AR-13367

GZA GeoEnvironmental, Inc. Engineers and Scientists

VIA EMAIL

March 9, 2012 File No. 04.0029307.00



380 Harvey Road Manchester

New Hampshire

www.gza.com

03103-3347 603-623-3600 FAX 603-624-9463 Ms. Nancy Lesieur Industrial Pretreatment Coordinator Winnipesaukee River Basin Program Wastewater Treatment Plant Water Division New Hampshire Department of Environmental Services 528 River Street Franklin, New Hampshire 03235

Re: Wastewater Discharge Monitoring Report Treated Wastewater Merrimack Station Public Service of New Hampshire Bow, New Hampshire

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 February 9, 2012, in accordance with Special Agreement – PSNH and WRBP Wastewater Treatment Plant, which requires that "Any testing results on the proposed discharge after start up at your facility will need to be forwarded to us for our review and files."

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.

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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.

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Ronald A. Breton, P.E. Principal

RAB:tmd

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Attachment: Analytical Data Report

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ANALYTICAL DATA REPORT

eastern analytical

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



Subject: Laboratory Report

Eastern Analytical, Inc. ID: 107558 Client Identification: Wastewater Analysis - Weekly Date Received: 2/9/2012

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,

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Lorraine Olashaw, Lab Director

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of pages (excluding cover letter)

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Client: GZA GeoEnvironmental, Inc. (NH)

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Client Designation: Wastewater Analysis - Weekly

Temperat	ture upon receipt (°C): 2	0		Re	eceived	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)
107558.01	Effluent Field Blank	2/9/12	2/9/12	aqueous		Adheres to Sample Acceptance Policy
107558.02	Treat Tank Effluent	2/9/12	2/9/12	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

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Client: GZA GeoEnvironmental, Inc. (NH)

Client Designation: Wastewater Analysis - Weekly

Sample ID:	Treat Tank Effluent							
Lab Sample ID:	107558.02							
Matrix:	aqueous							
Date Sampled:	2/9/12				An	alysis		
Date Received:	2/9/12			Units	Date	Time	Method	Analyst
рН	7.2			SU	2/09/12	10:56	4500H+I	B CJJ

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Client: GZA GeoEnvironmental, Inc. (NH)

Client Designation: Wastewater Analysis - Weekly

Parameter Name	Blank	LCS	LCSD	Units	Date of Analysis	Limits	RPD	Method
рН		6.0 (101 %R)	6.0 (101 %R) (0 RPD)	SL	J 2/9/12	5.95 - 6.07	10	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.

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.

eastern analytical, inc.

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27 February 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,

Lig Siska

Liz Siska Project Manager



ANALYTICAL REPORT FOR SAMPLES

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SDG:

Client: Eastern Analytical, Inc.

Project: Merrimack Station 200.8

Sample ID	Lab ID	Matrix	Date Sampled	Date Received
Effluent Field Blank	1202140-01	Water	09-Feb-12 00:00	10-Feb-12 09:25
Treat Tank Effluent	1202140-02	Water	09-Feb-12 00:00	10-Feb-12 09:25

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CASE NARRATIVE

SAMPLE RECEIPT

Samples were received at Frontier Global Sciences (FGS) on February 10th, 2012. The samples were received intact, on-ice with temperatures measured at 2.0 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

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.

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CHAIN OF CUSTODY FORMS

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L	C-3042 6	Feluent Field Blank	1	AQ	alaliz	6	-121	.N .	1 1	X		-	1.	Metals Include
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Liz Siska, Project Manager



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ANALYTICAL RESULTS

Effluent Field Blank

Matrix: Water

Laboratory ID: 1202140-01

Analyte	Result	MDL	MRL	Units	Dilution	Batch	Sequence	Analyzed	Method	Notes
Aluminum	ND	0.4	4.0	μg/L	1	F202131	2B18016	02/17/12	EPA 200.8 Mod	U
Arsenic	ND	0.05	0.15	μg/L	1	F202131	2B18016	02/17/12	EPA 200.8 Mod	U
Cadmium	ND	0.004	0.020	μg/L	1	F202215	2B21010	02/21/12	EPA 200.8 Mod	U
Chromium	ND	0.009	0.10	µg/L	1	F202131	2B18016	02/17/12	EPA 200.8 Mod	U
Copper	ND	0.01	0.10	μg/L	1	F202131	2B18016	02/17/12	EPA 200.8 Mod	QM-12, U
Lead	ND	0.004	0.040	μg/L	1	F202131	2B18016	02/17/12	EPA 200.8 Mod	U
Manganese	ND	0.007	0.10	μg/L	1	F202131	2B18016	02/17/12	EPA 200.8 Mod	U
Mercury	ND	0.08	0.50	ng/L	1	F202196	2B17024	02/17/12	EPA 1631E	U
Molybdenum	ND	0.006	0.06	μg/L	1	F202131	2B18016	02/17/12	EPA 200.8 Mod	U
Nickel	ND	0.008	0.10	µg/L	1	F202131	2B18016	02/17/12	EPA 200.8 Mod	U
Selenium	ND	0.19	0.60	µg/L	1	F202131	2B18016	02/17/12	EPA 200.8 Mod	QM-12, U
Silver	ND	0.006	0.020	µg/L	1	F202149	2B15001	02/14/12	EPA 200.8 Mod	QM-12, U
Zinc	ND	0.02	0.20	μg/L	1	F202215	2B21010	02/21/12	EPA 200.8 Mod	U

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ANALYTICAL RESULTS

Treat Tank Effluent

Matrix: Water

Laboratory ID: 1202140-02

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Analyte	Result	MDL	MRL	Units	Dilution	Batch	Sequence	Analyzed	Method	Notes
Aluminum	ND	22.2	200	μg/L	50	F202131	2B18016	02/17/12	EPA 200.8 Mod	U
Arsenic	ND	2.55	7.50	µg/L	50	F202131	2B18016	02/17/12	EPA 200.8 Mod	U
Cadmium	ND	0.208	1.00	µg/L	50	F202215	2B21010	02/21/12	EPA 200.8 Mod	U
Chromium	ND	0.45	5.00	μg/L	50	F202131	2B18016	02/17/12	EPA 200.8 Mod	U
Copper	ND	0.50	5.00	µg/L	50	F202131	2B18016	02/17/12	EPA 200.8 Mod	OM-12. U
Lead	ND	0.195	2.00	μg/L	50	F202131	2B18016	02/17/12	EPA 200.8 Mod	U
Manganese	1730	0.37	5.00	µg/L	50	F202131	2B18016	02/17/12	EPA 200.8 Mod	
Mercury	20.9	0.17	1.01	ng/L	2	F202196	2B17024	02/17/12	EPA 1631E	
Molybdenum	110	0.30	3.00	μg/L	50	F202131	2B18016	02/17/12	EPA 200.8 Mod	
Nickel	12.6	0.40	5.00	μg/L	50	F202131	2B18016	02/17/12	EPA 200.8 Mod	
Selenium	82.2	9.69	30.0	μg/L	50	F202131	2B24005	02/23/12	EPA 200.8 Mod	
Silver	ND	0.300	1.00	μg/L	50	F202149	2B15001	02/14/12	EPA 200.8 Mod	OM-12, U
Zinc	ND	0.82	10.0	μg/L	50	F202215	2B21010	02/21/12	EPA 200.8 Mod	U

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MATRIX DUPLICATES/TRIPLICATES

SOURCE: 1202140-02RE1

and a state	Sample	Duplicate		A A A A A A A A A A A A A A A A A A A	
Preparation: BrCl Oxidation		Lab Number:	F20219	6-DUP1	
Batch: F202196		Sequence:	<u>2B1702</u>	4	

Analyte	ng/L	ng/L	MRL	RPD	Limit	Method	Notes
Mercury	24.34	22.57	10.1	7.52	24	EPA 1631E	

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MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY AND RPD

SOURCE: 1202140-02

Batch: F202131

Sequence: 2B18016

Preparation: Closed Vessel Nitric Oven Dis	igestion
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Lab Number: F202131-MS/MSD1

Analyte	20032	eren Mer	Sample Concentrati (µg/L)	Spike on Added (µg/L)	N Conce (µ	AS ntration g/L)	MS % Recovery	Recovery Limits	Method	Notes
Aluminum			48.4	151.50	19	9.9	100	70 - 130	EPA 200.8 Mod	
Chromium			1.07	7.0700	8	.66	107	70 - 130	EPA 200.8 Mod	
Manganese			1735	6.0600	1	712	-373	70 - 130	EPA 200.8 Mod	QM-02
Nickel			12.62	4.0400	1	7.66	125	70 - 130	EPA 200.8 Mod	
Copper			0.83	4.0400	5	.07	105	70 - 130	EPA 200.8 Mod	
Zinc			2.32	10.100	8	1.69	786	70 - 130	EPA 200.8 Mod	QM-07
Arsenic			5.61	15.150	2	1.94	108	70 - 130	EPA 200.8 Mod	
Selenium			97.17	30.300	1:	23.0	85.2	70 - 130	EPA 200.8 Mod	
Molybdenum			110.1	2.0200	1	11.5	71.9	70 - 130	EPA 200.8 Mod	
Lead			ND	1.5150	1	.567	103	70 - 130	EPA 200.8 Mod	
Analyte	and at	419 110	Spike Added (µg/L)	MSD Concentration (µg/L)	MSD % Recovery	% RPD	Recovery Limits	RPD Limit	Method	Notes
Aluminum	12 1302 24	1	151.50	203.2	102	1.64	70 - 130	20	EPA 200.8 Mod	
Chromium			7.0700	8.56	106	1.15	70 - 130	20	EPA 200.8 Mod	
Manganese			6.0600	1727	-131	0.852	70 - 130	20	EPA 200.8 Mod	QM-02
Nickel	*		4.0400	16.18	88.1	8.76	70 - 130	20	EPA 200.8 Mod	
Copper			4.0400	4.84	99.3	4.59	70 - 130	20	EPA 200.8 Mod	
Zinc			10.100	16.88	144	131	70 - 130	20	EPA 200.8 Mod	QM-07, OR-08
Arsenic			15.150	24.85	127	12.4	70 - 130	20	EPA 200.8 Mod	
Selenium			30.300	135.1	125	9.38	70 - 130	20	EPA 200.8 Mod	
Molybdenum			2.0200	112.5	119	0.846	70 - 130	20	EPA 200.8 Mod	
Lead			1.5150	1.468	96.9	6.56	70 - 130	20	EPA 200.8 Mod	

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Liz Siska, Project Manager



MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY AND RPD

SOURCE: 1202140-02

Batch: F202131

Preparation: Closed Vessel Nitric Oven Digestion

Sequence: <u>2B18016</u> Lab Number: <u>F202131-MS/MSD2</u>

nalyte	Sample Concentration (µg/L)	Spike Added (µg/L)	MS Concentration (µg/L)	MS % Recovery	Recovery Limits	Method	Notes
luminum	48.4	10100	10380	102	70 - 130 1	EPA 200.8 Mod	AS
hromium	1.07	1010.0	1060	105	70 - 130 1	EPA 200.8 Mod	AS
langanese	1735	1010.0	2770	102	70 - 130 J	EPA 200.8 Mod	AS
ickel	12.62	1262.5	1303	102	70 - 130 1	EPA 200.8 Mod	AS
opper	0.83	1262.5	1253	99.2	70 - 130	EPA 200.8 Mod	AS
inc	2.32	2525.0	2530	100	70 - 130	EPA 200.8 Mod	AS
rsenic	5.61	1010.0	1073	106	70 - 130	EPA 200.8 Mod	AS
elenium	97.17	1010.0	1127	102	70 - 130	EPA 200.8 Mod	AS
folybdenum	110.1	505.00	630.5	103	70 - 130	EPA 200.8 Mod	AS
ead	ND	252.50	251.4	99.5	70 - 130	EPA 200.8 Mod	AS
elenium folybdenum ead	97.17 110.1 ND	1010.0 505.00 252.50	1127 630.5 251.4	102 103 99.5	70 - 130 70 - 130 70 - 130	EPA 200.8 Mod EPA 200.8 Mod EPA 200.8 Mod	

Analyte	Added (µg/L)	Concentration (µg/L)	% Recovery	% RPD	Recovery Limits	RPD Limit	Method	Notes
Aluminum	10100	10120	99.8	2.52	70 - 130	20	EPA 200.8 Mod	AS
Chromium	1010.0	1050	104	0.947	70 - 130	20	EPA 200.8 Mod	AS
Manganese	1010.0	2755	101	0.548	70 - 130	20	EPA 200.8 Mod	AS
Nickel	1262.5	1302	102	0.101	70 - 130	20	EPA 200.8 Mod	AS
Copper	1262.5	1258	99.6	0.384	70 - 130	20	EPA 200.8 Mod	AS
Zinc	2525.0	2511	99.3	0.770	70 - 130	20	EPA 200.8 Mod	AS
Arsenic	1010.0	1092	108	1.73	70 - 130	20	EPA 200.8 Mod	AS
Selenium	1010.0	1169	106	3.69	70 - 130	20	EPA 200.8 Mod	AS
Molybdenum	505.00	616.8	100	2.18	70 - 130	20	EPA 200.8 Mod	AS
Lead	252.50	249.9	99.0	0.581	70 - 130	20	EPA 200.8 Mod	AS

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MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY AND RPD

SOURCE: 1202140-02RE1

Batch: F202149

Sequence: 2B15001

Preparation:	Closed V	/essel	Nitric	Oven	Digestion
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Preparation:	Closed Vesse	igestion	La	Land a set of the second					
Analyte	funte 1	Sampl Concentra (µg/L)	e Spike ation Addeo (μg/L)	I Conc	MS entration µg/L)	MS % Recovery	Recovery Limits	, Method	Notes
Silver		ND	1.5180)	1.529	101	70 - 130	EPA 200.8 Mod	
Analyte		Spike Added (µg/L)	MSD Concentration (µg/L)	MSD % Recovery	% RPD	Recovery Limits	RPD Limit	Method	Notes
Silver		1.5180	1.577	104	3.13	70 - 130	20	EPA 200.8 Mod	

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MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY AND RPD

SOURCE: 1202140-02RE1

Batch: F202149

Sequence: 2B15001

Preparation: Closed Vessel Nitric Oven Digestion

Lab Number: F202149-MS/MSD2

Analyte	Sample Concentrati (µg/L)	Spike ion Added (µg/L)	М Conce (щ	AS ntration g/L)	MS % Recovery	Recovery Limits	Method	Notes
Silver	ND	50.500	44	4.17	87.5	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
Silver	50.500	43.81	86.8	0.808	70 - 130	20	EPA 200.8 Mod	AS

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MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY AND RPD

SOURCE: 1202223-02

Batch: F202196

Sequence: 2B17024

Prenaration.	BrCl Oxidation
ricparation.	DICIONIdation

Preparation: BrCl Ox	ridation		Lab	Number	r: <u>F202196</u> -	MS/MSD1		
Analyte	Sample Concentratio (ng/L)	Spike on Added (ng/L)	N Conce (ng	AS ntration g/L)	MS % Recovery	Recovery Limits	Method	Notes
Mercury	39.63	102.00	14	15.3	104	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	143.6	102	1.12	71 - 125	24	EPA 1631E	

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MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY AND RPD

SOURCE: 1202140-02RE1

Batch: F202196 Preparation: BrCl Oxidation			Lab	Sequence Number	e: <u>2B17024</u> r: <u>F202196-</u>	MS/MSD2		
Analyte	Sample Concentrat (ng/L)	Spike tion Added (ng/L)	T Conce (n	VIS ntration g/L)	MS % Recovery	Recovery Limits	Method	Notes
Mercury	24.34	71.400	9	6.61	101	71 - 125	EPA 1631E	
Analyte	Spike Added (ng/L)	MSD Concentration (ng/L)	MSD % Recovery	% RPD	Recovery Limits	RPD Limit	Method	Notes
Mercury	71.400	96.20	101	0.422	71 - 125	24	EPA 1631E	

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MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY AND RPD

SOURCE: 1202140-02RE1

Batch:	F202215				Sequence	: <u>2B21010</u>			
Preparation:	Closed Vessel	Closed Vessel Nitric Oven Digestion		Lal	o Number	: F202215-	MS/MSD1		
Analyte	1.000	Sample Concentrat (µg/L)	spike tion Added (μg/L)	Conce (1	MS entration 1g/L)	MS % Recovery	Recovery Limits	Method	Notes
Zinc		ND	10.100		9.65	95.5	70 - 130	EPA 200.8 Mod	
Cadmium		0.216	0.80800) 1	.142	115	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	9.99	98.9	3.47	70 - 130	20	EPA 200.8 Mod	
Cadmium		0.80800	1.189	120	4.07	70 - 130	20	EPA 200.8 Mod	

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MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY AND RPD

SOURCE: 1202140-02RE1

Batch: Preparation:	F202215 Closed Vesse	l Nitric Oven Dig	Lab	Sequence Number	:: <u>2B21010</u> :: <u>F202215</u> -	اب این کارکندگی مستخل او دو در دان			
Analyte		Sample Concentrat (µg/L)	Spike tion Added (µg/L)	Γ Conce (μ	VIS ntration g/L)	MS % Recovery	Recovery Limits	Method	Notes
Zinc		ND	2525.0	2	297	91.0	70 - 130	EPA 200.8 Mod	AS
Cadmium		0.216	101.00	8	7.31	86.2	70 - 130	EPA 200.8 Mod	AS
Analyte	turin de	Spike Added (µg/L)	MSD Concentration (µg/L)	MSD % Recovery	% RPD	Recovery Limits	RPD Limit	Method	Notes
Zinc		2525.0	2300	91.1	0.162	70 - 130	20	EPA 200.8 Mod	AS
Cadmium		101.00	89.53	88.4	2.50	70 - 130	20	EPA 200.8 Mod	AS

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LABORATORY CONTROL SAMPLE/ LABORATORY CONTROL SAMPLE DUPLICATE

RECOVERY AND RPD

Batch: F202131

Preparation: Closed Vessel Nitric Oven Digestion

Sequence: <u>2B18016</u>

Lab Number: F202131-BS/BSD1

LCS Source: Blank Spike

Analyte	Spike Added (µg/L)	LCS Concentration (µg/L)	LCS % Recovery	Recovery Limits	Method	Notes
Aluminum	150.00	145.9	97.3	85 - 115	EPA 200.8 Mod	NIA CONTRACTOR
Chromium	7.0000	6.94	99.1	85 - 115	EPA 200.8 Mod	
Manganese	6.0000	5.91	98.5	85 - 115	EPA 200.8 Mod	
Nickel	4.0000	4.19	105	85 - 115	EPA 200.8 Mod	
Copper	4.0000	4.40	110	85 - 115	EPA 200.8 Mod	
Zinc	10.000	11.13	111	85 - 115	EPA 200.8 Mod	
Arsenic	15.000	15.05	100	85 - 115	EPA 200.8 Mod	
Selenium	30.000	30.61	102	85 - 115	EPA 200.8 Mod	
Molybdenum	2.0000	1.93	96.6	85 - 115	EPA 200.8 Mod	
Lead	1.5000	1.560	104	85 - 115	EPA 200.8 Mod	

Analyte	Spike Added (µg/L)	LCSD Concentration (µg/L)	LCSD % Recovery	% RPD	Recovery Limits	RPD Limit	Method	Notes
Aluminum	150.00	147.3	98.2	0.925	85 - 115	20	EPA 200.8 Mod	
Chromium	7.0000	6.94	99.1	0.0117	85 - 115	20	EPA 200.8 Mod	
Manganese	6.0000	6.00	99.9	1.48	85 - 115	20	EPA 200.8 Mod	
Nickel	4.0000	4.23	106	1.04	85 - 115	20	EPA 200.8 Mod	
Copper	4.0000	4.43	111	0.541	85 - 115	20	EPA 200.8 Mod	
Zinc	10.000	10.92	109	1.97	85 - 115	20	EPA 200.8 Mod	
Arsenic	15.000	14.83	98.9	1.46	85 - 115	20	EPA 200.8 Mod	
Selenium	30.000	32.03	107	4.53	85 - 115	-20	EPA 200.8 Mod	
Molybdenum	2.0000	1.91	95.4	1.17	85 - 115	20	EPA 200.8 Mod	
Lead	1.5000	1.586	106	1.66	85 - 115	20	EPA 200.8 Mod	

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LABORATORY CONTROL SAMPLE/ LABORATORY CONTROL SAMPLE DUPLICATE

RECOVERY AND RPD

Batch: F202149

Sequence: <u>2B15001</u> Lab Number: <u>F202149-BS/BSD1</u>

Preparation: Closed Vessel Nitric Oven Digestion

LCS Source: Blank Spike

Analyte	an said a said	3-	Spike Added (µg/L)	LC Concent (µg/	S tration L)	LCS % Recovery	Recovery Limits	Method	Notes
Silver			1.5000	1.70	114	85 - 115	EPA 200.8 Mod		
Analyte	Spike Added (µg/L)		LCSD Concentration (µg/L)	LCSD % Recovery	% RPD	Recovery Limits	RPD Limit	Method	Notes
Silver		1.5000	1.738	116	1.68	85 - 115	20	EPA 200.8 Mod	QM-12

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LABORATORY CONTROL SAMPLE/ LABORATORY CONTROL SAMPLE DUPLICATE

RECOVERY AND RPD

Batch: F202196

Preparation: BrCl Oxidation

Sequence: <u>2B17024</u>

Lab Number: F202196-BS/BSD1

			LC	S Sourc	e: LCS			
Analyte	and and	Spike Added (ng/L)	LC Concen (ng/	CS tration /L)	LCS % Recovery	Recovery Limits	Method	Notes
Mercury			16.	16.27 104		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	16.20	103	0.396	80 - 120	24	EPA 1631E	

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LABORATORY CONTROL SAMPLE/ LABORATORY CONTROL SAMPLE DUPLICATE

RECOVERY AND RPD

Batch: F202215

Preparation: Closed Vessel Nitric Oven Digestion

Sequence: <u>2B21010</u> Lab Number: <u>F202215-BS/BSD1</u>

LCS Source: Blank Spike

Analyte		Spike Added (μg/L)	LC: Concent (µg/l	S ration L)	LCS % Recovery	Recovery Limits	Method	Notes
Zinc		10.000	9.99)	99.9	85 - 115	EPA 200.8 Mod	
Cadmium		0.80000	0.89	2	112	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	9.93	99.3	0.528	85 - 115	20	EPA 200.8 Mod	
Cadmium	0.80000	0.897	112	0.517	85 - 115	20	EPA 200.8 Mod	

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PREPARATION BLANKS

Instrument: ICPMS-6

Sequence: 2B15001

Preparation: Closed Vessel Nitric Oven Digestion

Lab Sample ID	Analyte	Found	MRL	Units	Batch	Method	Notes
F202149-BLK1	Silver	-0.0002	0.020	μg/L	F202149	EPA 200.8 Moc	U

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PREPARATION BLANKS

Instrument: <u>Hg-16</u>			Seq Prepa	uence: <u>2B</u> ration: <u>Br</u>	<u>17024</u> Cl Oxidation		
Lab Sample ID	Analyte	Found	MRL	Units	Batch	Method	Notes
F202196-BLK1	Mercury	0.04	0.50	ng/L	F202196	EPA 1631E	U
F202196-BLK2	Mercury	0.04	0.50	ng/L	F202196	EPA 1631E	U
F202196-BLK3	Mercury	0.05	0.50	ng/L	F202196	EPA 1631E	U
F202196-BLK4	Mercury	0.08	0.50	ng/L	F202196	EPA 1631E	QB-04, U

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PREPARATION BLANKS

Instrument: ICPMS-6

Sequence: 2B18016

Preparation: Closed Vessel Nitric Oven Digestion

	Lab Sample ID	Analyte	Found	MRL	Units	Batch	Method	Notes
-	F202131-BLK1	Aluminum	0.09	4.0	μg/L	F202131	EPA 200.8 Moc	IJ
	F202131-BLK1	Chromium	-0.02	0.10	μg/L	F202131	EPA 200.8 Moc	U
	F202131-BLK1	Manganese	0.004	0.10	μg/L	F202131	EPA 200.8 Moc	U
	F202131-BLK1	Nickel	0.004	0.10	μg/L	F202131	EPA 200.8 Moc	Ŭ
	F202131-BLK1	Copper	0.005	0.10	μg/L	F202131	EPA 200.8 Moc	U
	F202131-BLK1	Zinc	0.07	0.20	μg/L	F202131	EPA 200.8 Moc	U
	F202131-BLK1	Arsenic	-0.10	0.15	μg/L	F202131	EPA 200.8 Moc	Ū
	F202131-BLK1	Selenium	-0.06	0.60	μg/L	F202131	EPA 200.8 Moc	U
Ð	F202131-BLK1	Molybdenum	0.01	0.06	µg/L	F202131	EPA 200.8 Moc	U
	F202131-BLK1	Lead	0.002	0.040	μg/L	F202131	3PA 200.8 Moc	Ū

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PREPARATION BLANKS

Instrument: ICPMS-6

Sequence: 2B21010

Preparation: Closed Vessel Nitric Oven Digestion

	Lab Sample ID	Analyte	Found	MRL	Units	Batch	Method	Notes
12	F202215-BLK1	Zinc	-0.03	0.20	µg/L	F202215	EPA 200.8 Moc	U
	F202215-BLK1	Cadmium	-0.001	0.020	μg/L	F202215	EPA 200.8 Moc	U

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Notes and Definitions

U Analyte included in the analysis, but not detected

- QR-08 The RPD value for the MS/MSD was outside of acceptance limits. Batch QC acceptable based on matrix duplicate and/or LCS/LCSD RPD values within control limits.
- 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-07 The spike recovery was outside control limits for the MS and/or MSD. The batch was accepted based on LCS and LCSD recoveries within control limits and, when analysis permits, acceptable AS/ASD.
- 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.
- 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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Liz Siska, Project Manager

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27 February 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,

Lig Siska

Liz Siska Project Manager



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ANALYTICAL REPORT FOR SAMPLES

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SDG:

Client: Eastern Analytical, Inc

Project: Merrimack Station 200.8

Sample ID	Lab ID	Matrix	Date Sampled	Date Received
Effluent Field Blank	1202140-01	Water	09-Feb-12 00:00	10-Feb-12 09:25
Treat Tank Effluent	1202140-02	Water	09-Feb-12 00:00	10-Feb-12 09:25

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CASE NARRATIVE

SAMPLE RECEIPT

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Samples were received at Frontier Global Sciences (FGS) on February 10th, 2012. The samples were received intact, on-ice with temperatures measured at 2.0 degrees Celsius.

SAMPLE PREPARATION AND ANALYSIS

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

ANALYTICAL ISSUES

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.

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CHAIN OF CUSTODY FORMS

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2	C-3042 (C-3062 G302) C-3018	Effluent Field Freat Tent Eff	blan F lucht	 3	AQ WW	29/12)) (w	67/24 E5/24	N N	1 1	XX				Metals Include As, Cd, Cr, Cu, Pb, Hg, Mo, Ni, Sc, Ag, En
		ana a la mati	11.2222 1.222 (2.222)											-	4) Add'I volume provided for Project-specific As/MSD
	 a. The second sec	· · · · ·								-		-			S) Please we Eff. 200 Mulic FGD Effluent.
1	a a a a a a a a a a a a a a a a a a a	n a la colar de la plana ann			(), e			-		-			-	-	Add Al and Aln per client
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	For Labora C Seal: Ng oler Temp: 2.0 rrier: UFS SR: UFS	tory Use Only Comments: 72 X46 544 9210 85 710:036	01 82 - K	Mal FWI Freps V WWI Waste SB: Sea and SS: Sol and TS: Plant at HC: Hydroc TB: Trap	vater Water I Brackish Sediment d Antribit 1 arbons	es: Water Rissue	Relingu Frame: Organi Date 8	Gress Ization:	H The	r>~]	Rece Nam Orga Date	ei Binization & Time	hurs EA 2/9	Jehn F	Received By: A SAP 2-16 2-73C Warne: ALEXA BAILM, (ANB) Organization: FGS StoDate & Time: 2-10-12 (C

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ANALYTICAL RESULTS

Effluent Field Blank

Matrix: <u>Water</u>		Laboratory ID: <u>1202140-01</u>											
Analyte	Result	MDL	MRL	Units	Dilution	Batch	Sequence	Analyzed	Method	Notes			
Boron	ND	0.21	3.00	μg/L	1	F202131	2B18016	02/17/12	EPA 200.8 Mod	QB-02, QM-12, U			
Cobalt	ND	0.007	0.10	μg/L	1	F202131	2B18016	02/17/12	EPA 200.8 Mod	Ŭ			
Vanadium	ND	0.01	0.10	μg/L	1	F202131	2B18016	02/17/12	EPA 200.8 Mod	U			

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ANALYTICAL RESULTS

Treat Tank Effluent

Mat	rix: <u>Water</u>			Laboratory ID: <u>1202140-02</u>									
Analyte		Result	MDL	MRL	Units	Dilution	Batch	Sequence	Analyzed	Method	Notes		
Boron		357000	412	6000	μg/L	2000	F202131	2B24005	02/23/12	EPA 200.8 Mod			
Cobalt		ND	0.34	5.00	μg/L	50	F202131	2B18016	02/17/12	EPA 200.8 Mod	U		
Vanadium		ND	0.68	5.00	μg/L	50	F202131	2B18016	02/17/12	EPA 200.8 Mod	U		

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MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY AND RPD

SOURCE: 1202140-02

Batch: F20213	1		5	Sequence	: <u>2B18016</u>			
Preparation: Closed	Vessel Nitric Oven Di	tic Oven Digestion Lab Number: F202131-MS/MSD1						
Analyte	Sample Concentrat (µg/L)	Spike tion Added (µg/L)	N Conce (µ)	AS ntration g/L)	MS % Recovery	Recovery Limits	Method	Notes
Vanadium	1.21	5.0500	8	.07	136	70 - 130	EPA 200.8 Mod	QM-07
Cobalt	0.76	5.0500	5	.83	100	70 - 130	EPA 200.8 Mod	
Analyte	Spike Added (µg/L)	MSD Concentration (µg/L)	MSD % Recovery	% RPD	Recovery Limits	RPD Limit	Method	Notes
Vanadium	5.0500	6.58	106	20.2	70 - 130	20	EPA 200.8 Mod	QR-08
Cobalt	5.0500	6.06	105	3.84	70 - 130	20	EPA 200.8 Mod	

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MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY AND RPD

SOURCE: 1202140-02

Batch: F202131 -

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Sequence: 2B18016

Preparation:	Closed Vessel	Nitric Oven	Digestion

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Preparation:	Closed Ves	Lab Number: F202131-MS/MSD2							
Analyte	budt (17	Sample Concentrati (µg/L)	Spike on Added (µg/L)	N Conce (بیا	/IS ntration g/L)	MS % Recovery	Recovery Limits	Method	Notes
Vanadium		1.21	1010.0	10	097	108	70 - 130	EPA 200.8 Mod	AS
Cobalt		0.76	505.00	51	17.4	102	70 - 130	EPA 200.8 Mod	AS
Analyte	Sanobi Christian	Spike Added (µg/L)	MSD Concentration (µg/L)	MSD % Recovery	% RPD	Recovery Limits	RPD Limit	Method	Notes
Vanadium		1010.0	1052	104	4.20	70 - 130	20	EPA 200.8 Mod	AS
Cobalt		505.00	518.3	102	0.187	70 - 130	20	EPA 200.8 Mod	AS

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MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY AND RPD

SOURCE: 1202140-02RE2

Batch:	F202131			5	Sequence	: <u>2B24005</u>			
Preparation:	Closed Vessel	Nitric Oven Dig	estion	Lab	Number	: <u>F202131-</u>	MS/MSD5	at 7 Deptil 1990.	
Analyte	+ 1	Sample Concentrati (µg/L)	Spike ion Added (µg/L)	М Сопсе (µ	/IS ntration g/L)	MS % Recovery	Recovery Limits	Method	Notes
Boron		356800	75.750	35	6500	-478	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	359700	3820	0.909	70 - 130	20	EPA 200.8 Mod	QM-02

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MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY AND RPD

Batch:	F202131		(\$5		Sequence	e: 2B24005			
Preparation:	Closed Vessel 1	Nitric Oven Di	gestion	La	b Number				
Analyte	-	Sample Concentra (µg/L)	e Spike tion Added (μg/L)	Cond	MS entration µg/L)	MS % Recovery	Recovery Limits	Method	Notes
Boron		356800	161600	5	30100	107	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		161600	497000	86.8	6.43	70 - 130	20	EPA 200.8 Mod	AS

SOURCE: 1202140-02RE2

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LABORATORY CONTROL SAMPLE/ LABORATORY CONTROL SAMPLE DUPLICATE

RECOVERY AND RPD

Batch: F202131

Preparation: Closed Vessel Nitric Oven Digestion

Sequence: <u>2B18016</u> Lab Number: <u>F202131-BS/BSD1</u>

LCS Source: Blank Spike

Analyte	n ^{ander} schutzen er Stillenst	Spike Added (µg/L)	LCS Concentra (µg/L	ation)	LCS % Recovery	Recovery Limits	Method	Notes
Boron		75.000	76.23	1	102	85 - 115	EPA 200.8 Mod	
Vanadium		5.0000	4.57		91.4	85 - 115	EPA 200.8 Mod	
Cobalt		5.0000	5.06		101	85 - 115	EPA 200.8 Mod	
Analyte	Spike Added (µg/L)	LCSD Concentration (µg/L)	LCSD % Recovery	% RPD	Recovery Limits	RPD Limit	Method	Notes
Boron	75.000	77.22	103	1.29	85 - 115	20	EPA 200.8 Mod	
Vanadium	5.0000	4.93	98.6	7.59	85 - 115	20	EPA 200.8 Mod	
Cobalt	5.0000	5.15	103	1.81	85 - 115	20	EPA 200.8 Mod	

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PREPARATION BLANKS

Instrument: ICPMS-6

Sequence: 2B18016

Preparation: Closed Vessel Nitric Oven Digestion

	Lab Sample ID	Analyte	Found	MRL	Units	Batch	Method	Notes
-	F202131-BLK1	Boron	1.13	3.00	µg/L	F202131	EPA 200.8 Moc	U
	F202131-BLK1	Vanadium	-0.06	0.10	µg/L	F202131	EPA 200.8 Moc	U
	F202131-BLK1	Cobalt	0.0001	0.10	µg/L	F202131	EPA 200.8 Moc	U

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Notes and Definitions

U Analyte included in the analysis, but not detected

- QR-08 The RPD value for the MS/MSD was outside of acceptance limits. Batch QC acceptable based on matrix duplicate and/or LCS/LCSD RPD values within control limits.
- 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-07 The spike recovery was outside control limits for the MS and/or MSD. The batch was accepted based on LCS and LCSD recoveries within control limits and, when analysis permits, acceptable AS/ASD.
- 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-02 The method blank and/or initial/continuing calibration blank contains analyte at a concentration above the MRL. However, the sample concentrations are less than the MRL.
- 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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ΛΛΛ	eastern analytica	l, inc.	CHAIN-OF-CUSTODY RECORD	107558
	professional laboratory se	ervices		GZANH
Sample IDs	Date/Time Composites need start and stop dates/times	Matrix	Parameters and Sample Notes	# of containers
Effluent Field Blank	29/12	aqueous	AqTot/SWLLMetalsSub	
	08:52	Grabor Comp		
Sampler confir	ms ID and parameters	are accurate	Circle preservative/s: HCL HNO, H,SO, NaOH MEOH Na,S,O, (ICE)	Dissolved Sample Field Filtered
Treat Tank Effluent	29/12	aqueous	AqTot/SWLLMetalsSub/pH	4
	09:15	Grabor Comp		
Sampler confir	I ms ID and parameters	are accurate	Circle preservative/s: HCL HNO, H2SO, NaOH MEOH Na2S2O, CE	Dissolved Sample Field Filtered

Please ensure this auto COC is accurate, adheres to permit or sampling requirements for this sampling event, and modify as necessary.

West in

EAI Project ID 3902 Project Name Wastewater Analysis - Weekly	Results Needed by: Preferred date Notes about project: (i.e. Special Limits, Billing info	ReportingOptions	PONumber: 02259252
State NH	Subcontract ALL metals to Frontier Global Sciences	EDD email	
Client (Pro Mgr) Paul Pepler	Metals include Total As,Cd,Cr,Cu,Pb,Hg,Mo,Ni,Se,	e-mail Login Confirmation	Temperature
Customer GZA GeoEnvironmental, Inc. (NH) Address 380 Harvey Road City Manchester NH 03103	Ag,Zn. Metals analyses require project-specific MS/MSD.	NO FAX Samples Collected by: <u>6-7/</u> <u>Au</u> <u>2/9/12</u> Relinquished by Di	100 Priso Prison
Phone 623-3600 Fax 624-9463 (37)	00 dellarentidas		
EmailAddress: paul.pepler@gza.com	□ A □ A+ ⊠ B □ B+ □ C □ PC	Relinquished by Da	ate/Time Received by
Eastern Analytical, Inc. 25 Cher	nell Dr. Concord, NH 03301 Phone: (603)228-05	25 1-800-287-0525 F	ax: (603)228-4591