



TRAINING, SAFETY &
ENVIRONMENTAL
8142 Hwy 412B, PO Box 609
Chouteau, OK 74337-0609
918-256-5545

March 6, 2020

Ms. Hillary Young, P.E.
Chief Engineer
Land Protection Division
Oklahoma Department of Environmental Quality
707 North Robinson
P.O. Box 1677
Oklahoma City, Oklahoma 73101-1677

**RE: Addendum to Annual Groundwater Monitoring and
Corrective Action Report for Calendar Year 2019
Grand River Dam Authority
Grand River Energy Center
Chouteau, Oklahoma
A&M Engineering Project No. 1986-002**

Dear Ms. Young:

As discussed in the previously submitted Annual Groundwater Monitoring and Corrective Action Report (Calendar Year 2019) for the Coal Combustion Residuals (CCR) Landfill located at the Grand River Energy Center (GREC) in Chouteau, Oklahoma, attached herewith are the results of laboratory analysis and statistical evaluation for a confirmation sample collected from monitoring well MW03-02.

If you recall and as addressed in the Annual Report, during the second 2019 semi-annual groundwater monitoring event at the facility, mercury (reported at a concentration of 0.00694 milligrams per liter) in groundwater from MW03-02 showed a statistically significant increase in both inter- and intra-well evaluations and was above the National Primary Drinking Water Standard maximum contaminant level (MCL) of 0.002 milligrams per liter.

Considering the distance between MW-03-02 and the CCR landfill (approximately 1,800 feet) and the previously calculated and reported shallow groundwater velocity in the area (3.5 feet per year), it would not be expected that the CCR landfill was the source of mercury observed in the monitoring well. Coupled with the observed variation in mercury concentration during background sampling of the well (varying from non-detect at <0.00005 mg/L to 0.00107 mg/L), it was believed that the statistically observed increase was the result of natural variation of the groundwater in that area. A confirmation sample from MW03-02 was therefore proposed.

We deliver affordable,
reliable **ELECTRICITY**,
with a focus on **EFFICIENCY**
and a commitment to
ENVIRONMENTAL
STEWARDSHIP.

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ECONOMIC DEVELOPMENT,
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Our **EMPLOYEES**
are our greatest asset in
meeting our mission to be an
Oklahoma Agency
of Excellence.



A confirmation sample, collected from MW-03-02 on February 14, 2020 and forwarded to Green Country Testing, Inc. for analysis, shows the mercury concentration in the groundwater on that date to be 0.00171 milligrams per liter. Substituting the confirmation sample results into the statistical database still results in statistical significance for both inter- and intra-well evaluations. However, the concentration observed in the sample is below the drinking water MCL for mercury.

Considering the results obtained for the confirmation sample and in accordance with O.A.C. 252:517-9-6(f), GRDA respectfully requests herein to continue Assessment Monitoring of the groundwater at the facility. Note that mercury is a constituent for which Assessment Monitoring is required and additional data will continue to be collected and evaluated on a semi-annual basis.

Please consider this request to continue Assessment Monitoring. Note also that in accordance with the Annual Groundwater Monitoring and Corrective Action Report and O.A.C. 252:517, a copy of this Addendum is being posted on the GRDA CCR Webpage and a copy maintained in the facility operating records.

If you have any questions on this matter, or if you require any additional information, please do not hesitate to call.

Sincerely,

A handwritten signature in cursive script that reads "Michael L. Bednar".

Michael L. Bednar
Manager of Environmental Compliance

Green Country Testing, Inc.
6825 E 38th Street
Tulsa, OK 74145
TEL: 918-828-9977 FAX: 918-828-7756
Website: www.greencountrytesting.com



February 21, 2020

Valerie Blomgren
A & M Engineering
10010 E. 16th St.
Tulsa, OK 74128-4813
TEL: (918) 665-6575
FAX: (918) 665-6576

RE: GRDA Grec Landfill

Order No.: 2002222

Dear Valerie Blomgren:

Green Country Testing, Inc. received 1 sample(s) on 2/14/2020 for the analyses presented in the following report.

In accordance with your instructions, Green Country Testing conducted the analysis shown on the following pages on samples submitted by your company. The results relate only to the items tested. Unless otherwise noted, all analysis were conducted using EPA approved methodologies. Test reports meet all the NELAC requirements. All relevant sampling information is on the attached chain-of-custody form. The initials SUB as the analyst designate any testing sub-contracted by Green Country Testing.

Certifications/Accreditation: OK - 7604 - AR - ADEQ - KS - E-10232

A scope of Certified/Accredited parameters is available upon request. If you have any questions regarding these tests results, please feel free to call.

Sincerely,

A handwritten signature in black ink, appearing to read "Brian Duzan", with a stylized flourish at the end.

Brian Duzan
Laboratory Director

CC:
Accounts Payable
Jeff Elbert

Original

Green Country Testing, Inc.
 6825 E 38th Street
 Tulsa, OK 74145
 TEL: 918-828-9977 FAX: 918-828-7756
 Website: www.greencountrytesting.com



Analytical Report

(wastewater)
 WO#: 2002222
 Date Reported: 2/21/2020

CLIENT: A & M Engineering **Collection Date:** 2/14/2020 11:43:00 AM
Project: GRDA Grec Landfill
Lab ID: 2002222-001 **Matrix:** WASTEWATER
Client Sample ID: MW03-2
Sample Location:

Analyses	Result	PQL	Qual	Units	DF	PL	Date Analyzed
MERCURY IN WATER, TOTAL					E245.1,	1994	Analyst: KR
Mercury	0.00171	0.0000500		mg/L	1		2/21/2020 10:14:10 AM

Qualifiers: H Holding times for preparation or analysis exceeded M Manual Integration used to determine area response
 ND Not Detected at the Reporting Limit PL Permit Limit
 RL Reporting Detection Limit W Sample container temperature is out of limit as specified at testcode



QC SUMMARY REPORT

WO#: 2002222
 21-Feb-20

Client: A & M Engineering
Project: GRDA Grec Landfill
TestNo: E245.1, 1994

Sample ID: MB-R41652	SampType: MBLK	TestCode: HG_WW	Units: mg/L	Prep Date:	RunNo: 41652						
Client ID: PBW	Batch ID: R41652	TestNo: E245.1, 1994		Analysis Date: 2/21/2020	SeqNo: 449017						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	< 0.0000500	0.0000500									

Sample ID: LCS-R41652	SampType: LCS	TestCode: HG_WW	Units: mg/L	Prep Date:	RunNo: 41652						
Client ID: LCSW	Batch ID: R41652	TestNo: E245.1, 1994		Analysis Date: 2/21/2020	SeqNo: 449018						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.00101	0.0000500	0.001000	0	101	85	115				

Sample ID: 2002212-001BMS	SampType: IMS	TestCode: HG_WW	Units: mg/L	Prep Date:	RunNo: 41652						
Client ID: BatchQC	Batch ID: R41652	TestNo: E245.1, 1994		Analysis Date: 2/21/2020	SeqNo: 449020						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.000991	0.0000500	0.001000	0	99.1	77.8	119				

Sample ID: 2002212-001BMSD	SampType: MSD	TestCode: HG_WW	Units: mg/L	Prep Date:	RunNo: 41652						
Client ID: BatchQC	Batch ID: R41652	TestNo: E245.1, 1994		Analysis Date: 2/21/2020	SeqNo: 449021						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.000990	0.0000500	0.001000	0	99.0	77.8	119	0.0009907	0.0505		1.89

Qualifiers: H Holding times for preparation or analysis exceeded
 PL Permit Limit
 M Manual Integration used to determine area response
 RL Reporting Detection Limit
 ND Not Detected at the Reporting Limit
 W Sample container temperature is out of limit as sp



QC SUMMARY REPORT

WO#: 2002222
 21-Feb-20

Client: A & M Engineering
Project: GRDA Grec Landfill

TestNo: E245.1, 1994

Sample ID:	2002239-001AMS	SampType:	MS	TestCode:	HG_WW	Units:	mg/L	Prep Date:	RunNo:	41652	
Client ID:	BatchQC	Batch ID:	R41652	TestNo:	E245.1, 1994	Analysis Date:	2/21/2020	SeqNo:	449029		
Analyte	Result	PQL	SPK value	SPK RefVal	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.00101	0.0000500	0.001000	0	101	77.8	119				

Sample ID:	2002239-001AMSD	SampType:	MSD	TestCode:	HG_WW	Units:	mg/L	Prep Date:	RunNo:	41652	
Client ID:	BatchQC	Batch ID:	R41652	TestNo:	E245.1, 1994	Analysis Date:	2/21/2020	SeqNo:	449030		
Analyte	Result	PQL	SPK value	SPK RefVal	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	0.000999	0.0000500	0.001000	0	99.9	77.8	119	0.001009	0.996	1.89	

Qualifiers: H Holding times for preparation or analysis exceeded
 PL Permit Limit

M Manual Integration used to determine area response
 RL Reporting Detection Limit

ND Not Detected at the Reporting Limit
 W Sample container temperature is out of limit as sp



Chain of Custody Record

Laboratory Number: *1986-038*

Client Information:
 Company Name: *A + M*
 Contact Name: *Tom Trebonik*
 Address: *10010 E 16th St.*
 City, State Zip: *Tulsa OK 74128*
 Phone Number: *615-665-6575* Ext:
 Fax Number:
 E-mail Address: *trebonik@amtesting.com*

Billing Information:
 Billing Information: *Same*
 PO Number: *1986-038*
 Quote Number:
 Required QC Level:
 Bill Monthly: Yes No
 Ext:

Project Name/Number:
 Project Name/Number: *GEDA GEEC Landfill*
 Sampler's Signature: *Valerie Bryngren*
 Shipping Method: UPS FedEx / Air Hand / GCT / Mail
 Turn Time: 1 Day 2 Day Standard Other
 (Rush turn times will incur a surcharge.)

Page *1* of *1*

Sample ID/Description	Matrix Code:		Grab / Composite	Matrix	Container Number	Pres.	Requested Tests	Comments
	AQ = Aqueous	SO = Soil						
MWD3-2	<input type="checkbox"/> Drinking Water <input type="checkbox"/> POTW <input checked="" type="checkbox"/> RPDES <input type="checkbox"/> USDA/FDA <input type="checkbox"/> RECAP/PRISC	<input type="checkbox"/> O = Oil <input type="checkbox"/> SL = Sludge <input type="checkbox"/> F = Food <input type="checkbox"/> SW = Swab <input type="checkbox"/> SOL = Solid	G	W	P	HNO ₃	mercury	GREEN COUNTRY TESTING CHAIN OF CUSTODY ATTACHMENT 1-1-1 PAGES

Relinquished by: *Valerie Bryngren* **Date/Time:** *2/14/20 1143*

Received by: *Paul Apperald* **Date/Time:** *2/17/20*

Field Notes:

Received on ice? Yes No
 Temp: *6°*

All samples submitted to Green Country Testing for analysis are accepted on a custodial basis only. Ownership of the material remains with the client submitting the samples. Green Country Testing reserves the right to return unused sample portions.

Tulsa, OK 74145
 6825 E. 38th Street
 918-828-9977
 Fax: 918-828-7756

10/08

Concentrations (mg/L)

Parameter: Mercury

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Samples: 45

Total Non-Detect: 26

Percent Non-Detects: 57.7778%

Total Background Samples: 9

There is 1 background well

Well	Samples	ND	Date	Result	Original
MW#93-1	9	9 (100%)	5/24/2018	ND<5e-005	ND<5e-005
			6/19/2018	ND<5e-005	ND<5e-005
			7/19/2018	ND<5e-005	ND<5e-005
			8/22/2018	ND<5e-005	ND<5e-005
			9/19/2018	ND<5e-005	ND<5e-005
			10/18/2018	ND<5e-005	ND<5e-005
			11/20/2018	ND<5e-005	ND<5e-005
			12/20/2018	ND<5e-005	ND<5e-005
			11/21/2019	ND<5e-005	ND<5e-005

There are 4 compliance wells

Well	Samples	ND	Date	Result	Original
MW#03-1	9	8 (88.8889%)	5/24/2018	ND<5e-005	ND<5e-005
			6/19/2018	ND<5e-005	ND<5e-005
			7/19/2018	ND<5e-005	ND<5e-005
			8/22/2018	0.000184	0.000184
			10/18/2018	ND<5e-005	ND<5e-005
			11/20/2018	ND<5e-005	ND<5e-005
			12/20/2018	ND<5e-005	ND<5e-005
			3/26/2019	ND<5e-005	ND<5e-005
			11/21/2019	ND<5e-005	ND<5e-005
MW#03-2	9	1 (11.1111%)	5/24/2018	ND<5e-005	ND<5e-005
			6/19/2018	0.000224	0.000224
			7/19/2018	0.000239	0.000239
			8/22/2018	0.000255	0.000255
			9/19/2018	0.000636	0.000636
			10/18/2018	0.00101	0.00101
			11/20/2018	0.000803	0.000803
			12/20/2018	0.00107	0.00107
			2/14/2020	0.00171	0.00171
MW#93-2	9	8 (88.8889%)	5/24/2018	ND<5e-005	ND<5e-005
			6/19/2018	ND<5e-005	ND<5e-005
			7/19/2018	ND<5e-005	ND<5e-005
			8/22/2018	ND<5e-005	ND<5e-005
			9/19/2018	ND<5e-005	ND<5e-005
			10/18/2018	0.000572	0.000572
			11/20/2018	ND<5e-005	ND<5e-005
			12/20/2018	ND<5e-005	ND<5e-005
			11/21/2019	ND<5e-005	ND<5e-005

MW#93-3	9	0 (0%)	5/24/2018	0.000787	0.000787
			6/19/2018	0.000367	0.000367
			7/19/2018	0.00033	0.00033
			8/22/2018	0.000514	0.000514
			9/19/2018	0.000428	0.000428
			10/18/2018	0.000579	0.000579
			11/20/2018	0.000577	0.000577
			12/20/2018	0.000245	0.000245
			11/21/2019	0.000861	0.000861

There are 0 unused wells

Well	Samples	ND	Date	Result	Original
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Levene's Test for Equal of Variance

Parameter: Mercury

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Overall Mean = 0.00014361

Overall Std Dev = 0.000212413

Overall Total = 0.00646244

SS Wells = 1.05612e-006

SS Total = 1.98525e-006

ANOVA Table

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Squares	F
Between Wells	1.05612e-006	4	2.64029e-007	11.3667
Error (within wells)	9.29134e-007	40	2.32284e-008	
Totals	1.98525e-006	44		

11.3667 exceeds 2.60597; assumption of equal variance should be rejected

Well: MW#93-1

Sample	Residual
5/24/2018	6.77626e-021
6/19/2018	6.77626e-021
7/19/2018	6.77626e-021
8/22/2018	6.77626e-021
9/19/2018	6.77626e-021
10/18/2018	6.77626e-021
11/20/2018	6.77626e-021
12/20/2018	6.77626e-021
11/21/2019	6.77626e-021

Well: MW#03-1

Sample	Residual
5/24/2018	1.48889e-005
6/19/2018	1.48889e-005
7/19/2018	1.48889e-005
8/22/2018	0.000119111
10/18/2018	1.48889e-005
11/20/2018	1.48889e-005
12/20/2018	1.48889e-005
3/26/2019	1.48889e-005
11/21/2019	1.48889e-005

Well: MW#03-2

Sample	Residual
5/24/2018	0.000616333
6/19/2018	0.000442333
7/19/2018	0.000427333
8/22/2018	0.000411333
9/19/2018	3.03333e-005
10/18/2018	0.000343667
11/20/2018	0.000136667
12/20/2018	0.000403667
2/14/2020	0.00104367

Well: MW#93-2

Sample	Residual
5/24/2018	5.8e-005
6/19/2018	5.8e-005
7/19/2018	5.8e-005
8/22/2018	5.8e-005
9/19/2018	5.8e-005
10/18/2018	0.000464
11/20/2018	5.8e-005
12/20/2018	5.8e-005
11/21/2019	5.8e-005

Well: MW#93-3

Sample	Residual
5/24/2018	0.000266111
6/19/2018	0.000153889
7/19/2018	0.000190889
8/22/2018	6.88889e-006
9/19/2018	9.28889e-005
10/18/2018	5.81111e-005
11/20/2018	5.61111e-005
12/20/2018	0.000275889
11/21/2019	0.000340111

Shapiro-Wilks Test of Normality

Parameter: Mercury

All Wells

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 22; Samples = 45

i	x(i)	x(n-i+1)	x(n-1+1)-x(i)a(n-i+1)		b(i)
1	5e-005	0.00171	0.00166	0.385	0.0006391
2	5e-005	0.00107	0.00102	0.2651	0.000270402
3	5e-005	0.00101	0.00096	0.2313	0.000222048
4	5e-005	0.000861	0.000811	0.2065	0.000167471
5	5e-005	0.000803	0.000753	0.1865	0.000140435
6	5e-005	0.000787	0.000737	0.1695	0.000124922
7	5e-005	0.000636	0.000586	0.1545	9.0537e-005
8	5e-005	0.000579	0.000529	0.141	7.4589e-005
9	5e-005	0.000577	0.000527	0.1286	6.77722e-005
10	5e-005	0.000572	0.000522	0.1173	6.12306e-005
11	5e-005	0.000514	0.000464	0.1062	4.92768e-005
12	5e-005	0.000428	0.000378	0.0959	3.62502e-005
13	5e-005	0.000367	0.000317	0.086	2.7262e-005
14	5e-005	0.00033	0.00028	0.0775	2.17e-005
15	5e-005	0.000255	0.000205	0.0673	1.37965e-005
16	5e-005	0.000245	0.000195	0.0584	1.1388e-005
17	5e-005	0.000239	0.000189	0.0497	9.3933e-006
18	5e-005	0.000224	0.000174	0.0412	7.1688e-006
19	5e-005	0.000184	0.000134	0.0328	4.3952e-006
20	5e-005	5e-005	0	0.0245	0
21	5e-005	5e-005	0	0.0163	0
22	5e-005	5e-005	0	0.0081	0
23	5e-005	5e-005	0		
24	5e-005	5e-005	0		
25	5e-005	5e-005	0		
26	5e-005	5e-005	0		
27	0.000184	5e-005	-0.000134		
28	0.000224	5e-005	-0.000174		
29	0.000239	5e-005	-0.000189		
30	0.000245	5e-005	-0.000195		
31	0.000255	5e-005	-0.000205		
32	0.00033	5e-005	-0.00028		
33	0.000367	5e-005	-0.000317		
34	0.000428	5e-005	-0.000378		
35	0.000514	5e-005	-0.000464		
36	0.000572	5e-005	-0.000522		
37	0.000577	5e-005	-0.000527		
38	0.000579	5e-005	-0.000529		
39	0.000636	5e-005	-0.000586		
40	0.000787	5e-005	-0.000737		
41	0.000803	5e-005	-0.000753		
42	0.000861	5e-005	-0.000811		
43	0.00101	5e-005	-0.00096		
44	0.00107	5e-005	-0.00102		
45	0.00171	5e-005	-0.00166		

Sum of b values = 0.00203914

Sample Standard Deviation = 0.000367345

W Statistic = 0.700311

5% Critical value of 0.945 exceeds 0.700311

Evidence of non-normality at 95% level of significance

1% Critical value of 0.926 exceeds 0.700311

Evidence of non-normality at 99% level of significance

Non-Parametric Prediction Interval

Inter-Well Comparison

Parameter: Mercury

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Percent Non-Detects = 57.7778%

Number of comparisons = 4

Future Samples (k) = 4

Recent Dates = 1

Background Samples (n) = 9

Maximum Background Concentration = 5e-005

Confidence Level = 69.2%

False Positive Rate = 30.8%

Well	Date	Samples	Mean	Impacted
MW#03-1	11/21/2019	1	5e-005	FALSE
MW#03-2	2/14/2020	1	0.00171	TRUE
MW#93-2	11/21/2019	1	5e-005	FALSE
MW#93-3	11/21/2019	1	0.000861	TRUE

Non-Parametric Prediction Interval

Intra-Well Comparison for MW#03-2

Parameter: Mercury

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Percent Non-Detects = 12.5%

Future Samples (k) = 1

Recent Dates = 1

Baseline Samples (n) = 8

Maximum Baseline Concentration = 0.00107

Confidence Level = 88.9%

False Positive Rate = 11.1%

Baseline Samples	Date	Result
	5/24/2018	ND<5e-005
	6/19/2018	0.000224
	7/19/2018	0.000239
	8/22/2018	0.000255
	9/19/2018	0.000636
	10/18/2018	0.00101
	11/20/2018	0.000803
	12/20/2018	0.00107

Date	Samples	Mean	Impacted
2/14/2020	1	0.00171	TRUE

Non-Parametric Prediction Interval

Intra-Well Comparison for MW#93-3

Parameter: Mercury

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Percent Non-Detects = 0%

Future Samples (k) = 1

Recent Dates = 1

Baseline Samples (n) = 8

Maximum Baseline Concentration = 0.000787

Confidence Level = 88.9%

False Positive Rate = 11.1%

Baseline Samples	Date	Result
	5/24/2018	0.000787
	6/19/2018	0.000367
	7/19/2018	0.00033
	8/22/2018	0.000514
	9/19/2018	0.000428
	10/18/2018	0.000579
	11/20/2018	0.000577
	12/20/2018	0.000245

Date	Samples	Mean	Impacted
11/21/2019	1	0.000861	TRUE