

VIA EMAIL

April 27, 2012
File No. 04.0029307.00



Ms. Nancy Lesieur
Industrial Pretreatment Coordinator
Winnepesaukee River Basin Program Wastewater Treatment Plant
Water Division
New Hampshire Department of Environmental Services
528 River Street
Franklin, New Hampshire 03235

Re: Analytical Data Report
Treated Wastewater
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. Lesieur:

On behalf of Public Service of New Hampshire (PSNH), GZA GeoEnvironmental, Inc. is pleased to submit the attached **Analytical Data Report** for sampling conducted on **January 5, 2012**, previously submitted on January 16, 2012. In anticipation of extremely low metals concentrations, the previous analysis was performed by Environmental Protection Agency (EPA) Method 1638 which was specifically developed by EPA to enable metals detection by Inductively Coupled Plasma/Mass Spectrometry (ICP-MS) at extremely low concentrations in ambient water when used in conjunction with sampling Method 1669: Sampling Ambient Water for Determination of Trace Metals at EPA Water Quality Criteria Levels.

Total metals were reanalyzed using Method 200.8MOD within the sample hold time, in accordance 40 CFR 136. This method is specified in the United States EPA draft Standard Operating Procedure (SOP) for trace metals analysis of flue gas desulfurization (FGD) wastewater. The SOP is discussed below.

ANALYTICAL DISCUSSION

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 EPA web site and a link to their draft 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 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 SOP. For further information, see:

Standard Operating Procedure: 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 FDG 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.

Handwritten signature of Ronald A. Breton in black ink.

Ronald A. Breton, P.F.
Principal

Handwritten signature of Michael P. North in black ink.

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

RAB/MPN:tmd

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Attachment: Analytical Data Report



Eastern Analytical, Inc.
2000 North Main Street
Riverside, CA 92504
Tel: (951) 514-1100
Fax: (951) 514-1101

Eastern Analytical, Inc.
Chemical Division
1000 North Main Street
Riverside, CA 92504

Page 1 of 1

The information in this report is based on the analysis of the sample described on the label. The sample was analyzed and the results are as follows:

ANALYTICAL DATA REPORT

Sample: 1000 North Main Street
Reference: 1000 North Main Street
Method: 1000 North Main Street

The results of the analysis are as follows: The sample was analyzed and the results are as follows:

The results of the analysis are as follows: The sample was analyzed and the results are as follows:

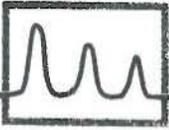
Page 1 of 1

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eastern analytical

professional laboratory services

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



Subject: Laboratory Report

Eastern Analytical, Inc. ID: 107555
Client Identification: Merrimack Station
Date Received: 1/5/2012

Dear Mr. Pepler :

Enclosed please find the report of analysis for the above identified project.
As discussed, analyses were subcontracted and are listed as follows:

Analysis: Subcontract - Metals Method 200.8
(Al, Sb, Ba, Be, Cd, Ca, Cr, Cu, Fe, Pb, Mn, Mo, Na, Ni, Ag, Ti, Zn, As, Se & Hg)

Subcontractor Lab: Frontier Global Sciences, Inc

A complete copy of the report is attached. This report may not be reproduced except in full, without the written approval of the laboratory.

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

Sincerely,



Lorraine Olashaw, Lab Director

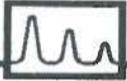
4/25/12

Date

29

of pages (excluding cover letter)

REVISED
PN 4/25/12



SAMPLE CONDITIONS PAGE

EAI ID#: 107555

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

Client Designation: **Merrimack Station**

Temperature upon receipt (°C): **4.7**

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)
107555.01	Treat Tank Eff Composite	1/5/12	1/5/12	aqueous		Adheres to Sample Acceptance Policy
107555.02	Treat Tank Eff Grab	1/5/12	1/5/12	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, Ignitibility, 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



11720 North Creek Parkway North, Suite 400
Bothell, WA 98011
Ph: 425-686-1996
Fx: 425-686-3096

25 April 2012

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

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



11720 North Creek Parkway North, Suite 400
Bothell, WA 98011
Ph: 425-686-1996
Fx: 425-686-3096

ANALYTICAL REPORT FOR SAMPLES

Laboratory: Frontier Global Sciences, Inc.

SDG:

Client: Eastern Analytical, Inc

Project: Merrimack Station

Sample ID	Lab ID	Matrix	Date Sampled	Date Received
Treat Tank Eff Composite	1201073-01	Water	05-Jan-12 10:00	06-Jan-12 09:50
Treat Tank Eff Grab	1201073-02	Water	05-Jan-12 08:00	06-Jan-12 09:50

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.



CASE NARRATIVE

Revised Report 4/25/12:

Per client request Boron was removed from report.

Revised Report 3/28/12:

Per client request samples were prepared and analyzed for total metals in accordance with EPA 200.8 (modified).

SAMPLE RECEIPT

Samples were received at Frontier Global Sciences (FGS) on January 6th, 2012. The samples were received intact, on-ice with temperatures measured at 3.4 degrees Celsius.

SAMPLE PREPARATION AND ANALYSIS

Samples were prepared and analyzed for total metals in accordance with FGS-054/EPA 1638.

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

ANALYTICAL AND QUALITY CONTROL ISSUES

There were no analytical difficulties experienced with analysis of these samples with the exceptions flagged in the report.

Frontier Global Sciences, Inc.

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

Liz Siska, Project Manager

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ANALYTICAL RESULTS

Treat Tank Eff Composite

Matrix: Water

Laboratory ID: 1201073-01

Analyte	Result	MDL	MRL	Units	Dilution	Batch	Sequence	Analyzed	Method	Notes
Aluminum	ND	8.9	80.0	µg/L	20	F203271	2C22005	03/22/12	EPA 200.8 Mod	U
Antimony	0.408	0.092	0.400	µg/L	20	F203271	2C22005	03/22/12	EPA 200.8 Mod	
Barium	240	0.54	4.00	µg/L	20	F203271	2C22005	03/22/12	EPA 200.8 Mod	
Beryllium	ND	0.454	1.20	µg/L	20	F203271	2C22005	03/22/12	EPA 200.8 Mod	U
Cadmium	ND	0.083	0.400	µg/L	20	F203271	2C22005	03/22/12	EPA 200.8 Mod	U
Calcium	5010000	16200	200000	µg/L	5000	F203271	2C22005	03/22/12	EPA 200.8 Mod	
Chromium	ND	0.18	2.00	µg/L	20	F203271	2C22005	03/22/12	EPA 200.8 Mod	U
Copper	ND	0.20	2.00	µg/L	20	F203271	2C22005	03/22/12	EPA 200.8 Mod	U
Iron	ND	26.0	200	µg/L	20	F203271	2C22005	03/22/12	EPA 200.8 Mod	U
Lead	ND	0.078	0.800	µg/L	20	F203271	2C22005	03/22/12	EPA 200.8 Mod	U
Manganese	280	0.15	2.00	µg/L	20	F203271	2C22005	03/22/12	EPA 200.8 Mod	
Molybdenum	134	0.12	1.20	µg/L	20	F203271	2C22005	03/22/12	EPA 200.8 Mod	
Nickel	9.79	0.16	2.00	µg/L	20	F203271	2C22005	03/22/12	EPA 200.8 Mod	
Silver	ND	0.120	0.400	µg/L	20	F203271	2C22005	03/22/12	EPA 200.8 Mod	U
Sodium	259000	23	400	µg/L	20	F203271	2C22005	03/22/12	EPA 200.8 Mod	
Thallium	5.56	0.250	1.00	µg/L	100	F203314	2C25005	03/25/12	EPA 200.8 Mod	
Zinc	ND	0.33	4.00	µg/L	20	F203271	2C22005	03/22/12	EPA 200.8 Mod	U

Frontier Global Sciences, Inc.

Liz Siska, Project Manager

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ANALYTICAL RESULTS

Treat Tank Eff Grab

Matrix: Water

Laboratory ID: 1201073-02

Analyte	Result	MDL	MRL	Units	Dilution	Batch	Sequence	Analyzed	Method	Notes
Arsenic	8.51	1.02	3.00	µg/L	20	F203271	2C22005	03/22/12	EPA 200.8 Mod	
Mercury	10.5	0.34	2.02	ng/L	4	F201063	2A09010	01/09/12	EPA 1631E	FB-1631
Selenium	68.9	3.88	12.0	µg/L	20	F203271	2C22005	03/22/12	EPA 200.8 Mod	

Frontier Global Sciences, Inc.

Liz Siska, Project Manager

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MATRIX DUPLICATES/TRIPPLICATES

SOURCE: 1201073-02

Batch: F201063

Sequence: 2A09010

Preparation: BrCl Oxidation

Lab Number: F201063-DUPI

Analyte	Sample Concentration ng/L	Duplicate Concentration ng/L	MRL	% RPD	RPD Limit	Method	Notes
Mercury	10.48	10.54	2.02	0.617	24	EPA 1631E	

Frontier Global Sciences, Inc.

Liz Siska, Project Manager

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MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY AND RPD

SOURCE: 1201073-02

Batch: F201063

Sequence: 2A09010

Preparation: BrCl Oxidation

Lab Number: F201063-MS/MSD1

Analyte	Sample Concentration (ng/L)	Spike Added (ng/L)	MS Concentration (ng/L)	MS % Recovery	Recovery Limits	Method	Notes
Mercury	10.48	20.400	31.36	102	71 - 125	EPA 1631E	

Analyte	Spike Added (ng/L)	MSD Concentration (ng/L)	MSD % Recovery	% RPD	Recovery Limits	RPD Limit	Method	Notes
Mercury	20.400	27.08	81.4	14.7	71 - 125	24	EPA 1631E	

Frontier Global Sciences, Inc.

Liz Siska, Project Manager

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MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY AND RPD

SOURCE: 1112278-02

Batch: F201063

Sequence: 2A09010

Preparation: BrCl Oxidation

Lab Number: F201063-MS/MSD2

Analyte	Sample Concentration (ng/L)	Spike Added (ng/L)	MS Concentration (ng/L)	MS % Recovery	Recovery Limits	Method	Notes
Mercury	7.61	20.400	27.86	99.2	71 - 125	EPA 1631E	

Analyte	Spike Added (ng/L)	MSD Concentration (ng/L)	MSD % Recovery	% RPD	Recovery Limits	RPD Limit	Method	Notes
Mercury	20.400	28.37	102	1.82	71 - 125	24	EPA 1631E	

Frontier Global Sciences, Inc.

Liz Siska, Project Manager

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MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY AND RPD

SOURCE: 1201029-01

Batch: F201063

Sequence: 2A09010

Preparation: BrCl Oxidation

Lab Number: F201063-MS/MSD3

Analyte	Sample Concentration (ng/L)	Spike Added (ng/L)	MS Concentration (ng/L)	MS % Recovery	Recovery Limits	Method	Notes
Mercury	5.34	10.200	15.58	100	71 - 125	EPA 1631E	

Analyte	Spike Added (ng/L)	MSD Concentration (ng/L)	MSD % Recovery	% RPD	Recovery Limits	RPD Limit	Method	Notes
Mercury	10.200	14.07	85.6	10.2	71 - 125	24	EPA 1631E	

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Liz Siska, Project Manager



MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY AND RPD

SOURCE: 1201030-02

Batch: F201063

Sequence: 2A09010

Preparation: BrCl Oxidation

Lab Number: F201063-MS/MSD4

Analyte	Sample Concentration (ng/L)	Spike Added (ng/L)	MS Concentration (ng/L)	MS % Recovery	Recovery Limits	Method	Notes
Mercury	5.54	10.200	14.82	91.0	71 - 125	EPA 1631E	

Analyte	Spike Added (ng/L)	MSD Concentration (ng/L)	MSD % Recovery	% RPD	Recovery Limits	RPD Limit	Method	Notes
Mercury	10.200	14.61	89.0	1.40	71 - 125	24	EPA 1631E	

Frontier Global Sciences, Inc.

Liz Siska, Project Manager

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MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY AND RPD

SOURCE: 1201073-01RE3

Batch: F203271

Sequence: 2C22005

Preparation: Closed Vessel Nitric Oven Digestion

Lab Number: F203271-MS/MSD1

Analyte	Sample Concentration (µg/L)	Spike Added (µg/L)	MS Concentration (µg/L)	MS % Recovery	Recovery Limits	Method	Notes
Calcium	5013000	1515.0	4802000	-13900	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
Calcium	1515.0	4943000	-4600	2.89	70 - 130	20	EPA 200.8 Mod	QM-02

Frontier Global Sciences, Inc.

Liz Siska

Liz Siska, Project Manager

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MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY AND RPD

SOURCE: 1201073-01RE4

Batch: F203271

Sequence: 2C22005

Preparation: Closed Vessel Nitric Oven Digestion

Lab Number: F203271-MS/MSD2

Analyte	Sample Concentration (µg/L)	Spike Added (µg/L)	MS Concentration (µg/L)	MS % Recovery	Recovery Limits	Method	Notes
Beryllium	0.507	2.0200	2.442	95.8	70 - 130	EPA 200.8 Mod	
Sodium	258800	505.00	257700	-213	70 - 130	EPA 200.8 Mod	QM-02
Aluminum	52.9	151.50	202.3	98.6	70 - 130	EPA 200.8 Mod	
Chromium	0.57	7.0700	8.04	106	70 - 130	EPA 200.8 Mod	
Manganese	280.5	6.0600	283.4	47.6	70 - 130	EPA 200.8 Mod	QM-02
Iron	ND	505.00	520.0	103	70 - 130	EPA 200.8 Mod	
Nickel	9.79	4.0400	14.11	107	70 - 130	EPA 200.8 Mod	
Copper	0.55	4.0400	4.34	93.9	70 - 130	EPA 200.8 Mod	
Zinc	0.40	10.100	8.42	79.4	70 - 130	EPA 200.8 Mod	
Arsenic	10.30	15.150	24.18	91.6	70 - 130	EPA 200.8 Mod	
Selenium	63.40	30.300	89.73	86.9	70 - 130	EPA 200.8 Mod	
Molybdenum	133.8	2.0200	136.7	142	70 - 130	EPA 200.8 Mod	QM-02
Silver	ND	1.5150	1.388	91.6	70 - 130	EPA 200.8 Mod	
Cadmium	0.332	0.80800	1.105	95.6	70 - 130	EPA 200.8 Mod	
Antimony	0.408	0.80800	1.259	105	70 - 130	EPA 200.8 Mod	
Barium	239.7	10.100	249.5	96.8	70 - 130	EPA 200.8 Mod	
Lead	ND	1.5150	1.542	102	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	2.561	102	4.74	70 - 130	20	EPA 200.8 Mod	
Sodium	505.00	257100	-336	0.243	70 - 130	20	EPA 200.8 Mod	QM-02
Aluminum	151.50	203.4	99.3	0.564	70 - 130	20	EPA 200.8 Mod	
Chromium	7.0700	7.73	101	3.85	70 - 130	20	EPA 200.8 Mod	
Manganese	6.0600	285.2	76.9	0.625	70 - 130	20	EPA 200.8 Mod	
Iron	505.00	518.7	103	0.242	70 - 130	20	EPA 200.8 Mod	
Nickel	4.0400	13.81	99.5	2.13	70 - 130	20	EPA 200.8 Mod	
Copper	4.0400	4.19	90.2	3.47	70 - 130	20	EPA 200.8 Mod	
Zinc	10.100	9.16	86.8	8.49	70 - 130	20	EPA 200.8 Mod	
Arsenic	15.150	22.25	78.9	8.31	70 - 130	20	EPA 200.8 Mod	
Selenium	30.300	94.00	101	4.64	70 - 130	20	EPA 200.8 Mod	
Molybdenum	2.0200	136.6	137	0.0771	70 - 130	20	EPA 200.8 Mod	QM-02

Frontier Global Sciences, Inc.

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Liz Siska, Project Manager



MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY AND RPD

SOURCE: 1201073-01RE4

Batch: F203271

Sequence: 2C22005

Preparation: Closed Vessel Nitric Oven Digestion

Lab Number: F203271-MS/MSD2

Analyte	Spike Added (µg/L)	MSD Concentration (µg/L)	MSD % Recovery	% RPD	Recovery Limits	RPD Limit	Method	Notes
Silver	1.5150	1.387	91.5	0.0874	70 - 130	20	EPA 200.8 Mod	
Cadmium	0.80800	1.061	90.2	4.03	70 - 130	20	EPA 200.8 Mod	
Antimony	0.80800	1.274	107	1.21	70 - 130	20	EPA 200.8 Mod	
Barium	10.100	251.4	116	0.781	70 - 130	20	EPA 200.8 Mod	
Lead	1.5150	1.534	101	0.525	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: 1201073-01RE3

Batch: F203271

Sequence: 2C22005

Preparation: Closed Vessel Nitric Oven Digestion

Lab Number: F203271-MS/MSD3

Analyte	Sample Concentration (µg/L)	Spike Added (µg/L)	MS Concentration (µg/L)	MS % Recovery	Recovery Limits	Method	Notes
Calcium	5013000	10100000	15120000	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
Calcium	10100000	16140000	110	6.53	70 - 130	20	EPA 200.8 Mod	AS

Frontier Global Sciences, Inc.

Liz Siska, Project Manager

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MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY AND RPD

SOURCE: 1201073-01RE4

Batch: F203271

Sequence: 2C22005

Preparation: Closed Vessel Nitric Oven Digestion

Lab Number: F203271-MS/MSD4

Analyte	Sample Concentration (µg/L)	Spike Added (µg/L)	MS Concentration (µg/L)	MS % Recovery	Recovery Limits	Method	Notes
Beryllium	0.507	20.200	20.41	98.5	70 - 130	EPA 200.8 Mod	AS
Sodium	258800	40400	292900	84.5	70 - 130	EPA 200.8 Mod	AS
Aluminum	52.9	4040.0	3956	96.6	70 - 130	EPA 200.8 Mod	AS
Chromium	0.57	404.00	430.1	106	70 - 130	EPA 200.8 Mod	AS
Manganese	280.5	404.00	704.2	105	70 - 130	EPA 200.8 Mod	AS
Iron	ND	2020.0	2121	105	70 - 130	EPA 200.8 Mod	AS
Nickel	9.79	505.00	511.2	99.3	70 - 130	EPA 200.8 Mod	AS
Copper	0.55	505.00	475.4	94.0	70 - 130	EPA 200.8 Mod	AS
Zinc	0.40	1010.0	907.4	89.8	70 - 130	EPA 200.8 Mod	AS
Arsenic	10.30	404.00	431.7	104	70 - 130	EPA 200.8 Mod	AS
Selenium	63.40	404.00	468.8	100	70 - 130	EPA 200.8 Mod	AS
Molybdenum	133.8	202.00	338.1	101	70 - 130	EPA 200.8 Mod	AS
Silver	ND	20.200	18.50	91.6	70 - 130	EPA 200.8 Mod	AS
Cadmium	0.332	40.400	39.37	96.6	70 - 130	EPA 200.8 Mod	AS
Antimony	0.408	20.200	20.91	102	70 - 130	EPA 200.8 Mod	AS
Barium	239.7	808.00	1056	101	70 - 130	EPA 200.8 Mod	AS
Lead	ND	101.00	99.32	98.3	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	20.200	20.07	96.8	1.71	70 - 130	20	EPA 200.8 Mod	AS
Sodium	40400	292600	83.7	0.114	70 - 130	20	EPA 200.8 Mod	AS
Aluminum	4040.0	3954	96.6	0.0362	70 - 130	20	EPA 200.8 Mod	AS
Chromium	404.00	428.7	106	0.337	70 - 130	20	EPA 200.8 Mod	AS
Manganese	404.00	694.4	102	1.40	70 - 130	20	EPA 200.8 Mod	AS
Iron	2020.0	2077	103	2.11	70 - 130	20	EPA 200.8 Mod	AS
Nickel	505.00	512.6	99.6	0.276	70 - 130	20	EPA 200.8 Mod	AS
Copper	505.00	470.7	93.1	0.997	70 - 130	20	EPA 200.8 Mod	AS
Zinc	1010.0	905.9	89.6	0.166	70 - 130	20	EPA 200.8 Mod	AS
Arsenic	404.00	429.9	104	0.419	70 - 130	20	EPA 200.8 Mod	AS
Selenium	404.00	468.2	100	0.141	70 - 130	20	EPA 200.8 Mod	AS
Molybdenum	202.00	336.5	100	0.473	70 - 130	20	EPA 200.8 Mod	AS

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Liz Siska

Liz Siska, Project Manager



MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY AND RPD

SOURCE: 1201073-01RE4

Batch: F203271

Sequence: 2C22005

Preparation: Closed Vessel Nitric Oven Digestion

Lab Number: F203271-MS/MSD4

Analyte	Spike Added (µg/L)	MSD Concentration (µg/L)	MSD % Recovery	% RPD	Recovery Limits	RPD Limit	Method	Notes
Silver	20.200	18.95	93.8	2.42	70 - 130	20	EPA 200.8 Mod	AS
Cadmium	40.400	39.33	96.5	0.104	70 - 130	20	EPA 200.8 Mod	AS
Antimony	20.200	21.07	102	0.736	70 - 130	20	EPA 200.8 Mod	AS
Barium	808.00	1058	101	0.205	70 - 130	20	EPA 200.8 Mod	AS
Lead	101.00	98.77	97.8	0.549	70 - 130	20	EPA 200.8 Mod	AS

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Liz Siska, Project Manager



MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY AND RPD

SOURCE: 1201073-01RE6

Batch: F203314

Sequence: 2C25005

Preparation: Closed Vessel Nitric Oven Digestion

Lab Number: F203314-MS/MSD2

Analyte	Sample Concentration (µg/L)	Spike Added (µg/L)	MS Concentration (µg/L)	MS % Recovery	Recovery Limits	Method	Notes
Thallium	5.563	0.40400	5.875	77.3	70 - 130	EPA 200.8 Mod	

Analyte	Spike Added (µg/L)	MSD Concentration (µg/L)	MSD % Recovery	% RPD	Recovery Limits	RPD Limit	Method	Notes
Thallium	0.40400	5.880	78.5	0.0859	70 - 130	20	EPA 200.8 Mod	

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MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY AND RPD

SOURCE: 1201073-01RE6

Batch: F203314

Sequence: 2C25005

Preparation: Closed Vessel Nitric Oven Digestion

Lab Number: F203314-MS/MSD4

Analyte	Sample Concentration (µg/L)	Spike Added (µg/L)	MS Concentration (µg/L)	MS % Recovery	Recovery Limits	Method	Notes
Thallium	5.563	101.00	103.3	96.8	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
Thallium	101.00	103.7	97.1	0.341	70 - 130	20	EPA 200.8 Mod	AS

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LABORATORY CONTROL SAMPLE/ LABORATORY CONTROL SAMPLE DUPLICATE

RECOVERY AND RPD

Batch: F201063

Sequence: 2A09010

Preparation: BrCl Oxidation

Lab Number: F201063-BS/BSD1

LCS Source: Nist 1641d

Analyte	Spike Added (ng/L)	LCS Concentration (ng/L)	LCS % Recovery	Recovery Limits	Method	Notes
Mercury	15.679	15.50	98.8	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	2.89	80 - 120	24	EPA 1631E	

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Liz Siska

Liz Siska, Project Manager



LABORATORY CONTROL SAMPLE/ LABORATORY CONTROL SAMPLE DUPLICATE

RECOVERY AND RPD

Batch: F203271

Sequence: 2C22005

Preparation: Closed Vessel Nitric Oven Digestion

Lab Number: F203271-BS/BSD1

LCS Source: Blank Spike

Analyte	Spike Added (µg/L)	LCS Concentration (µg/L)	LCS % Recovery	Recovery Limits	Method	Notes
Beryllium	2.0000	1.930	96.5	85 - 115	EPA 200.8 Mod	
Sodium	500.00	499	99.8	85 - 115	EPA 200.8 Mod	
Aluminum	150.00	146.0	97.3	85 - 115	EPA 200.8 Mod	
Calcium	1500.0	1528	102	85 - 115	EPA 200.8 Mod	
Chromium	7.0000	6.57	93.9	85 - 115	EPA 200.8 Mod	
Manganese	6.0000	5.86	97.6	85 - 115	EPA 200.8 Mod	
Iron	500.00	475.3	95.1	85 - 115	EPA 200.8 Mod	
Nickel	4.0000	4.01	100	85 - 115	EPA 200.8 Mod	
Copper	4.0000	4.18	105	85 - 115	EPA 200.8 Mod	
Zinc	10.000	10.33	103	85 - 115	EPA 200.8 Mod	
Arsenic	15.000	14.37	95.8	85 - 115	EPA 200.8 Mod	
Selenium	30.000	29.66	98.9	85 - 115	EPA 200.8 Mod	
Molybdenum	2.0000	1.81	90.5	85 - 115	EPA 200.8 Mod	
Silver	1.5000	1.517	101	85 - 115	EPA 200.8 Mod	
Cadmium	0.80000	0.781	97.6	85 - 115	EPA 200.8 Mod	
Antimony	0.80000	0.815	102	85 - 115	EPA 200.8 Mod	
Barium	10.000	9.69	96.9	85 - 115	EPA 200.8 Mod	
Lead	1.5000	1.597	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
Beryllium	2.0000	1.949	97.4	0.955	85 - 115	20	EPA 200.8 Mod	
Sodium	500.00	500	100	0.216	85 - 115	20	EPA 200.8 Mod	
Aluminum	150.00	148.5	99.0	1.71	85 - 115	20	EPA 200.8 Mod	
Calcium	1500.0	1544	103	1.03	85 - 115	20	EPA 200.8 Mod	
Chromium	7.0000	6.67	95.3	1.48	85 - 115	20	EPA 200.8 Mod	
Manganese	6.0000	5.96	99.4	1.75	85 - 115	20	EPA 200.8 Mod	
Iron	500.00	485.2	97.0	2.06	85 - 115	20	EPA 200.8 Mod	
Nickel	4.0000	4.02	101	0.246	85 - 115	20	EPA 200.8 Mod	

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Liz Siska, Project Manager



LABORATORY CONTROL SAMPLE/ LABORATORY CONTROL SAMPLE DUPLICATE

RECOVERY AND RPD

Batch: F203271

Sequence: 2C22005

Preparation: Closed Vessel Nitric Oven Digestion

Lab Number: F203271-BS/BSDI

LCS Source: Blank Spike

Analyte	Spike Added (µg/L)	LCSD Concentration (µg/L)	LCSD % Recovery	LCSD % RPD	Recovery Limits	RPD Limit	Method	Notes
Copper	4.0000	4.28	107	2.24	85 - 115	20	EPA 200.8 Mod	
Zinc	10.000	10.39	104	0.570	85 - 115	20	EPA 200.8 Mod	
Arsenic	15.000	14.52	96.8	0.977	85 - 115	20	EPA 200.8 Mod	
Selenium	30.000	30.15	101	1.66	85 - 115	20	EPA 200.8 Mod	
Molybdenum	2.0000	1.82	91.0	0.564	85 - 115	20	EPA 200.8 Mod	
Silver	1.5000	1.502	100	1.03	85 - 115	20	EPA 200.8 Mod	
Cadmium	0.80000	0.828	103	5.85	85 - 115	20	EPA 200.8 Mod	
Antimony	0.80000	0.808	101	0.848	85 - 115	20	EPA 200.8 Mod	
Barium	10.000	9.86	98.6	1.77	85 - 115	20	EPA 200.8 Mod	
Lead	1.5000	1.620	108	1.42	85 - 115	20	EPA 200.8 Mod	

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Liz Siska, Project Manager



LABORATORY CONTROL SAMPLE/ LABORATORY CONTROL SAMPLE DUPLICATE

RECOVERY AND RPD

Batch: F203314

Sequence: 2C25005

Preparation: Closed Vessel Nitric Oven Digestion

Lab Number: F203314-BS/BSD1

LCS Source: Blank Spike

Analyte	Spike Added (µg/L)	LCS Concentration (µg/L)	LCS % Recovery	Recovery Limits	Method	Notes
Thallium	0.40000	0.396	98.9	85 - 115	EPA 200.8 Mod	

Analyte	Spike Added (µg/L)	LCSD Concentration (µg/L)	LCSD % Recovery	% RPD	Recovery Limits	RPD Limit	Method	Notes
Thallium	0.40000	0.391	97.8	1.12	85 - 115	20	EPA 200.8 Mod	

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Liz Siska

Liz Siska, Project Manager



PREPARATION BLANKS

Instrument: Hg-17

Sequence: 2A09010

Preparation: BrCl Oxidation

Lab Sample ID	Analyte	Found	MRL	Units	Batch	Method	Notes
F201063-BLK1	Mercury	-0.009	0.50	ng/L	F201063	EPA 1631E	U
F201063-BLK2	Mercury	-0.006	0.50	ng/L	F201063	EPA 1631E	U
F201063-BLK3	Mercury	-0.02	0.50	ng/L	F201063	EPA 1631E	U
F201063-BLK4	Mercury	0.03	0.50	ng/L	F201063	EPA 1631E	U, QB-04
F201063-BLK5	Mercury	0.11	0.52	ng/L	F201063	EPA 1631E	U, QB-06

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PREPARATION BLANKS

Instrument: ICPMS-6

Sequence: 2C22005

Preparation: Closed Vessel Nitric Oven Digestion

Lab Sample ID	Analyte	Found	MRL	Units	Batch	Method	Notes
F203271-BLK1	Beryllium	0.00008	0.060	µg/L	F203271	EPA 200.8 Moc	U
F203271-BLK1	Sodium	2	20	µg/L	F203271	EPA 200.8 Moc	U
F203271-BLK1	Aluminum	-0.04	4.0	µg/L	F203271	EPA 200.8 Moc	U
F203271-BLK1	Calcium	1	40	µg/L	F203271	EPA 200.8 Moc	U
F203271-BLK1	Chromium	-0.02	0.10	µg/L	F203271	EPA 200.8 Moc	U
F203271-BLK1	Manganese	0.01	0.10	µg/L	F203271	EPA 200.8 Moc	U
F203271-BLK1	Iron	-0.02	10.0	µg/L	F203271	EPA 200.8 Moc	U
F203271-BLK1	Nickel	0.004	0.10	µg/L	F203271	EPA 200.8 Moc	U
F203271-BLK1	Copper	0.003	0.10	µg/L	F203271	EPA 200.8 Moc	U
F203271-BLK1	Zinc	0.007	0.20	µg/L	F203271	EPA 200.8 Moc	U
F203271-BLK1	Arsenic	-0.06	0.15	µg/L	F203271	EPA 200.8 Moc	U
F203271-BLK1	Selenium	-0.02	0.60	µg/L	F203271	EPA 200.8 Moc	U
F203271-BLK1	Molybdenum	0.01	0.06	µg/L	F203271	EPA 200.8 Moc	U
F203271-BLK1	Silver	-0.0005	0.020	µg/L	F203271	EPA 200.8 Moc	U
F203271-BLK1	Cadmium	0.004	0.020	µg/L	F203271	EPA 200.8 Moc	U
F203271-BLK1	Antimony	0.002	0.020	µg/L	F203271	EPA 200.8 Moc	U
F203271-BLK1	Barium	0.01	0.20	µg/L	F203271	EPA 200.8 Moc	U
F203271-BLK1	Lead	0.010	0.040	µg/L	F203271	EPA 200.8 Moc	U

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PREPARATION BLANKS

Instrument: ICPMS-3

Sequence: 2C25005

Preparation: Closed Vessel Nitric Oven Digestion

Lab Sample ID	Analyte	Found	MRL	Units	Batch	Method	Notes
F203314-BLK1	Thallium	0.0007	0.010	µg/L	F203314	EPA 200.8 Mo	U

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Notes and Definitions

- U Analyte included in the analysis, but not detected
- 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-06 The blank was preserved to 5% BrCl rather than 1%. The control limit for blanks preserved to greater than 1% BrCl is the preservation percentage multiplied by the MRL.
- 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.
- 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
- MRL 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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