>Compound List</b>		
Hexavalent chromium Discrete Analyzer		Cr6		
Sample #	Sample ID	Matrix	Collected	Received
131506002	B2RVF3	WATER	12/12/2013 10:13	12/12/2013 12:50
<b>Procedure</b>		<b>Compound List</b>		
Anions by Ion Chromatography (Water)		F,Cl,NO2,NO3,SO4		
Sample #	Sample ID	Matrix	Collected	Received
131506003	B2RVF6	WATER	12/12/2013 10:13	12/12/2013 12:50
<b>Procedure</b>		<b>Compound List</b>		
ICP-6010 - All possible metals		6010 ICP Common + GW03		
Sample #	Sample ID	Matrix	Collected	Received
131506004	B2RVF2	WATER	12/12/2013 10:13	12/12/2013 12:50
<b>Procedure</b>		<b>Compound List</b>		
GAB Discrete analysis Alpha only		Alpha		
GAB Discrete analysis Beta only		Beta		
Gamma Energy Analysis-general		GE A List-1 (10)		
ICP-6010 - All possible metals		6010 ICP Common + GW03		
Strontium 89/90 (GPC/GE A)		SR89/90		
TC99 by Liquid Scintillation		Tc-99		
Total Alkalinity as mg/L CaCO3 (Water)		Alkalinity,Carbonate,Bicarbonate,Hydroxyl Ion		
Tritium by LSC		H3		



CH2MHill Plateau Remediation Company

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

C.O.C. #  
**114-005-309**  
Page 1 of 1

Collector	Robert Crow	Contact/Requester	Karen Waters-Husted	Telephone No.	509-376-1650
SAF No.	114-005	Sampling Origin	Hanford Site	Purchase Order/Charge Code	300071ES20
Project Title	100KR4, NOVEMBER 2013	Logbook No.	HNF-N-506 <b>6074</b>	Ice Chest No.	N/A
Shipped To (Last)	Waste Sampling & Characterization	Method of Shipment	GOVERNMENT VEHICLE	Bill of Lading/Air Bill No.	N/A
Protocol	CERCLA	Priority	31 Days	Offsite Property No.	N/A

POSSIBLE SAMPLE HAZARDS/REMARKS  
 \*\*\* Certain Radioactive Material at concentrations that are not regulated for transportation per 49 CFR but are not releasable per DOE Order 5400.5 (1990/1995)

SPECIAL INSTRUCTIONS  
 100 Area Generator Knowledge Information Form applies. The CALN for analytical work at WSCF is 401047. FY13 & FY14 SAFs cannot be in the same SDG.

Sample No.	Filter	Date	Time	No./Type Container	Sample Analysis	Holding Time	Preservative
B2RVF3	N	12/12/13	1013	1x500-mL P	300 C. ANIONS, IC: COMMON	48 Hours	Conl-4C

Relinquished By	Robert Crow	Front Sign	Date/Time	Received By	CS Johnson	Part Sign	Date/Time	Matrix *
Relinquished By	R Crow		DEC 17 2013	Received By			DEC 19 2013	S - Soil SE - Sediment SO - Solid SL - Sludge W - Water O - Oil A - Air
Relinquished By				Received By				DS - Dismantle DL - Drum Linings T - Tissue WT - Waste L - Liquefied V - Vegetation X - Other
Relinquished By				Received By				

FINAL SAMPLE DISPOSITION  
 Disposal Method (e.g., Return to customer, per lab procedure, used in process)

Chain of Custody

CH2MHill Plateau Remediation Company

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

C.O.C. # **114-005-308**  
Page 1 of 1

Collector	Robert Crow	Contact/Requester	Karen Walters-Husted	Telephone No.	509-376-4650
SAF No.	114-005	Sampling Origin	Hanford Site	Purchase Order/Charge Code	300071ESS20
Project Title	100KRR4, NOVEMBER 2013	Logbook No.	HNF-N-506 <u>GC/HA</u>	Ice Chest No.	N/A
Shipped To (Lab)	Waste Sampling & Characterization	Method of Shipment	GOVERNMENT VEHICLE	Bill of Lading/Air Bill No.	N/A
Protocol	CERCLA	Priority:	31 Days	Offsite Property No.	N/A
POSSIBLE SAMPLE HAZARDS/REMARKS *** Contains Radioactive Material at concentration that are not regulated for transportation per 49 CFR but are not releasable per DOE Order 5400.5 (1990/1993)			SPECIAL INSTRUCTIONS 106 Area Generator Knowledge Information Form applies. The CACIN for analytical work at WSCF is 40 0497. FY13 & FY14 SAFs cannot be in the same SDX1.		
Total Activity Exemption: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>					

Sample No.	Filter	Date	Time	No./Type Container	Sample Analysis	Holding Time	Preservative
B2RVF6	Y	12/12/13	1015	1X500-mL G/P	6010_METALS_ICP: COMMON; 6010_METALS_ICP: GW 03	6 Months	HNO3 to pH <2
B2RVF2	N			1X500-mL G/P	6010_METALS_ICP: COMMON; 6010_METALS_ICP: GW 03	6 Months	HNO3 to pH <2
B2RVF2	N			1X250-mL G/P	2320_ALKALINITY: GW 01	14 Days	Quol-4C
B2RVF2	N			1X500-mL G/P	ALPHA_GPC: DISCRETE: COMMON; BETA_GPC: COMMON; GAMMA_GS: GW 01	6 Months	HNO3 to pH <2
B2RVF2	N			1X500-mL G/P	SRTOT_GEP_FREPIP_GFC: COMMON	6 Months	HNO3 to pH <2
B2RVF2	N			1X1-L G/P	TC99_3MDSK_LSC: COMMON	6 Months	HCl to pH <2
B2RVF2	N			1X250-mL G	TRITIUM_EIE_L9C: COMMON	6 Months	None

Relinquished By	Robert Crow	Date/Time	DEC 12 2013 12:10	Received By	Sammon	Date/Time	DEC 12 2013 1:50
Relinquished By		Date/Time		Received By		Date/Time	
Relinquished By		Date/Time		Received By		Date/Time	
Relinquished By		Date/Time		Received By		Date/Time	
FINAL SAMPLE DISPOSITION	Disposal Method (e.g., Return to customer, per lab procedure, used in process)			Disposed By			

Matrix *	SE	SO	SL	W	Q	A
Soil						
Sediment						
Solid						
Sludge						
Water						
Oil						
Air						
Drum Solids						
Drum Liquids						
Tissue						
Wipe						
Liquid						
Vegetation						
Other						

PRINTED ON 9/24/2013

A-0004-042 (REV 2)