

March 20, 2012
File No. 04.0029307.00



Ms. Amy Daigneault
Pretreatment Coordinator
Lowell Regional Wastewater Utility
451 First St. Blvd. (Rte 110)
Lowell, Massachusetts 01850

Re: Supplemental Monthly Self-Monitoring Report
February 2012
Merrimack Station
Public Service of New Hampshire
Bow, New Hampshire

380 Harvey Road
Manchester
New Hampshire
03103-3347
603-623-3600
FAX 603-624-9463
www.gza.com

Dear Ms. Daigneault:

On behalf of Public Service of New Hampshire (PSNH), GZA GeoEnvironmental, Inc. (GZA) is pleased to submit a supplement to the Self-Monitoring Report previously submitted for the period February 1, 2012 through February 29, 2012. The attached **Table 1** summarizes the data contained in the attached **Analytical Data Report** from the **Stream B** sample collected on February 15, 2012. The results indicate that pollutant concentrations were within the Local Sewer Discharge Limits.

ANALYTICAL DISCUSSION

Flue Gas Desulfurization (FGD) wastewater requires specialized analytical techniques to overcome matrix interference for certain analysis of trace metals. To assist you in evaluating this issue further, we offer an excerpt below from the United States Environmental Protection Agency (EPA) web site and a link to their draft Standard Operating Procedure (SOP) for trace metals analysis of FGD wastewater that contains further guidance.

LABORATORY ANALYSIS OF FGD WASTEWATER

Wastewater from FGD systems can contain constituents known to cause matrix interferences. EPA has observed that, during inductively coupled plasma – mass spectrometry (ICP-MS) analysis of FGD wastewater, certain elements commonly present in the wastewater may cause polyatomic interferences that bias the detection and/or quantization of certain elements of interest. These potential interferences may become significant when measuring trace elements at concentrations in the low parts-per-billion range.



As part of a recent sampling effort for the steam electric power generating effluent guidelines rulemaking, EPA developed an SOP that was used in conjunction with EPA Method 200.8 to conduct ICP-MS analyses of FGD wastewater. The SOP describes critical technical and quality assurance procedures that were implemented to mitigate anticipated interferences and generate reliable data for FGD wastewater. EPA regulations at 40 CFR 136.6 already allow the analytical community flexibility to modify approved methods to lower the costs of measurements, overcome matrix interferences, or otherwise improve the analysis. The draft SOP developed for FGD wastewater takes a proactive approach toward looking for and taking steps to mitigate matrix interferences, including using specialized interference check solutions (i.e., a synthetic FGD wastewater matrix). EPA's draft SOP is being made available to laboratories contemplating ICP-MS analysis of FGD wastewater, either for adoption as currently written or to serve as a framework for developing their own laboratory-specific SOPs. For further information please see the following:

- Draft SOP: Inductively Coupled Plasma/Mass Spectrometry for Trace Element Analysis in Flue Gas Desulfurization Wastewaters (30 pp, 174K), http://water.epa.gov/scitech/wastetech/guide/upload/steam_draft_sop.pdf, EPA May 2011.

Considering that specialized analytical techniques are necessary to overcome matrix interference for certain analysis of trace metals in FGD wastewater, we recommend any analysis on FGD wastewater be conducted in accordance with the EPA draft SOP for trace metals analysis of FGD wastewater.

Should you have any questions concerning this report, please do not hesitate to contact me at (603) 232-8744.

Very truly yours,

GZA GEOENVIRONMENTAL, INC.

A handwritten signature in black ink, reading "Ronald A. Breton".

Ronald A. Breton, P.E.
Principal

A handwritten signature in black ink, reading "Michael P. North".

Michael P. North, P.E.
Consultant/Reviewer

RAB/MPN:rkl

P:\04Jobs\0029300s\04.0029307.00\Work\SAMPLING AND REPORTING REPORTS\Lowell Stream B\FINAL 29307 STREAM B Supplemental 032012.docx

Attachments: Table
Analytical Data Report

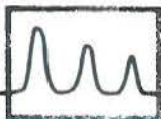
TABLE

TABLE 1
SUMMARY OF STREAM B CONCENTRATIONS
COMPARED TO LOWELL SEWER DISCHARGE LIMITS

Public Service of New Hampshire
Merrimack Station
Bow, New Hampshire

PARAMETER	LOWELL SEWER DISCHARGE LIMITS (mg/L)	STREAM B RESULTS (mg/L) 2/15/2012 EAI/Frontier
Aluminum	24.69	3.920
Arsenic	0.556	0.0494
Cadmium	0.056	0.00252
Chromium (T)	8.108	0.0282
Copper	3.124	0.0669
Lead	0.857	0.00621
Mercury	0.004	0.0000458
Nickel	1.541	0.165
pH	5-9.5	6.5
Silver	0.053	< 0.00100
Zinc	4.959	0.0925

ANALYTICAL DATA REPORT



Paul Pepler
GZA GeoEnvironmental, Inc. (NH)
380 Harvey Road
Manchester, NH 03103



Subject: Laboratory Report

Eastern Analytical, Inc. ID: 107792B
Client Identification: Stream B
Date Received: 2/16/2012

Dear Mr. Pepler:

Enclosed please find the laboratory report for the above identified project. All analyses were performed in accordance with our QA/QC Program. Unless otherwise stated, holding times, preservation techniques, container types, and sample conditions adhered to EPA Protocol. Samples which were collected by Eastern Analytical, Inc. (EAI) were collected in accordance with approved EPA procedures. Eastern Analytical, Inc. certifies that the enclosed test results meet all requirements of NELAP and other applicable state certifications. Please refer to our website at www.eailabs.com for a copy of our NELAP certificate and accredited parameters.

The following standard abbreviations and conventions apply to all EAI reports:
Solid samples are reported on a dry weight basis, unless otherwise noted
< : "less than" followed by the reporting limit
> : "greater than" followed by the reporting limit
%R : % Recovery

Eastern Analytical Inc. maintains certification in the following states: Connecticut (PH-0492), Maine (NH005), Massachusetts (M-NH005), New Hampshire/NELAP (1012), Rhode Island (269) and Vermont (VT1012).

The following information is contained within this report: Sample Conditions summary, Analytical Results/Data, Quality Control data (if requested) and copies of the Chain of Custody. This report may not be reproduced except in full, without the the written approval of the laboratory.

If you have any questions regarding the results contained within, please feel free to directly contact me or the chemist(s) who performed the testing in question. Unless otherwise requested, we will dispose of the sample(s) 30 days from the sample receipt date.

We appreciate this opportunity to be of service and look forward to your continued patronage.

Sincerely,


Lorraine Olashaw, Lab Director

3.9.12
Date

28
of pages (excluding cover letter)



SAMPLE CONDITIONS PAGE

EAI ID#: 107792

Client: **GZA GeoEnvironmental, Inc. (NH)**Client Designation: **Stream B (Report B)**Temperature upon receipt (°C): **7**Received on ice or cold packs (Yes/No): **Y**

Acceptable temperature range (°C): 0-6

Lab ID	Sample ID	Date Received	Date Sampled	Sample Matrix	% Dry Weight	Exceptions/Comments (other than thermal preservation)
107792.01	Concentrated Wastewater	2/16/12	2/15/12	aqueous		Adheres to Sample Acceptance Policy

Samples were properly preserved and the pH measured when applicable unless otherwise noted. Analysis of solids for pH, Flashpoint, Ignitability, Paint Filter, Corrosivity, Conductivity and Specific Gravity are reported on an "as received" basis.

All results contained in this report relate only to the above listed samples.

References include:

- 1) EPA 600/4-79-020, 1983
- 2) Standard Methods for Examination of Water and Wastewater : Inorganics, 19th Edition, 1995; Microbiology, 20th Edition, 1998
- 3) Test Methods for Evaluating Solid Waste SW 846 3rd Edition including updates IVA and IVB
- 4) Hach Water Analysis Handbook, 2nd edition, 1992

eastern analytical, inc.

www.eailabs.com

Phone: (603) 228-0525



LABORATORY REPORT

EAI ID#: 107792B

Client: **GZA GeoEnvironmental, Inc. (NH)**

Client Designation: **Stream B**

Sample ID: Concentrated Wastewater

Lab Sample ID: 107792.03

Matrix: aqueous

Date Sampled: 2/15/12

Date Received: 2/16/12

Solids Suspended 33000

Solids Dissolved 180000

Fluoride 20

Sulfate 17000

Nitrate/Nitrite-N 5.7

TKN 30

Total Nitrogen 35.7

BOD 67

COD 1300

pH 6.5

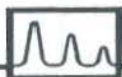
Specific Gravity @ 60F 1.252

Chloride 110000

Chloride 93000

Analytical Matrix	Units	Analysis		Method	Analyst
		Date			
AqTot	mg/L	2/22/12	2540D	DLS	
AqTot	mg/L	2/22/12	2540C	DLS	
AqTot	mg/L	2/24/12	300.0	KL	
AqTot	mg/L	2/24/12	300.0	KL	
AqTot	mg/L	2/17/12	353.2	DLS	
AqTot	mg/L	2/24/12	4500NorgC	SEL	
AqTot	mg/L	2/24/12	4500NorgC	SEL	
AqTot	mg/L	2/17/12	5210B	SKC	
AqTot	mg/L	2/24/12	H8000	KJR	
AqTot	SU	2/17/12	4500H+B	JG	
AqTot	None	2/27/12	D1429D	KL	
AqTot	mg/L	2/29/12	4500CIE	DLS	
AqDis	mg/L	2/29/12	4500CIE	DLS	

Total Nitrogen is determined by a calculation derived from method EPA 353.2, and Standard Methods 4500orgC/NH3D.



QC REPORT

EAI ID#: 107792B

Client: GZA GeoEnvironmental, Inc. (NH)

Client Designation: Stream B

Parameter Name	Blank	LCS	LCSD	Units	Date of Analysis	Limits	RPD	Method
Solids Suspended	< 5	100 (104 %R)	110 (110 %R) (6 RPD)	mg/L	2/22/12	90 - 110	20	2540D
Solids Dissolved	< 5	970 (97 %R)	NA	mg/L	2/22/12	85 - 115	20	2540C
Fluoride	< 0.1	2.1 (104 %R)	2.1 (105 %R) (1 RPD)	mg/L	2/24/12	90 - 110	20	300.0
Sulfate	< 1	21 (106 %R)	21 (106 %R) (0 RPD)	mg/L	2/24/12	90 - 110	20	300.0
Chloride	< 1	26 (102 %R)	26 (103 %R) (1 RPD)	mg/L	2/21/12	90 - 110	20	4500CIE
Nitrate/Nitrite-N	< 0.5	5.4 (108 %R)	5.4 (108 %R) (0 RPD)	mg/L	2/17/12	90 - 110	20	353.2
TKN	< 0.5	5.0 (99 %R)	4.8 (96 %R) (3 RPD)	mg/L	2/24/12	90 - 110	20	4500Norg
BOD	< 6	380 (94 %R)	NA	mg/L	2/17/12	84 - 115	20	5210B
COD	< 10	95 (95 %R)	NA	mg/L	2/24/12	85 - 115	20	H8000
pH		6.0 (100 %R)	NA	SU	2/17/12	5.95 - 6.07	20	4500H+B

Parameter Name	Duplicate Parent ID	Duplicate Parent	Duplicate	Units	Date of Analysis	RPD	Method
Solids Suspended	107848.01	400	350 (12 RPD)	mg/L	2/22/12	20	2540D
Solids Dissolved	107792.03	180000	160000 (10 RPD)	mg/L	2/22/12	20	2540C
Fluoride		NA	NA	mg/L	2/24/12	20	300.0
Sulfate		NA	NA	mg/L	2/24/12	20	300.0
Chloride		NA	NA	mg/L	2/21/12	20	4500CIE
Nitrate/Nitrite-N		NA	NA	mg/L	2/17/12	20	353.2
TKN		NA	NA	mg/L	2/24/12	20	4500NorgC
BOD	107749.01	89	85 (4 RPD)	mg/L	2/17/12	20	5210B
COD		NA	NA	mg/L	2/24/12	20	H8000
pH	107792.03	6.5	6.5 (0 RPD)	SU	2/17/12	20	4500H+B

Samples were analyzed within holding times unless noted on the sample results page.
Instrumentation was calibrated in accordance with the method requirements.
The method blanks were free of contamination at the reporting limits.
The associated matrix spikes and/or Laboratory Control Samples met the above stated criteria.
Exceptions to the above statements are flagged or noted above or on the QC Narrative page.
*/! Flagged analyte recoveries deviated from the QA/QC limits.



414 Pontius Ave North
Seattle, WA 98109
Ph: 206-622-6960
Fx: 206-622-6870

08 March 2012

Jeff Gagne
Eastern Analytical, Inc
25 Chenell Drive
Concord, NH 03301
RE: Merrimack Station 200.8

Enclosed are the analytical results for samples received by Frontier Global Sciences. All quality control measurements are within established control limits and there were no analytical difficulties encountered with the exception of those listed in the case narrative section of this report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

A handwritten signature in cursive script that reads "Liz Siska".

Liz Siska
Project Manager



414 Pontius Ave North
Seattle, WA 98109
Ph: 206-622-6960
Fx: 206-622-6870

ANALYTICAL REPORT FOR SAMPLES

Laboratory: Frontier Global Sciences, Inc.

SDG:

Client: Eastern Analytical, Inc

Project: Merrimack Station 200.8

Sample ID	Lab ID	Matrix	Date Sampled	Date Received
Concentrated Waste Water	1202262-01	Water	15-Feb-12 00:00	20-Feb-12 09:38

Frontier Global Sciences, Inc.

Liz Siska, Project Manager

The results in this report only apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

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CASE NARRATIVE

Revised Report- Sample date corrected and updated Case Narrative 3/8/12

SAMPLE RECEIPT

Samples were received at Frontier Global Sciences (FGS) on February 20th, 2012. The samples were received intact, on-ice with temperatures measured at 2.2 degrees Celsius.

SAMPLE PREPARATION AND ANALYSIS

Samples were prepared and analyzed for total metals in accordance with EPA Method 200.8 (modified).

Samples were prepared and analyzed for total mercury in accordance with EPA Method 1631E.

ANALYTICAL ISSUES

The requested MS/MSD was not run for Zn due to limited sample volume.

Liquid spikes were prepared for every preparation as a measure of accuracy. All liquid spikes and certified reference material were within the control limits.

As an additional measure of the accuracy of the methods utilized for analysis and to check for matrix interference, matrix spikes (MS) and matrix spike duplicates (MSD) were digested and analyzed. All of the matrix spike recoveries were within the control limits with the exception of any QC flagged and described in the notes and definitions section of the following report.

A reasonable measure of the precision of the analytical methods utilized for analysis is the relative percent difference (RPD) between matrix spike and matrix spike duplicate recoveries and between laboratory control sample and laboratory control sample duplicate recoveries. All of the relative percent differences were within the control limits with the exception of any QC flagged and described in the notes and definitions section of the following report.

Frontier Global Sciences, Inc.

Liz Siska, Project Manager

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CHAIN OF CUSTODY FORMS



Chain of Custody Record & Laboratory Analysis Request:
Air, Water, Sediments, Plant and Animal Tissue,
Hydrocarbon & Other Samples

414 Pontius Ave. N, Seattle WA 98109
Phone: 206-622-6960
Fax: 206-622-6870
info@frontiersci.com
http://www.frontiersci.com

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1202262

Client: <u>ERL</u> Address: <u>414 Pontius Ave N</u> City: <u>Seattle</u> State: <u>WA</u> Zip: <u>98109</u>		Contact: <u>J. Siska</u> Phone: <u>206-622-6960</u> E-mail: <u>jsiska@frontiersci.com</u>		Contract/PO: <u>1278000</u>		Invoice To:		Address:		Phone: <u>206-622-6960</u> Fax: <u>206-622-6870</u> E-mail: <u>jsiska@frontiersci.com</u>		Analyses Requested		FSS PM: <u>Log</u> Date: <u>2/17/12</u> TAT (business days): <u>20</u> (std) <u>15</u> (0 0 5 4 3 2 24 hrs) (for TAT < 10 days, contact PM) Saturday delivery? ☐ Y ☒ N (if yes, please contact PM) FDD ☐ Y ☒ N CA ☐ Standard ☐ High	
No.	Engraved Bottle ID	Sample ID	# of Bottles	Matrix	Date & Time	Sampled By	Field Filtered (Y/N)	Field Preserved: HCl, HCl, BCl, Other: (N)							Comments
1	13040/0-0000	1278000-001	2	Water	2/17/12										1) Metals: As, Cd, Cr, Hg, Pb, Se, V, Zn, Cu, Fe, Mn, Ni, Si, Ag, Ti, B
2															2) Metals: As, Cd, Cr, Hg, Pb, Se, V, Zn, Cu, Fe, Mn, Ni, Si, Ag, Ti, B
3															
4															
5															
6															
7															
8															
9															
10															
11															
12															
For Laboratory Use Only						Matrix Codes:		Requisitioned By:		Received By:		Received By:			
COC Seal: <u>12</u>		Comments: <u>1278000-001</u>		FW: Fresh Water WW: Waste Water SW: Sea and Brackish Water SS: Soil and Sediment PT: Plant and Animal Tissue HC: Hydrocarbons TR: Trip OT: Other				Name: <u>James Eric Mathis</u>		Name: <u>Chris Mathis</u>		Name:			
Cooler Temp: <u>22°C</u>								Organization: <u>ERI</u>		Organization: <u>FSS</u>		Organization:			
Carrier: <u>UPS</u>								Date & Time: <u>2/17/12 15:30</u>		Date & Time: <u>2/17/12 15:30</u>		Date & Time:			
VTSR: <u>0935</u>								Tracking number:							
4 of Coolers:															
Sample Disposal:															
☐ Return (shipping fees may apply)															
☐ Standard Disposal - 30 Days after report															
☐ Retain for _____ weeks after report (storage fees may apply)															
By signing, you declare that you agree with FGS' terms and conditions, and that you authorize FGS to perform the specified analyses.										Customer Approval: <u>James Eric Mathis</u>		Date: <u>2/17/12</u>			

Frontier Global Sciences, Inc.

Liz Siska

Liz Siska, Project Manager

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ANALYTICAL RESULTS

Concentrated Waste Water

Matrix: Water

Laboratory ID: 1202262-01

Analyte	Result	MDL	MRL	Units	Dilution	Batch	Sequence	Analyzed	Method	Notes
Aluminum	3920	89.0	800	µg/L	200	F202240	2B27019	02/24/12	EPA 200.8 Mod	
Antimony	13.6	0.230	1.00	µg/L	50	F202240	2B27019	02/24/12	EPA 200.8 Mod	
Arsenic	49.4	2.55	7.50	µg/L	50	F202240	2B27019	02/24/12	EPA 200.8 Mod	
Barium	2470	1.35	10.0	µg/L	50	F202240	2B27019	02/24/12	EPA 200.8 Mod	
Beryllium	ND	1.14	3.00	µg/L	50	F202240	2B27019	02/24/12	EPA 200.8 Mod	U
Boron	2980000	1030	15000	µg/L	5000	F202240	2B27019	02/24/12	EPA 200.8 Mod	
Cadmium	2.52	0.208	1.00	µg/L	50	F202240	2B27019	02/24/12	EPA 200.8 Mod	
Chromium	28.2	1.80	20.0	µg/L	200	F202240	2B27019	02/24/12	EPA 200.8 Mod	
Copper	66.9	0.50	5.00	µg/L	50	F202240	2B27019	02/24/12	EPA 200.8 Mod	
Lead	6.21	0.195	2.00	µg/L	50	F202240	2B27019	02/24/12	EPA 200.8 Mod	
Magnesium	5450000	871	12500	µg/L	5000	F202240	2B27019	02/24/12	EPA 200.8 Mod	
Mercury	45.8	1.68	10.1	ng/L	20	F202351	2B29014	02/29/12	EPA 1631E	FB-1631
Molybdenum	848	1.20	12.0	µg/L	200	F202240	2B27019	02/24/12	EPA 200.8 Mod	
Nickel	165	0.40	5.00	µg/L	50	F202240	2B27019	02/24/12	EPA 200.8 Mod	
Potassium	270000	200	2000	µg/L	50	F202240	2B27019	02/24/12	EPA 200.8 Mod	
Selenium	498	9.69	30.0	µg/L	50	F202240	2B27019	02/24/12	EPA 200.8 Mod	
Silver	ND	0.300	1.00	µg/L	50	F202240	2B27019	02/24/12	EPA 200.8 Mod	QM-12, U
Sodium	4300000	5750	100000	µg/L	5000	F202240	2B27019	02/24/12	EPA 200.8 Mod	
Thallium	29.9	0.125	0.500	µg/L	50	F202240	2B27019	02/24/12	EPA 200.8 Mod	QB-01
Zinc	92.5	0.82	10.0	µg/L	50	F203070	2C06014	03/06/12	EPA 200.8 Mod	

Frontier Global Sciences, Inc.

Liz Siska

Liz Siska, Project Manager

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03/08/2012



414 Pontius Ave North
Seattle, WA 98109
Ph: 206-622-6960
Fx: 206-622-6870

MATRIX DUPLICATES/TRIPPLICATES

SOURCE: 1202337-01

Batch: F202351

Sequence: 2B29014

Preparation: BrCl Oxidation

Lab Number: F202351-DUP1

Analyte	Sample Concentration ng/L	Duplicate Concentration ng/L	MRL	% RPD	RPD Limit	Method	Notes
Mercury	25.26	25.95	10.0	2.69	24	EPA 1631E	

Frontier Global Sciences, Inc.

Liz Siska, Project Manager

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MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY AND RPD

SOURCE: 1202262-01

Batch: F202240

Sequence: 2B27019

Preparation: Closed Vessel Nitric Oven Digestion

Lab Number: F202240-MS/MSD1

Analyte	Sample Concentration (µg/L)	Spike Added (µg/L)	MS Concentration (µg/L)	MS % Recovery	Recovery Limits	Method	Notes
Beryllium	2.385	2.0200	3.954	77.7	70 - 130	EPA 200.8 Mod	
Potassium	269500	303.00	274800	1750	70 - 130	EPA 200.8 Mod	QM-02
Nickel	164.9	4.0400	172.2	180	70 - 130	EPA 200.8 Mod	QM-02
Copper	66.90	4.0400	70.34	85.2	70 - 130	EPA 200.8 Mod	
Arsenic	49.43	15.150	68.03	123	70 - 130	EPA 200.8 Mod	
Selenium	497.6	30.300	555.9	193	70 - 130	EPA 200.8 Mod	QM-02
Silver	ND	1.5150	1.939	128	70 - 130	EPA 200.8 Mod	
Cadmium	2.524	0.80800	3.323	98.9	70 - 130	EPA 200.8 Mod	
Antimony	13.59	0.80800	14.62	128	70 - 130	EPA 200.8 Mod	
Barium	2475	10.100	2548	730	70 - 130	EPA 200.8 Mod	QM-02
Thallium	29.95	0.40400	30.79	209	70 - 130	EPA 200.8 Mod	QM-02
Lead	6.212	1.5150	7.940	114	70 - 130	EPA 200.8 Mod	

Analyte	Spike Added (µg/L)	MSD Concentration (µg/L)	MSD % Recovery	% RPD	Recovery Limits	RPD Limit	Method	Notes
Beryllium	2.0200	4.033	81.6	2.00	70 - 130	20	EPA 200.8 Mod	
Potassium	303.00	271400	618	1.26	70 - 130	20	EPA 200.8 Mod	QM-02
Nickel	4.0400	169.6	118	1.48	70 - 130	20	EPA 200.8 Mod	
Copper	4.0400	69.01	52.3	1.91	70 - 130	20	EPA 200.8 Mod	QM-02
Arsenic	15.150	67.71	121	0.467	70 - 130	20	EPA 200.8 Mod	
Selenium	30.300	586.2	293	5.31	70 - 130	20	EPA 200.8 Mod	QM-02
Silver	1.5150	1.944	128	0.286	70 - 130	20	EPA 200.8 Mod	
Cadmium	0.80800	3.527	124	5.94	70 - 130	20	EPA 200.8 Mod	
Antimony	0.80800	14.64	130	0.128	70 - 130	20	EPA 200.8 Mod	
Barium	10.100	2533	579	0.601	70 - 130	20	EPA 200.8 Mod	QM-02
Thallium	0.40400	29.17	-193	5.41	70 - 130	20	EPA 200.8 Mod	QM-02
Lead	1.5150	7.623	93.2	4.07	70 - 130	20	EPA 200.8 Mod	

Frontier Global Sciences, Inc.

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Liz Siska, Project Manager

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY AND RPD

SOURCE: 1202262-01RE1

Batch: F202240

Sequence: 2B27019

Preparation: Closed Vessel Nitric Oven Digestion

Lab Number: F202240-MS/MSD2

Analyte	Sample Concentration (µg/L)	Spike Added (µg/L)	MS Concentration (µg/L)	MS % Recovery	Recovery Limits	Method	Notes
Aluminum	3924	151.50	4258	220	70 - 130	EPA 200.8 Mod	QM-02
Chromium	28.16	7.0700	38.35	144	70 - 130	EPA 200.8 Mod	QM-02
Molybdenum	847.8	2.0200	890.0	2090	70 - 130	EPA 200.8 Mod	QM-02

Analyte	Spike Added (µg/L)	MSD Concentration (µg/L)	MSD % Recovery	% RPD	Recovery Limits	RPD Limit	Method	Notes
Aluminum	151.50	3993	45.9	6.41	70 - 130	20	EPA 200.8 Mod	QM-02
Chromium	7.0700	33.98	82.3	12.1	70 - 130	20	EPA 200.8 Mod	
Molybdenum	2.0200	850.9	151	4.50	70 - 130	20	EPA 200.8 Mod	QM-02

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MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY AND RPD

SOURCE: 1202262-01RE2

Batch: F202240

Sequence: 2B27019

Preparation: Closed Vessel Nitric Oven Digestion

Lab Number: F202240-MS/MSD3

Analyte	Sample Concentration (µg/L)	Spike Added (µg/L)	MS Concentration (µg/L)	MS % Recovery	Recovery Limits	Method	Notes
Boron	2975000	75.750	3015000	52200	70 - 130	EPA 200.8 Mod	QM-02
Sodium	4297000	505.00	4350000	10600	70 - 130	EPA 200.8 Mod	QM-02
Magnesium	5449000	252.50	5555000	42000	70 - 130	EPA 200.8 Mod	QM-02

Analyte	Spike Added (µg/L)	MSD Concentration (µg/L)	MSD % Recovery	% RPD	Recovery Limits	RPD Limit	Method	Notes
Boron	75.750	3071000	127000	1.86	70 - 130	20	EPA 200.8 Mod	QM-02
Sodium	505.00	4416000	23600	1.51	70 - 130	20	EPA 200.8 Mod	QM-02
Magnesium	252.50	5571000	48300	0.284	70 - 130	20	EPA 200.8 Mod	QM-02

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MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY AND RPD

SOURCE: 1202262-01

Batch: F202240

Sequence: 2B27019

Preparation: Closed Vessel Nitric Oven Digestion

Lab Number: F202240-MS/MSD4

Analyte	Sample Concentration (µg/L)	Spike Added (µg/L)	MS Concentration (µg/L)	MS % Recovery	Recovery Limits	Method	Notes
Beryllium	2.385	50.500	40.13	74.7	70 - 130	EPA 200.8 Mod	AS
Potassium	269500	101000	359400	89.1	70 - 130	EPA 200.8 Mod	AS
Nickel	164.9	1262.5	1318	91.3	70 - 130	EPA 200.8 Mod	AS
Copper	66.90	1262.5	1113	82.9	70 - 130	EPA 200.8 Mod	AS
Arsenic	49.43	1010.0	1090	103	70 - 130	EPA 200.8 Mod	AS
Selenium	497.6	1010.0	1496	98.8	70 - 130	EPA 200.8 Mod	AS
Silver	ND	50.500	38.25	75.7	70 - 130	EPA 200.8 Mod	AS
Cadmium	2.524	101.00	85.71	82.4	70 - 130	EPA 200.8 Mod	AS
Antimony	13.59	50.500	61.29	94.5	70 - 130	EPA 200.8 Mod	AS
Barium	2475	2020.0	4750	113	70 - 130	EPA 200.8 Mod	AS
Thallium	29.95	50.500	83.65	106	70 - 130	EPA 200.8 Mod	AS
Lead	6.212	252.50	252.2	97.4	70 - 130	EPA 200.8 Mod	AS

Analyte	Spike Added (µg/L)	MSD Concentration (µg/L)	MSD % Recovery	% RPD	Recovery Limits	RPD Limit	Method	Notes
Beryllium	50.500	41.06	76.6	2.30	70 - 130	20	EPA 200.8 Mod	AS
Potassium	101000	359400	89.0	0.0202	70 - 130	20	EPA 200.8 Mod	AS
Nickel	1262.5	1319	91.4	0.0742	70 - 130	20	EPA 200.8 Mod	AS
Copper	1262.5	1108	82.4	0.501	70 - 130	20	EPA 200.8 Mod	AS
Arsenic	1010.0	1081	102	0.796	70 - 130	20	EPA 200.8 Mod	AS
Selenium	1010.0	1552	104	3.71	70 - 130	20	EPA 200.8 Mod	AS
Silver	50.500	37.71	74.7	1.41	70 - 130	20	EPA 200.8 Mod	AS
Cadmium	101.00	84.00	80.7	2.01	70 - 130	20	EPA 200.8 Mod	AS
Antimony	50.500	61.88	95.6	0.963	70 - 130	20	EPA 200.8 Mod	AS
Barium	2020.0	4853	118	2.15	70 - 130	20	EPA 200.8 Mod	AS
Thallium	50.500	82.09	103	1.88	70 - 130	20	EPA 200.8 Mod	AS
Lead	252.50	253.5	97.9	0.510	70 - 130	20	EPA 200.8 Mod	AS

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MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY AND RPD

SOURCE: 1202262-01RE1

Batch: F202240

Sequence: 2B27019

Preparation: Closed Vessel Nitric Oven Digestion

Lab Number: F202240-MS/MSD5

Analyte	Sample Concentration (µg/L)	Spike Added (µg/L)	MS Concentration (µg/L)	MS % Recovery	Recovery Limits	Method	Notes
Aluminum	3924	40400	42250	94.9	70 - 130	EPA 200.8 Mod	AS
Chromium	28.16	4040.0	4082	100	70 - 130	EPA 200.8 Mod	AS
Molybdenum	847.8	2020.0	2876	100	70 - 130	EPA 200.8 Mod	AS

Analyte	Spike Added (µg/L)	MSD Concentration (µg/L)	MSD % Recovery	% RPD	Recovery Limits	RPD Limit	Method	Notes
Aluminum	40400	41800	93.7	1.08	70 - 130	20	EPA 200.8 Mod	AS
Chromium	4040.0	4049	99.5	0.803	70 - 130	20	EPA 200.8 Mod	AS
Molybdenum	2020.0	2739	93.6	4.86	70 - 130	20	EPA 200.8 Mod	AS

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MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY AND RPD

SOURCE: 1202262-01RE2

Batch: F202240

Sequence: 2B27019

Preparation: Closed Vessel Nitric Oven Digestion

Lab Number: F202240-MS/MSD6

Analyte	Sample Concentration (µg/L)	Spike Added (µg/L)	MS Concentration (µg/L)	MS % Recovery	Recovery Limits	Method	Notes
Boron	2975000	404000	3353000	93.4	70 - 130	EPA 200.8 Mod	AS
Sodium	4297000	10100000	14370000	99.7	70 - 130	EPA 200.8 Mod	AS
Magnesium	5449000	10100000	15630000	101	70 - 130	EPA 200.8 Mod	AS

Analyte	Spike Added (µg/L)	MSD Concentration (µg/L)	MSD % Recovery	% RPD	Recovery Limits	RPD Limit	Method	Notes
Boron	404000	3377000	99.3	0.711	70 - 130	20	EPA 200.8 Mod	AS
Sodium	10100000	14320000	99.2	0.368	70 - 130	20	EPA 200.8 Mod	AS
Magnesium	10100000	15580000	100	0.309	70 - 130	20	EPA 200.8 Mod	AS

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MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY AND RPD

SOURCE: 1202337-01

Batch: F202351

Sequence: 2B29014

Preparation: BrCl Oxidation

Lab Number: F202351-MS/MSD1

Analyte	Sample Concentration (ng/L)	Spike Added (ng/L)	MS Concentration (ng/L)	MS % Recovery	Recovery Limits	Method	Notes
Mercury	25.26	70.700	93.70	96.8	71 - 125	EPA 1631E	

Analyte	Spike Added (ng/L)	MSD Concentration (ng/L)	MSD % Recovery	% RPD	Recovery Limits	RPD Limit	Method	Notes
Mercury	70.700	98.68	104	5.18	71 - 125	24	EPA 1631E	

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MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY AND RPD

SOURCE: 1202262-01RE1

Batch: F202351

Sequence: 2B29014

Preparation: BrCl Oxidation

Lab Number: F202351-MS/MSD2

Analyte	Sample Concentration (ng/L)	Spike Added (ng/L)	MS Concentration (ng/L)	MS % Recovery	Recovery Limits	Method	Notes
Mercury	45.82	102.00	137.3	89.7	71 - 125	EPA 1631E	

Analyte	Spike Added (ng/L)	MSD Concentration (ng/L)	MSD % Recovery	% RPD	Recovery Limits	RPD Limit	Method	Notes
Mercury	102.00	153.0	105	10.8	71 - 125	24	EPA 1631E	

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MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY AND RPD

SOURCE: 1202384-01

Batch: F203070

Sequence: 2C06014

Preparation: Closed Vessel Nitric Oven Digestion

Lab Number: F203070-MS/MSDI

Analyte	Sample Concentration (µg/L)	Spike Added (µg/L)	MS Concentration (µg/L)	MS % Recovery	Recovery Limits	Method	Notes
Zinc	4.37	10.100	15.62	111	70 - 130	EPA 200.8 Mod	

Analyte	Spike Added (µg/L)	MSD Concentration (µg/L)	MSD % Recovery	% RPD	Recovery Limits	RPD Limit	Method	Notes
Zinc	10.100	14.81	103	5.35	70 - 130	20	EPA 200.8 Mod	

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MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY AND RPD

SOURCE: 1202384-01

Batch: F203070

Sequence: 2C06014

Preparation: Closed Vessel Nitric Oven Digestion

Lab Number: F203070-MS/MSD2

Analyte	Sample Concentration (µg/L)	Spike Added (µg/L)	MS Concentration (µg/L)	MS % Recovery	Recovery Limits	Method	Notes
Zinc	4.37	252.50	266.7	104	70 - 130	EPA 200.8 Mod	AS

Analyte	Spike Added (µg/L)	MSD Concentration (µg/L)	MSD % Recovery	% RPD	Recovery Limits	RPD Limit	Method	Notes
Zinc	252.50	266.8	104	0.0481	70 - 130	20	EPA 200.8 Mod	AS

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LABORATORY CONTROL SAMPLE/ LABORATORY CONTROL SAMPLE DUPLICATE

RECOVERY AND RPD

Batch: F202240

Sequence: 2B27019

Preparation: Closed Vessel Nitric Oven Digestion

Lab Number: F202240-BS/BSD1

LCS Source: Blank Spike

Analyte	Spike Added (µg/L)	LCS Concentration (µg/L)	LCS % Recovery	Recovery Limits	Method	Notes
Beryllium	2.0000	1.966	98.3	85 - 115	EPA 200.8 Mod	
Boron	75.000	70.26	93.7	85 - 115	EPA 200.8 Mod	
Sodium	500.00	459	91.9	85 - 115	EPA 200.8 Mod	
Magnesium	250.00	234.8	93.9	85 - 115	EPA 200.8 Mod	
Aluminum	150.00	135.6	90.4	85 - 115	EPA 200.8 Mod	
Potassium	300.00	290.7	96.9	85 - 115	EPA 200.8 Mod	
Chromium	7.0000	6.55	93.6	85 - 115	EPA 200.8 Mod	
Nickel	4.0000	4.10	103	85 - 115	EPA 200.8 Mod	
Copper	4.0000	4.29	107	85 - 115	EPA 200.8 Mod	
Arsenic	15.000	14.75	98.3	85 - 115	EPA 200.8 Mod	
Selenium	30.000	30.20	101	85 - 115	EPA 200.8 Mod	
Molybdenum	2.0000	1.81	90.3	85 - 115	EPA 200.8 Mod	
Silver	1.5000	2.270	151	85 - 115	EPA 200.8 Mod	QM-12
Cadmium	0.80000	0.809	101	85 - 115	EPA 200.8 Mod	
Antimony	0.80000	0.793	99.1	85 - 115	EPA 200.8 Mod	
Barium	10.000	10.10	101	85 - 115	EPA 200.8 Mod	
Thallium	0.40000	0.441	110	85 - 115	EPA 200.8 Mod	
Lead	1.5000	1.659	111	85 - 115	EPA 200.8 Mod	

Analyte	Spike Added (µg/L)	LCSD Concentration (µg/L)	LCSD % Recovery	% RPD	Recovery Limits	RPD Limit	Method	Notes
Beryllium	2.0000	1.907	95.4	3.03	85 - 115	20	EPA 200.8 Mod	
Boron	75.000	68.60	91.5	2.38	85 - 115	20	EPA 200.8 Mod	
Sodium	500.00	448	89.5	2.57	85 - 115	20	EPA 200.8 Mod	
Magnesium	250.00	235.6	94.2	0.349	85 - 115	20	EPA 200.8 Mod	
Aluminum	150.00	135.4	90.3	0.122	85 - 115	20	EPA 200.8 Mod	
Potassium	300.00	291.2	97.1	0.185	85 - 115	20	EPA 200.8 Mod	
Chromium	7.0000	6.56	93.7	0.101	85 - 115	20	EPA 200.8 Mod	
Nickel	4.0000	4.06	101	1.04	85 - 115	20	EPA 200.8 Mod	

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LABORATORY CONTROL SAMPLE/ LABORATORY CONTROL SAMPLE DUPLICATE

RECOVERY AND RPD

Batch: F202240

Sequence: 2B27019

Preparation: Closed Vessel Nitric Oven Digestion

Lab Number: F202240-BS/BSDI

LCS Source: Blank Spike Dup

Analyte	Spike Added (µg/L)	LCSD Concentration (µg/L)	LCSD % Recovery	% RPD	Recovery Limits	RPD Limit	Method	Notes
Copper	4.0000	4.32	108	0.661	85 - 115	20	EPA 200.8 Mod	
Arsenic	15.000	15.29	102	3.58	85 - 115	20	EPA 200.8 Mod	
Selenium	30.000	31.57	105	4.46	85 - 115	20	EPA 200.8 Mod	
Molybdenum	2.0000	1.81	90.4	0.108	85 - 115	20	EPA 200.8 Mod	
Silver	1.5000	2.269	151	0.0198	85 - 115	20	EPA 200.8 Mod	QM-12
Cadmium	0.80000	0.816	102	0.806	85 - 115	20	EPA 200.8 Mod	
Antimony	0.80000	0.791	98.9	0.198	85 - 115	20	EPA 200.8 Mod	
Barium	10.000	9.98	99.8	1.14	85 - 115	20	EPA 200.8 Mod	
Thallium	0.40000	0.437	109	0.946	85 - 115	20	EPA 200.8 Mod	
Lead	1.5000	1.618	108	2.47	85 - 115	20	EPA 200.8 Mod	

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LABORATORY CONTROL SAMPLE/ LABORATORY CONTROL SAMPLE DUPLICATE

RECOVERY AND RPD

Batch: F202351

Sequence: 2B29014

Preparation: BrCl Oxidation

Lab Number: F202351-BS/BSDI

LCS Source: LCS

Analyte	Spike Added (ng/L)	LCS Concentration (ng/L)	LCS % Recovery	Recovery Limits	Method	Notes
Mercury	15.679	14.24	90.8	80 - 120	EPA 1631E	

Analyte	Spike Added (ng/L)	LCSD Concentration (ng/L)	LCSD % Recovery	% RPD	Recovery Limits	RPD Limit	Method	Notes
Mercury	15.679	15.95	102	11.4	80 - 120	24	EPA 1631E	

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LABORATORY CONTROL SAMPLE/ LABORATORY CONTROL SAMPLE DUPLICATE

RECOVERY AND RPD

Batch: F203070

Sequence: 2C06014

Preparation: Closed Vessel Nitric Oven Digestion

Lab Number: F203070-BS/BSDI

LCS Source: Blank Spike

Analyte	Spike Added (µg/L)	LCS Concentration (µg/L)	LCS % Recovery	Recovery Limits	Method	Notes
Zinc	10.000	10.60	106	85 - 115	EPA 200.8 Mod	

Analyte	Spike Added (µg/L)	LCSD Concentration (µg/L)	LCSD % Recovery	% RPD	Recovery Limits	RPD Limit	Method	Notes
Zinc	10.000	10.95	110	3.28	85 - 115	20	EPA 200.8 Mod	

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PREPARATION BLANKS

Instrument: ICPMS-6

Sequence: 2B27019

Preparation: Closed Vessel Nitric Oven Digestion

Lab Sample ID	Analyte	Found	MRL	Units	Batch	Method	Notes
F202240-BLK1	Beryllium	-0.0001	0.060	µg/L	F202240	EPA 200.8 Moc	U
F202240-BLK1	Boron	0.24	3.00	µg/L	F202240	EPA 200.8 Moc	U
F202240-BLK1	Sodium	11	20	µg/L	F202240	EPA 200.8 Moc	U
F202240-BLK1	Magnesium	0.7	2.5	µg/L	F202240	EPA 200.8 Moc	U
F202240-BLK1	Aluminum	0.07	4.0	µg/L	F202240	EPA 200.8 Moc	U
F202240-BLK1	Potassium	-6.7	40.0	µg/L	F202240	EPA 200.8 Moc	U
F202240-BLK1	Chromium	-0.01	0.10	µg/L	F202240	EPA 200.8 Moc	U
F202240-BLK1	Nickel	-0.006	0.10	µg/L	F202240	EPA 200.8 Moc	U
F202240-BLK1	Copper	-0.003	0.10	µg/L	F202240	EPA 200.8 Moc	U
F202240-BLK1	Arsenic	-0.08	0.15	µg/L	F202240	EPA 200.8 Moc	U
F202240-BLK1	Selenium	-0.18	0.60	µg/L	F202240	EPA 200.8 Moc	U
F202240-BLK1	Molybdenum	0.003	0.06	µg/L	F202240	EPA 200.8 Moc	U
F202240-BLK1	Silver	-0.0007	0.020	µg/L	F202240	EPA 200.8 Moc	U
F202240-BLK1	Cadmium	-0.001	0.020	µg/L	F202240	EPA 200.8 Moc	U
F202240-BLK1	Antimony	-0.0002	0.020	µg/L	F202240	EPA 200.8 Moc	U
F202240-BLK1	Barium	-0.005	0.20	µg/L	F202240	EPA 200.8 Moc	U
F202240-BLK1	Thallium	0.0003	0.010	µg/L	F202240	EPA 200.8 Moc	U
F202240-BLK1	Lead	0.001	0.040	µg/L	F202240	EPA 200.8 Moc	U

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PREPARATION BLANKS

Instrument: Hg-08

Sequence: 2B29014

Preparation: BrCl Oxidation

Lab Sample ID	Analyte	Found	MRL	Units	Batch	Method	Notes
F202351-BLK1	Mercury	0.00	0.50	ng/L	F202351	EPA 1631E	U
F202351-BLK2	Mercury	0.03	0.50	ng/L	F202351	EPA 1631E	U
F202351-BLK3	Mercury	0.03	0.50	ng/L	F202351	EPA 1631E	U
F202351-BLK4	Mercury	0.03	0.50	ng/L	F202351	EPA 1631E	U, QB-04

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PREPARATION BLANKS

Instrument: ICPMS-6

Sequence: 2C06014

Preparation: Closed Vessel Nitric Oven Digestion

Lab Sample ID	Analyte	Found	MRL	Units	Batch	Method	Notes
F203070-BLK1	Zinc	0.15	0.20	µg/L	F203070	EPA 200.8 Moa	U

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Notes and Definitions

- U Analyte included in the analysis, but not detected
- QM-12 Initial or continuing calibration verification and/or blank spike/blank spike duplicate recoveries above upper control limits. All reported sample concentrations were below the reporting limit.
- QM-02 The MS and/or MSD recoveries outside acceptance limits, due to spike concentration less than 1 times the sample concentration. The batch was accepted based on LCS and LCSD recoveries within control limits and, when analysis permits, acceptable AS/ASD.
- QB-04 The blank was preserved to 2% BrCl rather than 1%. The control limit for blanks preserved to greater than 1% BrCl is the preservation percentage multiplied by the MRL.
- QB-01 The method blank and/or initial/continuing calibration blank contains analyte at a concentration above the MRL. However, the blank concentration(s) are less than 10% of the sample result.
- FB-1631 Required equipment/field/filter blank not submitted by the client. The sample has been analyzed according to 1631E, but does not meet 1631E criteria
- AS This MS and/or MSD is an analytical spike and/or an analytical spike duplicate.
- DET Analyte Detected
- MDL Minimum Detection Limit
- MRI Minimum Reporting Limit
- ND Analyte Not Detected at or above the reporting limit
- wet Sample results reported on a wet weight basis
- dry Sample results reported on a dry weight basis
- RPD Relative Percent Difference
- RSD Relative Standard Deviation

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