2019 Annual Groundwater Monitoring and Corrective Action Report

LCL1 - Utility Waste Landfill Cell 1, Labadie Energy Center, Franklin County, Missouri, USA

Submitted to:

Ameren Missouri

1901 Chouteau Avenue, St. Louis, Missouri 63103

Submitted by:

Golder Associates Inc.

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Project No. 153-140601

January 31, 2020

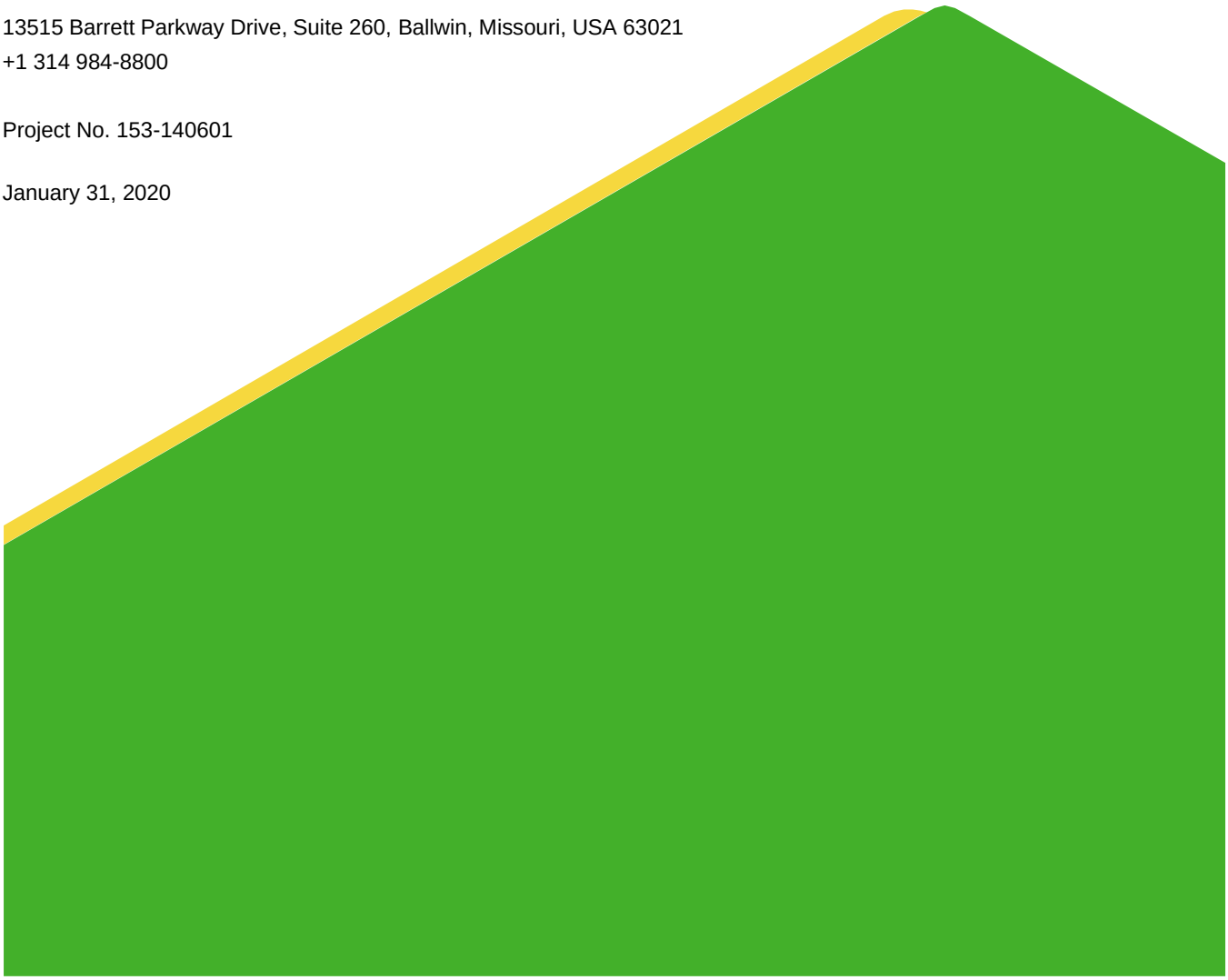


Table of Contents

TABLES

FIGURES

APPENDICES

1.0 INTRODUCTION

This annual report was developed to meet the requirements of United States Environmental Protection Agency (USEPA) 40 CFR Part 257 “Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals From Electric Utilities; Final Rule” (the CCR Rule). The CCR Rule requires owners or operators of existing CCR units to produce an Annual Groundwater Monitoring and Corrective Action Report (Annual Report) each year (§§ 257.90(e)). Ameren Missouri (Ameren) has determined that the Utility Waste Landfill (UWL) at the Labadie Energy Center (LEC) is subject to the requirements of the CCR Rule. The UWL currently only operates LCL1 (Cell 1) which is an on-site landfill cell and manages Coal Combustion Residuals (CCR) from the facility. This Annual Report for the LCL1 describes CCR Rule groundwater monitoring activities from January 1, 2019 through December 31, 2019.

2.0 INSTALLATION OR DECOMMISSIONING OF MONITORING WELLS

In accordance with the CCR Rule, a groundwater monitoring system has been installed to monitor the LCL1. The groundwater monitoring system consists of six (6) groundwater monitoring wells screened in the uppermost aquifer and is displayed in **Figure 1**. No new monitoring wells were installed or decommissioned in 2019 as a part of the CCR Rule monitoring program for the LCL1. For more information on the groundwater monitoring network, see the 2017 Annual Groundwater Monitoring Report for the LCL1.

3.0 GROUNDWATER SAMPLING RESULTS AND DISCUSSION

The following sections review the sampling events completed for the LCL1 CCR Unit in 2019. **Table 1** below provides a summary of the groundwater samples collected in 2019 including the number of samples, the date of sample collection, and the monitoring program.

Table 1 – Summary of Groundwater Sampling Dates

Sampling Event	BMW-1S	BMW-2S	MW-26	TMW-1	TMW-2	TMW-3	Detection or Assessment Monitoring Program
	Date of Sample Collection						
January 2019 Verification Sampling Event	-	-	-	1/3/2019	1/3/2019	-	Detection
May 2019 Detection Monitoring	5/1/2019	5/1/2019	5/8/2019	5/2/2019	5/2/2019	5/8/2019	Detection
August 2019 Verification Sampling Event	-	-	8/21/2019	8/21/2019	8/21/2019	8/21/2019	Detection
November 2019 Detection Monitoring	11/5/2019	11/5/2019	11/6/2019	11/5/2019	11/5/2019	11/5/2019	Detection
Total Number of Samples Collected	2	2	3	4	4	3	NA

Notes:
1.) Detection Monitoring Events tested for Appendix III Parameters.
2.) Verification Sampling Events tested for Appendix III Parameters with initial exceedances.
3.) "-" No sample collected.
4.) NA - Not applicable.

3.1 Detection Monitoring Program

A Detection Monitoring event was completed November 7-9, 2018. Verification sampling and the statistical analysis to evaluate for Statistically Significant Increases (SSIs) for the November 2018 event were not completed until 2019 and are, therefore, included in this report. Detections of Appendix III analytes triggered a verification sampling event, which was completed on January 3, 2019 and verified one SSI. **Table 2** summarizes the results of the statistical analysis of the November 2018 Detection Monitoring event and laboratory analytical data are provided in **Appendix A**.

As outlined in section 257.94(e)(2) of the CCR Rule, the owner or operator may demonstrate that a source other than the CCR Unit has caused an SSI and that the apparent SSI was the result of an alternative source or resulted from errors in sampling, analysis, statistical evaluation, or natural variation in groundwater quality. An Alternative Source Demonstration (ASD) was completed for the SSI and is provided in **Appendix B**. This ASD demonstrates that the SSI was not caused by the LCL1 CCR Unit and the LCL1 CCR Unit remains in Detection Monitoring.

A Detection Monitoring event was completed May 1-8, 2019, and testing was completed for all Appendix III analytes. Statistical analysis of the data determined that there was an SSI. **Table 3** summarizes the results of the statistical analysis of the May 2019 Detection Monitoring event and laboratory analytical data are provided in **Appendix A**. As with the November 2018 sampling event, the SSI in the monitoring well network was not caused by the LCL1 CCR Unit and an ASD for this is provided in **Appendix C**.

As outlined in the Statistical Analysis Plan for this site, updates to the statistical limits are completed once 4 (four) to 8 (eight) new sample results are available. During the statistical analysis of the May 2019 sampling event, the statistical limits used to determine an SSI were updated according to the Statistical Analysis Plan. These updated limits will be used for November 2019 and subsequent statistical analyses.

A Detection Monitoring event was completed November 5-6, 2019, and testing was performed for all Appendix III analytes. Statistical analyses to evaluate for SSIs in the November 2019 data were not completed in 2019 and the results will be provided in the 2020 annual report. **Table 4** summarizes the results of the November 2019 Detection Monitoring event and laboratory analytical data are provided in **Appendix A**.

3.2 Groundwater Elevation, Flow Rate and Direction

To meet the requirements of §257.93(c), water level measurements were taken at all monitoring wells prior to the start of groundwater purging and sampling. Static water levels were measured within a 24-hour period in each monitoring well using an electronic water level indicator.

Groundwater elevations were used to generate potentiometric surface maps provided in **Appendix D**. As shown on the potentiometric surface maps, groundwater flow direction within the uppermost aquifer is dynamic and influenced by seasonal changes in the water level in the adjacent Missouri River. Water flows into and out of the alluvial aquifer because of fluctuating river water levels that produce “bank recharge” and “bank discharge” conditions. Overall, based on potentiometric surface maps, a general flow direction from the south/southwest (bluffs area) to the north/northeast (Missouri River) is observed under normal river conditions. However, during periods of high river levels, groundwater flow can temporarily reverse. During these times of high river stage and temporary flow direction changes, horizontal groundwater gradients generally decrease, and little net movement of groundwater occurs.

Groundwater flow direction and hydraulic gradient were estimated for the alluvial aquifer wells at the LEC using commercially available software. Results from this assessment indicate that while groundwater flow direction is variable, the overall net groundwater flow in the alluvial aquifer at the LEC is from the bluffs toward the river. Horizontal gradients calculated by the program range from 0.0001 to 0.0007 feet/foot with an estimated net annual groundwater velocity of approximately 17 feet per year.

4.0 STATUS OF THE GROUNDWATER MONITORING PROGRAM

The LCL1 remains in Detection Monitoring. Section 5.0 provides a discussion of the activities planned for 2020.

4.1 Sampling Issues

During the May 2019 Sampling event, sample analysis for EPA method 200.7 for L-UWL-FB-1 was not performed due to laboratory error. Reported values for L-UWL-FB-1 were mistakenly reported from L-MW-26, and no method 200.7 samples were analyzed from L-UWL-FB-1. These values were determined to be incorrect based on review of the results and professional judgement. The incorrect values were not used for statistical analysis or data validation.

From approximately May to August 2019, some of the monitoring wells at the LEC were under water due to the flooding of the Missouri River. This caused a delay in the planned sampling dates of some of the monitoring wells. On July 19, July 26 and August 12, 2019, Golder performed post-flood monitoring well inspections at the LEC and found that only BMW-1S had been impacted by the flood. This monitoring well was re-developed to remove floodwater impacts to the well prior to any future groundwater elevation measurements or groundwater samples being collected. After successful re-development, BMW-1S was returned to service. No other notable sampling issues were encountered in 2019.

5.0 ACTIVITIES PLANNED FOR 2020

Detection Monitoring is scheduled to continue on a semi-annual basis in the second and fourth quarters of 2020. Statistical analysis of the November 2019 Detection Monitoring data will be completed in 2020 and included in the 2020 Annual Report.

Tables

Table 2
November 2018 Detection Monitoring Results
LCL1 - Utility Waste Landfill Cell 1
Labadie Energy Center, Franklin County, MO

ANALYTE	UNITS	BACKGROUND		GROUNDWATER MONITORING WELLS							
		BMW-1S	BMW-2S	Prediction Limit MW-26	MW-26	Prediction Limit TMW-1	TMW-1	Prediction Limit TMW-2	TMW-2	Prediction Limit TMW-3	TMW-3
November 2018 Detection Monitoring Event											
DATE	NA	11/7/2018	11/7/2018	NA	11/9/2018	NA	11/9/2018	NA	11/9/2018	NA	11/9/2018
pH	SU	6.83	7.12	6.2-7.44	7.00	6.437-7.305	6.94	6.303-7.517	6.93	6.55-7.207	6.81
BORON, TOTAL	µg/L	151	84.8 J	DQR	76.9 J	117.5	124	139.9	106	140	128
CALCIUM, TOTAL	µg/L	201,000	128,000	154,083	134,000	175,638	162,000	200,867	178,000	217,698	184,000
CHLORIDE, TOTAL	mg/L	5.6	1.3 J	14.4	2.7	3.603	3.7	6.933	5.5	8.489	6.7
FLUORIDE, TOTAL	mg/L	ND	ND	DQR	ND	0.2269	0.29	DQR	0.21	DQR	ND
SULFATE, TOTAL	mg/L	36.7	28.4	33.38	24.8	115	96.8	112.1	91.0	97.4	66.9
TOTAL DISSOLVED SOLIDS	mg/L	751	958 J	520.2	494 J	694.1	677 J	775.5	686 J	752.2	720 J
January 2019 Verification Sampling											
DATE	NA						1/3/2019		1/3/2019		
pH	SU						6.98		6.95		
BORON, TOTAL	µg/L						117.0				
CALCIUM, TOTAL	µg/L										
CHLORIDE, TOTAL	mg/L						3.6				
FLUORIDE, TOTAL	mg/L						0.23		0.20 J		
SULFATE, TOTAL	mg/L										
TOTAL DISSOLVED SOLIDS	mg/L										

NOTES:
1. Unit Abbreviations: µg/L - micrograms per liter, mg/L - milligrams per liter, SU - standard units.
2. J - Result is an estimated value.
3. ND - Constituent was analyzed for, but was not detected above the Method Detection Limit (MDL) and is considered a non-detect. Values displayed as ND.
4. NA - Not applicable.
5. Prediction Limits calculated using Sanitas Software.
6. If all background values are less than the Practical Quantitation Limit (PQL) then the Double Quantification Rule (DQR) is used.
7. Values highlighted in yellow indicate a Statistically Significant Increase (SSI).
8. Values highlighted in green indicate an initial exceedance above the prediction limit that was not confirmed by Verification Sampling (not an SSI).
9. Only analytes/wells that were detected above the prediction limit were tested during Verification Sampling.

Prepared By: RJF
Checked By: KAB
Reviewed By: CMR

Table 3
May 2019 Detection Monitoring Results
LCL1 - Utility Waste Landfill Cell 1
Labadie Energy Center, Franklin County, MO

ANALYTE	UNITS	BACKGROUND		GROUNDWATER MONITORING WELLS							
		BMW-1S	BMW-2S	Prediction Limit MW-26	MW-26	Prediction Limit TMW-1	TMW-1	Prediction Limit TMW-2	TMW-2	Prediction Limit TMW-3	TMW-3
May 2019 Detection Monitoring Event											
DATE	NA	5/1/2019	5/1/2019	NA	5/8/2019	NA	5/2/2019	NA	5/2/2019	NA	5/8/2019
pH	SU	6.53	6.18	6.2-7.44	6.02	6.437-7.305	6.91	6.303-7.517	6.87	6.55-7.207	5.83
BORON, TOTAL	µg/L	111	61.3 J	DQR	98.2 J	117.5	109	139.9	98.5 J	140.0	114
CALCIUM, TOTAL	µg/L	196,000	126,000	154,083	182,000	175,638	164,000 J	200,867	176,000	217,698	170,000
CHLORIDE, TOTAL	mg/L	4.4	1.4	14.4	3.3	3.603	3.7	6.933	5.3	8.489	6.2
FLUORIDE, TOTAL	mg/L	0.22	0.21	DQR	0.20	0.2269	0.24	DQR	0.24	DQR	0.19 J
SULFATE, TOTAL	mg/L	39.2	29.4	33.38	19.3	115	98.6 J	112.1	86.4	97.4	48.9
TOTAL DISSOLVED SOLIDS	mg/L	740	459	520.2	516	694.1	664	775.5	676	752.2	733
August 2019 Verification Sampling Event											
DATE	NA				8/21/2019		8/21/2019		8/21/2019		8/21/2019
pH	SU				6.54		6.61		6.45		6.57
BORON, TOTAL	µg/L										
CALCIUM, TOTAL	µg/L				142,000						
CHLORIDE, TOTAL	mg/L						4.4				
FLUORIDE, TOTAL	mg/L				0.15 J		ND		ND		
SULFATE, TOTAL	mg/L										
TOTAL DISSOLVED SOLIDS	mg/L										

NOTES:
1. Unit Abbreviations: µg/L - micrograms per liter, mg/L - milligrams per liter, SU - standard units.
2. J - Result is an estimated value.
3. ND - Constituent was analyzed for, but was not detected above the Method Detection Limit (MDL) and is considered a non-detect. Values displayed as ND.
4. NA - Not applicable.
5. Prediction Limits calculated using Sanitas Software.
6. If all background values are less than the Practical Quantitation Limit (PQL) then the Double Quantification Rule (DQR) is used.
7. Values highlighted in yellow indicate a Statistically Significant Increase (SSI).
8. Values highlighted in green indicate an initial exceedance above (or below for pH) the prediction limit that was not confirmed by Verification Sampling (not a SSI).
9. Only analytes/wells that were detected above the prediction limit were tested during Verification Sampling.

Prepared By: JSI
Checked By: KAB
Reviewed By: CMR

Table 4
November 2019 Detection Monitoring Results
LCL1 - Utility Waste Landfill Cell 1
Labadie Energy Center, Franklin County, MO

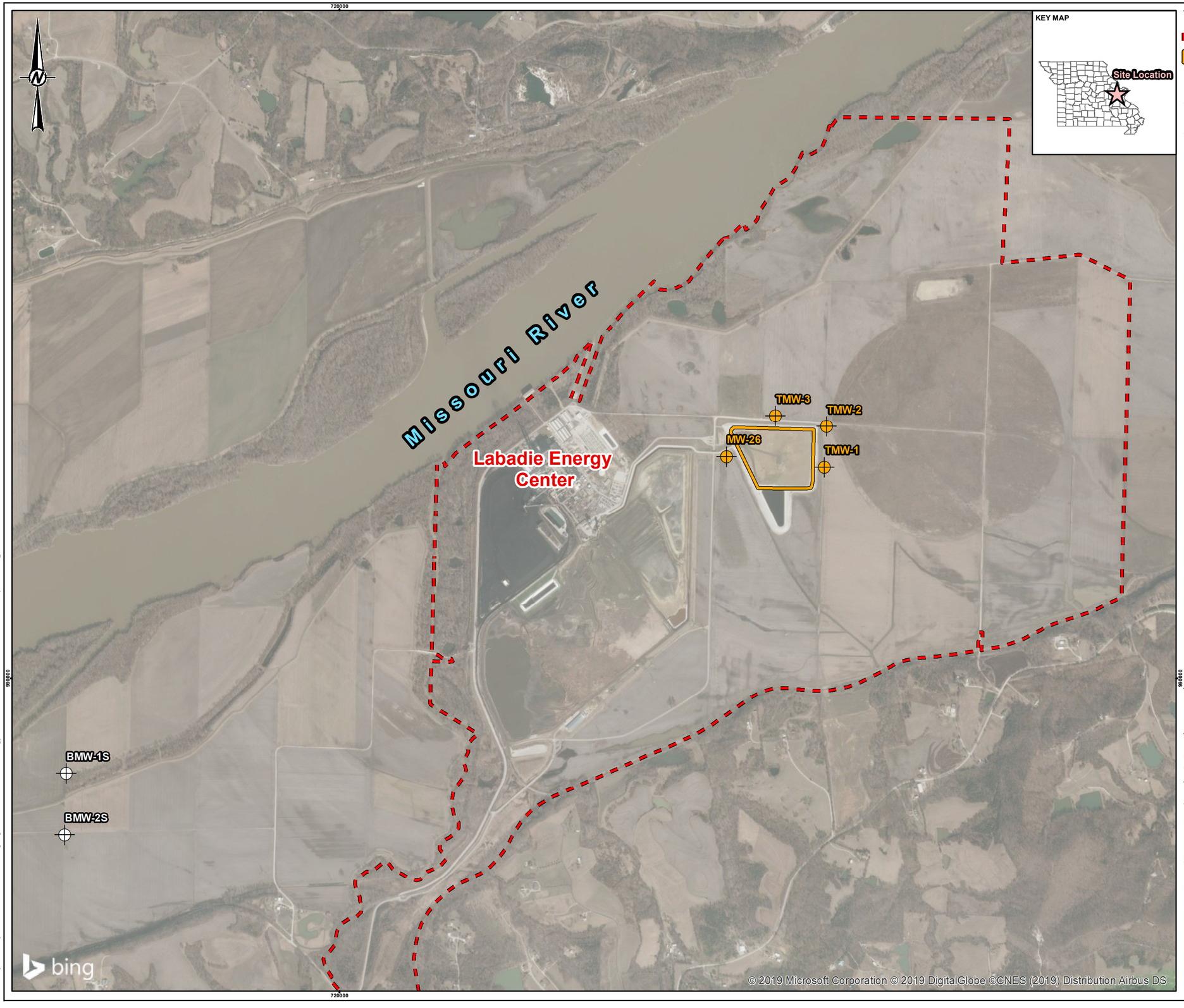
ANALYTE	UNITS	BACKGROUND		GROUNDWATER MONITORING WELLS			
		BMW-1S	BMW-2S	MW-26	TMW-1	TMW-2	TMW-3
November 2019 Detection Monitoring Event							
DATE	NA	11/5/2019	11/5/2019	11/6/2019	11/5/2019	11/5/2019	11/5/2019
pH	SU	6.83	7.08	7.30	6.94	6.95	6.74
BORON, TOTAL	µg/L	122	61.2 J	423	101	97.3 J	122
CALCIUM, TOTAL	µg/L	194,000	125,000	146,000	174,000 J	177,000	176,000
CHLORIDE, TOTAL	mg/L	4.8	3.3	22.5	4.4	4.9	5.5
FLUORIDE, TOTAL	mg/L	ND	0.12 J	ND	0.15 J	0.13 J	0.089 J
SULFATE, TOTAL	mg/L	29.9	28.5	18.1	109	82.6	44.5
TOTAL DISSOLVED SOLIDS	mg/L	700	425	540	673	687	604

NOTES:

1. Unit Abbreviations: µg/L - micrograms per liter, mg/L - milligrams per liter, SU - standard units.
2. J - Result is an estimated value.
3. ND - Constituent was analyzed for, but was not detected above the Method Detection Limit (MDL) and is considered a non-detect. Values displayed as ND.
4. NA - Not applicable.

Prepared By: RJF
Checked By: KAB
Reviewed By: CMR

Figures



KEY MAP

LEGEND

- Approximate Property Boundary
- LCL1 - Utility Waste Landfill Cell 1

LCL1 Monitoring Wells

- LCL1 - Utility Waste Landfill Cell 1 Monitoring Well
- Background Monitoring Well

0 1,000 2,000 3,000 4,000

Feet

NOTE(S)

1.) ALL LOCATIONS AND BOUNDARIES ARE APPROXIMATE.

REFERENCE(S)

1.) ZAHNER AND ASSOCIATES, INC. 2016. LOT CONSOLIDATION PLAT OF "LABADIE ENERGY CENTER" - PREPARED FOR AMEREN MISSOURI. REVISED JUNE 15, 2016.
2.) COORDINATE SYSTEM: NAD 1983 STATEPLANE MISSOURI EAST FIPS 2,401 FEET.

CLIENT
AMEREN MISSOURI
LABADIE ENERGY CENTER

PROJECT
GROUNDWATER MONITORING PROGRAM

TITLE
SITE LOCATION AERIAL MAP AND MONITORING WELL LOCATIONS

CONSULTANT
GOLDER

YYYY-MM-DD	2019-12-31
DESIGNED	JSI
PREPARED	JSI
REVIEWED	RJF
APPROVED	CMR

PROJECT NO.	CONTROL	REV.	FIGURE
153140601	1240	0.0	1

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI B

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APPENDIX A

Laboratory Analytical Data

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

January 09, 2019

Mark Haddock
Golder Associates
820 S. Main St
Suite 100
Saint Charles, MO 63301

RE: Project: AMEREN GW SAMPLING
Pace Project No.: 60291121

Dear Mark Haddock:
Enclosed are the analytical results for sample(s) received by the laboratory on January 04, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

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

Sincerely,

Jamie Church
jamie.church@pacelabs.com
314-838-7223
Project Manager

Enclosures

cc: Ryan Feldmann, Golder
Jeffrey Ingram, Golder Associates
Eric Schneider, Golder Associates

Pace Analytical Services, LLC
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(913)599-5665

CERTIFICATIONS

Project: AMEREN GW SAMPLING
Pace Project No.: 60291121

Kansas Certification IDs

9608 Loiret Boulevard, Lenexa, KS 66219
Missouri Certification Number: 10090
Arkansas Drinking Water
WY STR Certification #: 2456.01
Arkansas Certification #: 18-016-0
Arkansas Drinking Water
Illinois Certification #: 004455
Iowa Certification #: 118
Kansas/NELAP Certification #: E-10116 / E10426
Louisiana Certification #: 03055
Nevada Certification #: KS000212018-1
Oklahoma Certification #: 9205/9935
Texas Certification #: T104704407-18-11
Utah Certification #: KS000212018-8
Kansas Field Laboratory Accreditation: # E-92587
Missouri Certification: 10070
Missouri Certification Number: 10090

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

SAMPLE SUMMARY

Project: AMEREN GW SAMPLING
Pace Project No.: 60291121

Lab ID	Sample ID	Matrix	Date Collected	Date Received
60291121001	**L-TMW-2**	Water	01/03/19 12:10	01/04/19 03:25
60291121002	**L-TMW-1**	Water	01/03/19 13:00	01/04/19 03:25
60291121003	**L-LCLI-FB-1**	Water	01/03/19 13:00	01/04/19 03:25
60291121004	**L-LCLI-DUP-1**	Water	01/03/19 13:00	01/04/19 03:25

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SAMPLE ANALYTE COUNT

Project: AMEREN GW SAMPLING
Pace Project No.: 60291121

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
60291121001	**L-TMW-2**	EPA 300.0	MGS	1	PASI-K
60291121002	**L-TMW-1**	EPA 200.7	CTR	2	PASI-K
		SM 2540C	AJS	1	PASI-K
		EPA 300.0	MGS	3	PASI-K
60291121003	**L-LCLI-FB-1**	EPA 200.7	CTR	2	PASI-K
		SM 2540C	AJS	1	PASI-K
		EPA 300.0	MGS	3	PASI-K
60291121004	**L-LCLI-DUP-1**	EPA 200.7	CTR	2	PASI-K
		SM 2540C	AJS	1	PASI-K
		EPA 300.0	MGS	3	PASI-K

Pace Analytical Services, LLC
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Lenexa, KS 66219
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ANALYTICAL RESULTS

Project: AMEREN GW SAMPLING
Pace Project No.: 60291121

Sample: L-TMW-2 **Lab ID: 60291121001** Collected: 01/03/19 12:10 Received: 01/04/19 03:25 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Fluoride	**0.20J**	mg/L	0.20	0.19	1		01/08/19 22:09	16984-48-8	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
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ANALYTICAL RESULTS

Project: AMEREN GW SAMPLING
Pace Project No.: 60291121

Sample: L-TMW-1 **Lab ID: 60291121002** Collected: 01/03/19 13:00 Received: 01/04/19 03:25 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.7 Metals, Total	Analytical Method: EPA 200.7 Preparation Method: EPA 200.7								
Boron	**117**	ug/L	100	12.5	1	01/08/19 09:37	01/09/19 10:55	7440-42-8	
Calcium	**169000**	ug/L	200	53.5	1	01/08/19 09:37	01/09/19 10:55	7440-70-2	
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**670**	mg/L	5.0	5.0	1		01/08/19 08:39		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**3.6**	mg/L	1.0	0.29	1		01/08/19 22:25	16887-00-6	
Fluoride	**0.23**	mg/L	0.20	0.19	1		01/08/19 22:25	16984-48-8	
Sulfate	**98.6**	mg/L	10.0	2.4	10		01/09/19 12:26	14808-79-8	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

ANALYTICAL RESULTS

Project: AMEREN GW SAMPLING
Pace Project No.: 60291121

Sample: L-LCLI-FB-1 **Lab ID: 60291121003** Collected: 01/03/19 13:00 Received: 01/04/19 03:25 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.7 Metals, Total	Analytical Method: EPA 200.7 Preparation Method: EPA 200.7								
Boron	**<12.5**	ug/L	100	12.5	1	01/08/19 09:37	01/09/19 11:02	7440-42-8	
Calcium	**<53.5**	ug/L	200	53.5	1	01/08/19 09:37	01/09/19 11:02	7440-70-2	
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**6.0**	mg/L	5.0	5.0	1		01/08/19 08:39		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**<0.29**	mg/L	1.0	0.29	1		01/08/19 23:29	16887-00-6	
Fluoride	**<0.19**	mg/L	0.20	0.19	1		01/08/19 23:29	16984-48-8	
Sulfate	**<0.24**	mg/L	1.0	0.24	1		01/08/19 23:29	14808-79-8	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

ANALYTICAL RESULTS

Project: AMEREN GW SAMPLING
Pace Project No.: 60291121

Sample: L-LCLI-DUP-1 **Lab ID: 60291121004** Collected: 01/03/19 13:00 Received: 01/04/19 03:25 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.7 Metals, Total	Analytical Method: EPA 200.7 Preparation Method: EPA 200.7								
Boron	**107**	ug/L	100	12.5	1	01/08/19 09:37	01/09/19 11:04	7440-42-8	
Calcium	**169000**	ug/L	200	53.5	1	01/08/19 09:37	01/09/19 11:04	7440-70-2	
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**666**	mg/L	5.0	5.0	1		01/08/19 08:39		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**3.6**	mg/L	1.0	0.29	1		01/09/19 00:01	16887-00-6	
Fluoride	**0.21**	mg/L	0.20	0.19	1		01/09/19 00:01	16984-48-8	
Sulfate	**100**	mg/L	10.0	2.4	10		01/09/19 00:17	14808-79-8	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

QUALITY CONTROL DATA

Project: AMEREN GW SAMPLING
Pace Project No.: 60291121

QC Batch: 563580 Analysis Method: EPA 200.7
QC Batch Method: EPA 200.7 Analysis Description: 200.7 Metals, Total
Associated Lab Samples: 60291121002, 60291121003, 60291121004

METHOD BLANK: 2312313 Matrix: Water
Associated Lab Samples: 60291121002, 60291121003, 60291121004

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Boron	ug/L	<12.5	100	12.5	01/09/19 10:36	
Calcium	ug/L	<53.5	200	53.5	01/09/19 10:36	

LABORATORY CONTROL SAMPLE: 2312314

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Boron	ug/L	1000	1010	101	85-115	
Calcium	ug/L	10000	10400	104	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2312315 2312316

Parameter	Units	60291121002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Boron	ug/L	117	1000	1000	1150	1140	103	102	70-130	1	20	
Calcium	ug/L	169000	10000	10000	178000	180000	95	109	70-130	1	20	

MATRIX SPIKE SAMPLE: 2312351

Parameter	Units	60291119003 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Boron	ug/L	5890	1000	6950	106	70-130	
Calcium	ug/L	72200	10000	82800	106	70-130	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

QUALITY CONTROL DATA

Project: AMEREN GW SAMPLING
Pace Project No.: 60291121

QC Batch: 563588 Analysis Method: SM 2540C
QC Batch Method: SM 2540C Analysis Description: 2540C Total Dissolved Solids
Associated Lab Samples: 60291121002, 60291121003, 60291121004

METHOD BLANK: 2312355 Matrix: Water
Associated Lab Samples: 60291121002, 60291121003, 60291121004

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	<5.0	5.0	5.0	01/08/19 08:39	

LABORATORY CONTROL SAMPLE: 2312356

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Dissolved Solids	mg/L	1000	1000	100	80-120	

SAMPLE DUPLICATE: 2312358

Parameter	Units	60291119003 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	531	528	1	10	

SAMPLE DUPLICATE: 2312359

Parameter	Units	60291121002 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	670	669	0	10	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

QUALITY CONTROL DATA

Project: AMEREN GW SAMPLING
Pace Project No.: 60291121

QC Batch: 563695 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 60291121001, 60291121002, 60291121003, 60291121004

METHOD BLANK: 2312684 Matrix: Water
Associated Lab Samples: 60291121001, 60291121002, 60291121003, 60291121004

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Chloride	mg/L	<0.29	1.0	0.29	01/08/19 17:20	
Fluoride	mg/L	<0.19	0.20	0.19	01/08/19 17:20	
Sulfate	mg/L	<0.24	1.0	0.24	01/08/19 17:20	

LABORATORY CONTROL SAMPLE: 2312685

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	5	4.6	92	90-110	
Fluoride	mg/L	2.5	2.5	100	90-110	
Sulfate	mg/L	5	4.9	98	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2312686 2312687

Parameter	Units	60291119003 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	19.0	5	5	24.4	25.0	109	119	90-110	2	15	E,M1, R1
Fluoride	mg/L	<0.19	2.5	2.5	2.6	2.7	97	102	90-110	5	15	
Sulfate	mg/L	278	100	100	382	386	104	109	90-110	1	15	

MATRIX SPIKE SAMPLE: 2312688

Parameter	Units	60291121002 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	3.6	5	8.9	106	90-110	
Fluoride	mg/L	0.23	2.5	2.9	105	90-110	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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Lenexa, KS 66219
(913)599-5665

QUALITY CONTROL DATA

Project: AMEREN GW SAMPLING
Pace Project No.: 60291121

QC Batch: 563846 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 60291121002

METHOD BLANK: 2313290 Matrix: Water
Associated Lab Samples: 60291121002

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Sulfate	mg/L	<0.24	1.0	0.24	01/09/19 11:19	

LABORATORY CONTROL SAMPLE: 2313291

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Sulfate	mg/L	5	4.8	97	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2313292 2313293

Parameter	Units	60291121002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Sulfate	mg/L	98.6	50	50	152	152	108	107	90-110	0	15	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALIFIERS

Project: AMEREN GW SAMPLING
Pace Project No.: 60291121

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

LABORATORIES

PASI-K	Pace Analytical Services - Kansas City

ANALYTE QUALIFIERS

E	Analyte concentration exceeded the calibration range. The reported result is estimated.
M1	Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.
R1	RPD value was outside control limits.

Pace Analytical Services, LLC
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Lenexa, KS 66219
(913)599-5665

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: AMEREN GW SAMPLING
Pace Project No.: 60291121

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
60291121002	**L-TMW-1**	EPA 200.7	563580	EPA 200.7	563633
60291121003	**L-LCLI-FB-1**	EPA 200.7	563580	EPA 200.7	563633
60291121004	**L-LCLI-DUP-1**	EPA 200.7	563580	EPA 200.7	563633
60291121002	**L-TMW-1**	SM 2540C	563588		
60291121003	**L-LCLI-FB-1**	SM 2540C	563588		
60291121004	**L-LCLI-DUP-1**	SM 2540C	563588		
60291121001	**L-TMW-2**	EPA 300.0	563695		
60291121002	**L-TMW-1**	EPA 300.0	563695		
60291121002	**L-TMW-1**	EPA 300.0	563846		
60291121003	**L-LCLI-FB-1**	EPA 300.0	563695		
60291121004	**L-LCLI-DUP-1**	EPA 300.0	563695		

Pace Analytical
www.pacelabs.com

Sample Condition Upon Receipt

Janie

WO# : 60291121

60291121

Client Name: Golder Associates

Courier: FedEx ☐ UPS ☐ VIA ☐ Clay ☐ PEX ☐ ECI ☐ Pace ☐ Xroads ☑ Client ☐ Other ☐

Tracking #: _____ Pace Shipping Label Used? Yes ☐ No ☑

Custody Seal on Cooler/Box Present: Yes ☑ No ☐ Seals intact: Yes ☑ No ☐

Packing Material: Bubble Wrap ☐ Bubble Bags ☑ Foam ☐ None ☐ Other ☐

Thermometer Used: T-301 **Type of Ice:** Wet Blue None

Cooler Temperature (°C): As-read 0.5 Corr. Factor 0.0 Corrected 0.5

Date and initials of person examining contents: AK 1/4/19

Temperature should be above freezing to 6°C

Chain of Custody present:	☑Yes ☐No ☐N/A	
Chain of Custody relinquished:	☑Yes ☐No ☐N/A	
Samples arrived within holding time:	☑Yes ☐No ☐N/A	
Short Hold Time analyses (<72hr):	☐Yes ☑No ☐N/A	
Rush Turn Around Time requested:	☐Yes ☑No ☐N/A	
Sufficient volume:	☑Yes ☐No ☐N/A	
Correct containers used:	☑Yes ☐No ☐N/A	
Pace containers used:	☑Yes ☐No ☐N/A	
Containers intact:	☑Yes ☐No ☐N/A	
Unpreserved 5035A / TX1005/1006 soils frozen in 48hrs?	☐Yes ☐No ☑N/A	
Filtered volume received for dissolved tests?	☐Yes ☑No ☐N/A	
Sample labels match COC: Date / time / ID / analyses	☑Yes ☑No ☐N/A	Got dup sample L-Dup-1 (BP2U, BP3N). It doesn't read L-LCL1 like the previous sample.
Samples contain multiple phases? Matrix: WT	☐Yes ☑No ☐N/A	
Containers requiring pH preservation in compliance? (HNO_3, H_2SO_4, HCl<2; NaOH>9 Sulfide, NaOH>10 Cyanide) (Exceptions: VOA, Micro, O&G, KS TPH, OK-DRO)	☑Yes ☐No ☐N/A	List sample IDs, volumes, lot #'s of preservative and the date/time added.
Cyanide water sample checks: Lead acetate strip turns dark? (Record only)	☐Yes ☑No	Dup is L-LCL1-Dup-1
Potassium iodide test strip turns blue/purple? (Preserve)	☐Yes ☑No	
Trip Blank present:	☐Yes ☐No ☑N/A	
Headspace in VOA vials (>6mm):	☐Yes ☐No ☑N/A	
Samples from USDA Regulated Area: State:	☐Yes ☐No ☑N/A	
Additional labels attached to 5035A / TX1005 vials in the field?	☐Yes ☐No ☑N/A	

Client Notification/ Resolution: Copy COC to Client? Y / N Field Data Required? Y / N

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Jann Chunk 1/7/19

Project Manager Review: _____ Date:

Pace Analytical
www.pacelabs.com

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Page: | of

Section A Required Client Information:

Company:	Golder Associates
Address:	820 South Main Street, Suite 100
	St Charles, MO 63301
Email To:	maddock@golder.com
Phone: 636-724-9191	Fax: 636-724-9323
Requested Due Date/TAT:	Standard

Section B Required Project Information:

Report To:	Mark Haddock (mhaddock@golder.com)
Copy To:	Jeffrey Ingram
Purchase Order No.:	
Project Name:	Ameren GW Sampling
Project Number:	1531406.0001 LCL1 Cell

Section C Invoice Information:

Attention:	
Company Name:	
Address:	
Pace Quote Reference:	
Pace Project Manager:	Jamie Church
Pace Profile #:	9285

REGULATORY AGENCY

☐ NPDES ☑ GROUND WATER ☐ DRINKING WATER
☐ UST ☐ RCRA ☐ OTHER _____

Site Location STATE: MO

Section D Required Client Information

Valid Matrix Codes

MATRIX	CODE
DRINKING WATER	DW
WATER	WT
WASTE WATER	WW
PRODUCT	P
SOIL/SOLID	SL
OIL	OL
	WP
	AR
	OT
	TS

SAMPLE ID
(A-Z, 0-9 / ,-)
Sample IDs MUST BE UNIQUE

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED COMPOSITE START DATE	COMPOSITE START TIME	COMPOSITE END/GRAB DATE	COMPOSITE END/GRAB TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test Y/N	Boron	Calcium	Chloride	Fluoride	Sulfate	TDS	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
																		Y/N	N	N	N	N	N	N		
1	L-TMW-2	WT	G			1/3/19	1210		2	1		1										✓				60291121
2	L-TMW-1	WT	G				1306		6	3		3							✓	✓	✓	✓	✓	✓		002
3	L-ELCL1-FB-1	WT	G				1300		2	1		1							↓	↓	↓	↓	↓	↓		003
4	L-DUP-1	WT	G				—		2	1		1							↓	↓	↓	↓	↓	↓		004
5		WT	G																							
6		WT	G																							
7		WT	G																							
8		WT	G																							
9		WT	G																							
10		WT	G																							
11		WT	G																							
12		WT	G																							

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
							Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)
	[signature] / Golder	1/3/19	1710	E Brockett / Pace	1/4/19	0325	0.5	Y	Y	Y

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Eric Schneider

SIGNATURE of SAMPLER: [signature] DATE Signed (MM/DD/YY): 01/03/19

*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.

F-ALL-Q-020rev.08, 12-Oct-2007

MEMORANDUM

DATE January 10, 2019 **Project No.** 1531406

TO Project File
Golder Associates

CC

FROM Tommy Goodwin **EMAIL tgoodwin@golder.com**

DATA VALIDATION SUMMARY: AMEREN – LABADIE ENERGY CENTER – VERIFICATION SAMPLING – DATA PACKAGE 60291121

The following is a summary of instances where quality control criteria in the functional guidelines were not met and data qualification was required:

- When analytes exceeded the recovery criteria for MS/MSD of a sample, the sample result was not qualified on MS/MSD data alone.
- When a compound was detected in a sample result between the MDL and the PQL the results were recorded at the detection value and qualified as estimates (J).

Golder Associates Inc.
13515 Barrett Parkway Drive, Suite 260,
Ballwin, Missouri, USA 63021

T: +1 314 984-8800 F: +1 314 984-8770

QA LEVEL II - INORGANIC DATA EVALUATION CHECKLIST

Company Name: Golder Associates
Project Name: Ameren - LEC - VS - Jan 19 - LCL1
Reviewer: T Goodwin

Project Manager: J Ingram
Project Number: 1531406
Validation Date: 1/10/19

Laboratory: Pace Analytical (12) (12) (12) SDG #: 60291121 (12)
Analytical Method (type and no.): Metals (200.7&200.8), Hg (7470), Alk (SM 2320B), TDS (SM 2540C), Fe (SM 3500-Fe B#4), Anions (300.0), P (365.4), Ra (903.1&904.0) (12)
Matrix: ☐ Air ☐ Soil/Sed. ☒ Water ☐ Waste ☐ _____
Sample Names L-TMW-2, L-TMW-1, L-LCL1-FB-1, L-LCL1-DUP-1

NOTE: Please provide calculation in Comment areas or on the back (if on the back please indicate in comment areas).

Field Information	YES	NO	NA	COMMENTS
a) Sampling dates noted?	☒	☐	☐	1/3/19
b) Sampling team indicated?	☒	☐	☐	
c) Sample location noted?	☒	☐	☐	
d) Sample depth indicated (Soils)?	☐	☐	☒	
e) Sample type indicated (grab/composite)?	☒	☐	☐	Grab
f) Field QC noted?	☒	☐	☐	
g) Field parameters collected (note types)?	☒	☐	☐	pH, Cond, Turb, Temp, DO, ORP, Q, DTW
h) Field Calibration within control limits?	☒	☐	☐	
i) Notations of unacceptable field conditions/performances from field logs or field notes?	☐	☒	☐	
j) Does the laboratory narrative indicate deficiencies?	☐	☐	☒	

Note Deficiencies: _____

Chain-of-Custody (COC)	YES	NO	NA	COMMENTS
a) Was the COC properly completed?	☒	☐	☐	
b) Was the COC signed by both field and laboratory personnel?	☒	☐	☐	
c) Were samples received in good condition?	☒	☐	☐	

General (reference QAPP or Method)	YES	NO	NA	COMMENTS
a) Were hold times met for sample pretreatment?	☐	☐	☒	
b) Were hold times met for sample analysis?	☒	☐	☐	
c) Were the correct preservatives used?	☒	☐	☐	
d) Was the correct method used?	☒	☐	☐	
e) Were appropriate reporting limits achieved?	☒	☐	☐	
f) Were any sample dilutions noted?	☒	☐	☐	
g) Were any matrix problems noted?	☒	☐	☐	

QA LEVEL II - INORGANIC DATA EVALUATION CHECKLIST

Blanks	**YES**	**NO**	**NA**	**COMMENTS**
a) Were analytes detected in the method blank(s)?	☐	☑	☐	
b) Were analytes detected in the field blank(s)?	☑	☐	☐	FB-1: TDS (6.0)
c) Were analytes detected in the equipment blank(s)?	☐	☐	☒	
d) Were analytes detected in the trip blank(s)?	☐	☐	☒	

Laboratory Control Sample (LCS)	**YES**	**NO**	**NA**	**COMMENTS**
a) Was a LCS analyzed once per SDG?	☒	☐	☐	
b) Were the proper analytes included in the LCS?	☒	☐	☐	
c) Was the LCS accuracy criteria met?	☑	☐	☐	

Duplicates	**YES**	**NO**	**NA**	**COMMENTS**
a) Were field duplicates collected (note original and duplicate sample names)?				Dup-1@ TMW-1
	☑	☐	☐	FB-1@ TMW-1
b) Were field dup. precision criteria met (note RPD)?	☑	☐	☐	
c) Were lab duplicates analyzed (note original and duplicate samples)?				
	☒	☐	☐	
d) Were lab dup. precision criteria met (note RPD)?	☑	☐	☐	

Blind Standards	**YES**	**NO**	**NA**	**COMMENTS**
a) Was a blind standard used (indicate name, analytes included and concentrations)?	☐	☐	☒	
b) Was the %D within control limits?	☐	☐	☒	

Matrix Spike/Matrix Spike Duplicate (MS/MSD)	**YES**	**NO**	**NA**	**COMMENTS**
a) Was MS accuracy criteria met?	☑	☐	☐	
Recovery could not be calculated since sample contained high concentration of analyte?	☐	☐	☒	
b) Was MSD accuracy criteria met?	☐	☑	☐	Cl⁻
Recovery could not be calculated since sample contained high concentration of analyte?	☐	☐	☒	
c) Were MS/MSD precision criteria met?	☑	☐	☐	

Comments/Notes:

QA LEVEL II - INORGANIC DATA EVALUATION CHECKLIST

Data Qualification:

Sample Name	Constituent(s)	Result	Qualifier	Reason
None				

Signature: Tommy J. Goodrich Date: 1/10/19

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

August 15, 2019

Jeffrey Ingram
Golder Associates
13515 Barrett Parkway Drive
Suite 260
Ballwin, MO 63021

RE: Project: AMEREN LABADIE ENERGY CTR
Pace Project No.: 60301804

Dear Jeffrey Ingram:
Enclosed are the analytical results for sample(s) received by the laboratory between May 02, 2019 and May 10, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

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

Sincerely,

Jamie Church
jamie.church@pacelabs.com
314-838-7223
Project Manager

Enclosures

cc: Ryan Feldmann, Golder
Mark Haddock, Golder Associates
Eric Schneider, Golder Associates

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

CERTIFICATIONS

Project: AMEREN LABADIE ENERGY CTR
Pace Project No.: 60301804

Kansas Certification IDs

9608 Loiret Boulevard, Lenexa, KS 66219
Missouri Inorganic Drinking Water Certification #: 10090
Arkansas Drinking Water
Arkansas Certification #: 19-016-0
Arkansas Drinking Water
Illinois Certification #: 004455
Iowa Certification #: 118
Kansas/NELAP Certification #: E-10116
Louisiana Certification #: 03055
Nevada Certification #: KS000212018-1
Oklahoma Certification #: 9205/9935
Florida: Cert E871149 SEKS WET
Texas Certification #: T104704407-18-11
Utah Certification #: KS000212018-8
Illinois Certification #: 004592
Kansas Field Laboratory Accreditation: # E-92587
Missouri SEKS Micro Certification: 10070

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

SAMPLE SUMMARY

Project: AMEREN LABADIE ENERGY CTR
Pace Project No.: 60301804

Lab ID	Sample ID	Matrix	Date Collected	Date Received
60301804001	**L-TMW-1**	Water	05/02/19 13:55	05/04/19 04:35
60301804002	**L-TMW-2**	Water	05/02/19 12:10	05/04/19 04:35
60301804003	**L-UWL-DUP-1**	Water	05/02/19 12:10	05/04/19 04:35
60302536001	**L-TMW-3**	Water	05/08/19 12:00	05/10/19 03:45
60302536002	**L-MW-26**	Water	05/08/19 10:50	05/10/19 03:45
60302536003	**L-UWL-FB-1**	Water	05/08/19 10:55	05/10/19 03:45
60301568004	**L-BMW-1S**	Water	05/01/19 11:35	05/02/19 04:13
60301568005	**L-BMW-2S**	Water	05/01/19 10:50	05/02/19 04:13

Pace Analytical Services, LLC
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SAMPLE ANALYTE COUNT

Project: AMEREN LABADIE ENERGY CTR
Pace Project No.: 60301804

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
60301804001	**L-TMW-1**	EPA 200.7	HKC	7	PASI-K
		SM 2320B	AJS2	1	PASI-K
		SM 2540C	ZMH	1	PASI-K
		EPA 300.0	MGS	3	PASI-K
60301804002	**L-TMW-2**	EPA 200.7	HKC	7	PASI-K
		SM 2320B	AJS2	1	PASI-K
		SM 2540C	ZMH	1	PASI-K
		EPA 300.0	MGS	3	PASI-K
60301804003	**L-UWL-DUP-1**	EPA 200.7	HKC	7	PASI-K
		SM 2320B	AJS2	1	PASI-K
		SM 2540C	ZMH	1	PASI-K
		EPA 300.0	MGS	3	PASI-K
60302536001	**L-TMW-3**	EPA 200.7	EMR	7	PASI-K
		SM 2320B	AJS2	1	PASI-K
		SM 2540C	LDF	1	PASI-K
		EPA 300.0	MGS	3	PASI-K
60302536002	**L-MW-26**	EPA 200.7	EMR	7	PASI-K
		SM 2320B	AJS2	1	PASI-K
		SM 2540C	LDF	1	PASI-K
		EPA 300.0	MGS	3	PASI-K
60302536003	**L-UWL-FB-1**	EPA 200.7	EMR	7	PASI-K
		SM 2320B	AJS2	1	PASI-K
		SM 2540C	LDF	1	PASI-K
		EPA 300.0	MGS	3	PASI-K
60301568004	**L-BMW-1S**	EPA 200.7	EMR	7	PASI-K
		SM 2320B	LDB	1	PASI-K
		SM 2540C	ZMH	1	PASI-K
		EPA 300.0	JDS	3	PASI-K
60301568005	**L-BMW-2S**	EPA 200.7	EMR	7	PASI-K
		SM 2320B	LDB	1	PASI-K
		SM 2540C	ZMH	1	PASI-K
		EPA 300.0	JDS	3	PASI-K

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

ANALYTICAL RESULTS

Project: AMEREN LABADIE ENERGY CTR
Pace Project No.: 60301804

Sample: L-TMW-1 **Lab ID: 60301804001** Collected: 05/02/19 13:55 Received: 05/04/19 04:35 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.7 Metals, Total	Analytical Method: EPA 200.7 Preparation Method: EPA 200.7								
Boron	**109**	ug/L	100	10.7	1	05/15/19 08:55	05/16/19 11:43	7440-42-8	
Calcium	**164000**	ug/L	200	50.0	1	05/15/19 08:55	05/16/19 11:43	7440-70-2	M1
Iron	**286**	ug/L	50.0	14.0	1	05/15/19 08:55	05/16/19 11:43	7439-89-6	
Magnesium	**44200**	ug/L	50.0	13.0	1	05/15/19 08:55	05/16/19 11:43	7439-95-4	
Manganese	**4600**	ug/L	5.0	2.1	1	05/15/19 08:55	05/16/19 11:43	7439-96-5	
Potassium	**5510**	ug/L	500	79.0	1	05/15/19 08:55	05/16/19 11:43	7440-09-7	
Sodium	**11200**	ug/L	500	144	1	05/15/19 08:55	05/16/19 11:43	7440-23-5	
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**543**	mg/L	20.0	6.5	1		05/16/19 11:02		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**664**	mg/L	10.0	10.0	1		05/09/19 14:02		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**3.7**	mg/L	1.0	0.22	1		05/16/19 21:37	16887-00-6	B
Fluoride	**0.24**	mg/L	0.20	0.085	1		05/16/19 21:37	16984-48-8	
Sulfate	**98.6**	mg/L	5.0	1.2	5		05/16/19 23:52	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: AMEREN LABADIE ENERGY CTR
Pace Project No.: 60301804

Sample: L-TMW-2 **Lab ID: 60301804002** Collected: 05/02/19 12:10 Received: 05/04/19 04:35 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.7 Metals, Total	Analytical Method: EPA 200.7 Preparation Method: EPA 200.7								
Boron	**98.5J**	ug/L	100	10.7	1	05/15/19 08:55	05/15/19 17:38	7440-42-8	
Calcium	**176000**	ug/L	200	50.0	1	05/15/19 08:55	05/15/19 17:38	7440-70-2	
Iron	**1120**	ug/L	50.0	14.0	1	05/15/19 08:55	05/15/19 17:38	7439-89-6	
Magnesium	**41600**	ug/L	50.0	13.0	1	05/15/19 08:55	05/15/19 17:38	7439-95-4	
Manganese	**2710**	ug/L	5.0	2.1	1	05/15/19 08:55	05/15/19 17:38	7439-96-5	
Potassium	**6540**	ug/L	500	79.0	1	05/15/19 08:55	05/15/19 17:38	7440-09-7	
Sodium	**9660**	ug/L	500	144	1	05/15/19 08:55	05/15/19 17:38	7440-23-5	
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**576**	mg/L	20.0	6.5	1		05/16/19 11:15		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**676**	mg/L	10.0	10.0	1		05/09/19 14:02		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**5.3**	mg/L	1.0	0.22	1		05/17/19 00:42	16887-00-6	
Fluoride	**0.24**	mg/L	0.20	0.085	1		05/17/19 00:42	16984-48-8	
Sulfate	**86.4**	mg/L	10.0	2.3	10		05/17/19 01:16	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: AMEREN LABADIE ENERGY CTR
Pace Project No.: 60301804

Sample: L-UWL-DUP-1 **Lab ID: 60301804003** Collected: 05/02/19 12:10 Received: 05/04/19 04:35 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.7 Metals, Total	Analytical Method: EPA 200.7 Preparation Method: EPA 200.7								
Boron	**97.6J**	ug/L	100	10.7	1	05/15/19 08:55	05/15/19 17:40	7440-42-8	
Calcium	**179000**	ug/L	200	50.0	1	05/15/19 08:55	05/15/19 17:40	7440-70-2	
Iron	**1040**	ug/L	50.0	14.0	1	05/15/19 08:55	05/15/19 17:40	7439-89-6	
Magnesium	**42700**	ug/L	50.0	13.0	1	05/15/19 08:55	05/15/19 17:40	7439-95-4	
Manganese	**2740**	ug/L	5.0	2.1	1	05/15/19 08:55	05/15/19 17:40	7439-96-5	
Potassium	**6600**	ug/L	500	79.0	1	05/15/19 08:55	05/15/19 17:40	7440-09-7	
Sodium	**9780**	ug/L	500	144	1	05/15/19 08:55	05/15/19 17:40	7440-23-5	
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**577**	mg/L	20.0	6.5	1		05/16/19 11:21		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**681**	mg/L	10.0	10.0	1		05/09/19 14:03		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**5.3**	mg/L	1.0	0.22	1		05/17/19 01:33	16887-00-6	
Fluoride	**0.24**	mg/L	0.20	0.085	1		05/17/19 01:33	16984-48-8	
Sulfate	**89.9**	mg/L	5.0	1.2	5		05/17/19 02:40	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: AMEREN LABADIE ENERGY CTR
Pace Project No.: 60301804

Sample: L-TMW-3 **Lab ID: 60302536001** Collected: 05/08/19 12:00 Received: 05/10/19 03:45 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.7 Metals, Total	Analytical Method: EPA 200.7 Preparation Method: EPA 200.7								
Boron	**114**	ug/L	100	10.7	1	05/20/19 14:55	05/21/19 12:09	7440-42-8	
Calcium	**170000**	ug/L	200	50.0	1	05/20/19 14:55	05/21/19 12:09	7440-70-2	
Iron	**321**	ug/L	50.0	14.0	1	05/20/19 14:55	05/21/19 12:09	7439-89-6	
Magnesium	**47000**	ug/L	50.0	13.0	1	05/20/19 14:55	05/21/19 12:09	7439-95-4	
Manganese	**5020**	ug/L	5.0	2.1	1	05/20/19 14:55	05/21/19 12:09	7439-96-5	
Potassium	**5720**	ug/L	500	79.0	1	05/20/19 14:55	05/21/19 12:09	7440-09-7	
Sodium	**11500**	ug/L	500	144	1	05/20/19 14:55	05/21/19 12:09	7440-23-5	
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**580**	mg/L	20.0	6.5	1		05/17/19 13:01		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**733**	mg/L	10.0	10.0	1		05/15/19 16:12		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**6.2**	mg/L	1.0	0.22	1		05/23/19 21:31	16887-00-6	
Fluoride	**0.19J**	mg/L	0.20	0.085	1		05/23/19 21:31	16984-48-8	
Sulfate	**48.9**	mg/L	5.0	1.2	5		05/23/19 21:48	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: AMEREN LABADIE ENERGY CTR
Pace Project No.: 60301804

Sample: L-MW-26 **Lab ID: 60302536002** Collected: 05/08/19 10:50 Received: 05/10/19 03:45 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.7 Metals, Total	Analytical Method: EPA 200.7 Preparation Method: EPA 200.7								
Boron	**98.2J**	ug/L	100	10.7	1	05/20/19 14:55	05/21/19 12:11	7440-42-8	
Calcium	**182000**	ug/L	200	50.0	1	05/20/19 14:55	05/21/19 12:11	7440-70-2	
Iron	**1200**	ug/L	50.0	14.0	1	05/20/19 14:55	05/21/19 12:11	7439-89-6	
Magnesium	**43500**	ug/L	50.0	13.0	1	05/20/19 14:55	05/21/19 12:11	7439-95-4	
Manganese	**2870**	ug/L	5.0	2.1	1	05/20/19 14:55	05/21/19 12:11	7439-96-5	
Potassium	**6540**	ug/L	500	79.0	1	05/20/19 14:55	05/21/19 12:11	7440-09-7	
Sodium	**9650**	ug/L	500	144	1	05/20/19 14:55	05/21/19 12:11	7440-23-5	
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**432**	mg/L	20.0	6.5	1		05/17/19 13:06		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**516**	mg/L	10.0	10.0	1		05/15/19 16:13		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**3.3**	mg/L	1.0	0.22	1		05/23/19 22:05	16887-00-6	
Fluoride	**0.20**	mg/L	0.20	0.085	1		05/23/19 22:05	16984-48-8	
Sulfate	**19.3**	mg/L	2.0	0.46	2		05/23/19 22:55	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: AMEREN LABADIE ENERGY CTR
Pace Project No.: 60301804

Sample: L-UWL-FB-1 **Lab ID: 60302536003** Collected: 05/08/19 10:55 Received: 05/10/19 03:45 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.7 Metals, Total	Analytical Method: EPA 200.7 Preparation Method: EPA 200.7								
Boron	**95.0J**	ug/L	100	10.7	1	05/20/19 14:55	05/21/19 12:14	7440-42-8	
Calcium	**181000**	ug/L	200	50.0	1	05/20/19 14:55	05/21/19 12:14	7440-70-2	
Iron	**1110**	ug/L	50.0	14.0	1	05/20/19 14:55	05/21/19 12:14	7439-89-6	
Magnesium	**44000**	ug/L	50.0	13.0	1	05/20/19 14:55	05/21/19 12:14	7439-95-4	
Manganese	**2850**	ug/L	5.0	2.1	1	05/20/19 14:55	05/21/19 12:14	7439-96-5	
Potassium	**6610**	ug/L	500	79.0	1	05/20/19 14:55	05/21/19 12:14	7440-09-7	
Sodium	**9600**	ug/L	500	144	1	05/20/19 14:55	05/21/19 12:14	7440-23-5	
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**<6.5**	mg/L	20.0	6.5	1		05/17/19 13:10		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**<5.0**	mg/L	5.0	5.0	1		05/15/19 16:13		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**0.45J**	mg/L	1.0	0.22	1		05/23/19 23:12	16887-00-6	
Fluoride	**<0.085**	mg/L	0.20	0.085	1		05/23/19 23:12	16984-48-8	
Sulfate	**<0.23**	mg/L	1.0	0.23	1		05/23/19 23:12	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: AMEREN LABADIE ENERGY CTR
Pace Project No.: 60301804

Sample: L-BMW-1S **Lab ID: 60301568004** Collected: 05/01/19 11:35 Received: 05/02/19 04:13 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.7 Metals, Total	Analytical Method: EPA 200.7 Preparation Method: EPA 200.7								
Boron	**111**	ug/L	100	10.7	1	05/10/19 15:30	05/13/19 12:54	7440-42-8	
Calcium	**196000**	ug/L	200	50.0	1	05/10/19 15:30	05/13/19 12:54	7440-70-2	
Iron	**30000**	ug/L	50.0	14.0	1	05/10/19 15:30	05/13/19 12:54	7439-89-6	
Magnesium	**47000**	ug/L	50.0	13.0	1	05/10/19 15:30	05/13/19 12:54	7439-95-4	
Manganese	**2810**	ug/L	5.0	2.1	1	05/10/19 15:30	05/13/19 12:54	7439-96-5	
Potassium	**5760**	ug/L	500	79.0	1	05/10/19 15:30	05/13/19 12:54	7440-09-7	
Sodium	**19100**	ug/L	500	144	1	05/10/19 15:30	05/13/19 12:54	7440-23-5	
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**694**	mg/L	20.0	6.5	1		05/13/19 13:35		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**740**	mg/L	10.0	10.0	1		05/07/19 11:31		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**4.4**	mg/L	1.0	0.22	1		05/15/19 17:53	16887-00-6	
Fluoride	**0.22**	mg/L	0.20	0.085	1		05/15/19 17:53	16984-48-8	
Sulfate	**39.2**	mg/L	5.0	1.2	5		05/15/19 18:10	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: AMEREN LABADIE ENERGY CTR
Pace Project No.: 60301804

Sample: L-BMW-2S **Lab ID: 60301568005** Collected: 05/01/19 10:50 Received: 05/02/19 04:13 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.7 Metals, Total	Analytical Method: EPA 200.7 Preparation Method: EPA 200.7								
Boron	**61.3J**	ug/L	100	10.7	1	05/10/19 15:30	05/13/19 12:57	7440-42-8	
Calcium	**126000**	ug/L	200	50.0	1	05/10/19 15:30	05/13/19 12:57	7440-70-2	
Iron	**21.5J**	ug/L	50.0	14.0	1	05/10/19 15:30	05/13/19 12:57	7439-89-6	
Magnesium	**20900**	ug/L	50.0	13.0	1	05/10/19 15:30	05/13/19 12:57	7439-95-4	
Manganese	**<2.1**	ug/L	5.0	2.1	1	05/10/19 15:30	05/13/19 12:57	7439-96-5	
Potassium	**6860**	ug/L	500	79.0	1	05/10/19 15:30	05/13/19 12:57	7440-09-7	
Sodium	**9440**	ug/L	500	144	1	05/10/19 15:30	05/13/19 12:57	7440-23-5	
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**392**	mg/L	20.0	6.5	1		05/13/19 13:40		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**459**	mg/L	10.0	10.0	1		05/07/19 11:31		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**1.4**	mg/L	1.0	0.22	1		05/15/19 18:27	16887-00-6	
Fluoride	**0.21**	mg/L	0.20	0.085	1		05/15/19 18:27	16984-48-8	
Sulfate	**29.4**	mg/L	5.0	1.2	5		05/15/19 18:43	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: AMEREN LABADIE ENERGY CTR
Pace Project No.: 60301804

QC Batch: 583885 Analysis Method: EPA 200.7
QC Batch Method: EPA 200.7 Analysis Description: 200.7 Metals, Total
Associated Lab Samples: 60301568004, 60301568005

METHOD BLANK: 2395795 Matrix: Water
Associated Lab Samples: 60301568004, 60301568005

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Boron	ug/L	<10.7	100	10.7	05/13/19 12:26	
Calcium	ug/L	<50.0	200	50.0	05/13/19 12:26	
Iron	ug/L	<14.0	50.0	14.0	05/13/19 12:26	
Magnesium	ug/L	<13.0	50.0	13.0	05/13/19 12:26	
Manganese	ug/L	<2.1	5.0	2.1	05/13/19 12:26	
Potassium	ug/L	<79.0	500	79.0	05/13/19 12:26	
Sodium	ug/L	146J	500	144	05/13/19 12:26	

LABORATORY CONTROL SAMPLE: 2395796

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Boron	ug/L	1000	970	97	85-115	
Calcium	ug/L	10000	10000	100	85-115	
Iron	ug/L	10000	10000	100	85-115	
Magnesium	ug/L	10000	10100	101	85-115	
Manganese	ug/L	1000	1000	100	85-115	
Potassium	ug/L	10000	9680	97	85-115	
Sodium	ug/L	10000	10100	101	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2395797 2395798

Parameter	Units	60301568001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Boron	ug/L		1000	1000	9770	9690	93	85	70-130	1	20	
Calcium	ug/L		10000	10000	272000	271000	113	97	70-130	1	20	
Iron	ug/L		10000	10000	27200	27100	99	98	70-130	0	20	
Magnesium	ug/L		10000	10000	57900	57700	101	99	70-130	0	20	
Manganese	ug/L		1000	1000	3800	3780	96	94	70-130	1	20	
Potassium	ug/L		10000	10000	16800	16700	102	101	70-130	0	20	
Sodium	ug/L		10000	10000	34500	34200	102	99	70-130	1	20	

MATRIX SPIKE SAMPLE: 2395799

Parameter	Units	60301646001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Boron	ug/L	163	1000	1120	96	70-130	
Calcium	ug/L	63400	10000	72400	90	70-130	
Iron	ug/L	325	10000	10000	97	70-130	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: AMEREN LABADIE ENERGY CTR
Pace Project No.: 60301804

MATRIX SPIKE SAMPLE: 2395799

Parameter	Units	60301646001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Magnesium	ug/L	9420	10000	18700	92	70-130	
Manganese	ug/L	679	1000	1630	95	70-130	
Potassium	ug/L	302000	10000	309000	67	70-130	M1
Sodium	ug/L	279000	10000	286000	77	70-130	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: AMEREN LABADIE ENERGY CTR
Pace Project No.: 60301804

QC Batch: 584623 Analysis Method: EPA 200.7
QC Batch Method: EPA 200.7 Analysis Description: 200.7 Metals, Total
Associated Lab Samples: 60301804001, 60301804002, 60301804003

METHOD BLANK: 2398909 Matrix: Water
Associated Lab Samples: 60301804001, 60301804002, 60301804003

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Boron	ug/L	<10.7	100	10.7	05/16/19 11:33	
Calcium	ug/L	<50.0	200	50.0	05/16/19 11:33	
Iron	ug/L	<14.0	50.0	14.0	05/16/19 11:33	
Magnesium	ug/L	15.8J	50.0	13.0	05/16/19 11:33	
Manganese	ug/L	<2.1	5.0	2.1	05/16/19 11:33	
Potassium	ug/L	<79.0	500	79.0	05/16/19 11:33	
Sodium	ug/L	<144	500	144	05/16/19 11:33	

LABORATORY CONTROL SAMPLE: 2398910

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Boron	ug/L	1000	974	97	85-115	
Calcium	ug/L	10000	9980	100	85-115	
Iron	ug/L	10000	9790	98	85-115	
Magnesium	ug/L	10000	9900	99	85-115	
Manganese	ug/L	1000	980	98	85-115	
Potassium	ug/L	10000	9900	99	85-115	
Sodium	ug/L	10000	10100	101	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2398911 2398912

Parameter	Units	60301804001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Boron	ug/L	109	1000	1000	1120	1120	101	101	70-130	0	20	
Calcium	ug/L	164000	10000	10000	178000	177000	140	134	70-130	0	20	M1
Iron	ug/L	286	10000	10000	10200	10100	99	98	70-130	1	20	
Magnesium	ug/L	44200	10000	10000	55200	55100	110	108	70-130	0	20	
Manganese	ug/L	4600	1000	1000	5710	5680	112	108	70-130	1	20	
Potassium	ug/L	5510	10000	10000	15800	15700	103	102	70-130	1	20	
Sodium	ug/L	11200	10000	10000	21700	21700	105	104	70-130	0	20	

MATRIX SPIKE SAMPLE: 2398913

Parameter	Units	60301923002 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Boron	ug/L	ND	1000	1010	96	70-130	
Calcium	ug/L	26300	10000	34600	83	70-130	
Iron	ug/L	150	10000	9420	93	70-130	

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REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
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(913)599-5665

QUALITY CONTROL DATA

Project: AMEREN LABADIE ENERGY CTR
Pace Project No.: 60301804

MATRIX SPIKE SAMPLE: 2398913

Parameter	Units	60301923002 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Magnesium	ug/L	7480	10000	16700	92	70-130	
Manganese	ug/L	13.1	1000	956	94	70-130	
Potassium	ug/L	2990	10000	12600	96	70-130	
Sodium	ug/L	54000	10000	60800	68	70-130	M1

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: AMEREN LABADIE ENERGY CTR
Pace Project No.: 60301804

QC Batch: 585659 Analysis Method: EPA 200.7
QC Batch Method: EPA 200.7 Analysis Description: 200.7 Metals, Total
Associated Lab Samples: 60302536001, 60302536002, 60302536003

METHOD BLANK: 2403215 Matrix: Water
Associated Lab Samples: 60302536001, 60302536002, 60302536003

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Boron	ug/L	<10.7	100	10.7	05/21/19 12:05	
Calcium	ug/L	<50.0	200	50.0	05/21/19 12:05	
Iron	ug/L	<14.0	50.0	14.0	05/21/19 12:05	
Magnesium	ug/L	<13.0	50.0	13.0	05/21/19 12:05	
Manganese	ug/L	<2.1	5.0	2.1	05/21/19 12:05	
Potassium	ug/L	<79.0	500	79.0	05/21/19 12:05	
Sodium	ug/L	<144	500	144	05/21/19 12:05	

LABORATORY CONTROL SAMPLE: 2403216

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Boron	ug/L	1000	1020	102	85-115	
Calcium	ug/L	10000	10200	102	85-115	
Iron	ug/L	10000	9980	100	85-115	
Magnesium	ug/L	10000	10600	106	85-115	
Manganese	ug/L	1000	1060	106	85-115	
Potassium	ug/L	10000	10200	102	85-115	
Sodium	ug/L	10000	10200	102	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2403217 2403218

Parameter	Units	60302656002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Boron	ug/L	239	1000	1000	1260	1270	103	104	70-130	1	20	
Calcium	ug/L	113000	10000	10000	122000	122000	90	90	70-130	0	20	
Iron	ug/L	84.6	10000	10000	9640	9740	96	97	70-130	1	20	
Magnesium	ug/L	46100	10000	10000	56100	55700	100	96	70-130	1	20	
Manganese	ug/L	29.7	1000	1000	1080	1070	105	104	70-130	1	20	
Potassium	ug/L	76800	10000	10000	87300	87400	105	106	70-130	0	20	
Sodium	ug/L	567000	10000	10000	579000	573000	122	63	70-130	1	20	E,M1

MATRIX SPIKE SAMPLE: 2403219

Parameter	Units	60302658002 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Boron	ug/L	300	1000	1300	100	70-130	
Calcium	ug/L	74200	10000	84100	98	70-130	
Iron	ug/L	566	10000	10000	94	70-130	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: AMEREN LABADIE ENERGY CTR
Pace Project No.: 60301804

MATRIX SPIKE SAMPLE: 2403219

Parameter	Units	60302658002 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Magnesium	ug/L	10200	10000	20100	98	70-130	
Manganese	ug/L	18.5	1000	1060	104	70-130	
Potassium	ug/L	11600	10000	21600	101	70-130	
Sodium	ug/L	87900	10000	98300	104	70-130	

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QUALITY CONTROL DATA

Project: AMEREN LABADIE ENERGY CTR
Pace Project No.: 60301804

QC Batch: 584102 Analysis Method: SM 2320B
QC Batch Method: SM 2320B Analysis Description: 2320B Alkalinity
Associated Lab Samples: 60301568004, 60301568005

METHOD BLANK: 2397396 Matrix: Water
Associated Lab Samples: 60301568004, 60301568005

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Alkalinity, Total as CaCO3	mg/L	<6.5	20.0	6.5	05/13/19 12:18	

LABORATORY CONTROL SAMPLE: 2397397

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity, Total as CaCO3	mg/L	500	497	99	90-110	

SAMPLE DUPLICATE: 2397398

Parameter	Units	60301568001 Result	Dup Result	RPD	Max RPD	Qualifiers
Alkalinity, Total as CaCO3	mg/L		429	0	10	

SAMPLE DUPLICATE: 2397399

Parameter	Units	60301568005 Result	Dup Result	RPD	Max RPD	Qualifiers
Alkalinity, Total as CaCO3	mg/L	392	402	3	10	

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QUALITY CONTROL DATA

Project: AMEREN LABADIE ENERGY CTR
Pace Project No.: 60301804

QC Batch: 584515 Analysis Method: SM 2320B
QC Batch Method: SM 2320B Analysis Description: 2320B Alkalinity
Associated Lab Samples: 60301804001, 60301804002, 60301804003

METHOD BLANK: 2398572 Matrix: Water
Associated Lab Samples: 60301804001, 60301804002, 60301804003

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Alkalinity, Total as CaCO3	mg/L	<6.5	20.0	6.5	05/16/19 10:35	

LABORATORY CONTROL SAMPLE: 2398573

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity, Total as CaCO3	mg/L	500	519	104	90-110	

SAMPLE DUPLICATE: 2398574

Parameter	Units	60301804001 Result	Dup Result	RPD	Max RPD	Qualifiers
Alkalinity, Total as CaCO3	mg/L	543	549	1	10	

SAMPLE DUPLICATE: 2398575

Parameter	Units	60302254001 Result	Dup Result	RPD	Max RPD	Qualifiers
Alkalinity, Total as CaCO3	mg/L	611	617	1	10	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: AMEREN LABADIE ENERGY CTR
Pace Project No.: 60301804

QC Batch: 585263 Analysis Method: SM 2320B
QC Batch Method: SM 2320B Analysis Description: 2320B Alkalinity
Associated Lab Samples: 60302536001, 60302536002, 60302536003

METHOD BLANK: 2401500 Matrix: Water
Associated Lab Samples: 60302536001, 60302536002, 60302536003

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Alkalinity, Total as CaCO3	mg/L	<6.5	20.0	6.5	05/17/19 12:29	

LABORATORY CONTROL SAMPLE: 2401501

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity, Total as CaCO3	mg/L	500	506	101	90-110	

SAMPLE DUPLICATE: 2401502

Parameter	Units	60302527013 Result	Dup Result	RPD	Max RPD	Qualifiers
Alkalinity, Total as CaCO3	mg/L	498	495	1	10	

SAMPLE DUPLICATE: 2401503

Parameter	Units	60302446001 Result	Dup Result	RPD	Max RPD	Qualifiers
Alkalinity, Total as CaCO3	mg/L	202	197	3	10	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: AMEREN LABADIE ENERGY CTR
Pace Project No.: 60301804

QC Batch: 583021 Analysis Method: SM 2540C
QC Batch Method: SM 2540C Analysis Description: 2540C Total Dissolved Solids
Associated Lab Samples: 60301568004, 60301568005

METHOD BLANK: 2392610 Matrix: Water
Associated Lab Samples: 60301568004, 60301568005

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	<5.0	5.0	5.0	05/07/19 11:29	

LABORATORY CONTROL SAMPLE: 2392611

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Dissolved Solids	mg/L	1000	1030	103	80-120	

SAMPLE DUPLICATE: 2392612

Parameter	Units	60301568001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L		1120	1	10	

SAMPLE DUPLICATE: 2392613

Parameter	Units	60301618006 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	2610	2660	2	10	

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QUALITY CONTROL DATA

Project: AMEREN LABADIE ENERGY CTR
Pace Project No.: 60301804

QC Batch: 583514 Analysis Method: SM 2540C
QC Batch Method: SM 2540C Analysis Description: 2540C Total Dissolved Solids
Associated Lab Samples: 60301804001, 60301804002, 60301804003

METHOD BLANK: 2394354 Matrix: Water
Associated Lab Samples: 60301804001, 60301804002, 60301804003

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	<5.0	5.0	5.0	05/09/19 13:57	

LABORATORY CONTROL SAMPLE: 2394355

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Dissolved Solids	mg/L	1000	996	100	80-120	

SAMPLE DUPLICATE: 2394356

Parameter	Units	60301670001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	314	308	2	10	

SAMPLE DUPLICATE: 2394357

Parameter	Units	60301786007 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	4230	4720	11	10	D6

SAMPLE DUPLICATE: 2394358

Parameter	Units	60301804001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	664	670	1	10	

SAMPLE DUPLICATE: 2394359

Parameter	Units	60301827001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	2220	2260	2	10	

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QUALITY CONTROL DATA

Project: AMEREN LABADIE ENERGY CTR
Pace Project No.: 60301804

QC Batch: 584820 Analysis Method: SM 2540C
QC Batch Method: SM 2540C Analysis Description: 2540C Total Dissolved Solids
Associated Lab Samples: 60302536001, 60302536002, 60302536003

METHOD BLANK: 2399596 Matrix: Water
Associated Lab Samples: 60302536001, 60302536002, 60302536003

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	7.5	5.0	5.0	05/15/19 16:12	

LABORATORY CONTROL SAMPLE: 2399597

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Dissolved Solids	mg/L	1000	1100	110	80-120	

SAMPLE DUPLICATE: 2399598

Parameter	Units	60302527015 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	11.8	<5.0			

SAMPLE DUPLICATE: 2399599

Parameter	Units	60302459001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	355	719			D6

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: AMEREN LABADIE ENERGY CTR
Pace Project No.: 60301804

QC Batch: 584698 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 60301568004, 60301568005

METHOD BLANK: 2399191 Matrix: Water
Associated Lab Samples: 60301568004, 60301568005

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Chloride	mg/L	<0.22	1.0	0.22	05/15/19 10:10	
Fluoride	mg/L	<0.085	0.20	0.085	05/15/19 10:10	
Sulfate	mg/L	<0.23	1.0	0.23	05/15/19 10:10	

LABORATORY CONTROL SAMPLE: 2399192

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	5	4.6	92	90-110	
Fluoride	mg/L	2.5	2.3	91	90-110	
Sulfate	mg/L	5	4.7	94	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2399193 2399194

Parameter	Units	60301521004 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	200	5	5	202	202	48	54	80-120	0	15	M1
Fluoride	mg/L	0.20J	2.5	2.5	2.5	2.4	92	89	80-120	3	15	
Sulfate	mg/L	3.2	5	5	8.3	8.2	100	99	80-120	1	15	

MATRIX SPIKE SAMPLE: 2399195

Parameter	Units	60301568001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L		5	14.6	103	80-120	
Fluoride	mg/L		2.5	2.0	73	80-120	M1

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: AMEREN LABADIE ENERGY CTR
Pace Project No.: 60301804

QC Batch: 585101 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 60301804001, 60301804002, 60301804003

METHOD BLANK: 2400812 Matrix: Water
Associated Lab Samples: 60301804001, 60301804002, 60301804003

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Chloride	mg/L	0.46J	1.0	0.22	05/16/19 18:31	
Fluoride	mg/L	<0.085	0.20	0.085	05/16/19 18:31	
Sulfate	mg/L	<0.23	1.0	0.23	05/16/19 18:31	

LABORATORY CONTROL SAMPLE: 2400813

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	5	4.8	96	90-110	
Fluoride	mg/L	2.5	2.4	96	90-110	
Sulfate	mg/L	5	5.1	102	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2400814 2400815

Parameter	Units	60301804001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	3.7	5	5	8.4	8.4	94	95	80-120	0	15	
Fluoride	mg/L	0.24	2.5	2.5	2.5	2.6	92	93	80-120	1	15	
Sulfate	mg/L	98.6	25	25	129	127	120	115	80-120	1	15	E

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: AMEREN LABADIE ENERGY CTR
Pace Project No.: 60301804

QC Batch: 586587 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 60302536001, 60302536002, 60302536003

METHOD BLANK: 2406378 Matrix: Water
Associated Lab Samples: 60302536001, 60302536002, 60302536003

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Chloride	mg/L	<0.22	1.0	0.22	05/23/19 10:04	
Fluoride	mg/L	<0.085	0.20	0.085	05/23/19 10:04	
Sulfate	mg/L	<0.23	1.0	0.23	05/23/19 10:04	

LABORATORY CONTROL SAMPLE: 2406379

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	10	9.5	95	90-110	
Fluoride	mg/L	5	4.7	95	90-110	
Sulfate	mg/L	10	9.7	97	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2406380 2406381

Parameter	Units	60302742005 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	31.3	50	50	78.9	79.7	95	97	80-120	1	15	
Fluoride	mg/L	ND	25	25	24.5	24.5	93	93	80-120	0	15	
Sulfate	mg/L	48.2	50	50	99.1	101	102	106	80-120	2	15	

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REPORT OF LABORATORY ANALYSIS

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QUALIFIERS

Project: AMEREN LABADIE ENERGY CTR
Pace Project No.: 60301804

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

LABORATORIES

PASI-K	Pace Analytical Services - Kansas City

ANALYTE QUALIFIERS

B	Analyte was detected in the associated method blank.
D6	The precision between the sample and sample duplicate exceeded laboratory control limits.
E	Analyte concentration exceeded the calibration range. The reported result is estimated.
M1	Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: AMEREN LABADIE ENERGY CTR
Pace Project No.: 60301804

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
60301568004	**L-BMW-1S**	EPA 200.7	583885	EPA 200.7	584051
60301568005	**L-BMW-2S**	EPA 200.7	583885	EPA 200.7	584051
60301804001	**L-TMW-1**	EPA 200.7	584623	EPA 200.7	584665
60301804002	**L-TMW-2**	EPA 200.7	584623	EPA 200.7	584665
60301804003	**L-UWL-DUP-1**	EPA 200.7	584623	EPA 200.7	584665
60302536001	**L-TMW-3**	EPA 200.7	585659	EPA 200.7	585727
60302536002	**L-MW-26**	EPA 200.7	585659	EPA 200.7	585727
60302536003	**L-UWL-FB-1**	EPA 200.7	585659	EPA 200.7	585727
60301568004	**L-BMW-1S**	SM 2320B	584102		
60301568005	**L-BMW-2S**	SM 2320B	584102		
60301804001	**L-TMW-1**	SM 2320B	584515		
60301804002	**L-TMW-2**	SM 2320B	584515		
60301804003	**L-UWL-DUP-1**	SM 2320B	584515		
60302536001	**L-TMW-3**	SM 2320B	585263		
60302536002	**L-MW-26**	SM 2320B	585263		
60302536003	**L-UWL-FB-1**	SM 2320B	585263		
60301568004	**L-BMW-1S**	SM 2540C	583021		
60301568005	**L-BMW-2S**	SM 2540C	583021		
60301804001	**L-TMW-1**	SM 2540C	583514		
60301804002	**L-TMW-2**	SM 2540C	583514		
60301804003	**L-UWL-DUP-1**	SM 2540C	583514		
60302536001	**L-TMW-3**	SM 2540C	584820		
60302536002	**L-MW-26**	SM 2540C	584820		
60302536003	**L-UWL-FB-1**	SM 2540C	584820		
60301568004	**L-BMW-1S**	EPA 300.0	584698		
60301568005	**L-BMW-2S**	EPA 300.0	584698		
60301804001	**L-TMW-1**	EPA 300.0	585101		
60301804002	**L-TMW-2**	EPA 300.0	585101		
60301804003	**L-UWL-DUP-1**	EPA 300.0	585101		
60302536001	**L-TMW-3**	EPA 300.0	586587		
60302536002	**L-MW-26**	EPA 300.0	586587		
60302536003	**L-UWL-FB-1**	EPA 300.0	586587		

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Sample Condition Upon Receipt

WO# : 60301804

60301804

Client Name: Golder

Courier: FedEx ☐ UPS ☐ VIA ☑ Clay ☐ PEX ☐ ECI ☐ Pace ☐ Xroads ☐ Client ☐ Other ☐

Tracking #: _____ Pace Shipping Label Used? Yes ☐ No ☑

Custody Seal on Cooler/Box Present: Yes ☑ No ☐ Seals intact: Yes ☑ No ☐

Packing Material: Bubble Wrap ☐ Bubble Bags ☑ Foam ☐ None ☐ Other ☐

Thermometer Used: T-296 **Type of Ice:** Wet Blue None

Cooler Temperature (°C): As-read 2.2 **Corr. Factor** -1.0 **Corrected** 1.2

Date and initials of person examining contents: 5/4/19

Temperature should be above freezing to 6°C

Chain of Custody present:	☑Yes ☐No ☐N/A	L-TMW-1 samples are the same samples for both chains. / Also L-TMW-2 / DUP
Chain of Custody relinquished:	☑Yes ☐No ☐N/A	
Samples arrived within holding time:	☑Yes ☐No ☐N/A	
Short Hold Time analyses (<72hr):	☐Yes ☑No ☐N/A	
Rush Turn Around Time requested:	☐Yes ☑No ☐N/A	
Sufficient volume:	☑Yes ☐No ☐N/A	
Correct containers used:	☑Yes ☐No ☐N/A	
Pace containers used:	☑Yes ☐No ☐N/A	
Containers intact:	☑Yes ☐No ☐N/A	
Unpreserved 5035A / TX1005/1006 soils frozen in 48hrs?	☐Yes ☐No ☑N/A	
Filtered volume received for dissolved tests?	☐Yes ☐No ☑N/A	
Sample labels match COC: Date / time / ID / analyses	☑Yes ☐No ☐N/A	
Samples contain multiple phases? Matrix: WT	☐Yes ☑No ☐N/A	
Containers requiring pH preservation in compliance? (HNO_3, H_2SO_4, HCl<2; NaOH>9 Sulfide, NaOH>10 Cyanide) (Exceptions: VOA, Micro, O&G, KS TPH, OK-DRO)	☑Yes ☐No ☐N/A	List sample IDs, volumes, lot #'s of preservative and the date/time added.
Cyanide water sample checks:		
Lead acetate strip turns dark? (Record only)	☐Yes ☐No	
Potassium iodide test strip turns blue/purple? (Preserve)	☐Yes ☐No	
Trip Blank present:	☐Yes ☐No ☑N/A	
Headspace in VOA vials (>6mm):	☐Yes ☐No ☑N/A	
Samples from USDA Regulated Area: State:	☐Yes ☐No ☑N/A	
Additional labels attached to 5035A / TX1005 vials in the field?	☐Yes ☐No ☑N/A	

Client Notification/ Resolution: Copy COC to Client? Y / N Field Data Required? Y / N

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: Jami Church 5/6/19 Date: _____

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CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Page: 1 of 2

Section A — Required Client Information:

Company:	Golder Associates
Address:	13515 Barrett Parkway Drive, Ste 260
	Ballwin, MO 63021
Email To:	jeffrey_ingram@golder.com
Phone: 636-724-9191	Fax: 636-724-9323
Requested Due Date/TAT:	Standard

Section B — Required Project Information:

Report To:	Jeffrey Ingram
Copy To:	Ryan Feldmann/Eric Schneider
Purchase Order No.:	
Project Name:	Ameren Labadie Energy Center
Project Number:	153-1406-01.0001C (COC#3)

Section C — Invoice Information:

Attention:	
Company Name:	
Address:	
Pace Quote Reference:	
Pace Project Manager:	Jamie Church
Pace Profile #:	9285

REGULATORY AGENCY

NPDES | GROUND WATER | DRINKING WATER
UST | RCRA | OTHER _____

Site Location STATE: MO

Section D — Required Client Information

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Valid Matrix Codes

MATRIX	CODE
DRINKING WATER	DW
WATER	WT
WASTE WATER	WW
PRODUCT	P
SOIL/SOLID	SL
OIL	OL
	WP
	AR
	OT
	TS

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED: COMPOSITE START DATE	COMPOSITE START TIME	COMPOSITE END/GRAB DATE	COMPOSITE END/GRAB TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test Y/N	Metals*	Chloride/Fluoride/Sulfate	TDS	Alkalinity	Total Phosphorus	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
																		Y/N	N	N	N	N	N		40301804
1	L-TMW-1	WT	G			5/2/19	1355		9	6		3							X	X	X	X	BP3U(3), BP3N(3), BP3N(3),		001
2	L-TMW-2	WT	G			5/2/19	1210		3	2		1							X	X	X	X	BP3N, BP3N, BP3U		002
3	L-TMW-3	WT	G																							
4	L-MW-26	WT	G																							
5	L-UWL-DUP-1	WT	G			5/2/19	—		3	2		1							X	X	X	X	BP3N, BP3N, BP3U		003
6	L-UWL-FB-1	WT	G																							
7	L-BMW-1S	WT	G																							
8	L-BMW-2S	WT	G																							
9		WT	G																							
10		WT	G																							
11		WT	G																							
12		WT	G																							

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS: Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)
*EPA 200.7: B, Ca, Fe, Mg, Mn, K, Na		5/3/19	1025	PACE	5/3/19	1025				
	PACE	5/3/19	1700		5/3/19	0735	2.2	Y	Y	Y

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Eric Schneider

SIGNATURE of SAMPLER: [signature] DATE Signed (MM/DD/YY): 5/3/2019

Pace Analytical
www.pacelabs.com

Sample Condition Upon Receipt

WO# : 60302536

60302536

Client Name: Golder Assoc.

Courier: FedEx ☐ UPS ☐ VIA ☐ Clay ☐ PEX ☐ ECI ☐ Pace ☐ Xroads ☒ Client ☐ Other ☐

Tracking #: _____ Pace Shipping Label Used? Yes ☐ No ☒

Custody Seal on Cooler/Box Present: Yes ☒ No ☐ Seals intact: Yes ☒ No ☐

Packing Material: Bubble Wrap ☐ Bubble Bags ☐ Foam ☐ None ☐ Other ☒ Zpic

Thermometer Used: T700 **Type of Ice:** (Wet) Blue None

Cooler Temperature (°C): **As-read** 0.4 **Corr. Factor** +0.4 **Corrected** 0.8

Date and initials of person examining contents: 5-10-19 AZ

Temperature should be above freezing to 6°C

Chain of Custody present:	☒Yes ☐No ☐N/A	
Chain of Custody relinquished:	☒Yes ☐No ☐N/A	
Samples arrived within holding time:	☒Yes ☐No ☐N/A	
Short Hold Time analyses (<72hr):	☐Yes ☒No ☐N/A	
Rush Turn Around Time requested:	☐Yes ☒No ☐N/A	
Sufficient volume:	☒Yes ☐No ☐N/A	
Correct containers used:	☒Yes ☐No ☐N/A	
Pace containers used:	☒Yes ☐No ☐N/A	There are 2 COC for the
Containers intact:	☒Yes ☐No ☐N/A	same set of samples
Unpreserved 5035A / TX1005/1006 soils frozen in 48hrs?	☐Yes ☐No ☒N/A	
Filtered volume received for dissolved tests?	☐Yes ☐No ☒N/A	
Sample labels match COC: Date / time / ID / analyses	☒Yes ☐No ☐N/A	
Samples contain multiple phases? Matrix: WT	☐Yes ☒No ☐N/A	
Containers requiring pH preservation in compliance? (HNO_3, H_2SO_4, HCl<2; NaOH>9 Sulfide, NaOH>10 Cyanide) (Exceptions: VOA, Micro, O&G, KS TPH, OK-DRO)	☒Yes ☐No ☐N/A	List sample IDs, volumes, lot #'s of preservative and the date/time added.
Cyanide water sample checks: Lead acetate strip turns dark? (Record only)	☐Yes ☐No	
Potassium iodide test strip turns blue/purple? (Preserve)	☐Yes ☐No	
Trip Blank present:	☐Yes ☐No ☒N/A	
Headspace in VOA vials (>6mm):	☐Yes ☐No ☒N/A	
Samples from USDA Regulated Area: State:	☐Yes ☐No ☒N/A	
Additional labels attached to 5035A / TX1005 vials in the field?	☐Yes ☐No ☒N/A	

Client Notification/ Resolution: Copy COC to Client? Y / N Field Data Required? Y / N

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Jasmi Church 5/10/19

Project Manager Review: _____ Date: _____

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

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Section A Required Client Information:

Company:	Golder Associates
Address:	13515 Barrett Parkway Drive, Ste 260
	Ballwin, MO 63021
Email To:	jeffrey_ingram@golder.com
Phone: 636-724-9191	Fax: 636-724-9323
Requested Due Date/TAT:	Standard

Section B Required Project Information:

Report To:	Jeffrey Ingram
Copy To:	Ryan Feldmann/Eric Schneider
Purchase Order No.:	
Project Name:	Ameren Labadie Energy Center
Project Number:	153-1406-01.0001B (COC#2) 3

Section C Invoice Information:

Attention:	
Company Name:	
Address:	
Pace Quote Reference:	
Pace Project Manager:	Jamie Church
Pace Profile #:	9285

REGULATORY AGENCY

NPDES (GROUND WATER) DRINKING WATER

UST RCRA OTHER _____

Site Location STATE: MO

Section D Required Client Information

SAMPLE ID
(A-Z, 0-9 / ,-)
Sample IDs MUST BE UNIQUE

Valid Matrix Codes

MATRIX	CODE
DRINKING WATER	DW
WATER	WT
WASTE WATER	WW
PRODUCT	P
SOIL/SOLID	SL
OIL	OL
	WP
	AR
	OT
	TS

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED COMPOSITE START DATE	COLLECTED COMPOSITE START TIME	COLLECTED COMPOSITE END/GRAB DATE	COLLECTED COMPOSITE END/GRAB TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test Y/N	Metals*	Chloride/Fluoride/Sulfate	TDS	Alkalinity	Total Phosphorus						Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
																		Y/N	N	N	N	N	N					
1	L-TMW-3	WT	G			5/8/19	1200		3	2		1						X	X	X	X	6P2V, 6P2N, 6P3O					001
2	L-MW-26	WT	G			"	1050		1	1		1															002
3	L-DWL-FB-1	WT	G			5/8/19	1055		1	1		1															003
4		WT	G																								
5		WT	G																								
6		WT	G																								
7		WT	G																								
8		WT	G																								
9		WT	G																								
10		WT	G																								
11		WT	G																								
12		WT	G																								

6030 2536

Pace Project No./ Lab I.D.

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
*EPA 200.7: B, Ca, Fe, Mg, Mn, K, Na	Golder	5/9/19	1758		5/10/19	0345	0.8	Y	Y	Y

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Andrew Adkins

SIGNATURE of SAMPLER: [signature] DATE Signed (MM/DD/YY): 5/09/19

Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

Pace Analytical® www.pacelabs.com

Sample Condition Upon Receipt

WO#: 60301568

60301568

Client Name: Golder

Courier: FedEx ☐ UPS ☐ VIA ☐ Clay ☐ PEX ☐ ECI ☐ Pace ☐ Xroads ☑ Client ☐ Other ☐

Tracking #: _____ Pace Shipping Label Used? Yes ☐ No ☑

Custody Seal on Cooler/Box Present: Yes ☑ No ☐ Seals intact: Yes ☑ No ☐

Packing Material: Bubble Wrap ☐ Bubble Bags ☑ Foam ☐ None ☐ Other ☐

Thermometer Used: T-296 **Type of Ice:** Wet Blue None

Cooler Temperature (°C): As-read 3.0, 3.2 Corr. Factor -1.0 Corrected 2.0, 2.2

Date and initials of person examining contents: 5/2/19 AP

Temperature should be above freezing to 6°C

Chain of Custody present:	☑Yes ☐No ☐N/A	
Chain of Custody relinquished:	☑Yes ☐No ☐N/A	
Samples arrived within holding time:	☑Yes ☐No ☐N/A	
Short Hold Time analyses (<72hr):	☐Yes ☑No ☐N/A	
Rush Turn Around Time requested:	☐Yes ☑No ☐N/A	
Sufficient volume:	☑Yes ☐No ☐N/A	
Correct containers used:	☑Yes ☐No ☐N/A	
Pace containers used:	☑Yes ☐No ☐N/A	
Containers intact:	☑Yes ☐No ☐N/A	
Unpreserved 5035A / TX1005/1006 soils frozen in 48hrs?	☐Yes ☐No ☑N/A	
Filtered volume received for dissolved tests?	☐Yes ☐No ☑N/A	
Sample labels match COC: Date / time / ID / analyses	☑Yes ☑No ☐N/A	Sent extra samples: L-LMW-4S
Samples contain multiple phases? Matrix: WT	☐Yes ☑No ☐N/A	time + date 5/1/19 @ 1400 (BP2U, BP3N,
Containers requiring pH preservation in compliance? (HNO_3, H_2SO_4, HCl<2; NaOH>9 Sulfide, NaOH>10 Cyanide) (Exceptions: VOA, Micro, O&G, KS TPH, OK-DRO)	☑Yes ☐No ☐N/A	List sample IDs, volumes, lot #'s of preservative and the date/time added.
Cyanide water sample checks: Lead acetate strip turns dark? (Record only)	☐Yes ☐No	
Potassium iodide test strip turns blue/purple? (Preserve)	☐Yes ☐No	
Trip Blank present:	☐Yes ☐No ☑N/A	BP3U)
Headspace in VOA vials (>6mm):	☐Yes ☐No ☑N/A	
Samples from USDA Regulated Area: State:	☐Yes ☐No ☑N/A	
Additional labels attached to 5035A / TX1005 vials in the field?	☐Yes ☐No ☑N/A	

Client Notification/ Resolution: Copy COC to Client? Y / N Field Data Required? Y / N

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: Per Eric, analyze extra sample L-LMW-4S for all parameters.

Project Manager Review: Jami Church Date: 5/4/19

F-KS-C-003-Rev.11, February 28, 2018

60301568

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CHAIN-OF-CUSTODY / Analytical Request Document

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Page: 1 of 1

Section A Required Client Information:
Company: Golder Associates
Address: 13515 Barrett Parkway Drive, Ste 260
Ballwin, MO 63021
Email To: jeffrey_ingram@golder.com
Phone: 636-724-9191 Fax: 636-724-9323
Requested Due Date/TAT: Standard

Section B Required Project Information:
Report To: Jeffrey Ingram
Copy To: Ryan Feldmann/Eric Schneider
Purchase Order No.:
Project Name: Ameren Labadie Energy Center
Project Number: 153-1406-01.0001B (CCC#2)

Section C Invoice Information:
Attention:
Company Name:
Address:
Pace Quote Reference:
Pace Project Manager: Jamie Church
Pace Profile #: 9285

REGULATORY AGENCY: NPDES, GROUND WATER (circled), DRINKING WATER, UST, RCRA, OTHER
Site Location STATE: MO

ITEM #	SAMPLE ID	MATRIX CODE	SAMPLE TYPE	Composite Start DATE	TIME	Composite End/Grab DATE	TIME	# OF CONTAINERS	Unpreserved	HNO3	Metals*	Chloride/Fluoride/Sulfate	TDS	Alkalinity	Total Phosphorus	Pace Project No./Lab I.D.
1	L-LMW-1S	WT	G			5/1/19	1505	9	6	3	X	X	X	X		
2	L-LMW-2S	WT	G			4/30/19	1523	3	2	1	X	X	X	X		
3	L-LMW-3S	WT	G													
4	L-LMW-4S	WT	G													
5	L-LMW-5S	WT	G			5/1/19	1405	3	2	1	X	X	X	X		
6	L-LMW-6S	WT	G													
7	L-LMW-7S	WT	G													
8	L-LMW-8S	WT	G													
9	L-BMW-1S	WT	G			5/1/19	1135	3	2	1	X	X	X	X		
10	L-BMW-2S	WT	G			5/1/19	1050	3	2	1	X	X	X	X		
11	L-LMW-DUP-1	WT	G			4/30/19	—	3	2	1	X	X	X	X		
12	L-LMW-FB-1	WT	G													

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS
[illegible]	[signature] / Golder	5/1/19	1800	Holly Fowler / PASI	5/2/19	0413	

SAMPLER NAME AND SIGNATURE
PRINT Name of SAMPLER: Andrew Atkins
SIGNATURE of SAMPLER: [signature] DATE Signed (MM/DD/YY): 5/1/19

Temp in °C | Received on Ice (Y/N) | Custody Sealed Cooler (Y/N) | Samples Intact (Y/N)

MEMORANDUM

DATE August 16, 2019 **Project No.** 1531406

TO Project File
Golder Associates

CC Amanda Derhake, Jeff Ingram

FROM Tommy Goodwin **EMAIL Tommy_Goodwin@golder.com**

DATA VALIDATION SUMMARY, LABADIE ENERGY CENTER – LCL1 – DETECTION MONITORING - DATA PACKAGE 60301804

The following is a summary of instances where quality control criteria in the functional guidelines were not met and data qualification was required:

- When a compound was detected in a sample result between the MDL and the PQL the results were recorded at the detection value and qualified as estimates (J).
- When MS/MSD recovery exceeded the QC limits, the associated sample result was qualified as an estimate (J).

Golder Associates Inc.
13515 Barrett Parkway Drive, Suite 260,
Ballwin, Missouri, USA 63021

T: +1 314 984-8800 F: +1 314 984-8770

QA LEVEL II - INORGANIC DATA EVALUATION CHECKLIST

Company Name: Golder
Project Manager: J Ingram
Project Name: Ameren Labadie - LCLI - BM
Project Number: 1531406-01
Reviewer: T Goodwin
Validation Date: 8/16/19

Laboratory: Pace Analytical - KS
SDG #: 60301804
Analytical Method (type and no.): EPA 200.7 (Metals), 2320B (Alk), 2540C (TDS), 300.0 (Anions)
Matrix: ☐ Air ☐ Soil/Sed. ☑ Water ☐ Waste ☐ _____
Sample Names L-TMW-1, L-TMW-2, L-UWL-DUP-1, L-TMW-3, L-MW-26, L-UWL-FB-1, L-BMW-1S, L-BMW-2S

NOTE: Please provide calculation in Comment areas or on the back (if on the back please indicate in comment areas).

Field Information	YES	NO	NA	COMMENTS
a) Sampling dates noted?	☑	☐	☐	5/1 - 5/8/19
b) Sampling team indicated?	☑	☐	☐	
c) Sample location noted?	☑	☐	☐	
d) Sample depth indicated (Soils)?	☐	☐	☑	
e) Sample type indicated (grab/composite)?	☑	☐	☐	
f) Field QC noted?	☑	☐	☐	
g) Field parameters collected (note types)?	☑	☐	☐	
h) Field Calibration within control limits?	☑	☐	☐	
i) Notations of unacceptable field conditions/performances from field logs or field notes?	☐	☑	☐	
j) Does the laboratory narrative indicate deficiencies?	☐	☐	☑	

Note Deficiencies: _____

Chain-of-Custody (COC)	YES	NO	NA	COMMENTS
a) Was the COC properly completed?	☑	☐	☐	
b) Was the COC signed by both field and laboratory personnel?	☑	☐	☐	
c) Were samples received in good condition?	☑	☐	☐	

General (reference QAPP or Method)	YES	NO	NA	COMMENTS
a) Were hold times met for sample pretreatment?	☑	☐	☐	
b) Were hold times met for sample analysis?	☑	☐	☐	
c) Were the correct preservatives used?	☑	☐	☐	
d) Was the correct method used?	☑	☐	☐	
e) Were appropriate reporting limits achieved?	☑	☐	☐	
f) Were any sample dilutions noted?	☑	☐	☐	See Notes
g) Were any matrix problems noted?	☐	☑	☐	

QA LEVEL II - INORGANIC DATA EVALUATION CHECKLIST

Blanks	YES	NO	NA	COMMENTS
a) Were analytes detected in the method blank(s)?	☑	☐	☐	See Notes
b) Were analytes detected in the field blank(s)?	☑	☐	☐	~~Br (15.0)~~ (1b), See Notes
c) Were analytes detected in the equipment blank(s)?	☐	☐	☑	
d) Were analytes detected in the trip blank(s)?	☐	☐	☑	

Laboratory Control Sample (LCS)	YES	NO	NA	COMMENTS
a) Was a LCS analyzed once per SDG?	☑	☐	☐	
b) Were the proper analytes included in the LCS?	☑	☐	☐	
c) Was the LCS accuracy criteria met?	☑	☐	☐	

Duplicates	YES	NO	NA	COMMENTS
a) Were field duplicates collected (note original and duplicate sample names)?				DUP @ L-TMW-2
	☑	☐	☐	FB @ L-MW-26
b) Were field dup. precision criteria met (note RPD)?	☑	☐	☐	Max Field DUP RPD: 4% (Limit 20%)
c) Were lab duplicates analyzed (note original and duplicate samples)?				
	☑	☐	☐	
d) Were lab dup. precision criteria met (note RPD)?	☐	☑	☐	~~TDS (%) 8600~~ (1b) See Notes

Blind Standards	YES	NO	NA	COMMENTS
a) Was a blind standard used (indicate name, analytes included and concentrations)?	☐	☑	☐	
b) Was the %D within control limits?	☐	☐	☑	

Matrix Spike/Matrix Spike Duplicate (MS/MSD)	YES	NO	NA	COMMENTS
a) Was MS accuracy criteria met?	☐	☑	☐	See Notes
Recovery could not be calculated since sample contained high concentration of analyte?	☐	☐	☑	
b) Was MSD accuracy criteria met?	☐	☑	☐	See Notes
Recovery could not be calculated since sample contained high concentration of analyte?	☐	☐	☑	
c) Were MS/MSD precision criteria met?	☑	☐	☐	

Comments/Notes:

MB	MS/MSD	SD	FB
-68004-05: Na (146)	~~46001: K (+)~~	~~-8600: TDS (%)~~	Cl⁻ (0.45)
-04001-03: Mg (15.8)	04001: Ca (+)	~~-57001: TDS~~	FB-1: EPA 200.7 incorrect analyte results
-04001-03: Cl⁻ (0.46)	~~23002: Na (-)~~	-04001: Alk (%)	therefore not validated
	~~56002: Na (-)~~	+ TDS (%)	
	~~21004: Cl⁻ (-)~~		
	~~65001: F⁻ (-)~~		
	04001: SO_4^{2-} (E)		

Dilutions: Sulfate was diluted in several samples; no qualification is necessary.

QA LEVEL II - INORGANIC DATA EVALUATION CHECKLIST

Data Qualification:

Sample Name	Constituent(s)	Result	Qualifier	Reason
L-TMW-1	Calcium (Ca)	—	J	MS/MSD exceeded limits
1	Sulfate (SO4)	—	J	"

Signature: Tommy J Hood Jr Date: 8/16/2019

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

September 05, 2019

Jeffrey Ingram
Golder Associates
13515 Barrett Parkway Drive
Suite 260
Ballwin, MO 63021

RE: Project: AMEREN LABADIE ENERGY CTR LCL1
Pace Project No.: 60312685

Dear Jeffrey Ingram:
Enclosed are the analytical results for sample(s) received by the laboratory on August 22, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

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

Sincerely,

Jamie Church
jamie.church@pacelabs.com
314-838-7223
Project Manager

Enclosures

cc: Ryan Feldmann, Golder
Mark Haddock, Golder Associates
Eric Schneider, Golder Associates

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

CERTIFICATIONS

Project: AMEREN LABADIE ENERGY CTR LCL1
Pace Project No.: 60312685

Kansas Certification IDs

9608 Loiret Boulevard, Lenexa, KS 66219
Missouri Inorganic Drinking Water Certification #: 10090
Arkansas Drinking Water
Arkansas Certification #: 19-016-0
Arkansas Drinking Water
Illinois Certification #: 004455
Iowa Certification #: 118
Kansas/NELAP Certification #: E-10116
Louisiana Certification #: 03055
Nevada Certification #: KS000212018-1
Oklahoma Certification #: 9205/9935
Florida: Cert E871149 SEKS WET
Texas Certification #: T104704407-18-11
Utah Certification #: KS000212018-8
Illinois Certification #: 004592
Kansas Field Laboratory Accreditation: # E-92587
Missouri SEKS Micro Certification: 10070

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

SAMPLE SUMMARY

Project: AMEREN LABADIE ENERGY CTR LCL1
Pace Project No.: 60312685

Lab ID	Sample ID	Matrix	Date Collected	Date Received
60312685001	**L-MW-26**	Water	08/21/19 14:10	08/22/19 02:55
60312685002	**L-TMW-1**	Water	08/21/19 14:35	08/22/19 02:55
60312685003	**L-TMW-2**	Water	08/21/19 15:00	08/22/19 02:55

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(913)599-5665

SAMPLE ANALYTE COUNT

Project: AMEREN LABADIE ENERGY CTR LCL1
Pace Project No.: 60312685

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
60312685001	**L-MW-26**	EPA 200.7	HKC	1	PASI-K
		EPA 300.0	JDS	1	PASI-K
60312685002	**L-TMW-1**	EPA 300.0	JDS	2	PASI-K
60312685003	**L-TMW-2**	EPA 300.0	JDS	1	PASI-K

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Lenexa, KS 66219
(913)599-5665

ANALYTICAL RESULTS

Project: AMEREN LABADIE ENERGY CTR LCL1
Pace Project No.: 60312685

Sample: L-MW-26 **Lab ID: 60312685001** Collected: 08/21/19 14:10 Received: 08/22/19 02:55 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.7 Metals, Total	Analytical Method: EPA 200.7 Preparation Method: EPA 200.7								
Calcium	**142000**	ug/L	200	50.0	1	08/23/19 13:43	08/26/19 17:43	7440-70-2	M1
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Fluoride	**0.15J**	mg/L	0.20	0.085	1		09/05/19 01:25	16984-48-8	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

ANALYTICAL RESULTS

Project: AMEREN LABADIE ENERGY CTR LCL1
Pace Project No.: 60312685

Sample: L-TMW-1 **Lab ID: 60312685002** Collected: 08/21/19 14:35 Received: 08/22/19 02:55 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**4.4**	mg/L	1.0	0.22	1		09/05/19 01:41	16887-00-6	
Fluoride	**<0.085**	mg/L	0.20	0.085	1		09/05/19 01:41	16984-48-8	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

ANALYTICAL RESULTS

Project: AMEREN LABADIE ENERGY CTR LCL1
Pace Project No.: 60312685

Sample: L-TMW-2 **Lab ID: 60312685003** Collected: 08/21/19 15:00 Received: 08/22/19 02:55 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Fluoride	**<0.085**	mg/L	0.20	0.085	1		09/05/19 02:29	16984-48-8	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

QUALITY CONTROL DATA

Project: AMEREN LABADIE ENERGY CTR LCL1
Pace Project No.: 60312685

QC Batch: 605299
QC Batch Method: EPA 200.7
Analysis Method: EPA 200.7
Analysis Description: 200.7 Metals, Total
Associated Lab Samples: 60312685001

METHOD BLANK: 2474198
Matrix: Water
Associated Lab Samples: 60312685001

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Calcium	ug/L	<50.0	200	50.0	08/26/19 17:12	

LABORATORY CONTROL SAMPLE: 2474199

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Calcium	ug/L	10000	10200	102	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2474200 2474201

Parameter	Units	60312685001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Calcium	ug/L	142000	10000	10000	156000	158000	133	158	70-130	2	20	M1

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

QUALITY CONTROL DATA

Project: AMEREN LABADIE ENERGY CTR LCL1
Pace Project No.: 60312685

QC Batch: 607274 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 60312685001, 60312685002, 60312685003

METHOD BLANK: 2481584 Matrix: Water
Associated Lab Samples: 60312685001, 60312685002, 60312685003

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Chloride	mg/L	<0.22	1.0	0.22	09/04/19 16:58	
Fluoride	mg/L	<0.085	0.20	0.085	09/04/19 16:58	

LABORATORY CONTROL SAMPLE: 2481585

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	5	4.8	95	90-110	
Fluoride	mg/L	2.5	2.3	93	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2481586 2481587

Parameter	Units	60311649003 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Fluoride	mg/L	0.67	2.5	2.5	3.1	3.0	98	94	80-120	3	15	

MATRIX SPIKE SAMPLE: 2481588

Parameter	Units	60312823002 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Fluoride	mg/L	ND	12.5	11.8	95	80-120	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

QUALIFIERS

Project: AMEREN LABADIE ENERGY CTR LCL1
Pace Project No.: 60312685

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

LABORATORIES

PASI-K	Pace Analytical Services - Kansas City

ANALYTE QUALIFIERS

M1	Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: AMEREN LABADIE ENERGY CTR LCL1
Pace Project No.: 60312685

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
60312685001	**L-MW-26**	EPA 200.7	605299	EPA 200.7	605320
60312685001	**L-MW-26**	EPA 300.0	607274		
60312685002	**L-TMW-1**	EPA 300.0	607274		
60312685003	**L-TMW-2**	EPA 300.0	607274		

Pace Analytical
www.pacelabs.com

Sample Condition Upon Receipt

WO# : 60312685

60312685

Client Name: Golder

Courier: FedEx ☐ UPS ☐ VIA ☐ Clay ☐ PEX ☐ ECI ☐ Pace ☐ Xroads ☑ Client ☐ Other ☐

Tracking #: _____ Pace Shipping Label Used? Yes ☐ No ☑

Custody Seal on Cooler/Box Present: Yes ☑ No ☐ Seals intact: Yes ☑ No ☐

Packing Material: Bubble Wrap ☐ Bubble Bags ☐ Foam ☐ None ☑ Other ☐

Thermometer Used: T295 **Type of Ice:** Wet Blue None

Cooler Temperature (°C): As-read 1.2 Corr. Factor -0.2 Corrected 1.0

Date and initials of person examining contents: 8/22/19 HH

Temperature should be above freezing to 6°C

Chain of Custody present:	☑Yes ☐No ☐N/A	
Chain of Custody relinquished:	☑Yes ☐No ☐N/A	
Samples arrived within holding time:	☑Yes ☐No ☐N/A	
Short Hold Time analyses (<72hr):	☐Yes ☑No ☐N/A	
Rush Turn Around Time requested:	☐Yes ☑No ☐N/A	
Sufficient volume:	☑Yes ☐No ☐N/A	
Correct containers used:	☑Yes ☐No ☐N/A	
Pace containers used:	☑Yes ☐No ☐N/A	
Containers intact:	☑Yes ☐No ☐N/A	
Unpreserved 5035A / TX1005/1006 soils frozen in 48hrs?	☐Yes ☑No ☐N/A	
Filtered volume received for dissolved tests?	☐Yes ☑No ☐N/A	
Sample labels match COC: Date / time / ID / analyses	☑Yes ☐No ☐N/A	
Samples contain multiple phases? Matrix: WT	☐Yes ☑No ☐N/A	
Containers requiring pH preservation in compliance? (HNO_3, H_2SO_4, HCl<2; NaOH>9 Sulfide, NaOH>10 Cyanide) (Exceptions: VOA, Micro, O&G, KS TPH, OK-DRO)	☑Yes ☐No ☐N/A	List sample IDs, volumes, lot #'s of preservative and the date/time added.
Cyanide water sample checks: Lead acetate strip turns dark? (Record only)	☐Yes ☐No	
Potassium iodide test strip turns blue/purple? (Preserve)	☐Yes ☐No	
Trip Blank present:	☐Yes ☑No ☐N/A	
Headspace in VOA vials (>6mm):	☐Yes ☐No ☑N/A	
Samples from USDA Regulated Area: State:	☐Yes ☐No ☑N/A	
Additional labels attached to 5035A / TX1005 vials in the field?	☐Yes ☐No ☑N/A	

Client Notification/ Resolution: Copy COC to Client? Y / N Field Data Required? Y / N

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: Jami Church 8/23/19 Date: _____

Pace Analytical

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Page: 1 of 1

Section A
Required Client Information:

Company:	Golder Associates
Address:	13515 Barrett Parkway Drive, Ste 260
	Ballwin, MO 63021
Email To:	maddock@golder.com
Phone:	636-724-9191
Fax:	636-724-9323
Requested Due Date/TAT:	Standard

Section B
Required Project Information:

Report To:	Mark Haddock (mhaddock@golder.com)
Copy To:	Jeffrey Ingram
Purchase Order No.:	Labadie ~~LCPA-~~ L4L1
Project Name:	Ameren ~~Sioux~~ EC ~~SCPA~~ N&E
Project Number:	153-1406.00~~02~~C (COC ~~#20~~)

Section C
Invoice Information:

Attention:	
Company Name:	
Address:	
Pace Quote Reference:	
Pace Project Manager:	Jamie Church
Pace Profile #:	9285

REGULATORY AGENCY

NPDES | GROUND WATER (circled) | DRINKING WATER
UST | RCRA | OTHER ______

Site Location STATE: MO

Section D
Required Client Information

Valid Matrix Codes: MATRIX / CODE — DRINKING WATER DW; WATER WT; WASTE WATER WW; PRODUCT P; SOIL/SOLID SL; OIL OL; WP; AR; OT; TS

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Requested Analysis Filtered (Y/N): Metals N; Alkalinity N; Total Phosphorus N; Ferrous Iron N; Ferric Iron N

ITEM #	SAMPLE ID	MATRIX CODE	SAMPLE TYPE (G=GRAB C=COMP)	Composite Start DATE	Composite Start TIME	Composite End/Grab DATE	Composite End/Grab TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Metals*	Alkalinity	Total Phosphorus	Ferrous Iron	Ferric Iron	Chloride	Fluoride		Residual Chlorine (Y/N)	Pace Project No./ Lab I.D. L0312085
1	S-TMW-1 L-MW-26	WT	G			8/21/19	1410		2	1		1						/						/	BP2U	BP3N	001
2	S-TMW-2 L-TMW-1	WT	G			↓	1435		1	1													/	/	↓		002
3	S-TMW-3 L-TMW-2	WT	G			↓	1500		1	1														/			003
4	~~S-UG-3~~	WT	G																								
5	~~S-SCL4A-DUP-1~~	WT	G																								
6	~~S-SCL4A-FB-1~~	WT	G																								
7	~~S-BMW-1S~~	WT	G																								
8	~~S-BMW-3S~~	WT	G																								
9		WT	G																								
10		WT	G																								
11		WT	G																								
12		WT	G																								

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)
*EPA 200.7: ~~Ba, Li, Mo, Fe, Mg, Mn, K, Na~~ Calcium *EPA 200.8: ~~Se~~	[signature]	8/21/19	1800	Holly Frank / PASI	8/22/19	0255	1.0	Y	Y	Y

SAMPLE CONDITIONS

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Eric Schneider

SIGNATURE of SAMPLER: [signature]

DATE Signed (MM/DD/YY): 08/21/19

MEMORANDUM

DATE September 30, 2019 **Project No.** 1531406

TO Project File
Golder Associates

CC Amanda Derhake, Jeff Ingram

FROM Tommy Goodwin **EMAIL Tommy_Goodwin@golder.com**

DATA VALIDATION SUMMARY, LABADIE ENERGY CENTER – LCL1 – VERIFICATION SAMPLING - DATA PACKAGE 60312685

The following is a summary of instances where quality control criteria in the functional guidelines were not met and data qualification was required:

- When a compound was detected in a sample result between the MDL and the PQL the results were recorded at the detection value and qualified as estimates (J).
- When MS/MSD recovery exceeded the QC limits, the associated sample result was qualified as an estimate (J).

Golder Associates Inc.
13515 Barrett Parkway Drive, Suite 260,
Ballwin, Missouri, USA 63021
T: +1 314 984-8800 F: +1 314 984-8770

QA LEVEL II - INORGANIC DATA EVALUATION CHECKLIST

Company Name: Golder Associates
Project Manager: J Ingram
Project Name: Ameren - Labadie - LCL1 - VS
Project Number: 1531406
Reviewer: T Goodwin
Validation Date: 9/30/2019

Laboratory: Pace Analytical - KS
SDG #: 60312685
Analytical Method (type and no.): EPA 200.7 (Metals); EPA 300.0 (Anions)
Matrix: ☐ Air ☐ Soil/Sed. ■ Water ☐ Waste ☐ _____
Sample Names L-MW-26, L-TMW-1, L-TMW-2

NOTE: Please provide calculation in Comment areas or on the back (if on the back please indicate in comment areas).

Field Information	YES	NO	NA	COMMENTS
a) Sampling dates noted?	☒	☐	☐	8/21/2019
b) Sampling team indicated?	☒	☐	☐	
c) Sample location noted?	☒	☐	☐	
d) Sample depth indicated (Soils)?	☐	☐	☒	
e) Sample type indicated (grab/composite)?	☒	☐	☐	
f) Field QC noted?	☒	☐	☐	
g) Field parameters collected (note types)?	☒	☐	☐	pH, Sp.Cond, ORP, Temp, DO, Turb
h) Field Calibration within control limits?	☒	☐	☐	
i) Notations of unacceptable field conditions/performances from field logs or field notes?	☐	☒	☐	
j) Does the laboratory narrative indicate deficiencies?	☐	☐	☒	

Note Deficiencies: _____

Chain-of-Custody (COC)	YES	NO	NA	COMMENTS
a) Was the COC properly completed?	☒	☐	☐	
b) Was the COC signed by both field and laboratory personnel?	☒	☐	☐	
c) Were samples received in good condition?	☒	☐	☐	

General (reference QAPP or Method)	YES	NO	NA	COMMENTS
a) Were hold times met for sample pretreatment?	☒	☐	☐	
b) Were hold times met for sample analysis?	☒	☐	☐	
c) Were the correct preservatives used?	☒	☐	☐	
d) Was the correct method used?	☒	☐	☐	
e) Were appropriate reporting limits achieved?	☒	☐	☐	
f) Were any sample dilutions noted?	☐	☒	☐	
g) Were any matrix problems noted?	☐	☒	☐	

QA LEVEL II - INORGANIC DATA EVALUATION CHECKLIST

Blanks	YES	NO	NA	COMMENTS
a) Were analytes detected in the method blank(s)?	☐	☒	☐	
b) Were analytes detected in the field blank(s)?	☐	☐	☒	
c) Were analytes detected in the equipment blank(s)?	☐	☐	☒	
d) Were analytes detected in the trip blank(s)?	☐	☐	☒	

Laboratory Control Sample (LCS)	YES	NO	NA	COMMENTS
a) Was a LCS analyzed once per SDG?	☒	☐	☐	
b) Were the proper analytes included in the LCS?	☒	☐	☐	
c) Was the LCS accuracy criteria met?	☒	☐	☐	

Duplicates	YES	NO	NA	COMMENTS
a) Were field duplicates collected (note original and duplicate sample names)?	☐	☒	☐	
b) Were field dup. precision criteria met (note RPD)?	☐	☐	☒	
c) Were lab duplicates analyzed (note original and duplicate samples)?	☐	☒	☐	
d) Were lab dup. precision criteria met (note RPD)?	☐	☐	☒	

Blind Standards	YES	NO	NA	COMMENTS
a) Was a blind standard used (indicate name, analytes included and concentrations)?	☐	☒	☐	
b) Was the %D within control limits?	☐	☐	☒	

Matrix Spike/Matrix Spike Duplicate (MS/MSD)	YES	NO	NA	COMMENTS
a) Was MS accuracy criteria met?	☐	☒	☐	See Notes
Recovery could not be calculated since sample contained high concentration of analyte?	☐	☐	☒	
b) Was MSD accuracy criteria met?	☐	☒	☐	See Notes
Recovery could not be calculated since sample contained high concentration of analyte?	☐	☐	☒	
c) Were MS/MSD precision criteria met?	☒	☐	☐	

Comments/Notes:

MS/MSD: -85001: Calcium %Rec High

QA LEVEL II - INORGANIC DATA EVALUATION CHECKLIST

Data Qualification:

Sample Name	Constituent(s)	Result	Qualifier	Reason
L-MW-26	Calcium (Ca)	-	J	MS/MSD Exceeded Calibration Range; %Rec High

Signature: Tony Goad Date: 9/30/19

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

January 22, 2020

Jeffrey Ingram
Golder Associates
13515 Barrett Parkway Drive
Suite 260
Ballwin, MO 63021

RE: Project: AMEREN LABADIE ENERGY CTR LCL1
Pace Project No.: 60320422

Dear Jeffrey Ingram:
Enclosed are the analytical results for sample(s) received by the laboratory on November 07, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

REV-1, 1/22/20: Samples L-BMW-1S and L-BMW-2S added to report.

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

Sincerely,

Jamie Church
jamie.church@pacelabs.com
314-838-7223
Project Manager

Enclosures

cc: Ryan Feldmann, Golder
Tommy Goodwin, Golder Associates
Mark Haddock, Golder Associates
Eric Schneider, Golder Associates

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

CERTIFICATIONS

Project: AMEREN LABADIE ENERGY CTR LCL1
Pace Project No.: 60320422

Pace Analytical Services Kansas
9608 Loiret Boulevard, Lenexa, KS 66219
Missouri Inorganic Drinking Water Certification #: 10090
Arkansas Drinking Water
Arkansas Certification #: 19-016-0
Arkansas Drinking Water
Illinois Certification #: 004455
Iowa Certification #: 118
Kansas/NELAP Certification #: E-10116
Louisiana Certification #: 03055
Nevada Certification #: KS000212020-2
Oklahoma Certification #: 9205/9935
Florida: Cert E871149 SEKS WET
Texas Certification #: T104704407-19-12
Utah Certification #: KS000212018-8
Illinois Certification #: 004592
Kansas Field Laboratory Accreditation: # E-92587
Missouri SEKS Micro Certification: 10070

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SAMPLE SUMMARY

Project: AMEREN LABADIE ENERGY CTR LCL1
Pace Project No.: 60320422

Lab ID	Sample ID	Matrix	Date Collected	Date Received
60320422001	**L-TMW-1**	Water	11/05/19 10:20	11/07/19 09:02
60320422002	**L-TMW-2**	Water	11/05/19 12:43	11/07/19 09:02
60320422003	**L-TMW-3**	Water	11/05/19 14:44	11/07/19 09:02
60320422004	**L-TMW-26**	Water	11/06/19 12:49	11/07/19 09:02
60320422005	**L-LCL1-DUP-1**	Water	11/05/19 08:00	11/07/19 09:02
60320422006	**L-LCL1-FB-1**	Water	11/05/19 14:56	11/07/19 09:02
60320429007	**L-BMW-1S**	Water	11/05/19 10:45	11/07/19 03:50
60320429008	**L-BMW-2S**	Water	11/05/19 13:25	11/07/19 03:50

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SAMPLE ANALYTE COUNT

Project: AMEREN LABADIE ENERGY CTR LCL1
Pace Project No.: 60320422

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
60320422001	**L-TMW-1**	EPA 200.7	EMR	7	PASI-K
		SM 2320B	AJS2	1	PASI-K
		SM 2540C	BLA	1	PASI-K
		EPA 300.0	MGS	3	PASI-K
60320422002	**L-TMW-2**	EPA 200.7	EMR	7	PASI-K
		SM 2320B	AJS2	1	PASI-K
		SM 2540C	BLA	1	PASI-K
		EPA 300.0	MGS	3	PASI-K
60320422003	**L-TMW-3**	EPA 200.7	EMR	7	PASI-K
		SM 2320B	AJS2	1	PASI-K
		SM 2540C	BLA	1	PASI-K
		EPA 300.0	MGS	3	PASI-K
60320422004	**L-TMW-26**	EPA 200.7	EMR	7	PASI-K
		SM 2320B	AJS2	1	PASI-K
		SM 2540C	BLA	1	PASI-K
		EPA 300.0	MGS	3	PASI-K
60320422005	**L-LCL1-DUP-1**	EPA 200.7	EMR	7	PASI-K
		SM 2320B	AJS2	1	PASI-K
		SM 2540C	BLA	1	PASI-K
		EPA 300.0	MGS	3	PASI-K
60320422006	**L-LCL1-FB-1**	EPA 200.7	EMR	7	PASI-K
		SM 2320B	AJS2	1	PASI-K
		SM 2540C	BLA	1	PASI-K
		EPA 300.0	MGS	3	PASI-K
60320429007	**L-BMW-1S**	EPA 200.7	HKC	7	PASI-K
		SM 2320B	AJS2	1	PASI-K
		SM 2540C	BLA	1	PASI-K
		EPA 300.0	MGS	3	PASI-K
60320429008	**L-BMW-2S**	EPA 200.7	HKC	7	PASI-K
		SM 2320B	AJS2	1	PASI-K
		SM 2540C	BLA	1	PASI-K
		EPA 300.0	MJK	3	PASI-K

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ANALYTICAL RESULTS

Project: AMEREN LABADIE ENERGY CTR LCL1
Pace Project No.: 60320422

Sample: L-TMW-1 **Lab ID: 60320422001** Collected: 11/05/19 10:20 Received: 11/07/19 09:02 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.7 Metals, Total	Analytical Method: EPA 200.7 Preparation Method: EPA 200.7								
Boron	**101**	ug/L	100	10.7	1	11/12/19 17:15	11/13/19 10:29	7440-42-8	
Calcium	**174000**	ug/L	200	50.0	1	11/12/19 17:15	11/13/19 10:29	7440-70-2	M1
Iron	**360**	ug/L	50.0	14.0	1	11/12/19 17:15	11/13/19 10:29	7439-89-6	
Magnesium	**45600**	ug/L	50.0	13.0	1	11/12/19 17:15	11/13/19 10:29	7439-95-4	
Manganese	**4900**	ug/L	5.0	2.1	1	11/12/19 17:15	11/13/19 10:29	7439-96-5	
Potassium	**5760**	ug/L	500	79.0	1	11/12/19 17:15	11/13/19 10:29	7440-09-7	
Sodium	**11800**	ug/L	500	144	1	11/12/19 17:15	11/13/19 10:29	7440-23-5	
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**535**	mg/L	20.0	6.5	1		11/12/19 12:24		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**673**	mg/L	10.0	10.0	1		11/11/19 13:18		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**4.4**	mg/L	1.0	0.22	1		11/15/19 13:32	16887-00-6	
Fluoride	**0.15J**	mg/L	0.20	0.085	1		11/15/19 13:32	16984-48-8	M1
Sulfate	**109**	mg/L	10.0	2.3	10		11/15/19 14:22	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: AMEREN LABADIE ENERGY CTR LCL1
Pace Project No.: 60320422

Sample: L-TMW-2 **Lab ID: 60320422002** Collected: 11/05/19 12:43 Received: 11/07/19 09:02 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.7 Metals, Total	Analytical Method: EPA 200.7 Preparation Method: EPA 200.7								
Boron	**97.3J**	ug/L	100	10.7	1	11/12/19 17:15	11/13/19 10:37	7440-42-8	
Calcium	**177000**	ug/L	200	50.0	1	11/12/19 17:15	11/13/19 10:37	7440-70-2	
Iron	**2390**	ug/L	50.0	14.0	1	11/12/19 17:15	11/13/19 10:37	7439-89-6	
Magnesium	**41100**	ug/L	50.0	13.0	1	11/12/19 17:15	11/13/19 10:37	7439-95-4	
Manganese	**2560**	ug/L	5.0	2.1	1	11/12/19 17:15	11/13/19 10:37	7439-96-5	
Potassium	**6300**	ug/L	500	79.0	1	11/12/19 17:15	11/13/19 10:37	7440-09-7	
Sodium	**9590**	ug/L	500	144	1	11/12/19 17:15	11/13/19 10:37	7440-23-5	
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**567**	mg/L	20.0	6.5	1		11/12/19 12:37		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**687**	mg/L	10.0	10.0	1		11/11/19 13:18		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**4.9**	mg/L	1.0	0.22	1		11/15/19 15:45	16887-00-6	
Fluoride	**0.13J**	mg/L	0.20	0.085	1		11/15/19 15:45	16984-48-8	
Sulfate	**82.6**	mg/L	10.0	2.3	10		11/15/19 16:01	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: AMEREN LABADIE ENERGY CTR LCL1
Pace Project No.: 60320422

Sample: L-TMW-3 **Lab ID: 60320422003** Collected: 11/05/19 14:44 Received: 11/07/19 09:02 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.7 Metals, Total	Analytical Method: EPA 200.7 Preparation Method: EPA 200.7								
Boron	**122**	ug/L	100	10.7	1	11/12/19 17:15	11/13/19 10:39	7440-42-8	
Calcium	**176000**	ug/L	200	50.0	1	11/12/19 17:15	11/13/19 10:39	7440-70-2	
Iron	**6070**	ug/L	50.0	14.0	1	11/12/19 17:15	11/13/19 10:39	7439-89-6	
Magnesium	**37000**	ug/L	50.0	13.0	1	11/12/19 17:15	11/13/19 10:39	7439-95-4	
Manganese	**1220**	ug/L	5.0	2.1	1	11/12/19 17:15	11/13/19 10:39	7439-96-5	
Potassium	**6650**	ug/L	500	79.0	1	11/12/19 17:15	11/13/19 10:39	7440-09-7	
Sodium	**7570**	ug/L	500	144	1	11/12/19 17:15	11/13/19 10:39	7440-23-5	
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**585**	mg/L	20.0	6.5	1		11/12/19 12:45		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**604**	mg/L	10.0	10.0	1		11/11/19 13:19		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**5.5**	mg/L	1.0	0.22	1		11/15/19 16:18	16887-00-6	
Fluoride	**0.089J**	mg/L	0.20	0.085	1		11/15/19 16:18	16984-48-8	
Sulfate	**44.5**	mg/L	10.0	2.3	10		11/15/19 16:35	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: AMEREN LABADIE ENERGY CTR LCL1
Pace Project No.: 60320422

Sample: L-TMW-26 **Lab ID: 60320422004** Collected: 11/06/19 12:49 Received: 11/07/19 09:02 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.7 Metals, Total	Analytical Method: EPA 200.7 Preparation Method: EPA 200.7								
Boron	**423**	ug/L	100	10.7	1	11/12/19 17:15	11/13/19 10:42	7440-42-8	
Calcium	**146000**	ug/L	200	50.0	1	11/12/19 17:15	11/13/19 10:42	7440-70-2	
Iron	**73.7**	ug/L	50.0	14.0	1	11/12/19 17:15	11/13/19 10:42	7439-89-6	
Magnesium	**28800**	ug/L	50.0	13.0	1	11/12/19 17:15	11/13/19 10:42	7439-95-4	
Manganese	**3000**	ug/L	5.0	2.1	1	11/12/19 17:15	11/13/19 10:42	7439-96-5	
Potassium	**6110**	ug/L	500	79.0	1	11/12/19 17:15	11/13/19 10:42	7440-09-7	
Sodium	**8770**	ug/L	500	144	1	11/12/19 17:15	11/13/19 10:42	7440-23-5	
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**479**	mg/L	20.0	6.5	1		11/12/19 12:51		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**540**	mg/L	10.0	10.0	1		11/11/19 13:20		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**22.5**	mg/L	10.0	2.2	10		11/15/19 17:08	16887-00-6	
Fluoride	**<0.085**	mg/L	0.20	0.085	1		11/15/19 16:51	16984-48-8	
Sulfate	**18.1**	mg/L	1.0	0.23	1		11/15/19 16:51	14808-79-8	

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ANALYTICAL RESULTS

Project: AMEREN LABADIE ENERGY CTR LCL1
Pace Project No.: 60320422

Sample: L-LCL1-DUP-1 **Lab ID: 60320422005** Collected: 11/05/19 08:00 Received: 11/07/19 09:02 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.7 Metals, Total	Analytical Method: EPA 200.7 Preparation Method: EPA 200.7								
Boron	**93.5J**	ug/L	100	10.7	1	11/12/19 17:15	11/13/19 11:30	7440-42-8	
Calcium	**178000**	ug/L	200	50.0	1	11/12/19 17:15	11/13/19 11:30	7440-70-2	
Iron	**2230**	ug/L	50.0	14.0	1	11/12/19 17:15	11/13/19 11:30	7439-89-6	
Magnesium	**41500**	ug/L	50.0	13.0	1	11/12/19 17:15	11/13/19 11:30	7439-95-4	
Manganese	**2500**	ug/L	5.0	2.1	1	11/12/19 17:15	11/13/19 11:30	7439-96-5	
Potassium	**6450**	ug/L	500	79.0	1	11/12/19 17:15	11/13/19 11:30	7440-09-7	
Sodium	**9810**	ug/L	500	144	1	11/12/19 17:15	11/13/19 11:30	7440-23-5	
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**579**	mg/L	20.0	6.5	1		11/12/19 13:09		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**676**	mg/L	10.0	10.0	1		11/11/19 13:19		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**4.9**	mg/L	1.0	0.22	1		11/15/19 17:24	16887-00-6	
Fluoride	**0.12J**	mg/L	0.20	0.085	1		11/15/19 17:24	16984-48-8	
Sulfate	**84.3**	mg/L	10.0	2.3	10		11/15/19 17:41	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: AMEREN LABADIE ENERGY CTR LCL1
Pace Project No.: 60320422

Sample: L-LCL1-FB-1 **Lab ID: 60320422006** Collected: 11/05/19 14:56 Received: 11/07/19 09:02 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.7 Metals, Total	Analytical Method: EPA 200.7 Preparation Method: EPA 200.7								
Boron	**<10.7**	ug/L	100	10.7	1	11/12/19 17:15	11/13/19 10:27	7440-42-8	
Calcium	**<50.0**	ug/L	200	50.0	1	11/12/19 17:15	11/13/19 10:27	7440-70-2	
Iron	**<14.0**	ug/L	50.0	14.0	1	11/12/19 17:15	11/13/19 10:27	7439-89-6	
Magnesium	**<13.0**	ug/L	50.0	13.0	1	11/12/19 17:15	11/13/19 10:27	7439-95-4	
Manganese	**<2.1**	ug/L	5.0	2.1	1	11/12/19 17:15	11/13/19 10:27	7439-96-5	
Potassium	**<79.0**	ug/L	500	79.0	1	11/12/19 17:15	11/13/19 10:27	7440-09-7	
Sodium	**<144**	ug/L	500	144	1	11/12/19 17:15	11/13/19 10:27	7440-23-5	
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**<6.5**	mg/L	20.0	6.5	1		11/12/19 13:12		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**5.0**	mg/L	5.0	5.0	1		11/11/19 13:19		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**<0.22**	mg/L	1.0	0.22	1		11/15/19 18:31	16887-00-6	
Fluoride	**<0.085**	mg/L	0.20	0.085	1		11/15/19 18:31	16984-48-8	
Sulfate	**<0.23**	mg/L	1.0	0.23	1		11/15/19 18:31	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: AMEREN LABADIE ENERGY CTR LCL1
Pace Project No.: 60320422

Sample: L-BMW-1S **Lab ID: 60320429007** Collected: 11/05/19 10:45 Received: 11/07/19 03:50 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.7 Metals, Total	Analytical Method: EPA 200.7 Preparation Method: EPA 200.7								
Boron	**122**	ug/L	100	10.7	1	11/13/19 14:22	11/14/19 15:25	7440-42-8	
Calcium	**194000**	ug/L	200	50.0	1	11/13/19 14:22	11/14/19 15:25	7440-70-2	
Iron	**32000**	ug/L	50.0	14.0	1	11/13/19 14:22	11/14/19 15:25	7439-89-6	
Magnesium	**43400**	ug/L	50.0	13.0	1	11/13/19 14:22	11/14/19 15:25	7439-95-4	
Manganese	**2570**	ug/L	5.0	2.1	1	11/13/19 14:22	11/14/19 15:25	7439-96-5	
Potassium	**5880**	ug/L	500	79.0	1	11/13/19 14:22	11/14/19 15:25	7440-09-7	
Sodium	**19600**	ug/L	500	144	1	11/13/19 14:22	11/14/19 15:25	7440-23-5	
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**671**	mg/L	20.0	6.5	1		11/12/19 14:01		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**700**	mg/L	10.0	10.0	1		11/11/19 13:19		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**4.8**	mg/L	1.0	0.22	1		11/16/19 01:59	16887-00-6	
Fluoride	**<0.085**	mg/L	0.20	0.085	1		11/16/19 01:59	16984-48-8	
Sulfate	**29.9**	mg/L	5.0	1.2	5		11/16/19 02:16	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: AMEREN LABADIE ENERGY CTR LCL1
Pace Project No.: 60320422

Sample: L-BMW-2S **Lab ID: 60320429008** Collected: 11/05/19 13:25 Received: 11/07/19 03:50 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.7 Metals, Total	Analytical Method: EPA 200.7 Preparation Method: EPA 200.7								
Boron	**61.2J**	ug/L	100	10.7	1	11/13/19 14:22	11/14/19 15:27	7440-42-8	
Calcium	**125000**	ug/L	200	50.0	1	11/13/19 14:22	11/14/19 15:27	7440-70-2	
Iron	**22.1J**	ug/L	50.0	14.0	1	11/13/19 14:22	11/14/19 15:27	7439-89-6	
Magnesium	**18700**	ug/L	50.0	13.0	1	11/13/19 14:22	11/14/19 15:27	7439-95-4	
Manganese	**<2.1**	ug/L	5.0	2.1	1	11/13/19 14:22	11/14/19 15:27	7439-96-5	
Potassium	**7240**	ug/L	500	79.0	1	11/13/19 14:22	11/14/19 15:27	7440-09-7	
Sodium	**8560**	ug/L	500	144	1	11/13/19 14:22	11/14/19 15:27	7440-23-5	
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**371**	mg/L	20.0	6.5	1		11/12/19 14:17		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**425**	mg/L	5.0	5.0	1		11/11/19 13:19		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**3.3**	mg/L	1.0	0.22	1		11/18/19 13:20	16887-00-6	
Fluoride	**0.12J**	mg/L	0.20	0.085	1		11/18/19 13:20	16984-48-8	
Sulfate	**28.5**	mg/L	5.0	1.2	5		11/18/19 13:36	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: AMEREN LABADIE ENERGY CTR LCL1
Pace Project No.: 60320422

QC Batch: 621917 Analysis Method: EPA 200.7
QC Batch Method: EPA 200.7 Analysis Description: 200.7 Metals, Total
Associated Lab Samples: 60320422001, 60320422002, 60320422003, 60320422004, 60320422005, 60320422006

METHOD BLANK: 2535914 Matrix: Water
Associated Lab Samples: 60320422001, 60320422002, 60320422003, 60320422004, 60320422005, 60320422006

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Boron	ug/L	<10.7	100	10.7	11/13/19 10:24	
Calcium	ug/L	<50.0	200	50.0	11/13/19 10:24	
Iron	ug/L	<14.0	50.0	14.0	11/13/19 10:24	
Magnesium	ug/L	<13.0	50.0	13.0	11/13/19 10:24	
Manganese	ug/L	<2.1	5.0	2.1	11/13/19 10:24	
Potassium	ug/L	<79.0	500	79.0	11/13/19 10:24	
Sodium	ug/L	<144	500	144	11/13/19 10:24	

LABORATORY CONTROL SAMPLE: 2535915

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Boron	ug/L	1000	927	93	85-115	
Calcium	ug/L	10000	9580	96	85-115	
Iron	ug/L	10000	9510	95	85-115	
Magnesium	ug/L	10000	9490	95	85-115	
Manganese	ug/L	1000	931	93	85-115	
Potassium	ug/L	10000	9370	94	85-115	
Sodium	ug/L	10000	9650	96	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2535916 2535917

Parameter	Units	60320422001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Boron	ug/L	101	1000	1000	1080	1080	98	97	70-130	1	20	
Calcium	ug/L	174000	10000	10000	179000	181000	52	71	70-130	1	20	M1
Iron	ug/L	360	10000	10000	10100	10100	98	98	70-130	0	20	
Magnesium	ug/L	45600	10000	10000	54300	54700	87	91	70-130	1	20	
Manganese	ug/L	4900	1000	1000	5650	5770	76	88	70-130	2	20	
Potassium	ug/L	5760	10000	10000	15600	15600	98	98	70-130	0	20	
Sodium	ug/L	11800	10000	10000	21500	21700	97	99	70-130	1	20	

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REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
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Lenexa, KS 66219
(913)599-5665

QUALITY CONTROL DATA

Project: AMEREN LABADIE ENERGY CTR LCL1
Pace Project No.: 60320422

QC Batch: 622126 Analysis Method: EPA 200.7
QC Batch Method: EPA 200.7 Analysis Description: 200.7 Metals, Total
Associated Lab Samples: 60320429007, 60320429008

METHOD BLANK: 2536680 Matrix: Water
Associated Lab Samples: 60320429007, 60320429008

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Boron	ug/L	<10.7	100	10.7	11/14/19 14:40	
Calcium	ug/L	<50.0	200	50.0	11/14/19 14:40	
Iron	ug/L	<14.0	50.0	14.0	11/14/19 14:40	
Magnesium	ug/L	<13.0	50.0	13.0	11/14/19 14:40	
Manganese	ug/L	<2.1	5.0	2.1	11/14/19 14:40	
Potassium	ug/L	169J	500	79.0	11/14/19 14:40	
Sodium	ug/L	<144	500	144	11/14/19 14:40	

LABORATORY CONTROL SAMPLE: 2536681

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Boron	ug/L	1000	980	98	85-115	
Calcium	ug/L	10000	10300	103	85-115	
Iron	ug/L	10000	10100	101	85-115	
Magnesium	ug/L	10000	10200	102	85-115	
Manganese	ug/L	1000	991	99	85-115	
Potassium	ug/L	10000	10200	102	85-115	
Sodium	ug/L	10000	10400	104	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2536682 2536683

Parameter	Units	60320429001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Boron	ug/L	8730	1000	1000	9720	9870	100	115	70-130	2	20	
Calcium	ug/L	136000	10000	10000	145000	147000	88	115	70-130	2	20	
Iron	ug/L	5360	10000	10000	15200	15500	98	101	70-130	2	20	
Magnesium	ug/L	24700	10000	10000	34200	34700	95	100	70-130	2	20	
Manganese	ug/L	1360	1000	1000	2360	2390	100	103	70-130	2	20	
Potassium	ug/L	7540	10000	10000	17200	17500	97	100	70-130	2	20	
Sodium	ug/L	81900	10000	10000	92500	94800	106	129	70-130	2	20	

MATRIX SPIKE SAMPLE: 2536684

Parameter	Units	60320429006 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Boron	ug/L	7750	1000	8780	103	70-130	
Calcium	ug/L	212000	10000	222000	97	70-130	
Iron	ug/L	18000	10000	28000	101	70-130	

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REPORT OF LABORATORY ANALYSIS

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(913)599-5665

QUALITY CONTROL DATA

Project: AMEREN LABADIE ENERGY CTR LCL1
Pace Project No.: 60320422

MATRIX SPIKE SAMPLE: 2536684

Parameter	Units	60320429006 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Magnesium	ug/L	37100	10000	47200	101	70-130	
Manganese	ug/L	2850	1000	3840	99	70-130	
Potassium	ug/L	8570	10000	18700	101	70-130	
Sodium	ug/L	106000	10000	116000	101	70-130	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: AMEREN LABADIE ENERGY CTR LCL1
Pace Project No.: 60320422

QC Batch: 621823 Analysis Method: SM 2320B
QC Batch Method: SM 2320B Analysis Description: 2320B Alkalinity
Associated Lab Samples: 60320422001, 60320422002, 60320422003, 60320422004, 60320422005, 60320422006, 60320429007, 60320429008

METHOD BLANK: 2535596 Matrix: Water
Associated Lab Samples: 60320422001, 60320422002, 60320422003, 60320422004, 60320422005, 60320422006, 60320429007, 60320429008

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Alkalinity, Total as CaCO3	mg/L	<6.5	20.0	6.5	11/12/19 11:56	

LABORATORY CONTROL SAMPLE: 2535597

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity, Total as CaCO3	mg/L	500	499	100	90-110	

SAMPLE DUPLICATE: 2535600

Parameter	Units	60320422001 Result	Dup Result	RPD	Max RPD	Qualifiers
Alkalinity, Total as CaCO3	mg/L	535	531	1	10	

SAMPLE DUPLICATE: 2535601

Parameter	Units	60320429001 Result	Dup Result	RPD	Max RPD	Qualifiers
Alkalinity, Total as CaCO3	mg/L	377	383	2	10	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: AMEREN LABADIE ENERGY CTR LCL1
Pace Project No.: 60320422

QC Batch: 621544 Analysis Method: SM 2540C
QC Batch Method: SM 2540C Analysis Description: 2540C Total Dissolved Solids
Associated Lab Samples: 60320422001, 60320422002, 60320422003, 60320422004, 60320422005, 60320422006, 60320429007, 60320429008

METHOD BLANK: 2534910 Matrix: Water
Associated Lab Samples: 60320422001, 60320422002, 60320422003, 60320422004, 60320422005, 60320422006, 60320429007, 60320429008

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	<5.0	5.0	5.0	11/11/19 13:18	

LABORATORY CONTROL SAMPLE: 2534911

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Dissolved Solids	mg/L	1000	1010	101	80-120	

SAMPLE DUPLICATE: 2534912

Parameter	Units	60320422001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	673	691	3	10	

SAMPLE DUPLICATE: 2534913

Parameter	Units	60320429001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	804	844	5	10	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: AMEREN LABADIE ENERGY CTR LCL1
Pace Project No.: 60320422

QC Batch: 622423 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 60320422001, 60320422002, 60320422003, 60320422004, 60320422005, 60320422006, 60320429007

METHOD BLANK: 2537721 Matrix: Water
Associated Lab Samples: 60320422001, 60320422002, 60320422003, 60320422004, 60320422005, 60320422006, 60320429007

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Chloride	mg/L	<0.22	1.0	0.22	11/15/19 12:43	
Fluoride	mg/L	<0.085	0.20	0.085	11/15/19 12:43	
Sulfate	mg/L	<0.23	1.0	0.23	11/15/19 12:43	

METHOD BLANK: 2539925 Matrix: Water
Associated Lab Samples: 60320422001, 60320422002, 60320422003, 60320422004, 60320422005, 60320422006, 60320429007

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Chloride	mg/L	<0.22	1.0	0.22	11/16/19 12:00	
Fluoride	mg/L	<0.085	0.20	0.085	11/16/19 12:00	
Sulfate	mg/L	0.27J	1.0	0.23	11/16/19 12:00	

LABORATORY CONTROL SAMPLE: 2537722

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	5	4.8	96	90-110	
Fluoride	mg/L	2.5	2.7	107	90-110	
Sulfate	mg/L	5	5.3	107	90-110	

LABORATORY CONTROL SAMPLE: 2539926

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	5	4.6	92	90-110	
Fluoride	mg/L	2.5	2.6	104	90-110	
Sulfate	mg/L	5	5.4	108	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2537723 2537724

Parameter	Units	60320422001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	4.4	5	5	9.3	9.4	98	99	80-120	1	15	
Fluoride	mg/L	0.15J	2.5	2.5	3.1	3.2	118	121	80-120	2	15	M1
Sulfate	mg/L	109	50	50	161	160	103	102	80-120	0	15	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: AMEREN LABADIE ENERGY CTR LCL1
Pace Project No.: 60320422

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2537725 2537726

Parameter	Units	60320429001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	25.2	10	10	36.1	36.0	109	108	80-120	0	15	
Fluoride	mg/L	0.17J	2.5	2.5	3.1	3.2	116	120	80-120	3	15	
Sulfate	mg/L	261	100	100	362	373	101	113	80-120	3	15	

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QUALITY CONTROL DATA

Project: AMEREN LABADIE ENERGY CTR LCL1
Pace Project No.: 60320422

QC Batch: 622840 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 60320429008

METHOD BLANK: 2540041 Matrix: Water
Associated Lab Samples: 60320429008

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Chloride	mg/L	<0.22	1.0	0.22	11/18/19 08:21	
Fluoride	mg/L	<0.085	0.20	0.085	11/18/19 08:21	
Sulfate	mg/L	<0.23	1.0	0.23	11/18/19 08:21	

METHOD BLANK: 2541249 Matrix: Water
Associated Lab Samples: 60320429008

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Chloride	mg/L	<0.22	1.0	0.22	11/19/19 07:40	
Fluoride	mg/L	<0.085	0.20	0.085	11/19/19 07:40	
Sulfate	mg/L	0.30J	1.0	0.23	11/19/19 07:40	

METHOD BLANK: 2543009 Matrix: Water
Associated Lab Samples: 60320429008

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Chloride	mg/L	0.45J	1.0	0.22	11/20/19 09:10	
Fluoride	mg/L	<0.085	0.20	0.085	11/20/19 09:10	
Sulfate	mg/L	<0.23	1.0	0.23	11/20/19 09:10	

LABORATORY CONTROL SAMPLE: 2540042

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	5	4.8	96	90-110	
Fluoride	mg/L	2.5	2.6	106	90-110	
Sulfate	mg/L	5	5.3	107	90-110	

LABORATORY CONTROL SAMPLE: 2541250

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	5	5.0	100	90-110	
Fluoride	mg/L	2.5	2.6	102	90-110	
Sulfate	mg/L	5	5.0	101	90-110	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: AMEREN LABADIE ENERGY CTR LCL1
Pace Project No.: 60320422

LABORATORY CONTROL SAMPLE: 2543010

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	5	4.9	98	90-110	
Fluoride	mg/L	2.5	2.6	102	90-110	
Sulfate	mg/L	5	5.1	101	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2540043 2540044

Parameter	Units	60320174002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	10.9	50	50	58.8	56.0	96	90	80-120	5	15	H3
Fluoride	mg/L	1.1J	25	25	30.5	28.6	118	110	80-120	6	15	H3
Sulfate	mg/L	229	250	250	485	479	103	100	80-120	1	15	H3

MATRIX SPIKE SAMPLE: 2540045

Parameter	Units	60321269006 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	906	250	1150	99	80-120	E
Fluoride	mg/L	31.1	125	168	109	80-120	
Sulfate	mg/L	72.9	250	336	105	80-120	

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REPORT OF LABORATORY ANALYSIS

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QUALIFIERS

Project: AMEREN LABADIE ENERGY CTR LCL1
Pace Project No.: 60320422

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

LABORATORIES

PASI-K	Pace Analytical Services - Kansas City

ANALYTE QUALIFIERS

E	Analyte concentration exceeded the calibration range. The reported result is estimated.
H3	Sample was received or analysis requested beyond the recognized method holding time.
M1	Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: AMEREN LABADIE ENERGY CTR LCL1
Pace Project No.: 60320422

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
60320422001	L-TMW-1	EPA 200.7	621917	EPA 200.7	621979
60320422002	L-TMW-2	EPA 200.7	621917	EPA 200.7	621979
60320422003	L-TMW-3	EPA 200.7	621917	EPA 200.7	621979
60320422004	L-TMW-26	EPA 200.7	621917	EPA 200.7	621979
60320422005	L-LCL1-DUP-1	EPA 200.7	621917	EPA 200.7	621979
60320422006	L-LCL1-FB-1	EPA 200.7	621917	EPA 200.7	621979
60320429007	L-BMW-1S	EPA 200.7	622126	EPA 200.7	622187
60320429008	L-BMW-2S	EPA 200.7	622126	EPA 200.7	622187
60320422001	L-TMW-1	SM 2320B	621823		
60320422002	L-TMW-2	SM 2320B	621823		
60320422003	L-TMW-3	SM 2320B	621823		
60320422004	L-TMW-26	SM 2320B	621823		
60320422005	L-LCL1-DUP-1	SM 2320B	621823		
60320422006	L-LCL1-FB-1	SM 2320B	621823		
60320429007	L-BMW-1S	SM 2320B	621823		
60320429008	L-BMW-2S	SM 2320B	621823		
60320422001	L-TMW-1	SM 2540C	621544		
60320422002	L-TMW-2	SM 2540C	621544		
60320422003	L-TMW-3	SM 2540C	621544		
60320422004	L-TMW-26	SM 2540C	621544		
60320422005	L-LCL1-DUP-1	SM 2540C	621544		
60320422006	L-LCL1-FB-1	SM 2540C	621544		
60320429007	L-BMW-1S	SM 2540C	621544		
60320429008	L-BMW-2S	SM 2540C	621544		
60320422001	L-TMW-1	EPA 300.0	622423		
60320422002	L-TMW-2	EPA 300.0	622423		
60320422003	L-TMW-3	EPA 300.0	622423		
60320422004	L-TMW-26	EPA 300.0	622423		
60320422005	L-LCL1-DUP-1	EPA 300.0	622423		
60320422006	L-LCL1-FB-1	EPA 300.0	622423		
60320429007	L-BMW-1S	EPA 300.0	622423		
60320429008	L-BMW-2S	EPA 300.0	622840		

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Sample Condition Upon Receipt

WO# : 60320422

60320422

Client Name: Golder

Courier: FedEx ☐ UPS ☐ VIA ☐ Clay ☐ PEX ☐ ECI ☐ Pace ☐ Xroads ☑ Client ☐ Other ☐

Tracking #: _____ Pace Shipping Label Used? Yes ☑ No ☐

Custody Seal on Cooler/Box Present: Yes ☑ No ☐ Seals intact: Yes ☑ No ☐

Packing Material: Bubble Wrap ☐ Bubble Bags ☐ Foam ☐ None ☐ Other ☑ 2PIC

Thermometer Used: T296 **Type of Ice:** (Wet) Blue None

Cooler Temperature (°C): **As-read** 0.1, 0.5 **Corr. Factor** 0.0 **Corrected** 0.1, 0.5

Date and initials of person examining contents: VB 11/7/19

Temperature should be above freezing to 6°C

Chain of Custody present:	☑Yes ☐No ☐N/A	
Chain of Custody relinquished:	☑Yes ☐No ☐N/A	
Samples arrived within holding time:	☑Yes ☐No ☐N/A	
Short Hold Time analyses (<72hr):	☐Yes ☑No ☐N/A	
Rush Turn Around Time requested:	☐Yes ☑No ☐N/A	
Sufficient volume:	☑Yes ☐No ☐N/A	
Correct containers used:	☑Yes ☐No ☐N/A	
Pace containers used:	☑Yes ☐No ☐N/A	
Containers intact:	☑Yes ☐No ☐N/A	
Unpreserved 5035A / TX1005/1006 soils frozen in 48hrs?	☐Yes ☐No ☑N/A	
Filtered volume received for dissolved tests?	☐Yes ☐No ☑N/A	
Sample labels match COC: Date / time / ID / analyses	☑Yes ☐No ☐N/A	
Samples contain multiple phases? Matrix: WT	☐Yes ☑No ☐N/A	
Containers requiring pH preservation in compliance? (HNO_3, H_2SO_4, HCl<2; NaOH>9 Sulfide, NaOH>10 Cyanide) (Exceptions: VOA, Micro, O&G, KS TPH, OK-DRO)	☑Yes ☐No ☐N/A	List sample IDs, volumes, lot #'s of preservative and the date/time added.
Cyanide water sample checks: Lead acetate strip turns dark? (Record only)	☐Yes ☐No	
Potassium iodide test strip turns blue/purple? (Preserve)	☐Yes ☐No	
Trip Blank present:	☐Yes ☐No ☑N/A	
Headspace in VOA vials (>6mm):	☐Yes ☐No ☑N/A	
Samples from USDA Regulated Area: State:	☐Yes ☐No ☑N/A	
Additional labels attached to 5035A / TX1005 vials in the field?	☐Yes ☐No ☑N/A	

Client Notification/ Resolution: Copy COC to Client? Y / N Field Data Required? Y / N

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: Jami Church 11/7/19 Date: _____

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CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Section A Required Client Information:		Section B Required Project Information:		Section C Invoice Information:	
Company:	Golder Associates	Report To:	Jeffrey Ingram	Attention:	
Address:	13515 Barrett Parkway Dr., Ste 260	Copy To:		Company Name:	
	Ballwin, MO 63021			Address:	
Email To:	jeffrey_ingram@golder.com	Purchase Order No.:		Pace Quote Reference:	
Phone:	636-724-9191 Fax: 636-724-9323	Project Name:	Ameren Labadie Energy Center LCL1	Pace Project Manager:	Jamie Church
Requested Due Date/TAT:	Standard	Project Number:		Pace Profile #:	9285

REGULATORY AGENCY

☐ NPDES ☑ GROUND WATER ☐ DRINKING WATER
☐ UST ☐ RCRA ☐ OTHER _____

Site Location STATE: MO

Requested Analysis Filtered (Y/N)

ITEM #	Section D Required Client Information — SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED COMPOSITE START DATE	COMPOSITE START TIME	COMPOSITE END/GRAB DATE	COMPOSITE END/GRAB TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test Y/N	Metals*	Chloride/Fluoride/Sulfate	TDS	Alkalinity	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
	Valid Matrix Codes: DRINKING WATER DW; WATER WT; WASTE WATER WW; PRODUCT P; SOIL/SOLID SL; OIL OL; WP; AR; OT; TS																	N	N	N	N		60320472
1	L-TMW-1	WT	G			11/5/19	1020		2	1		1						1	1	1	1		001
2	L-TMW-2	WT	G			"	1243																002
3	L-TMW-3	WT	G			"	1444																003
4	L-MW-26	WT	G			11/6/19	1249																004
5	L-~~TMW~~ LCL1-DUP-1	WT	G			11/5/19	—																005
6	L-~~TMW~~ LCL1-FB-1	WT	G			"	1456																006
7	L-TMW-1-MS	WT	G			11/5/19	1020																001
8	L-TMW-1-MSD	WT	G			"	"		"	"		"											001
9		WT	G																				
10		WT	G																				
11		WT	G																				
12		WT	G																				

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS: Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)
*EPA 200.7: B, Ca, Fe, Mn, Mg, K, Na	Golder	11/6/19	1745	Valtia B Pace	11/7/19	0350	0.1	Y	Y	Y
							0.5	↓	↓	↓

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Eric Schneider

SIGNATURE of SAMPLER: [signature] DATE Signed (MM/DD/YY): 11/6/19

*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.

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Sample Condition Upon Receipt

WO# : 60320741

60320741

Client Name: Golder Associates

Courier: FedEx ☐ UPS ☐ VIA ☐ Clay ☐ PEX ☐ ECI ☐ Pace ☐ Xroads ☑ Client ☐ Other ☐

Tracking #: _____ Pace Shipping Label Used? Yes ☑ No ☐

Custody Seal on Cooler/Box Present: Yes ☑ No ☐ Seals intact: Yes ☑ No ☐

Packing Material: Bubble Wrap ☐ Bubble Bags ☐ Foam ☐ None ☐ Other ☑ 2 PIC

Thermometer Used: T298 **Type of Ice:** Wet Blue None

Cooler Temperature (°C): **As-read** 0.1 **Corr. Factor** +0.0 **Corrected** 0.1

Date and initials of person examining contents: VB 11/9/19

Temperature should be above freezing to 6°C

Chain of Custody present:	☑Yes ☐No ☐N/A	
Chain of Custody relinquished:	☑Yes ☐No ☐N/A	
Samples arrived within holding time:	☑Yes ☐No ☐N/A	
Short Hold Time analyses (<72hr):	☐Yes ☑No ☐N/A	
Rush Turn Around Time requested:	☐Yes ☑No ☐N/A	
Sufficient volume:	☑Yes ☐No ☐N/A	
Correct containers used:	☑Yes ☐No ☐N/A	
Pace containers used:	☑Yes ☐No ☐N/A	
Containers intact:	☑Yes ☐No ☐N/A	
Unpreserved 5035A / TX1005/1006 soils frozen in 48hrs?	☐Yes ☐No ☑N/A	
Filtered volume received for dissolved tests?	☐Yes ☐No ☑N/A	
Sample labels match COC: Date / time / ID / analyses	☑Yes ☐No ☐N/A	
Samples contain multiple phases? Matrix: Wt	☐Yes ☑No ☐N/A	
Containers requiring pH preservation in compliance? (HNO_3, H_2SO_4, HCl<2; NaOH>9 Sulfide, NaOH>10 Cyanide) (Exceptions: VOA, Micro, O&G, KS TPH, OK-DRO)	☑Yes ☐No ☐N/A	List sample IDs, volumes, lot #'s of preservative and the date/time added.
Cyanide water sample checks: Lead acetate strip turns dark? (Record only)	☐Yes ☐No	
Potassium iodide test strip turns blue/purple? (Preserve)	☐Yes ☐No	
Trip Blank present:	☐Yes ☐No ☑N/A	
Headspace in VOA vials (>6mm):	☐Yes ☐No ☑N/A	
Samples from USDA Regulated Area: State:	☐Yes ☐No ☑N/A	
Additional labels attached to 5035A / TX1005 vials in the field?	☐Yes ☐No ☑N/A	

Client Notification/ Resolution: Copy COC to Client? Y / N Field Data Required? Y / N

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: Jami Church Date: 11/10/19

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CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Page: 1 of 1

Section A Required Client Information:		Section B Required Project Information:		Section C Invoice Information:	
Company:	Golder Associates	Report To:	Jeffrey Ingram	Attention:	
Address:	13515 Barrett Parkway Dr., Ste 260	Copy To:		Company Name:	
	Ballwin, MO 63021			Address:	
Email To:	jeffrey_ingram@golder.com	Purchase Order No.:		Pace Quote Reference:	
Phone:	636-724-9191 Fax: 636-724-9323	Project Name:	Ameren Labadie Energy Center LCPB	Pace Project Manager:	Jamie Church
Requested Due Date/TAT:	Standard	Project Number:		Pace Profile #:	9285

REGULATORY AGENCY

☐ NPDES ☑ GROUND WATER ☐ DRINKING WATER
☐ UST ☐ RCRA ☐ OTHER _____

Site Location STATE: MO

Section D Required Client Information

Valid Matrix Codes

MATRIX	CODE
DRINKING WATER	DW
WATER	WT
WASTE WATER	WW
PRODUCT	P
SOIL/SOLID	SL
OIL	OL
	WP
	AR
	OT
	TS

SAMPLE ID
(A-Z, 0-9 / ,-)
Sample IDs MUST BE UNIQUE

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED: COMPOSITE START DATE	COMPOSITE START TIME	COMPOSITE END/GRAB DATE	COMPOSITE END/GRAB TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test ↓ Y/N	Metals*	Chloride/Fluoride/Sulfate	TDS	Alkalinity	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
																			N	N	N	N		60320741
1	L-LMW-1S	WT	G			11-7-19	1110		2	1		1							✓	✓	✓	✓		001
2	L-LMW-2S	WT	G			1	1139		2	1		1							✓	✓	✓	✓		002
3	L-LMW-3S	WT	G																					
4	L-LMW-4S	WT	G																					
5	L-LMW-5S	WT	G																					
6	L-LMW-6S	WT	G																					
7	L-LMW-7S	WT	G																					
8	L-LMW-8S	WT	G																					
9	L-BMW-1S	WT	G																					
10	L-BMW-2S	WT	G																					
11	L-LMW-DUP-1	WT	G																					
12	L-LMW-FB-1	WT	G																					

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS: Temp In °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)
*EPA 200.7: B, Ca, Fe, Mn, Mg, K, Na	Annie Muehlfarth / Golder	11/8/19	1628	Angela McMa	11/8	16:25				
	Angela McMa	11/8	16:25	Pace	11/9/19	0255	0.1	Y	Y	Y

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Annie Muehlfarth

SIGNATURE of SAMPLER: Annie Muehlfarth DATE Signed (MM/DD/YY): 11-7-19

*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.

MEMORANDUM

DATE January 23, 2020 **Project No.** 153140601

TO Project File
Golder Associates

CC Amanda Derhake, Jeff Ingram

FROM Tommy Goodwin **EMAIL Tommy_Goodwin@golder.com**

DATA VALIDATION SUMMARY, LABADIE ENERGY CENTER – LCL1 – VERIFICATION SAMPLING - DATA PACKAGE 60320422REV1

The following is a summary of instances where quality control criteria in the functional guidelines were not met and data qualification was required:

- When a compound was detected in a sample result between the MDL and the PQL the results were recorded at the detection value and qualified as estimates (J).
- When MS/MSD recovery exceeded the QC limits, the associated sample result was qualified as an estimate (J).

Golder Associates Inc.
13515 Barrett Parkway Drive, Suite 260,
Ballwin, Missouri, USA 63021

T: +1 314 984-8800 F: +1 314 984-8770

QA LEVEL II - INORGANIC DATA EVALUATION CHECKLIST

Company Name: Golder Associates
Project Name: Ameren - Labadie - LCL1 - DM
Reviewer: T Goodwin

Project Manager: J Ingram
Project Number: 1531406
Validation Date: 1/23/2020

Laboratory: Pace Analytical - KS
SDG #: 60320422rev1
Analytical Method (type and no.): EPA 200.7 (Metals); SM2320B (Alkalinity); SM2540C (Total Dissolved Solids); EPA 300.0 (Anions)
Matrix: ☐ Air ☐ Soil/Sed. ■ Water ☐ Waste ☐
Sample Names L-TMW-1, L-TMW-2, L-TMW-3, L-TMW-26, L-LCL1-DUP-1, L-LCL1-FB-1, L-BMW-1S, L-BMW-2S

NOTE: Please provide calculation in Comment areas or on the back (if on the back please indicate in comment areas).

Field Information	YES	NO	NA	COMMENTS
a) Sampling dates noted?	☒	☐	☐	11/5-11/6/2019
b) Sampling team indicated?	☒	☐	☐	
c) Sample location noted?	☒	☐	☐	
d) Sample depth indicated (Soils)?	☐	☐	☒	
e) Sample type indicated (grab/composite)?	☒	☐	☐	
f) Field QC noted?	☒	☐	☐	
g) Field parameters collected (note types)?	☒	☐	☐	pH, Sp.Cond, ORP, Temp, DO, Turb
h) Field Calibration within control limits?	☒	☐	☐	
i) Notations of unacceptable field conditions/performances from field logs or field notes?	☐	☒	☐	
j) Does the laboratory narrative indicate deficiencies?	☐	☐	☒	

Note Deficiencies:

Chain-of-Custody (COC)	YES	NO	NA	COMMENTS
a) Was the COC properly completed?	☒	☐	☐	
b) Was the COC signed by both field and laboratory personnel?	☒	☐	☐	
c) Were samples received in good condition?	☒	☐	☐	

General (reference QAPP or Method)	YES	NO	NA	COMMENTS
a) Were hold times met for sample pretreatment?	☒	☐	☐	
b) Were hold times met for sample analysis?	☒	☐	☐	
c) Were the correct preservatives used?	☒	☐	☐	
d) Was the correct method used?	☒	☐	☐	
e) Were appropriate reporting limits achieved?	☒	☐	☐	
f) Were any sample dilutions noted?	☒	☐	☐	See Notes
g) Were any matrix problems noted?	☐	☒	☐	

QA LEVEL II - INORGANIC DATA EVALUATION CHECKLIST

Blanks	**YES**	**NO**	**NA**	**COMMENTS**
a) Were analytes detected in the method blank(s)?	☒	☐	☐	See Notes
b) Were analytes detected in the field blank(s)?	☒	☐	☐	See Notes
c) Were analytes detected in the equipment blank(s)?	☐	☐	☒	
d) Were analytes detected in the trip blank(s)?	☐	☐	☒	

Laboratory Control Sample (LCS)	**YES**	**NO**	**NA**	**COMMENTS**
a) Was a LCS analyzed once per SDG?	☒	☐	☐	
b) Were the proper analytes included in the LCS?	☒	☐	☐	
c) Was the LCS accuracy criteria met?	☒	☐	☐	

Duplicates	**YES**	**NO**	**NA**	**COMMENTS**
a) Were field duplicates collected (note original and duplicate sample names)?				DUP-1 @ L-TMW-2
	☒	☐	☐	FB-1 @ L-TMW-3
b) Were field dup. precision criteria met (note RPD)?	☒	☐	☐	See Notes
c) Were lab duplicates analyzed (note original and duplicate samples)?				
	☒	☐	☐	-22001 (Alk, TDS); -29001 (Alk, TDS)
d) Were lab dup. precision criteria met (note RPD)?	☒	☐	☐	See Notes

Blind Standards	**YES**	**NO**	**NA**	**COMMENTS**
a) Was a blind standard used (indicate name, analytes included and concentrations)?	☐	☒	☐	
b) Was the %D within control limits?	☐	☐	☒	

Matrix Spike/Matrix Spike Duplicate (MS/MSD)	**YES**	**NO**	**NA**	**COMMENTS**
a) Was MS accuracy criteria met?	☐	☒	☐	See Notes
Recovery could not be calculated since sample contained high concentration of analyte?	☐	☐	☒	
b) Was MSD accuracy criteria met?	☐	☒	☐	See Notes
Recovery could not be calculated since sample contained high concentration of analyte?	☐	☐	☒	
c) Were MS/MSD precision criteria met?	☒	☐	☐	

Comments/Notes:

MS/MSD: -22001: Ca_MS-L (52%), F_MSD-H (121%)

MB: -22001-06, -29007: SO4 (0.27);

-29007-08: K (169); -29008: SO4 (0.30) and Cl (0.45)

FB: TDS (5.0)

Max Field Duplicate RPD: 8% (Limit: 20%)

Max Lab Duplicate RPD: 5% (Limit: 10%)

Dilution: Chloride and Sulfate diluted in several samples; no qualification is necessary.

QA LEVEL II - INORGANIC DATA EVALUATION CHECKLIST

Data Qualification:

Sample Name	Constituent(s)	Result	Qualifier	Reason
L-TMW-1	Calcium (Ca)	174000	J	MS/MSD Exceeded Calibration Range
"	Fluoride (F)	0.15	J	MS/MSD Exceeded Calibration Range

Signature: Tommy J Good Jr Date: 1/23/2020

APPENDIX B

Alternative Source Demonstration - November 2018 Sampling Event

LCL1 - Alternative Source Demonstration

Labadie Energy Center, Franklin County, Missouri, USA

Submitted to:

Ameren Missouri

1901 Chouteau Ave, St. Louis, MO 63103

Submitted by:

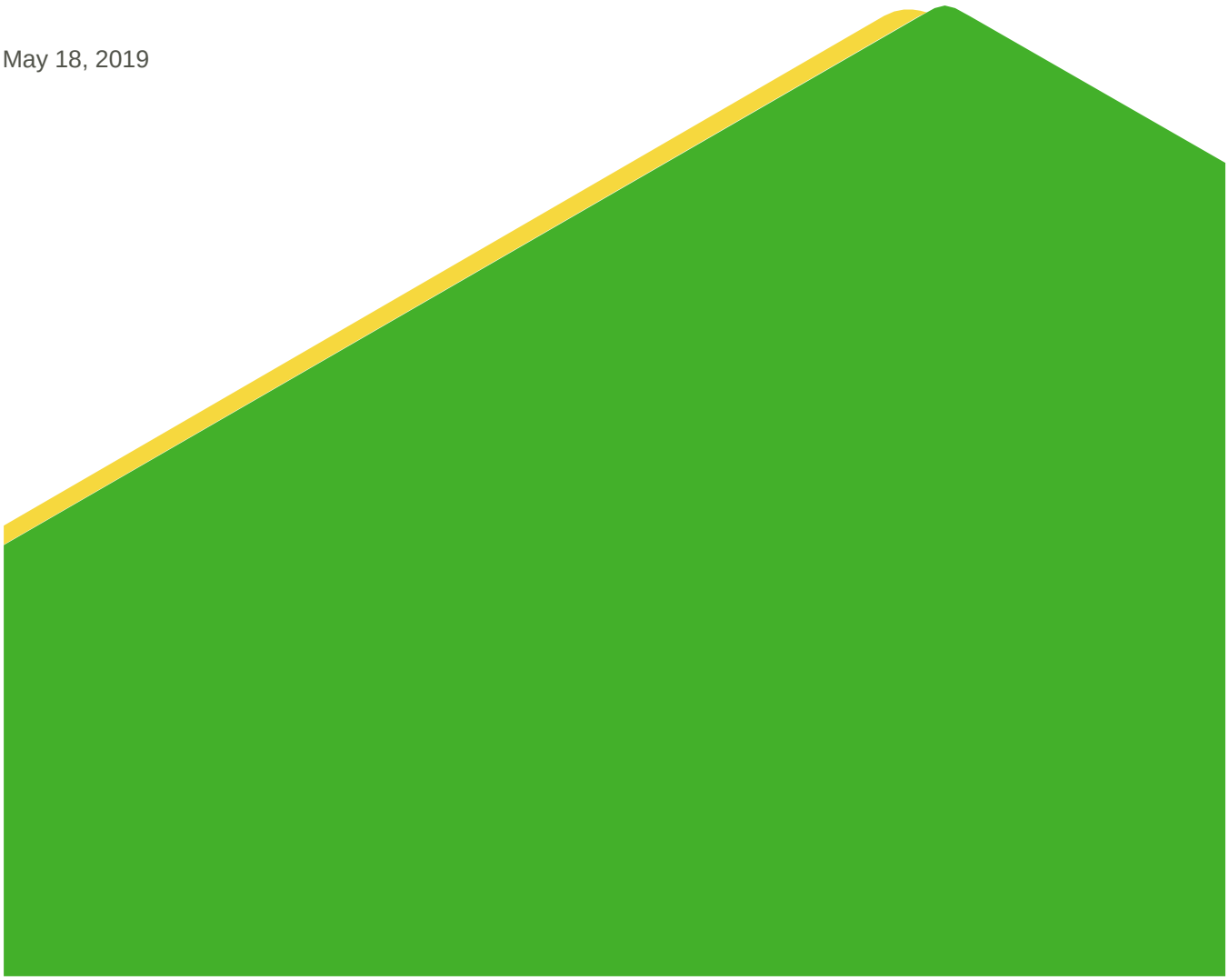
Golder Associates Inc.

13515 Barrett Parkway Drive, Suite 260

Ballwin, MO 63021, USA

+1 314 984 8800

May 18, 2019



Distribution List

1 Electronic Copy - Ameren Missouri

1 Hard Copy - Golder

Table of Contents

Tables

FIGURES

1.0 CERTIFICATION STATEMENT

This *LCL1 – Alternative Source Demonstration, Labadie Energy Center, Franklin County, Missouri, USA* has been prepared to comply with the United States Environmental Protection Agency (EPA) coal combustion residual (CCR) rule under the direction of a licensed professional engineer with Golder Associates Inc.

I hereby certify that this *LCL1 – Alternative Source Demonstration, Labadie Energy Center, Franklin County, Missouri, USA* located at 226 Labadie Power Plant Road, Labadie Missouri 63055 has been prepared to meet the requirements of 40 CFR §257.94(e)(2).

GOLDER ASSOCIATES INC.

_____

Mark Haddock, P.E., R.G.

Principal, Practice Leader

2.0 INTRODUCTION

In accordance with the United States Environmental Protection Agency (EPA) coal combustion residual (CCR) rule (CCR Rule or The Rule), this *LCL1 – Alternative Source Demonstration* has been prepared to document an Alternative Source Demonstration (ASD) for a Statistically Significant Increase (SSI) calculated at Ameren Missouri's (Ameren) Labadie Energy Center (LEC), Utility Waste Landfill (UWL) LCL1 or Cell 1. This document satisfies the requirements of §257.94(e)(2) which allows the owner or operator to demonstrate that a source other than the CCR Unit has caused an SSI and that the apparent SSI was the result of an alternative source or resulted from errors in sampling, analysis, statistical evaluation, or natural variation in groundwater quality.

3.0 SITE DESCRIPTION AND BACKGROUND

The LEC is located approximately 35 miles west of downtown St. Louis in Franklin County, Missouri just south of the Missouri River. **Figure 1** depicts the site location and layout, including the location of LCL1. The LEC encompasses approximately 2,400 acres and is located within the Missouri River Valley. The facility is bounded to the north by the Missouri River, to the west by Labadie Creek, to the northeast and east by agricultural land, and to the south by a railroad line and bedrock bluffs.

3.1 Geological and Hydrogeological Setting

The site lies between the Missouri River (to the north) and bedrock bluffs (to the south). Flow and deposition from the Missouri River have resulted in thick alluvial deposits which lie on top of bedrock. These alluvial deposits, which can range from approximately 90 to 120 feet thick, comprise the uppermost aquifer. Overall, this alluvial aquifer is described as a fining-upwards sequence of stratified sands and gravels with varying amounts of silts and clays. Based on drilling records, the alluvial aquifer is divided into sub-units, including, floodplain deposits, natural levee deposits, and channel deposits along with volumetrically less important loess deposits. Grain sizes of these alluvial deposits are variable.

Beneath the alluvial aquifer lies the bedrock aquifer. Bedrock in this region consists of Ordovician-aged rock. Formations include primarily limestone, dolomite, sandstone, and shale and are comprised of the Plattin Group, Joachim Dolomite, St. Peter Sandstone, Powell Dolomite, and the Cotter/Jefferson City Dolomites.

3.2 Utility Waste Landfill Cell 1 – LCL1

UWL Cell 1 is referred to by Ameren as the LCL1, or Cell 1. The LCL1 is approximately 31 acres in size and is located east of the generating plant (**Figure 1**). The CCR Unit manages CCR from the LEC and is permitted to accept fly ash waste, bottom ash waste, slag waste and flue gas emission control waste generated primarily from the combustion of coal or other fossil fuels. Currently the facility manages dry disposal of some fly ash and bottom ash taken from the other CCR impoundments onsite (LCPA and LCPB), as well as some dry disposal fly ash and bottom ash from the LEC itself.

The LCL1 was constructed with a composite liner system consisting of two feet of compacted clay soil with a hydraulic conductivity of less than 1 X 10^{-7} centimeters per second (cm/sec) overlain by a 60-mil High Density Polyethylene (HDPE) geomembrane liner. Information on the design of the UWL is available in the 2013 Proposed Construction Permit application (Gredell and Reitz & Jens, 2013).

A groundwater monitoring well network was installed in 2013 and 2014 in order to permit the UWL construction. This monitoring well network was approved by the Missouri Department of Natural Resources (MDNR) and consists of 36 monitoring wells ringing the current and proposed future extents of the UWL (**Figure 1**). Most of these monitoring wells are installed in the uppermost portions of the alluvial aquifer, just below the seasonally low

elevation for groundwater. Three monitoring wells (MW-33(D), MW-34(D), and MW-35(D)) are installed in the intermediate/deeper zones of the alluvial aquifer. Groundwater samples have been collected in most of these monitoring wells since April 2013 and tested for the MDNR UWL parameters.

The permit for the LCL1 was issued October 27, 2016 (permit #0907101). Eleven (11) sampling events were performed prior to October 27, 2016 at most of the state required UWL monitoring wells and four (4) rounds of baseline CCR Rule sampling were completed at CCR Rule monitoring wells (discussed below). These results represent groundwater quality prior to CCR placement in the UWL. The results from these pre-disposal monitoring events are used in conjunction with other site information in the ASD presented below.

3.3 CCR Rule Groundwater Monitoring

As required by the CCR Rule, the following were completed prior to the October 17, 2017 deadline; (1) a groundwater monitoring well system was installed and certified by a Professional Engineer, (2) a Statistical Method Certification was prepared and certified by a Professional Engineer, (3) a Groundwater Monitoring Plan (GMP) was prepared recording the design, installation, development, sampling procedures, as well as statistical methods, and placed in the owner's operating record, and (8) eight baseline groundwater sampling events were completed for all Appendix III and Appendix IV parameters of CCR Rule.

The groundwater monitoring system for the LCL1 consists of six monitoring wells screened in the uppermost aquifer (alluvial aquifer) as shown on **Figure 1**. Two existing monitoring wells (MW-26 and TMW-1) were installed by Reitz & Jens, Inc. in 2013 as a part of the state UWL monitoring program. The remaining monitoring wells (TMW-1, TMW-2, BMW-1S, and BMW-3S) were installed by Golder in 2015 and 2016 for CCR Rule groundwater monitoring purposes. More information on the design and installation of the monitoring wells is provided in the LCL1 GMP and the LCL1 2017 Annual Report.

Between May 2016 and June 2017, eight (8) baseline sampling events were completed for the LCL1. After baseline sampling, the Detection Monitoring events were completed in November 2017, May 2018, and November 2018. Laboratory testing was performed for the following Appendix III constituents during Detection Monitoring:

- Boron
- Calcium
- Chloride
- pH
- Sulfate
- Total Dissolved Solids (TDS)
- Fluoride

In January 2018, background results from the eight baseline sampling events were used to calculate statistical upper prediction limits (UPL's). These UPL's were then compared to the Detection Monitoring results. If results from Detection Monitoring were higher than the calculated UPL, it was considered to be an initial exceedance, in which case a verification sample was then collected and tested in accordance with the LCL1 statistical analysis plan. In November 2017, there were no initial exceedances. In May 2018, three initial exceedances were identified including boron, fluoride, and total dissolved solids (TDS) at TMW-1 and fluoride at TMW-2. Verification sampling results confirmed all four SSI's. An ASD was prepared for the May 2018 results and is available in the 2018 LCL1 Annual Report. This ASD concluded that the SSIs observed in the May 2018 sampling event were not caused by the LCL1, but rather primarily caused by relatively low calculated UPL's that did not reflect the full

natural variability within the alluvial aquifer. In November 2018, 4 initial exceedances were identified for Boron, Chloride and Fluoride at TMW-1 and Fluoride at TMW-2. Verification sampling results confirmed only the Fluoride at TMW-1 and it is the only verified SSI from this event.

4.0 REVIEW OF THE STATISTICALLY SIGNIFICANT INCREASE

The SSI for fluoride occurred at monitoring well TMW-1. TMW-1 is screened in the upper portion of the alluvial aquifer just below the average seasonal low for groundwater. As shown on **Figure 1**, TMW-1 is located to the east of the LCL1, the generating plant and the two surface impoundments (LCPA and LCPB).

Based on Golder's review of the pre-disposal data discussed in Section 3.2 above, and our comparison of the pre-disposal data with the results from the eight CCR-Rule baseline events, it was concluded that the groundwater at the LCL1 contained low-level pre-existing impacts from CCR that pre-dated LCL1 operation. As a result of these pre-existing impacts, the LCL1 statistical analysis plan uses intrawell upper prediction limits (UPL) to determine SSIs. Intrawell UPLs are calculated from historical data within a particular well, and not by pooling data from the background wells, such that individual limits are calculated for each constituent in each well in the monitoring program.

The intrawell UPL for fluoride at TMW-1 is 0.2269 milligrams per liter (mg/L), which is slightly above the Practical Quantitation Limit (PQL) of 0.20 mg/L provided by the laboratory. The UPL of 0.2269 mg/L was based on the results of the eight baseline sampling events for TMW-1 that ranged from 0.17 to 0.21 mg/L (**Figure 2**). During the November 2018 Detection Monitoring event, a value of 0.29 mg/L was reported, which was confirmed by a value of 0.23 mg/L during the Verification Sampling. These values do represent an SSI, but it is important to note they are very low (within 0.09 mg/L of baseline) and close to the PQL value the laboratory can accurately detect.

5.0 EVIDENCE OF SSI FROM ALTERNATIVE SOURCE

Several different lines of evidence indicate that the SSIs at the LCL1 are not caused by a release from the LCL1, but rather from an alternative source. The following section describes the different lines of evidence, listed below, that demonstrate this position.

- Documentation of pre-existing, low level concentrations of CCR indicators in groundwater that pre-date the LCL1 operation.
- Review of groundwater results prior to and after construction and CCR placement in the LCL1.
- Documentation of the construction of the LCL1 with a 60-mil geomembrane liner and a 2-foot thick clay barrier.
- Results of geochemical analysis displaying groundwater chemistries over the past several sampling events.
- Review of groundwater results in adjacent and background monitoring wells.

5.1 CCR Indicators

Several types of CCR byproducts are generated by coal-fired power plants. The different types of CCR typically display distinct geochemical signatures and indicator parameters. **Table 2** below describes the different types of CCRs and their typical indicator parameters (USEPA 2018, EPRI 2011, EPRI 2012, and EPRI 2017).

Table 2: Types of CCR and Typical Indicator Parameters

Type of CCR	Description of CCR (USEPA 2018)	Key Indicators (EPRI 2011, 2012, 2017)
Fly Ash	Fine grained, powdery material composed mostly of silica made from the burning of finely ground coal in the boiler.	■ Boron ■ Molybdenum ■ Lithium ■ Sulfate ■ Bromide ■ Potassium ■ Sodium ■ Fluoride
Boiler Slag / Bottom Ash	Molten bottom ash from the slag tap and cyclone type furnaces that turns into pellets that have a smooth glassy appearance after quenching with water	
Flue Gas Desulfurization Material (FGD)	A material leftover from the process of reducing sulfur dioxide emissions from a coal-fired boiler that can be a wet sludge consisting of calcium sulfite or calcium sulfate or a dry powered material that is a mixture of sulfites and sulfates.	■ Sulfate ■ Fluoride ■ Calcium ■ Boron ■ Bromide ■ Chloride

Notes:

1) Fly ash and boiler slag/bottom ash typically have the same indicator parameters.
2) Definitions from USEPA website, available at https://www.epa.gov/coalash/coal-ash-basics.
3) Key indicators from EPRI 2011, 2012, and 2017 as well as Gredell and Reitz & Jens, 2014.

5.1.1 Fluoride Concentrations at TMW-1

Fluoride can be an indicator of CCR impacts for fly ash and bottom ash wastes because fluoride is mobile in most hydrogeologic environments, however, it is not always present at high concentrations within all CCR wastes. At the Labadie Energy Center, fluoride has been tested for in the pore-water of both the LCPA and the LCPB. The results of the pore-water sampling show that fluoride ranges from 0.088 J - 20 J mg/L in the LCPA and from 1.0 to 2.4 mg/L in the LCPB.

As shown on **Figure 3**, current fluoride concentrations in monitoring well TMW-1 are similar to those reported prior to the operation of the LCL1. Fluoride concentrations have varied with values ranging from 0.12 – 0.28 mg/L prior to the operation of the LCL1 and from 0.17 – 0.29 mg/L since the operation of the LCL1. These similar results display that the range of fluoride concentrations has not changed prior to and after the receipt of CCR materials at the LCL1. Based on these data, in addition to the observations reported below, the variability in fluoride concentrations over time is not a result of impacts from the LCL1, but rather the result of geochemical variability in the alluvial aquifer.

As shown on **Figure 3**, if only the fluoride results at TMW-1 prior to placement of CCR waste are used (April 2014-October 2016), a UPL is 0.3201 mg/L is calculated. This value is approximately 0.10 mg/L higher than the UPL calculated from the eight baseline samples at TMW-1 collected for the CCR rule and 0.09 mg/L higher than the result reported for the January 2019 verification sampling event. Additionally, prior to CCR being placed in the

unit, fluoride values were reported at similar levels (0.28 mg/L) as those that were sampled in November 2018. Therefore, the calculated prediction limit from the CCR Rule was biased low because the results reported during the initial 8 baseline sampling rounds were relatively low for fluoride in this well[1]. If the historical data are used to supplement the results collected during the CCR rule baseline period, no SSI would be triggered for fluoride at TMW-1.

In addition, the verification sample collected in January 2019 was at 0.23 mg/L, which is less than 0.005 mg/L above the baseline UPL of 0.2269 mg/L and .09 mg/L below the UPL calculated using pre-CCR values. This further demonstrates that the values at TMW-1 do not display an SSI, but rather are due to natural variability within the alluvial aquifer, especially for low level results such as these near the laboratory PQL where laboratory testing inaccuracy and variability lead to variable results.

5.2 Geochemical Analysis

During November 2017, May 2018, and November 2018 Detection Monitoring events, major cation and anion concentrations were collected. These data were used to compare major ion chemistry over time to see if the groundwater chemistry is changing.

5.2.1 Stiff Diagrams

Stiff diagrams visually display the major cation and anion data. **Figure 4** displays the Stiff diagrams from the November 2017, May 2018, and November 2018 Detection Monitoring events. Data from November 2017 event display nearly identical distribution to that of May 2018, and November 2018 events. If impacts from the LCL1 were causing the apparent SSIs, then a shift in groundwater chemistry would be expected. This figure demonstrates that there has not been a shift in groundwater chemistry due to CCR impact between the two sampling events.

5.2.2 Piper Diagram

A Piper diagram is a graphical technique used to classify different groundwater chemistry. The same data used to generate the Stiff diagram are plotted on a ternary Piper diagram according to major cation and anion concentrations. In addition to showing instantaneous concentrations, Piper diagrams can be used to determine if groundwater chemistry is changing, either spatially or temporally. **Figure 7** displays a Piper diagram for TMW-1 over time. If CCR impacts from the LCL1 were causing the apparent SSIs, then a shift in groundwater chemistry would be expected. This figure demonstrates that there has not been a shift in groundwater chemistry between the sampling events.

Additionally, a comparison of this diagram with those in the LCPB ASD (2018 LCPB Annual Report) show that groundwater chemistry in the TMW-1 well plots in the area for background.

6.0 DEMONSTRATION THAT SSI WAS NOT CAUSED BY LCL1 IMPACT

Based on the information presented in Section 5 above, the SSI at TMW-1 was not caused by impacts from the LCL1. The SSI appears to be caused by numerous factors, but is primarily caused by pre-existing low concentrations of CCR indicators that pre-date the LCL1 and relatively low calculated UPL's and a relatively small set of baseline data that do not reflect the full natural variability within the alluvial aquifer. This is because only 8 baseline samples were collected prior to detection monitoring and these sampling events were not able to capture

[1] Given that the CCR material was not placed in LCL1 until after a liner system was installed, it is not likely that the decreased concentrations at TMW-1 observed during CCR sampling are a result of isolation of previous release of CCR materials.

the full extent of the natural spatial and temporal variability in the alluvial aquifer especially for those results near the laboratory PQL. When results are compared to historical data from the state sampling program, it is apparent that there are no impacts from the LCL1.

As required by the CCR Rule, eight (8) baseline samples were collected prior to the October 2017 deadline which were used to calculate the UPL at each compliance well around the LCL1. According to the *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance* (USEPA 2009), eight (8) samples is the minimum number of samples recommended in order to complete statistical tests and future data will be used to enlarge the dataset for UPL calculation. As shown throughout this ASD, the minimum 8 (eight) baseline samples has not been able to capture the full extent of the natural spatial and temporal variability. In addition, inaccuracy of laboratory testing at low levels near the PQL can produce results higher than the UPL when the baseline dataset is small.

Other supplemental lines of evidence also demonstrate that there are no impacts on groundwater from the LCL1. Geochemical comparisons display that there has been no significant change in groundwater chemistry between samples below the UPL and those above. Further, the construction of the LCL1, with 2-feet of compacted clay overlain by a 60-mil HDPE liner, also limits the likelihood that the SSI is a result an impact from LCL1. SSIs observed in TMW-1 are not caused by impacts from the LCL1.

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Table 3

Major Cation and Anion Concentrations

LCL1 - Alternative Source Demonstration

Labadie Energy Center, Franklin County, MO

Monitoring Well ID and Date of Sample Collection	Total Sodium (mg/L)	Total Potassium (mg/L)	Total Calcium (mg/L)	Total Magnesium (mg/L)	Total Chloride (mg/L)	Total Sulfate (mg/L)	Total Alkalinity [(1)] (mg/L)
L-TMW-1 11/8/2017	10.6	5.82	156	42.2	3.0	83.3	483
L-TMW-1 5/23/2018	11.8	5.77	162	43.6	3.2	100	552
L-TMW-1 11/9/2018	11.5	5.88	162	44.1	3.7	97	534

Notes:

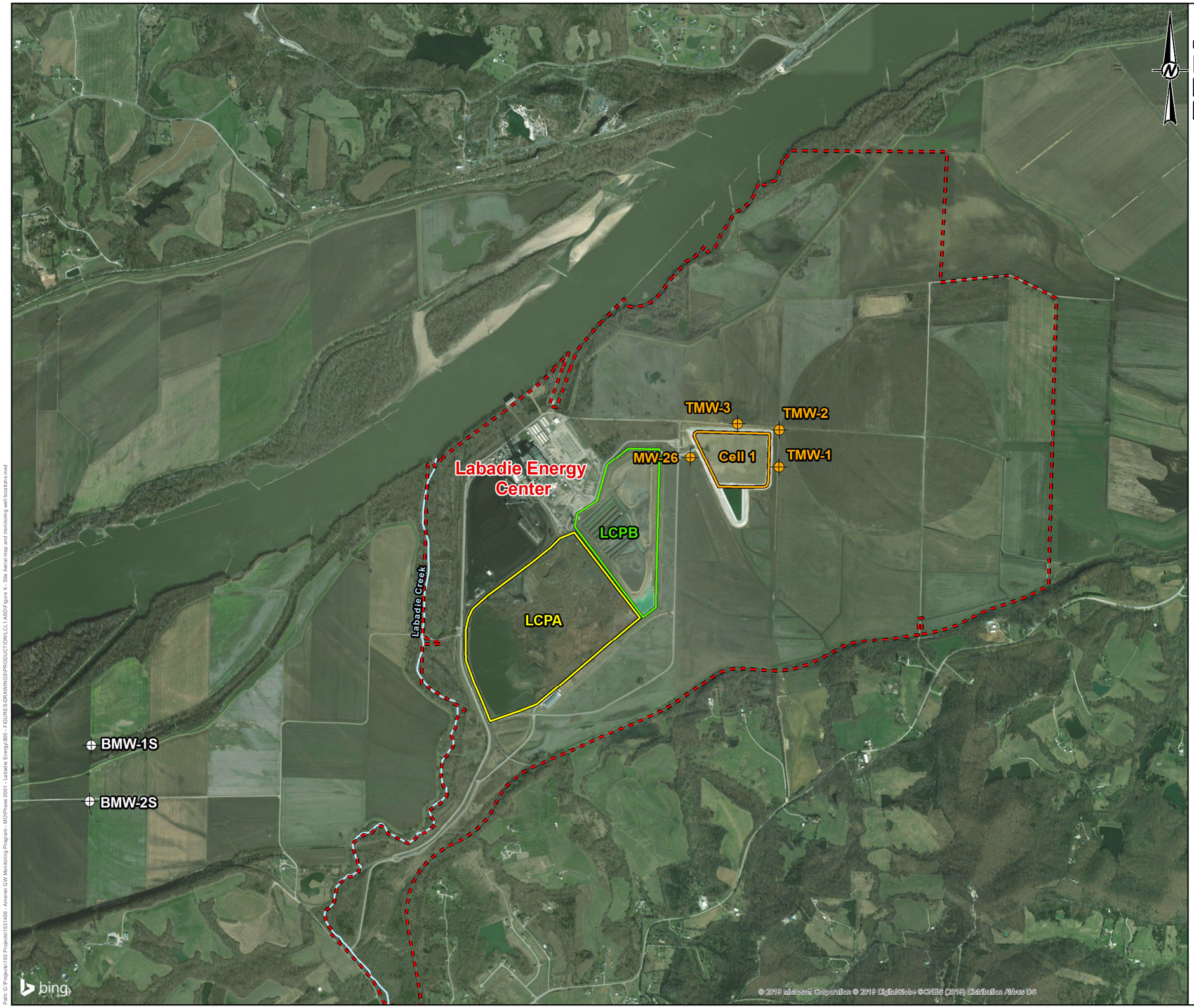
1) Alkalinity is equal to the sum of Carbonate and Bicarbonate.

2) mg/L - milligrams per liter.

Prepared by: EMS

Checked by: JSI

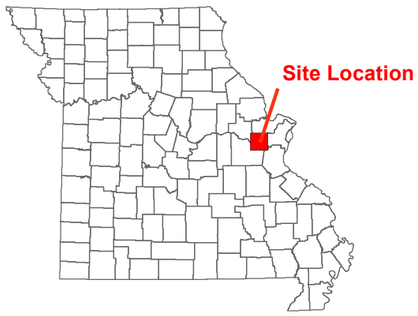
Reviewed by: MNH



LEGEND

- Labadie Energy Center Property Boundary
- LCPB - Fly Ash Surface Impoundment
- LCPA - Bottom Ash Surface Impoundment
- LCL1 - UWL Cell 1
- LCL1 Monitoring Well
- Background Monitoring Well

KEY MAP



NOTES

1. ALL LOCATIONS AND BOUNDARIES ARE APPROXIMATE.
2. GROUNDWATER MONITORING WELLS INSTALLED BY GOLDER ASSOCIATES WERE SURVEYED BY ZAHNER & ASSOCIATES, INC. ON FEBRUARY 11 AND APRIL 28, 2016.
3. GROUNDWATER MONITORING WELLS INSTALLED BY REITZ AND JENS, INC. WERE SURVEYED BY KDG.
4. UWL - UTILITY WASTE LANDFILL.

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1. ZAHNER AND ASSOCIATES, INC. 2016. LOT CONSOLIDATION PLAT OF "LABADIE ENERGY CENTER" - PREPARED FOR AMEREN MISSOURI. REVISED JUNE 15, 2016.
2.) COORDINATE SYSTEM: NAD 1983 STATEPLANE MISSOURI EAST FIPS 2,401 FEET.

0 500 1,000 2,000 3,000 4,000 Feet

CLIENT
AMEREN MISSOURI
LABADIE ENERGY CENTER

PROJECT
GROUNDWATER MONITORING PROGRAM

TITLE
SITE LOCATION AND AERIAL MAP

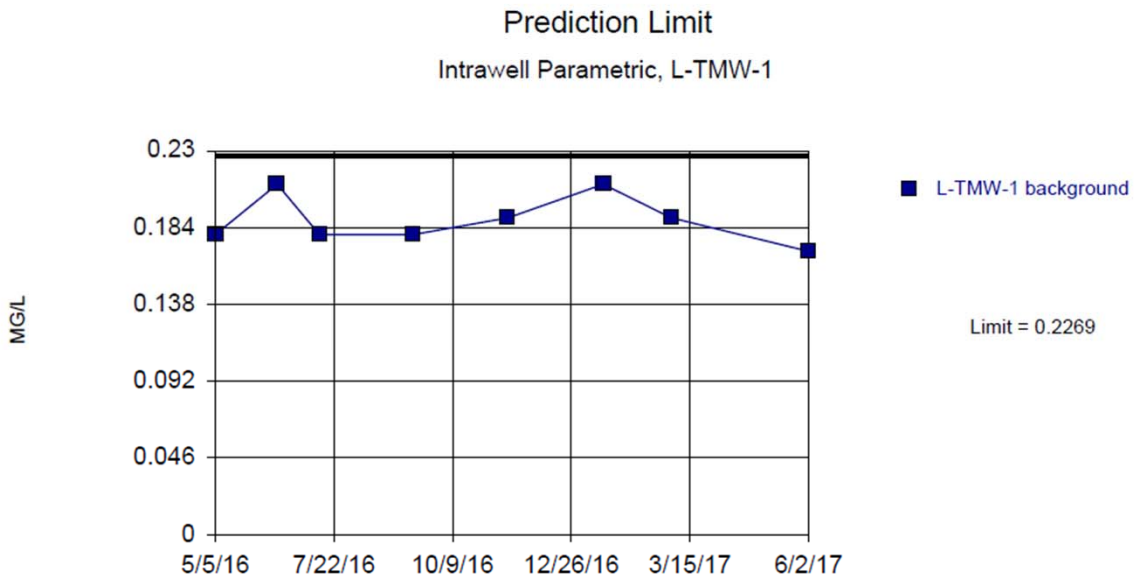
CONSULTANT
GOLDER

YYYY-MM-DD	2019-05-07
PREPARED	EMS
DESIGN	JSI
REVIEW	JSI
APPROVED	MNH

PROJECT No. 153-140601
PHASE 0001
FIGURE 1

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM:
1 in
0

Path: G:\Projects\1531406 - Ameren\ GW Monitoring Program - MO\Phase 0001 - Labadie Energy\800 - FIGURES-DRAWINGS\PRODUCTION\LCL1 ASD\Figure X - Site Aerial map and monitoring well locations.mxd

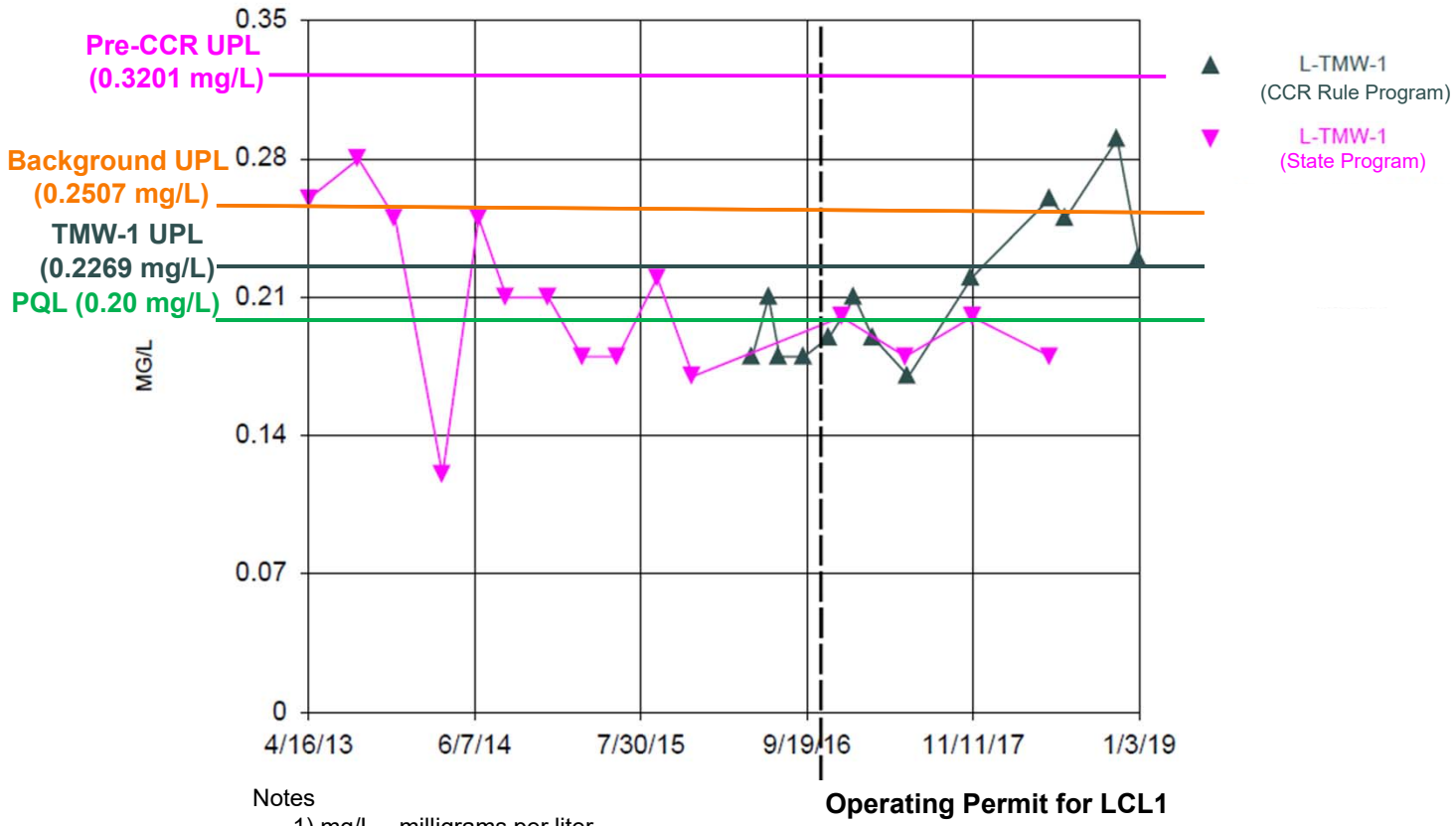


Background Data Summary: Mean=0.1888, Std. Dev.=0.01458, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.1, calculated = 0.8715, critical = 0.851. Kappa = 2.616 (c=7, w=4, 1 of 2, event alpha = 0.05132). Report alpha = 0.00188. Assumes 1 future value.

Notes

1) mg/L – Milligrams per liter.
2) Calculations completed using Sanitas Software.

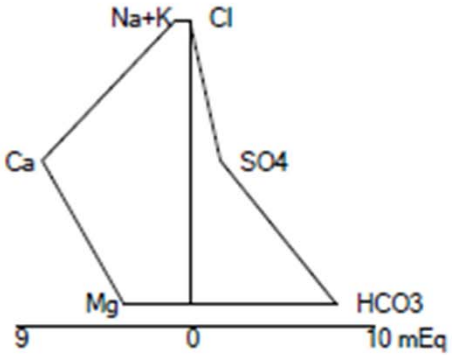
CLIENT/PROJECT							TITLE			
AMEREN MISSOURI **LABADIE ENERGY CENTER**				GOLDER			**Calculation of Upper Prediction Limit for Fluoride at TMW-1**			
DRAWN EMS	CHECKED JSI	REVIEWED MNH	DATE 2019/05/06	SCALE N/A	FILE NO. N/A	JOB NO. 153140601.0001	DWG NO. N/A	SUBTITLE N/A	REV. NO. N/A	FIGURE **2**



Notes

1) mg/L – milligrams per liter.
2) PQL – Practical Quantitation Limit.
3) UPL – Upper Prediction Limit.
4) Statistical Limits Calculated Using Sanitas Software.

CLIENT/PROJECT							TITLE		
AMEREN MISSOURI **LABADIE ENERGY CENTER**				GOLDER			**Time Series Plot and Upper Prediction Limits for Fluoride at TMW-1**		
DRAWN EMS	CHECKED JSI	REVIEWED MNH	DATE 2019/05/06	SCALE N/A	FILE NO. N/A	JOB NO. 153140601.0001	DWG NO. N/A	SUBTITLE N/A	REV. NO. N/A	FIGURE **3**



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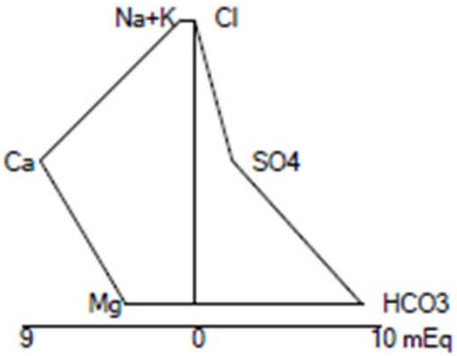

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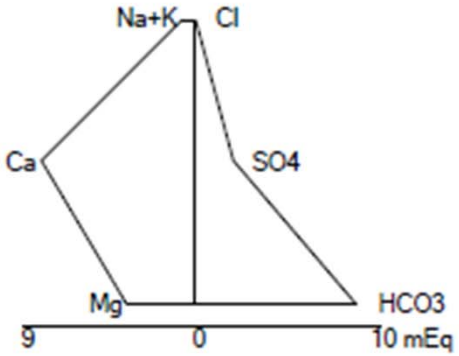


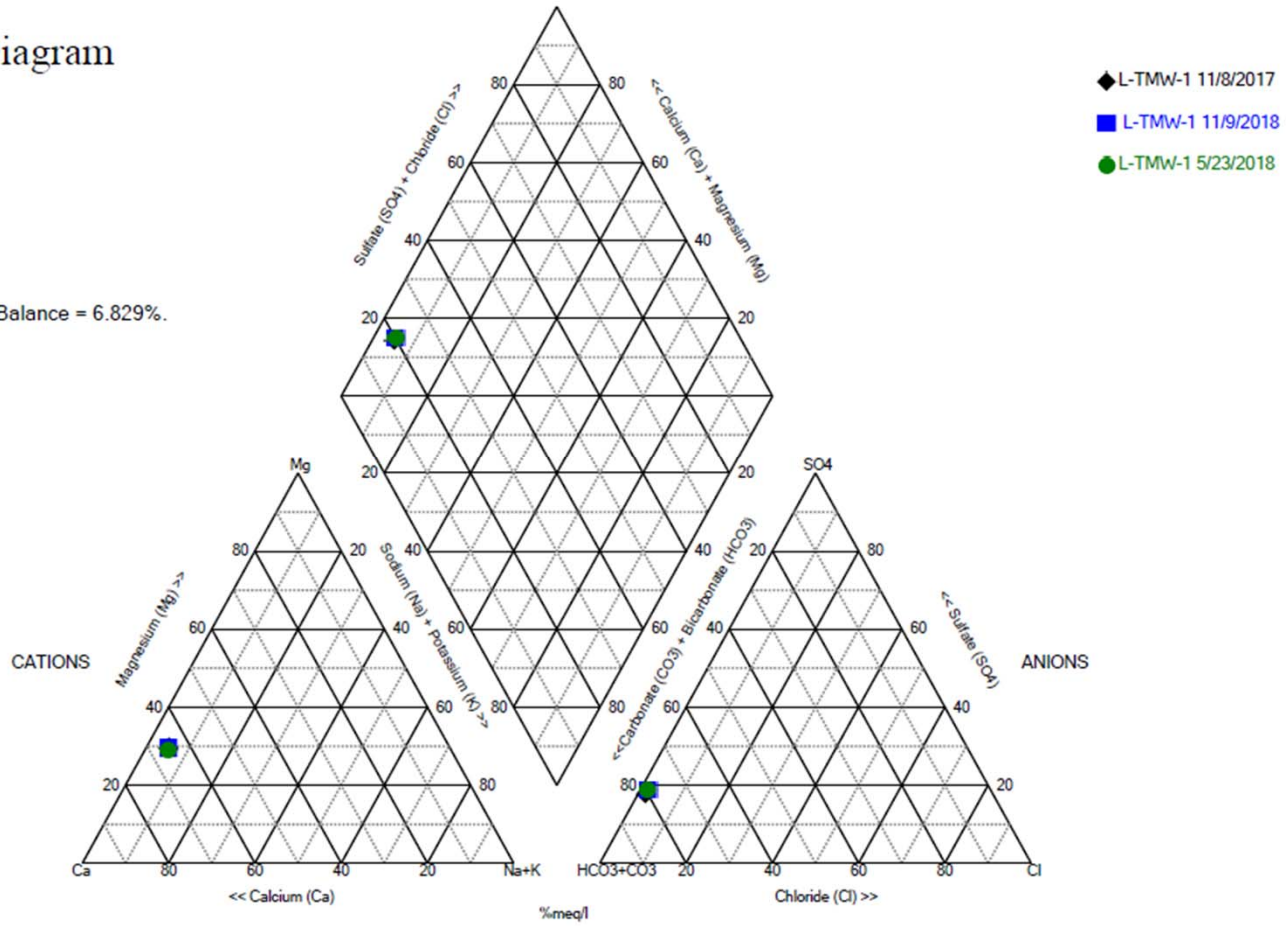
11/9/2018

Notes
1) Stiff diagrams calculated using Sanitas Software.
2) Data used to calculate diagrams provided in Table 3.
3) Na + K – Sodium plus Potassium.
4) SO4 – Sulfate.
5) HCO3 – Alkalinity.
6) Mg – Magnesium.
7) Ca –Calcium.
8) Cl – Chloride.
9) mEq – milliequivalents.

CLIENT/PROJECT							TITLE			
AMEREN MISSOURI **LABADIE ENERGY CENTER**				GOLDER			**TMW-1 Stiff Diagrams**			
DRAWN EMS	CHECKED JSI	REVIEWED MNH	DATE 2019/05/06	SCALE N/A	FILE NO. N/A	JOB NO. 153140601.0001	DWG NO. N/A	SUBTITLE N/A	REV. NO. N/A	FIGURE **4**

Piper Diagram

L-TMW-1



Notes

1) Piper diagram generated using Sanitas Software.
2) Data used to calculate diagrams provided in Table 3.

CLIENT/PROJECT **AMEREN MISSOURI** **LABADIE ENERGY CENTER**				GOLDER			TITLE **TMW-1 Piper Diagram**			
DRAWN EMS	CHECKED JSI	REVIEWED MNH	DATE 2019/05/06	SCALE N/A	FILE NO. N/A	JOB NO. 153140601.0001	DWG NO. N/A	SUBTITLE N/A	REV. NO. N/A	FIGURE **5**

APPENDIX C

Alternative Source Demonstration-May 2019 Sampling Event

LCL1 - Alternative Source Demonstration

Labadie Energy Center, Franklin County, Missouri, USA

Submitted to:

Ameren Missouri

1901 Chouteau Ave, St. Louis, MO 63103

Submitted by:

Golder Associates Inc.

13515 Barrett Parkway Drive, Suite 260

Ballwin, MO 63021, USA

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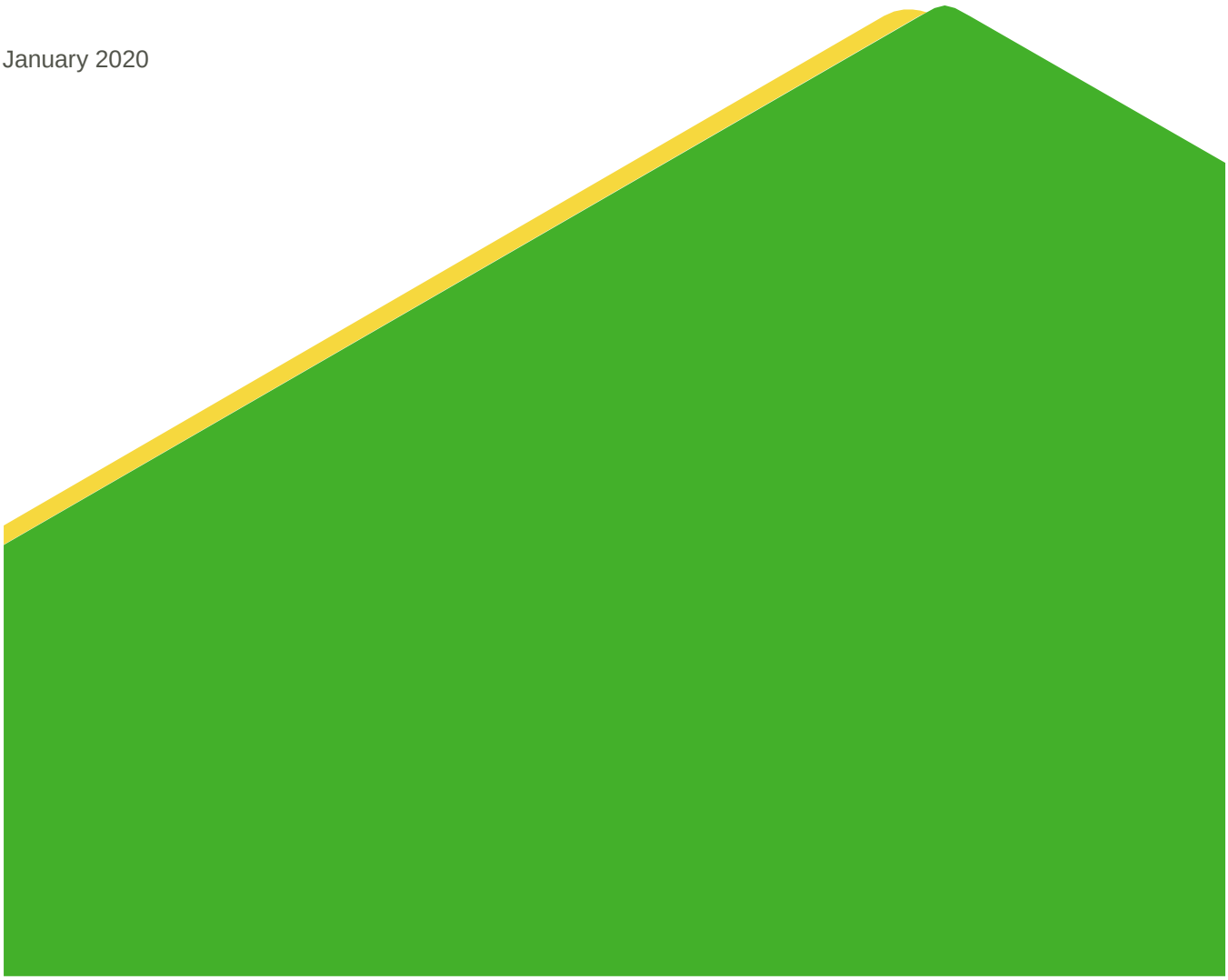
January 2020



Distribution List

1 Electronic Copy - Ameren Missouri

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Table of Contents

Tables

FIGURES

1.0 CERTIFICATION STATEMENT

This *LCL1 – Alternative Source Demonstration, Labadie Energy Center, Franklin County, Missouri, USA* has been prepared to comply with the United States Environmental Protection Agency (EPA) coal combustion residual (CCR) rule under the direction of a licensed professional engineer with Golder Associates Inc.

I hereby certify that this *LCL1 – Alternative Source Demonstration, Labadie Energy Center, Franklin County, Missouri, USA* located at 226 Labadie Power Plant Road, Labadie Missouri 63055 has been prepared to meet the requirements of 40 CFR §257.94(e)(2).

GOLDER ASSOCIATES INC.

_____

Mark Haddock, P.E., R.G.

Principal, Practice Leader

2.0 INTRODUCTION

In accordance with the United States Environmental Protection Agency (EPA) coal combustion residual (CCR) rule (CCR Rule or The Rule), this *LCL1 – Alternative Source Demonstration* has been prepared to document an Alternative Source Demonstration (ASD) for a Statistically Significant Increase (SSI) calculated at Ameren Missouri's (Ameren) Labadie Energy Center (LEC), Utility Waste Landfill (UWL) LCL1 or Cell 1. This document satisfies the requirements of §257.94(e)(2) which allows the owner or operator to demonstrate that a source other than the CCR Unit has caused an SSI and that the apparent SSI was the result of an alternative source or resulted from errors in sampling, analysis, statistical evaluation, or natural variation in groundwater quality.

3.0 SITE DESCRIPTION AND BACKGROUND

The LEC is located approximately 35 miles west of downtown St. Louis in Franklin County, Missouri just south of the Missouri River. **Figure 1** depicts the site location and layout, including the location of LCL1. The LEC encompasses approximately 2,400 acres and is located within the Missouri River Valley. The facility is bounded to the north by the Missouri River, to the west by Labadie Creek, to the northeast and east by agricultural land, and to the south by a railroad line and bedrock bluffs.

3.1 Geological and Hydrogeological Setting

The site lies between the Missouri River (to the north) and bedrock bluffs (to the south). Flow and deposition from the Missouri River have resulted in thick alluvial deposits which lie on top of bedrock. These alluvial deposits, which can range from approximately 90 to 120 feet thick, comprise the uppermost aquifer. Overall, this alluvial aquifer is described as a fining-upwards sequence of stratified sands and gravels with varying amounts of silts and clays. Based on drilling records, the alluvial aquifer is divided into sub-units, including, floodplain deposits, natural levee deposits, and channel deposits along with volumetrically less important loess deposits. Grain sizes of these alluvial deposits are variable.

Beneath the alluvial aquifer lies the bedrock aquifer. Bedrock in this region consists of Ordovician-aged rock. Formations include primarily limestone, dolomite, sandstone, and shale and are comprised of the Plattin Group, Joachim Dolomite, St. Peter Sandstone, Powell Dolomite, and the Cotter/Jefferson City Dolomites.

3.2 Utility Waste Landfill Cell 1 – LCL1

UWL Cell 1 is referred to by Ameren as the LCL1, or Cell 1. The LCL1 is approximately 31 acres in size and is located east of the generating plant (**Figure 1**). The CCR Unit manages CCR from the LEC and is permitted to accept fly ash waste, bottom ash waste, slag waste and flue gas emission control waste generated primarily from the combustion of coal or other fossil fuels. Currently the facility manages dry disposal of some fly ash and bottom ash taken from the other CCR impoundments onsite (LCPA and LCPB), as well as some dry disposal fly ash and bottom ash from the LEC itself.

The LCL1 was constructed with a composite liner system consisting of two feet of compacted clay soil with a hydraulic conductivity of less than 1 X 10^{-7} centimeters per second (cm/sec) overlain by a 60-mil High Density Polyethylene (HDPE) geomembrane liner. Information on the design of the UWL is available in the 2013 Proposed Construction Permit application (Gredell and Reitz & Jens, 2013).

A groundwater monitoring well network was installed in 2013 and 2014 in order to permit the UWL construction. This monitoring well network was approved by the Missouri Department of Natural Resources (MDNR) and consists of 36 monitoring wells ringing the current and proposed future extents of the UWL (**Figure 1**). Most of these monitoring wells are installed in the uppermost portions of the alluvial aquifer, just below the seasonally low

elevation for groundwater. Three (3) monitoring wells (MW-33(D), MW-34(D), and MW-35(D)) are installed in the intermediate/deeper zones of the alluvial aquifer. Groundwater samples have been collected in most of these monitoring wells since April 2013 and tested for the MDNR UWL parameters.

The permit for the LCL1 was issued October 27, 2016 (permit #0907101). Eleven (11) sampling events were performed prior to October 27, 2016 at most of the state required UWL monitoring wells and four (4) rounds of baseline CCR Rule sampling were completed at CCR Rule monitoring wells (discussed below). These results represent groundwater quality prior to CCR placement in the UWL. The results from these pre-disposal monitoring events are used in conjunction with other site information in the ASD presented below.

3.3 CCR Rule Groundwater Monitoring

As required by the CCR Rule, the following was completed prior to the October 17, 2017 deadline; (1) a groundwater monitoring well system was installed and certified by a Professional Engineer, (2) a Statistical Method Certification was prepared and certified by a Professional Engineer, (3) a Groundwater Monitoring Plan (GMP) was prepared recording the design, installation, development, sampling procedures, as well as statistical methods, and placed in the owner's operating record, and eight (8) baseline groundwater sampling events were completed for all Appendix III and Appendix IV parameters of CCR Rule.

The groundwater monitoring system for the LCL1 consists of six (6) monitoring wells screened in the uppermost aquifer (alluvial aquifer) as shown on **Figure 1**. Two (2) existing monitoring wells (MW-26 and TMW-1) were installed by Reitz & Jens, Inc. in 2013 as a part of the state UWL monitoring program. The remaining monitoring wells (TMW-2, BMW-1S, and BMW-3S) were installed by Golder in 2015 and 2016 for CCR Rule groundwater monitoring purposes. More information on the design and installation of the monitoring wells is provided in the LCL1 GMP and the LCL1 2017 Annual Report.

Between May 2016 and June 2017, eight (8) baseline sampling events were completed for the LCL1. After baseline sampling, Detection Monitoring events were completed in November 2017, May 2018, November 2018, and May 2019. Laboratory testing was performed for the following Appendix III constituents during Detection Monitoring:

- Boron
- Calcium
- Chloride
- pH
- Sulfate
- Total Dissolved Solids (TDS)
- Fluoride

In January 2018, background results from the eight (8) baseline sampling events were used to calculate statistical upper prediction limits (UPL). These UPL were then compared to the Detection Monitoring results. If results from Detection Monitoring were higher than the calculated UPL, it is an initial exceedance, in which case a verification sample was collected and tested in accordance with the LCL1 statistical analysis plan. Per the statistical analysis plan after the May 2019 sampling event, the UPLs were updated to include four (4) additional sampling events that had been completed for Detection Monitoring.

In November 2017, there were no initial exceedances. In May 2018, three initial exceedances were identified including boron, fluoride, and total dissolved solids (TDS) at TMW-1 and fluoride at TMW-2. Verification sampling results confirmed all four SSIs. An ASD was prepared for the May 2018 results and is available in the 2018 LCL1 Annual Report. This ASD concluded that the SSIs observed in the May 2018 sampling event were not caused by the LCL1, but rather primarily caused by relatively low calculated UPLs that did not reflect the full, natural variability within the alluvial aquifer. In November 2018, four (4) initial exceedances were identified for boron, chloride and fluoride at TMW-1 and fluoride at TMW-2. Verification sampling results confirmed only the fluoride at TMW-1 result. An ASD was prepared for the November 2018 results and is available in the 2019 LCL1 Annual Report. This ASD also concluded that the SSI observed in the November 2018 sampling event was not caused by the LCL1, but rather primarily caused by relatively low calculated UPL's that did not reflect the natural geochemical variability within the alluvial aquifer.

In May 2019, seven (7) initial exceedances were identified for pH, calcium, chloride, and fluoride as shown on **Table 1**. Verification sampling results confirmed only chloride at TMW-1.

4.0 REVIEW OF THE STATISTICALLY SIGNIFICANT INCREASE

The SSI for chloride occurred at monitoring well TMW-1. TMW-1 is screened in the upper portion of the alluvial aquifer just below the average seasonal low for groundwater. As shown on **Figure 1**, TMW-1 is located to the east of the LCL1, the generating plant and the two surface impoundments (LCPA and LCPB).

Based on Golder's review of the pre-disposal data discussed in Section 3.2 above, and our comparison of the pre-disposal data with the results from the eight (8) CCR-Rule baseline events, it was concluded that the groundwater at the LCL1 contained low-level pre-existing impacts from CCR that pre-dated LCL1 operation. As a result of these pre-existing impacts, the LCL1 statistical analysis plan uses intrawell upper prediction limits (UPL) to determine SSIs. Intrawell UPLs are calculated from historical data within a particular well, and not by pooling data from the background wells, such that individual limits are calculated for each constituent in each well in the monitoring program.

The intrawell UPL for chloride at TMW-1 is 3.603 milligrams per liter (mg/L), which is slightly above the Practical Quantitation Limit (PQL) of 1.0 mg/L provided by the laboratory. The UPL of 3.603 mg/L was based on the results of the eight baseline sampling events for TMW-1 that ranged from 1.5 to 2.9 mg/L (**Figure 2**). During the May 2019 Detection Monitoring event, a value of 3.7 mg/L was reported. This value does represent an SSI, but it is important to note it is very low (less than 0.1 mg/L above the UPL) and close to the PQL value the laboratory can accurately detect.

5.0 EVIDENCE OF SSI FROM ALTERNATIVE SOURCE

Several different lines of evidence indicate that the SSI at the LCL1 is not caused by a release from the LCL1, but rather from an alternative source. The following section describes the different lines of evidence, listed below, that demonstrate this position.

- Documentation of pre-existing, low level concentrations of CCR indicators in groundwater that pre-date the LCL1 operation.
- Review of groundwater results prior to and after construction and CCR placement in the LCL1.
- Documentation of the construction of the LCL1 with a 60-mil geomembrane liner and a 2-foot thick clay barrier.
- Results of geochemical analysis displaying groundwater chemistries over the past several sampling events.

- Review of groundwater results in adjacent and background monitoring wells.

5.1 CCR Indicators

Several types of CCR byproducts are generated by coal-fired power plants. The different types of CCR typically display distinct geochemical signatures and indicator parameters. **Table 2** below describes the different types of CCRs and their typical indicator parameters (USEPA 2018, EPRI 2011, EPRI 2012, and EPRI 2017).

Table 2: Types of CCR and Typical Indicator Parameters

Type of CCR	Description of CCR (USEPA 2018)	Key Indicators (EPRI 2011, 2012, 2017)
Fly Ash	Fine grained, powdery material composed mostly of silica made from the burning of finely ground coal in the boiler.	■ Boron ■ Molybdenum ■ Lithium ■ Sulfate ■ Bromide ■ Potassium ■ Sodium ■ Fluoride
Boiler Slag / Bottom Ash	Molten bottom ash from the slag tap and cyclone type furnaces that turns into pellets that have a smooth glassy appearance after quenching with water.	
Flue Gas Desulfurization Material (FGD)	A material leftover from the process of reducing sulfur dioxide emissions from a coal-fired boiler that can be a wet sludge consisting of calcium sulfite or calcium sulfate or a dry powdered material that is a mixture of sulfites and sulfates.	■ Sulfate ■ Fluoride ■ Calcium ■ Boron ■ Bromide ■ Chloride

Notes:

1) Fly ash and boiler slag/bottom ash typically have the same indicator parameters.
2) Definitions from USEPA website, available at https://www.epa.gov/coalash/coal-ash-basics.
3) Key indicators from EPRI 2011, 2012, and 2017 as well as Gredell and Reitz & Jens, 2014.

5.1.1 Chloride Concentrations at TMW-1

Chloride is not known to be an indicator of fly ash or boiler slag/bottom ash (EPRI 2012, EPRI 2017), but can be an indicator for FGD type wastes and is commonly found near salt and brine treated roadways. There is no FGD waste at the LEC, and fly ash or bottom ash/boiler slag are the typical wastes in the LCL1 as well as the LCPA and LCPB, therefore elevated concentrations in chloride alone are not a good indicator of CCR impacts. Concentrations for the May 2019 sampling event and subsequent verification sampling event are 3.7 and 4.4 mg/L respectively. These values are just above the initial UPL used for chloride concentrations at TMW-1 of 3.603 mg/L (**Figure 2**). This initial UPL is calculated based on eight baseline sampling events collected in 2016 and 2017 during which time chloride concentrations ranged from 1.5 to 2.9 mg/L. UPLs were updated after the May 2019 sampling event as outlined by the Statistical Analysis Plan. The updated UPL value that will be used for TMW-1, starting with the November 2019 sampling event, is 4.246 mg/L (**Figure 2**). State required sampling has also been completed at TMW-1 since April 2013, and chloride concentrations have ranged from 1.0 to 6.0

mg/L. If these results are included in the calculation of an UPL, the UPL for TMW-1 would be increased to 5.863 mg/L (**Figure 2**). **Figure 3** displays the results from TMW-1 against these UPLs and demonstrates that the results from the May 2019 sampling event are well within the typical range for results collected at TMW-1 historically (**Figure 3**). Additionally, CCR was placed in the LCL1 starting in October 2016 and results prior to the receipt of CCR in the LCL1 were historically higher than those currently detected.

Furthermore, chloride results in the background wells BMW-1S and BMW-2S, located approximately 2.5 miles to the southwest of the LCL1 (**Figure 1**) and outside of any possible impacts from the LCL1 or the LCPA have had chloride results ranging from 1.3 to 21.2 mg/L with an initial UPL of 13.75 mg/L and an updated May 2019 UPL of 8.317 mg/L. **Figure 3** displays the results from TMW-1 to the background UPLs and demonstrates that the results from the May 2019 sampling event are well within the background limits for chloride in the shallow zone of the alluvial aquifer at the LEC.

These results indicated that relatively low calculated UPLs for TMW-1 do not reflect the full, natural variability within the alluvial aquifer. When May 2019 results from TMW-1 are compared to an expanded historical dataset and to background monitoring wells, the results are well within compliance.

5.2 Geochemical Analysis

During November 2017, May 2018, November 2018, and May 2019 Detection Monitoring events, major cation and anion concentrations were collected. These data were used to compare major ion chemistry over time to see if the groundwater chemistry is changing. The data used to generate these diagrams is provided in **Table 3**.

5.2.1 Stiff Diagrams

Stiff diagrams visually display the major cation and anion data. **Figure 4** displays the Stiff diagrams from the November 2017, May 2018, November 2018, and May 2019 Detection Monitoring events. Data from the November 2017 event display nearly identical distribution to that of May 2018, November 2018, May 2019 events. If impacts from the LCL1 were causing the apparent SSIs, then a shift in groundwater chemistry would be expected. This figure demonstrates that there has not been a shift in groundwater chemistry due to CCR impact between the two sampling events.

5.2.2 Piper Diagram

A Piper diagram is a graphical technique used to classify different groundwater chemistry. The same data used to generate the Stiff diagram are plotted on a ternary Piper diagram according to major cation and anion concentrations. In addition to showing instantaneous concentrations, Piper diagrams can be used to determine if groundwater chemistry is changing, either spatially or temporally. **Figure 5** displays a Piper diagram for TMW-1 over time. If CCR impacts from the LCL1 were causing the apparent SSIs, then a shift in groundwater chemistry would be expected. This figure demonstrates that there has not been a shift in groundwater chemistry between the sampling events.

Additionally, a comparison of this diagram with those in the November 2017 LCPB ASD (2018 LCPB Annual Report) show that groundwater chemistry in the TMW-1 well plots in the area for background.

6.0 DEMONSTRATION THAT SSI WAS NOT CAUSED BY LCL1 IMPACT

Based on the information presented in Section 5 above, the SSI at TMW-1 was not caused by impacts from the LCL1. The SSI appears to be caused by numerous factors but is primarily caused by relatively low calculated UPLs and a relatively small set of baseline data that do not reflect the full natural variability within the alluvial aquifer. This is because only eight (8) baseline samples were collected prior to detection monitoring and these

sampling events were not able to capture the full extent of the natural spatial and temporal variability in the alluvial aquifer especially for those results near the laboratory PQL. When results are compared to historical data from the state sampling program, it is apparent that there are no impacts from the LCL1.

As required by the CCR Rule, eight (8) baseline samples were collected prior to the October 2017 deadline which were used to calculate the UPL at each compliance well around the LCL1. According to the *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance* (USEPA 2009), eight (8) samples is the minimum number of samples recommended in order to complete statistical tests and future data will be used to enlarge the dataset for UPL calculation. As shown throughout this ASD, the minimum 8 (eight) baseline samples have not been able to capture the full extent of the natural spatial and temporal variability. Starting with the November 2019 statistical analysis, the baseline data set will be enlarged to a minimum of 12 (twelve) samples and the May 2019 results were within those statistical limits. In addition, inaccuracy of laboratory testing at low levels near the PQL can produce results higher than the UPL when the baseline dataset is small.

Other supplemental lines of evidence also demonstrate that there are no impacts on groundwater from the LCL1. Geochemical comparisons display that there has been no significant change in groundwater chemistry between samples below the UPL and those above. Further, the construction of the LCL1, with 2-feet of compacted clay overlain by a 60-mil HDPE liner, also limits the likelihood that the SSI is a result an impact from LCL1. The SSI observed in TMW-1 was not caused by impacts from the LCL1.

7.0 REFERENCES

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Tables

Table 1
May 2019 Detection Monitoring Results
LCL1 - Utility Waste Landfill Cell 1
Labadie Energy Center, Franklin County, MO

ANALYTE	UNITS	BACKGROUND		GROUNDWATER MONITORING WELLS							
		BMW-1S	BMW-2S	Prediction Limit MW-26	MW-26	Prediction Limit TMW-1	TMW-1	Prediction Limit TMW-2	TMW-2	Prediction Limit TMW-3	TMW-3
May 2019 Detection Monitoring Event											
DATE	NA	5/1/2019	5/1/2019	NA	5/8/2019	NA	5/2/2019	NA	5/2/2019	NA	5/8/2019
pH	SU	6.53	6.18	6.2-7.44	6.02	6.437-7.305	6.91	6.303-7.517	6.87	6.55-7.207	5.83
BORON, TOTAL	µg/L	111	61.3 J	DQR	98.2 J	117.5	109	139.9	98.5 J	140.0	114
CALCIUM, TOTAL	µg/L	196,000	126,000	154,083	182,000	175,638	164,000 J	200,867	176,000	217,698	170,000
CHLORIDE, TOTAL	mg/L	4.4	1.4	14.4	3.3	3.603	3.7	6.933	5.3	8.489	6.2
FLUORIDE, TOTAL	mg/L	0.22	0.21	DQR	0.20	0.2269	0.24	DQR	0.24	DQR	0.19 J
SULFATE, TOTAL	mg/L	39.2	29.4	33.38	19.3	115	98.6 J	112.1	86.4	97.4	48.9
TOTAL DISSOLVED SOLIDS	mg/L	740	459	520.2	516	694.1	664	775.5	676	752.2	733
August 2019 Verification Sampling Event											
DATE	NA				8/21/2019		8/21/2019		8/21/2019		8/21/2019
pH	SU				6.54		6.61		6.45		6.57
BORON, TOTAL	µg/L										
CALCIUM, TOTAL	µg/L				142,000						
CHLORIDE, TOTAL	mg/L						4.4				
FLUORIDE, TOTAL	mg/L				0.15 J		ND		ND		
SULFATE, TOTAL	mg/L										
TOTAL DISSOLVED SOLIDS	mg/L										

NOTES:
1. Unit Abbreviations: µg/L - micrograms per liter, mg/L - milligrams per liter, SU - standard units.
2. J - Result is an estimated value.
3. ND - Constituent was analyzed for, but was not detected above the Method Detection Limit (MDL) and is considered a non-detect. Values displayed as ND.
4. NA - Not applicable.
5. Prediction Limits calculated using Sanitas Software.
6. If all background values are less than the Practical Quantitation Limit (PQL) then the Double Quantification Rule (DQR) is used.
7. Values highlighted in yellow indicate a Statistically Significant Increase (SSI).
8. Values highlighted in green indicate an initial exceedance above (or below for pH) the prediction limit that was not confirmed by Verification Sampling (not a SSI)
9. Only analytes/wells that were detected above the prediction limit were tested during Verification Sampling.

Prepared By: JSI
Checked By: KAB
Reviewed By: CMR

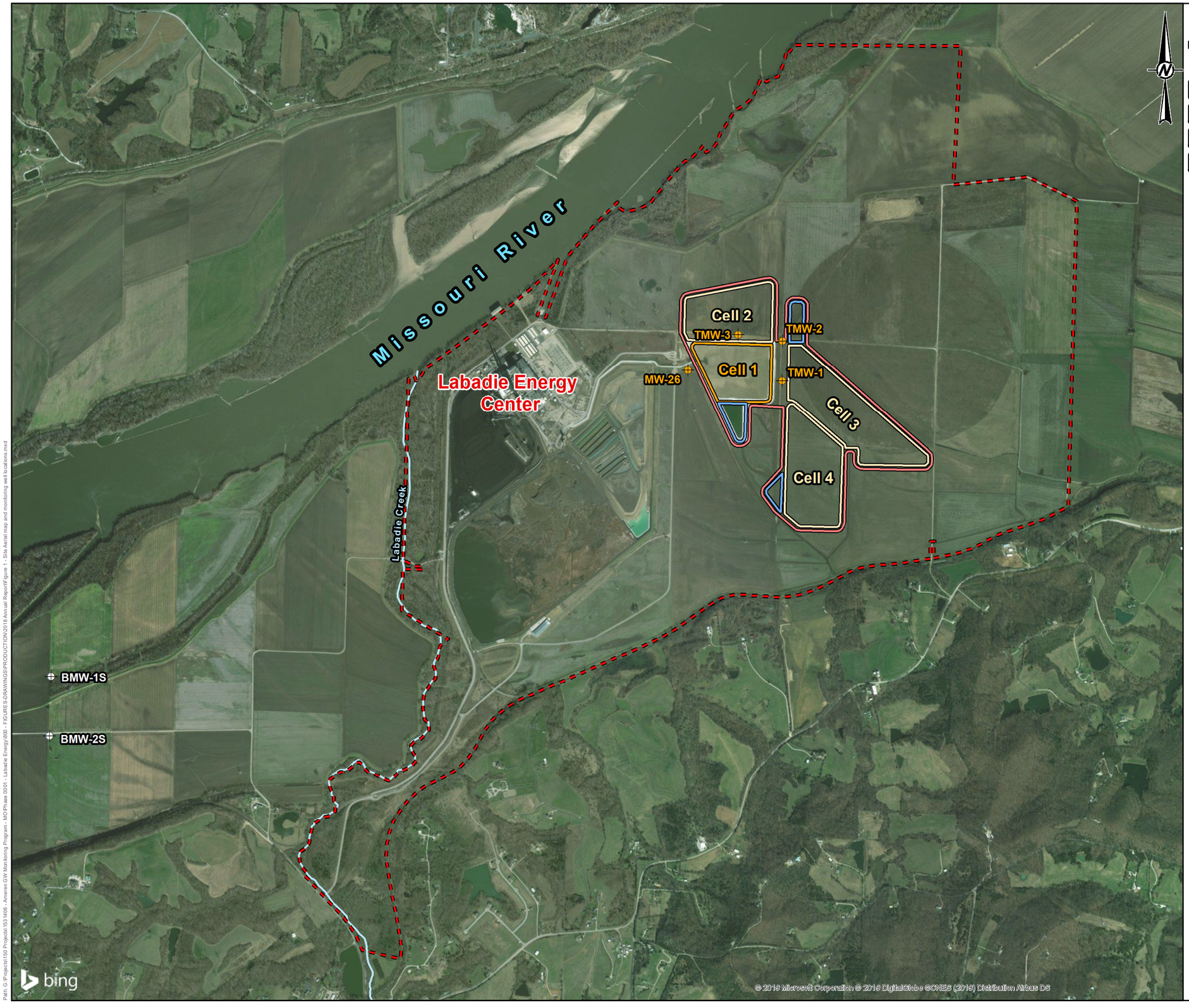
Table 3
Major Cation and Anion Concentrations
LCL1 - Alternative Source Demonstration
Labadie Energy Center, Franklin County, MO

Monitoring Well ID and Date of Sample Collection	Total Sodium (mg/L)	Total Potassium (mg/L)	Total Calcium (mg/L)	Total Magnesium (mg/L)	Total Chloride (mg/L)	Total Sulfate (mg/L)	Total Alkalinity [(1)] (mg/L)
L-TMW-1 - 11/8/2017	10.6	5.82	156	42.2	3.0	83.3	483
L-TMW-1 - 5/23/2018	11.8	5.77	162	43.6	3.2	100	552
L-TMW-1 - 11/9/2018	11.5	5.88	162	44.1	3.7	97	534
L-TMW-1 - 5/2/2019	11.2	5.51	164	44.2	3.7	98.6	543

Notes:
1) Alkalinity is equal to the sum of Carbonate and Bicarbonate.
2) mg/L - milligrams per liter.

Prepared by: JSI
Checked by: RJF
Reviewed by: MNH

Figures



LEGEND

Labadie Energy Center Property Boundary

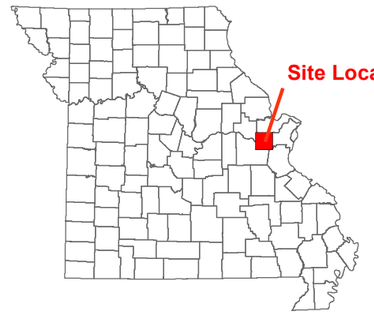
Utility Waste Landfill (UWL)

- Proposed Fence Perimeter
- Cell LCL1
- Proposed Stormwater Pond
- Proposed Future Cell

Ground/Surface Elevation Measurement Location

- UWL Monitoring Well
- Background Monitoring Well

KEY MAP



NOTES

1. ALL LOCATIONS AND BOUNDARIES ARE APPROXIMATE.
2. GROUNDWATER MONITORING WELLS INSTALLED BY GOLDER ASSOCIATES WERE SURVEYED BY ZAHNER & ASSOCIATES, INC. ON FEBRUARY 11 AND APRIL 28, 2016.
3. GROUNDWATER MONITORING WELLS INSTALLED BY REITZ AND JENS, INC. WERE SURVEYED BY KDG.

REFERENCES

1. ZAHNER AND ASSOCIATES, INC. 2016. LOT CONSOLIDATION PLAT OF "LABADIE ENERGY CENTER" - PREPARED FOR AMEREN MISSOURI. REVISED JUNE 15, 2016.
2.) COORDINATE SYSTEM: NAD 1983 STATEPLANE MISSOURI EAST FIPS 2,401 FEET.

0 750 1,500 3,000 Feet

CLIENT
AMEREN MISSOURI
LABADIE ENERGY CENTER

PROJECT
GROUNDWATER MONITORING PROGRAM

TITLE
SITE LOCATION AND AERIAL MAP

CONSULTANT
GOLDER

YYYY-MM-DD	2019-01-10
PREPARED	RJF
DESIGN	JSI
REVIEW	EMS
APPROVED	MNH

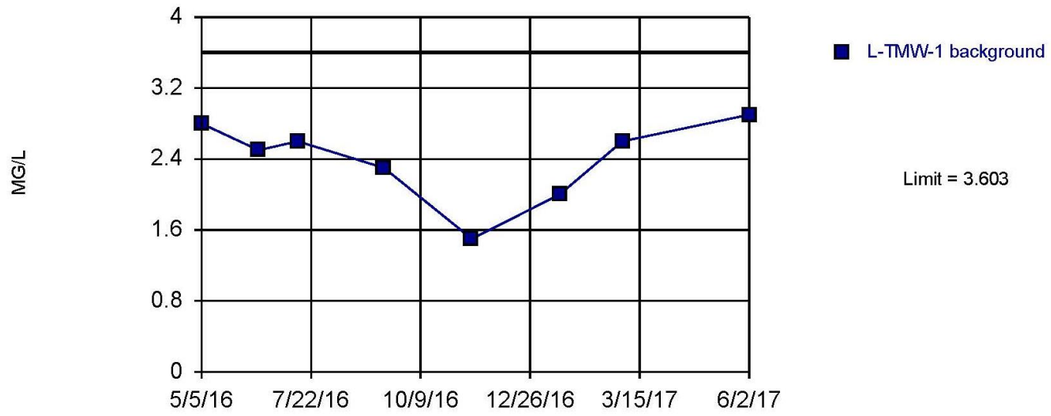
PROJECT No. 153-1406 PHASE 0001 FIGURE **1**

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: 1in 0

Path: G:\Projects\1150 Projects\153-1406 - Ameren GW Monitoring Program - MO\Phase 0001 - Labadie Energy\800 - FIGURES-DRAWINGS\PRODUCTION\2018 Annual Report\Figure 1 - Site Aerial map and monitoring well locations.mxd

Initial UPL

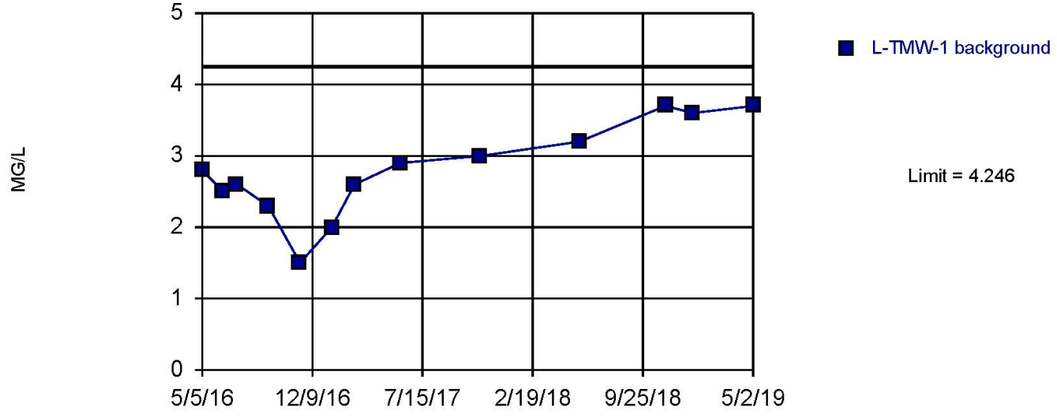
(Based on Initial 8 Baseline Events)



Background Data Summary: Mean=2.4, Std. Dev.=0.4598, n=8. Normality test: Shapiro Wilk @alpha = 0.1, calculated = 0.9065, critical = 0.851. Kappa = 2.616 (c=7, w=4, 1 of 2, event alpha = 0.05132). Report alpha = 0.00188. Assumes 1 future value.

Updated UPL

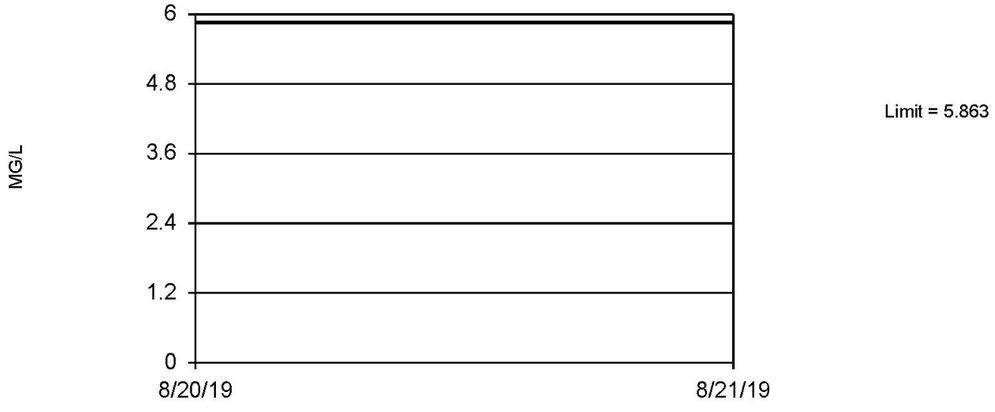
(Based on Initial 8 Baseline Events plus Subsequent Sampling Events)



Background Data Summary: Mean=2.8, Std. Dev.=0.6595, n=13. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.05, calculated = 0.959, critical = 0.866. Kappa = 2.193 (c=7, w=4, 1 of 2, event alpha = 0.05132). Report alpha = 0.00188. Assumes 1 future value.

UPL Using Historical Data

UPL using all CCR Rule and State UWL Sampling Results

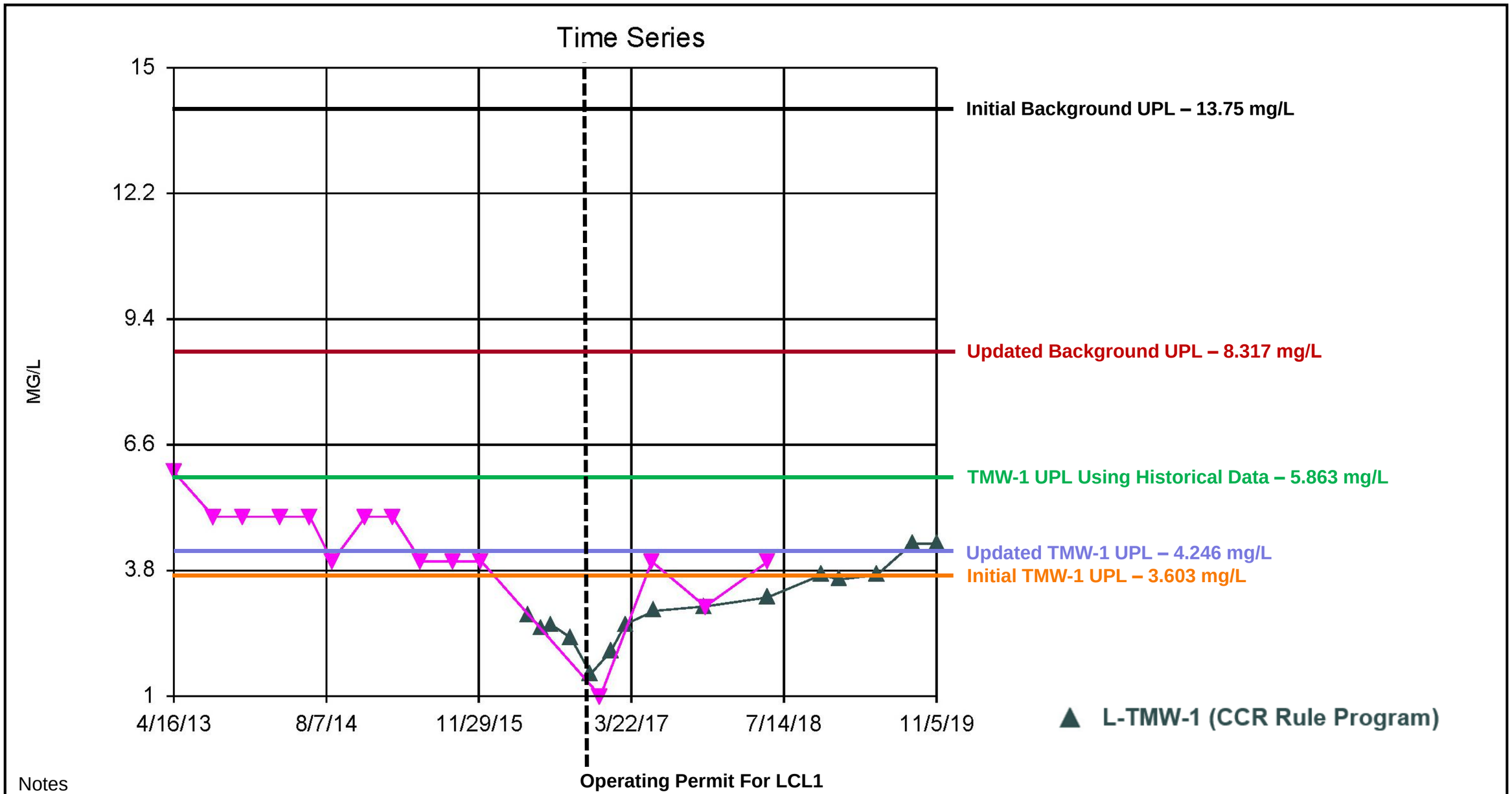


Background Data Summary: Mean=3.614, Std. Dev.=1.192, n=29. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9688, critical = 0.898. Kappa = 1.887 (c=7, w=4, 1 of 2, event alpha = 0.05132). Report alpha = 0.007498. Individual comparison alpha = 0.00188. Assumes 4 future values.

Notes

1) mg/L – milligrams per liter.
2) Calculations completed using Sanitas Software.
3) UPL – Upper Prediction Limit.
4) CCR – Coal Combustion Residuals.
5) UWL – Utility Waste Lanfill.

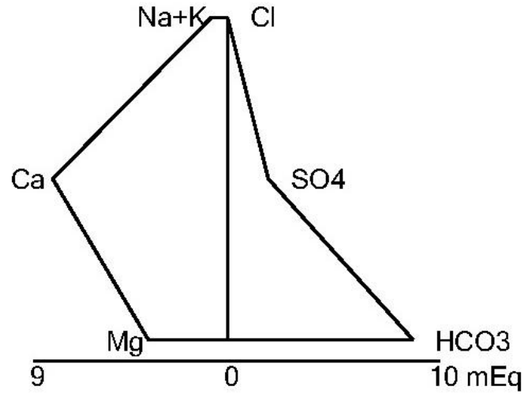
CLIENT/PROJECT **AMEREN MISSOURI** **LABADIE ENERGY CENTER**							TITLE **Calculation of Upper Prediction Limits for Chloride at TMW-1**			
DRAWN JSI	CHECKED RJF	REVIEWED MNH	DATE 2020/01/16	SCALE N/A	FILE NO. N/A	JOB NO. 153140601.0001	DWG NO. N/A	SUBTITLE N/A	REV. NO. N/A	FIGURE **2**



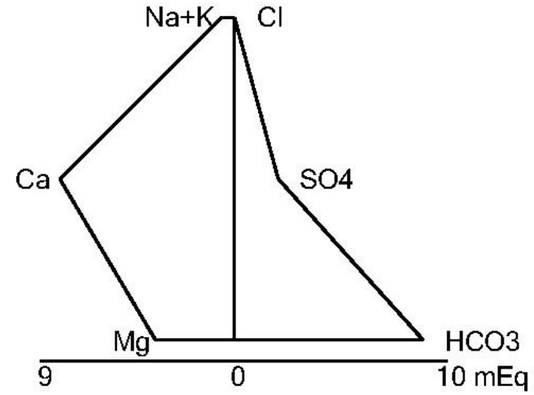
Notes

1) mg/L – milligrams per liter.
2) Calculations completed using Sanitas Software.
3) UPL – Upper Prediction Limit.
4) CCR – Coal Combustion Residuals.
5) UWL – Utility Waste Landfill.

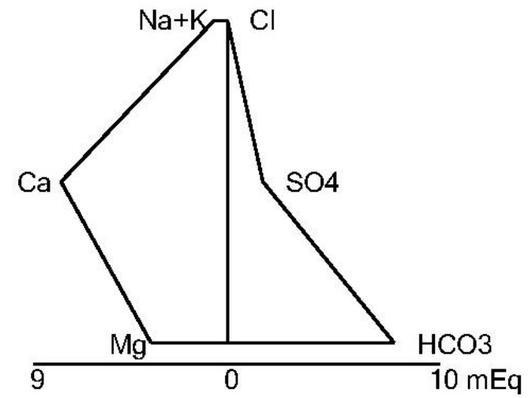
CLIENT/PROJECT					TITLE					
AMEREN MISSOURI **LABADIE ENERGY CENTER**				GOLDER	**Time Series Plot and Upper Prediction Limits for Chloride at TMW-1**					
DRAWN JSI	CHECKED RJF	REVIEWED MNH	DATE 2020/01/16	SCALE N/A	FILE NO. N/A	JOB NO. 153140601.0001	DWG NO. N/A	SUBTITLE N/A	REV. NO. N/A	FIGURE **3**



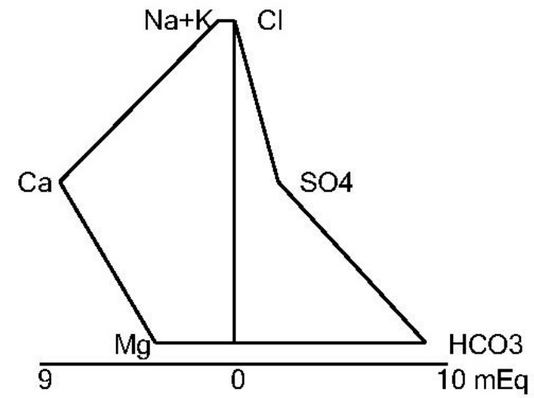
L-TMW-1* 11/9/2018



L-TMW-1* 5/2/2019



L-TMW-1* 11/8/2017



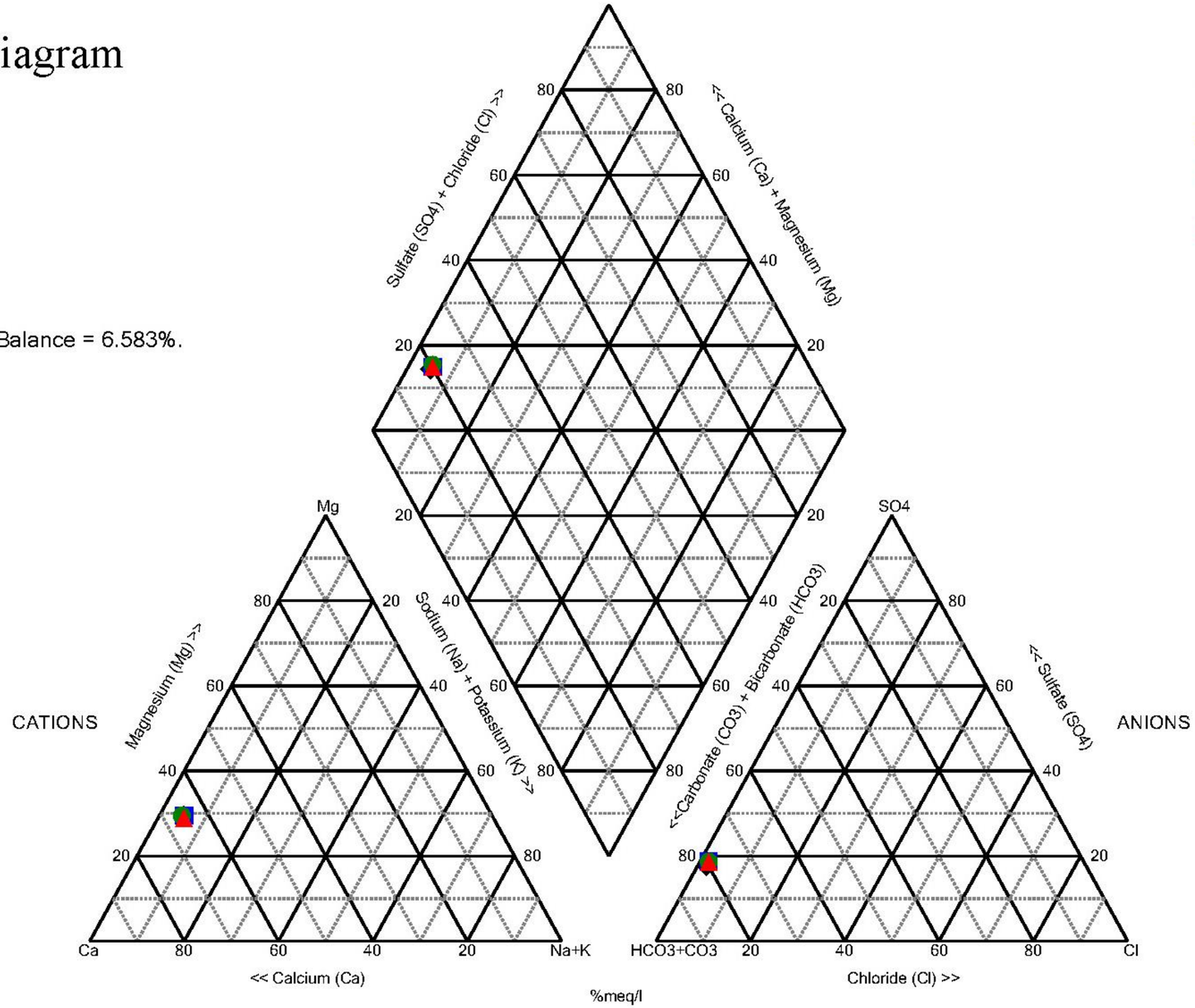
L-TMW-1* 5/23/2018

Notes
1) Stiff diagrams calculated using Sanitas Software.
2) Data used to calculate diagrams provided in Table 3.
3) Na + K – Sodium plus Potassium.
4) SO4 – Sulfate.
5) HCO3 – Alkalinity.
6) Mg – Magnesium.
7) Ca – Calcium.
8) Cl – Chloride.
9) mEq – milliequivalents.

CLIENT/PROJECT						TITLE			
AMEREN MISSOURI **LABADIE ENERGY CENTER**						**TMW-1 Stiff Diagrams**			
DRAWN JSI	CHECKED RJF	REVIEWED MNH	DATE 2020/01/16	SCALE N/A	FILE NO. N/A	JOB NO. 153140601.0001	DWG NO. N/A	SUBTITLE N/A	REV. NO. N/A	FIGURE **4**

Piper Diagram

Cation-Anion Balance = 6.583%.

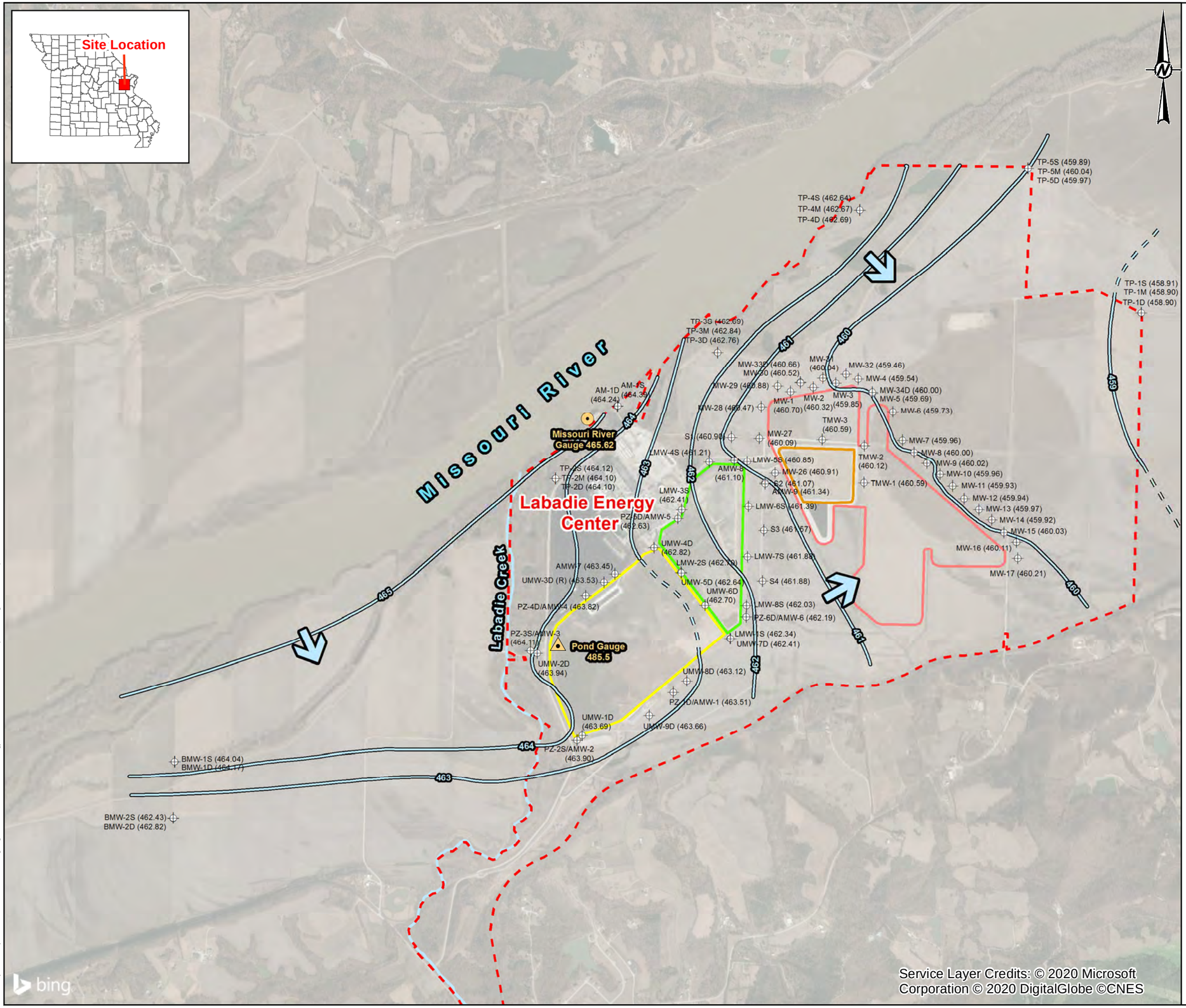


1) Piper diagram generated using Sanitas Software.
2) Data used to calculate diagrams provided in Table 3.

CLIENT/PROJECT **AMEREN MISSOURI** **LABADIE ENERGY CENTER**							TITLE **TMW-1 Piper Diagram**			
DRAWN JSI	CHECKED RJF	REVIEWED MNH	DATE 2020/01/16	SCALE N/A	FILE NO. N/A	JOB NO. 153140601.0001	DWG NO. N/A	SUBTITLE N/A	REV. NO. N/A	FIGURE **5**

APPENDIX D

Potentiometric Surface Maps



LEGEND

- Labadie Energy Center Property Boundary

Utility Waste Landfill (UWL)

- Proposed Final UWL Fence Perimeter
- Utility Waste Landfill Cell LCL1

Surface Impoundments

- LCPA - Bottom Ash Surface Impoundment
- LCPB - Fly Ash Surface Impoundment

Groundwater Elevation Measurement Location

- Monitoring Well or Piezometer

Surface Water Elevation Measurement Location

- Missouri River Gauge
- LCPA - Bottom Ash Surface Impoundment Gauge

Groundwater Elevation Contours

- Groundwater Elevation Contour (FT MSL)
- Inferred Groundwater Elevation Contour (FT MSL)
- Groundwater Flow Direction

NOTES

1. ALL LOCATIONS AND BOUNDARIES ARE APPROXIMATE.
2. GROUNDWATER ELEVATION MEASUREMENTS OBTAINED BY GOLDER.
3. GROUNDWATER ELEVATIONS DISPLAYED IN FT MSL (FEET ABOVE MEAN SEA LEVEL).
4. MISSOURI RIVER LEVEL OBTAINED FROM USGS LABADIE GAUGE 06935550.
5. POND GAUGE LEVEL OBTAINED ONSITE BY GOLDER.
6. THE UWL BOUNDARIES AND DESIGNATIONS ARE BASED ON AMEREN LABADIE CONSTRUCTION PERMIT APPLICATION DRAWINGS.

REFERENCES

1. ZAHNER AND ASSOCIATES, INC. 2016. LOT CONSOLIDATION PLAT OF "LABADIE ENERGY CENTER" - PREPARED FOR AMEREN MISSOURI. REVISED JUNE 15, 2016.
2. COORDINATE SYSTEM: NAD 1983 STATEPLANE MISSOURI EAST FIPS 2,401 FEET.
3. USGS (UNITED STATES GEOLOGICAL SURVEY), NATIONAL WATER INFORMATION SYSTEM, USGS GAUGE 06935550 MISSOURI RIVER NEAR LABADIE, MO.

0 1,000 2,000 3,000 4,000 5,000 6,000 Feet

CLIENT
AMEREN MISSOURI
LABADIE ENERGY CENTER

PROJECT
CCR GROUNDWATER MONITORING PROGRAM

TITLE
JANUARY 2, 2019 POTENTIOMETRIC SURFACE MAP

CONSULTANT
GOLDER

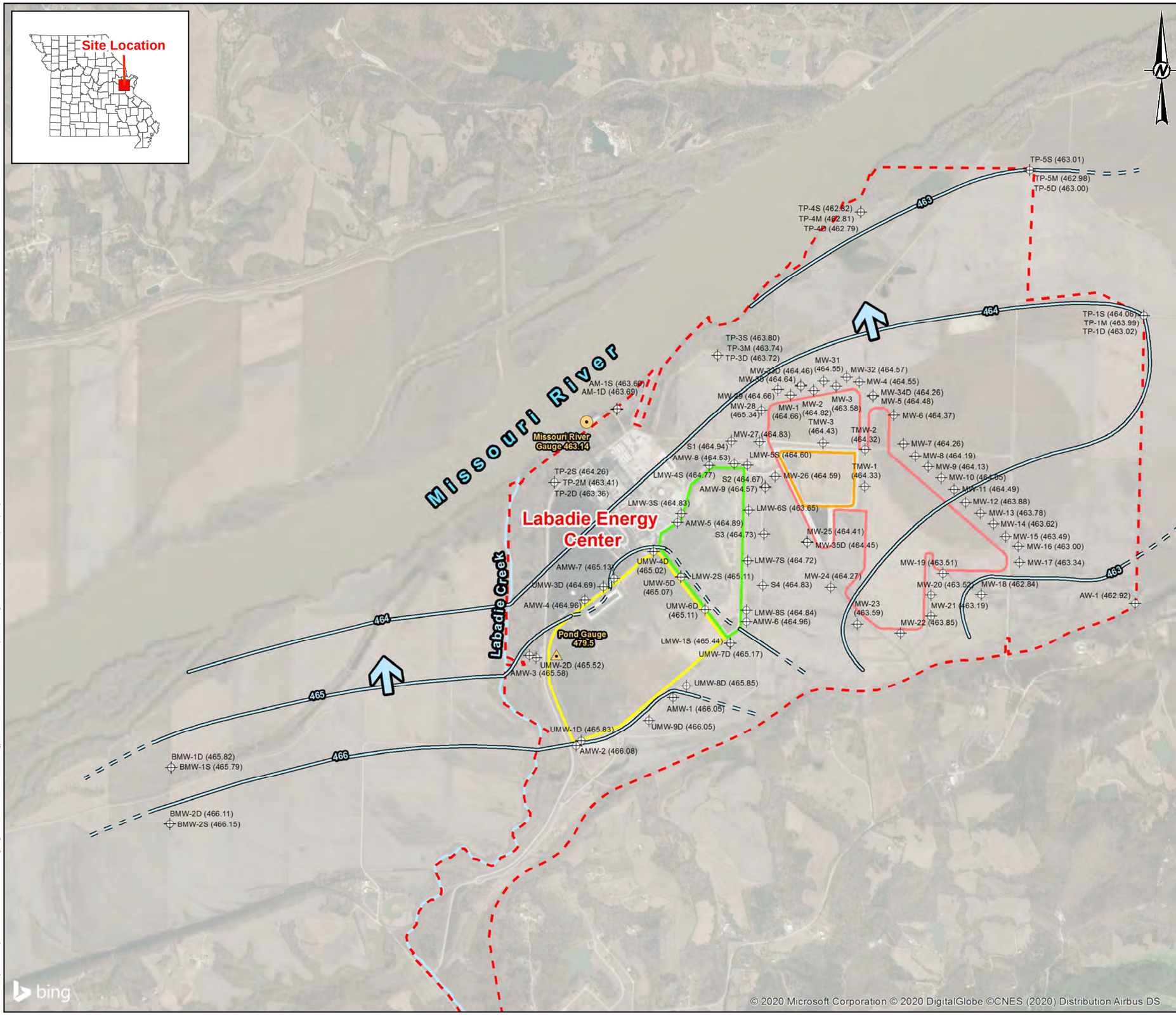
YYYY-MM-DD	2019-11-22
PREPARED	EMS/RJF
DESIGN	JSI
REVIEW	TJG
APPROVED	CMR

PROJECT No.
153-140601

FIGURE
P1

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM:
1 in
0

Path: G:\Projects\1531\Projects\1531406 - Ameren GW Monitoring Program - MO\Phase 0001 - Labadie Energy\300 - REPORTS\DRAFT\2019 Annual Report\ILCPA\Figures\2019 Pot maps\LEC - VS Jan 2019.mxd



LEGEND

Labadie Energy Center Property Boundary

Utility Waste Landfill (UWL)

Proposed Final UWL Fence Perimeter

Utility Waste Landfill Cell LCL1

Surface Impoundments

LCPA - Bottom Ash Surface Impoundment

LCPB - Fly Ash Surface Impoundment

Groundwater Elevation Measurement Location

Monitoring Well or Piezometer

Surface Water Elevation Measurement Location

Missouri River Gauge

LCPA Bottom Ash Surface Impoundment Gauge

Groundwater Elevation Contours

Groundwater Elevation Contour (FT MSL)

Inferred Groundwater Elevation Contour (FT MSL)

Groundwater Flow Direction

NOTES

1. ALL LOCATIONS AND BOUNDARIES ARE APPROXIMATE.
2. GROUNDWATER ELEVATION MEASUREMENTS OBTAINED BY GOLDER.
3. GROUNDWATER ELEVATIONS DISPLAYED IN FT MSL (FEET ABOVE MEAN SEA LEVEL).
4. MISSOURI RIVER LEVEL OBTAINED FROM USGS LABADIE GAUGE 06935550.
5. POND GAUGE LEVEL OBTAINED ONSITE BY GOLDER.
6. THE UWL BOUNDARIES AND DESIGNATIONS ARE BASED ON AMEREN LABADIE CONSTRUCTION PERMIT APPLICATION DRAWINGS.
7. LMW-6S, TP-1D AND MW-28 WERE NOT USED IN POTENTIOMETRIC SURFACE CONTOURING.

REFERENCES

1. ZAHNER AND ASSOCIATES, INC. 2016. LOT CONSOLIDATION PLAT OF "LABADIE ENERGY CENTER" - PREPARED FOR AMEREN MISSOURI. REVISED JUNE 15, 2016.
2. COORDINATE SYSTEM: NAD 1983 STATEPLANE MISSOURI EAST FIPS 2,401 FEET.
3. USGS (UNITED STATES GEOLOGICAL SURVEY), NATIONAL WATER INFORMATION SYSTEM, USGS GAUGE 06935550 MISSOURI RIVER NEAR LABADIE, MO.

0 1,000 2,000 3,000 4,000 5,000 6,000 Feet

CLIENT
AMEREN MISSOURI
LABADIE ENERGY CENTER

PROJECT
CCR GROUNDWATER MONITORING PROGRAM

TITLE
APRIL 29, 2019 POTENTIOMETRIC SURFACE MAP

CONSULTANT
GOLDER

YYYY-MM-DD	2019-06-03
PREPARED	EMS
DESIGN	JSI
REVIEW	RJF
APPROVED	MNH

PROJECT No.
153-140601

FIGURE
P2

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: 11in 0

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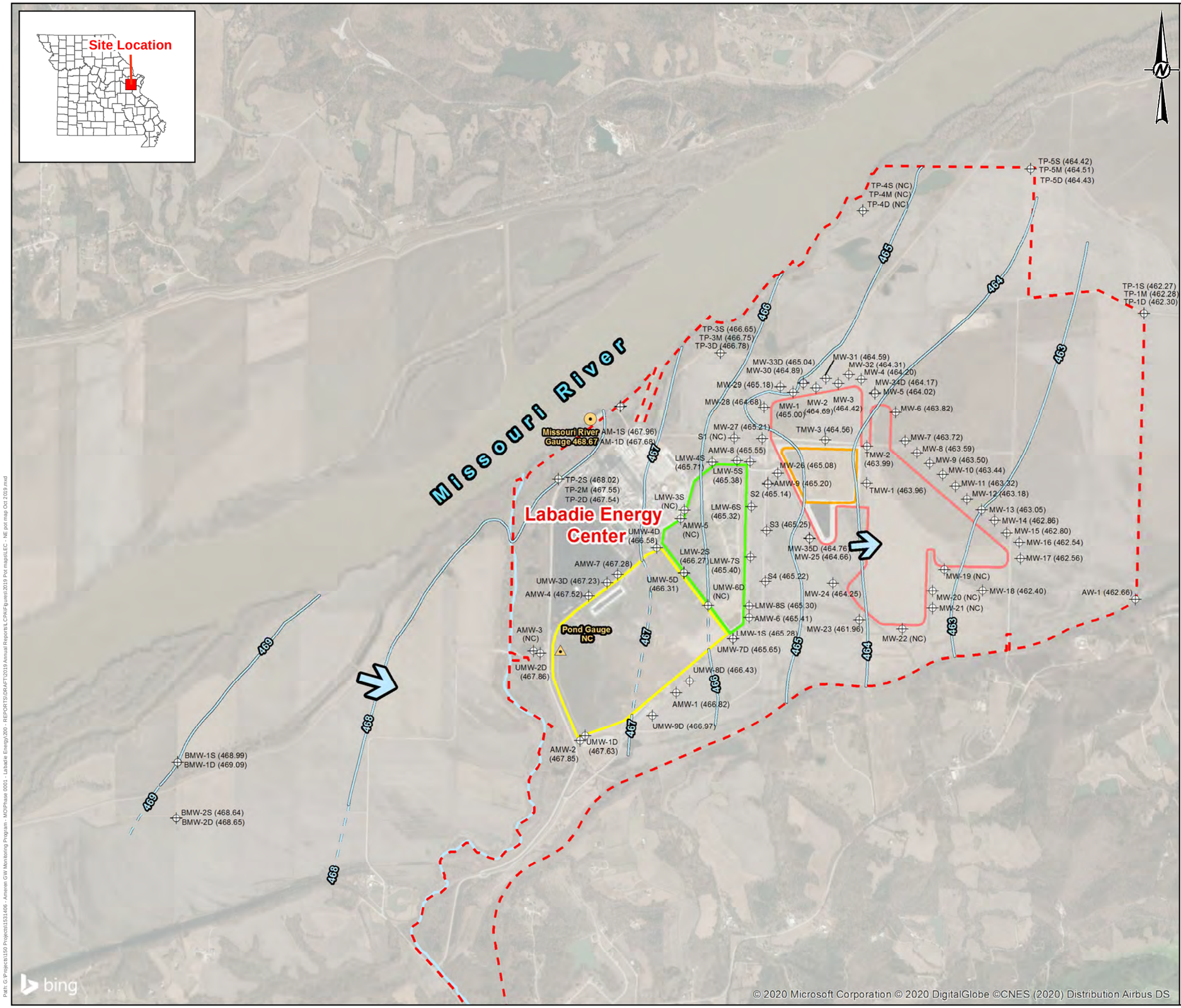


LEGEND

- Labadie Energy Center Property Boundary

Utility Waste Landfill (UWL)

- Proposed Final UWL Fence Perimeter
- Utility Waste Landfill Cell LCL1

Surface Impoundments

- LCPA - Bottom Ash Surface Impoundment
- LCPB - Fly Ash Surface Impoundment

Groundwater Elevation Measurement Location

- Monitoring Well or Piezometer

Surface Water Elevation Measurement Location

- Missouri River Gauge
- LCPA Bottom Ash Surface Impoundment Gauge

Groundwater Elevation Contours

- Groundwater Elevation Contour (FT MSL)
- Inferred Groundwater Elevation Contour (FT MSL)
- Groundwater Flow Direction

NOTES

1. ALL LOCATIONS AND BOUNDARIES ARE APPROXIMATE.
2. GROUNDWATER ELEVATION MEASUREMENTS OBTAINED BY GOLDER.
3. GROUNDWATER ELEVATIONS DISPLAYED IN FT MSL (FEET ABOVE MEAN SEA LEVEL).
4. MISSOURI RIVER LEVEL OBTAINED FROM USGS LABADIE GAUGE 06935550.
5. POND GAUGE LEVEL OBTAINED ONSITE BY GOLDER.
6. THE UWL BOUNDARIES AND DESIGNATIONS ARE BASED ON AMEREN LABADIE CONSTRUCTION PERMIT APPLICATION DRAWINGS.
7. THE POND GAUGE WAS BELOW THE GAUGE AND THEREFORE A POND ELEVATION LEVEL WAS NOT COLLECTED (NC).
8. WATER LEVELS WERE NOT COLLECTED AT WELLS LMW-3S, MW-19, MW-20, MW-21, MW-22, TP-4S, TP-4M, TP-4D, PZ-3S/AMW-3, PZ-5D/AMW-5, AND S1.

REFERENCES

1. ZAHNER AND ASSOCIATES, INC. 2016. LOT CONSOLIDATION PLAT OF "LABADIE ENERGY CENTER" - PREPARED FOR AMEREN MISSOURI. REVISED JUNE 15, 2016.
2. COORDINATE SYSTEM: NAD 1983 STATEPLANE MISSOURI EAST FIPS 2,401 FEET.
3. USGS (UNITED STATES GEOLOGICAL SURVEY), NATIONAL WATER INFORMATION SYSTEM, USGS GAUGE 06935550 MISSOURI RIVER NEAR LABADIE, MO.

0 1,000 2,000 3,000 4,000 5,000 6,000 Feet

CLIENT
AMEREN MISSOURI
LABADIE ENERGY CENTER

PROJECT
CCR GROUNDWATER MONITORING PROGRAM

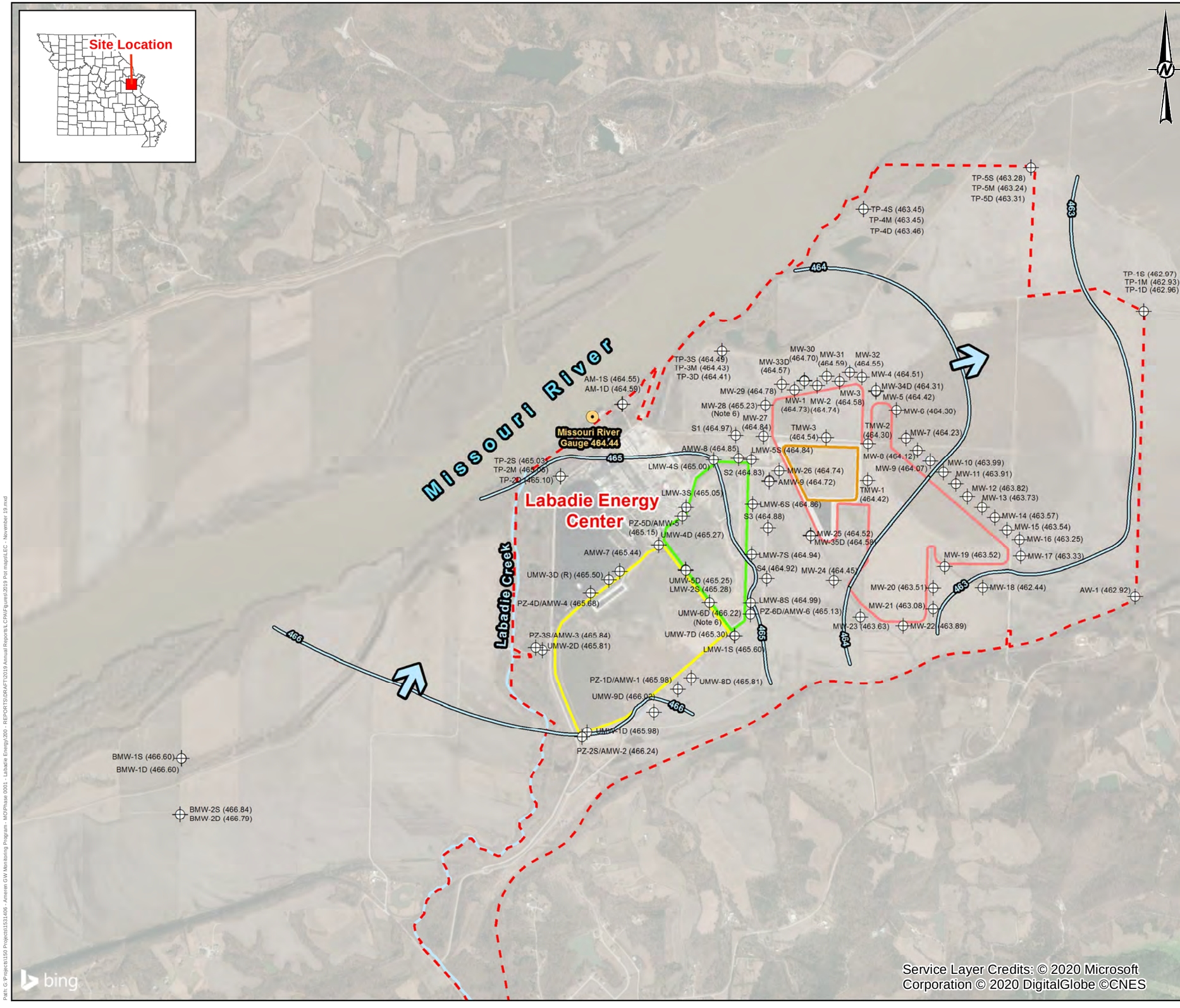
TITLE
OCTOBER 4, 2019 POTENTIOMETRIC SURFACE MAP

CONSULTANT
GOLDER

YYYY-MM-DD	2019-10-21
PREPARED	AMM
DESIGN	JSI
REVIEW	BCW
APPROVED	MNH

PROJECT No.
153-140601

FIGURE
P3



LEGEND

Labadie Energy Center Property Boundary

Utility Waste Landfill (UWL)

Proposed Final UWL Fence Perimeter

Utility Waste Landfill Cell LCL1

Surface Impoundments

LCPA - Bottom Ash Surface Impoundment

LCPB - Fly Ash Surface Impoundment

Groundwater Elevation Measurement Location

Monitoring Well or Piezometer

Surface Water Elevation Measurement Location

Missouri River Gauge

Groundwater Elevation Contours

Groundwater Elevation Contour (FT MSL)

Inferred Groundwater Elevation Contour (FT MSL)

Groundwater Flow Direction

NOTES

1. ALL LOCATIONS AND BOUNDARIES ARE APPROXIMATE.
2. GROUNDWATER ELEVATION MEASUREMENTS OBTAINED BY GOLDER.
3. GROUNDWATER ELEVATIONS DISPLAYED IN FT MSL (FEET ABOVE MEAN SEA LEVEL).
4. MISSOURI RIVER LEVEL OBTAINED FROM USGS LABADIE GAUGE 06935550.
5. THE UWL BOUNDARIES AND DESIGNATIONS ARE BASED ON AMEREN LABADIE CONSTRUCTION PERMIT APPLICATION DRAWINGS.
6. MONITORING WELLS UMW-6D AND MW-28 WERE NOT USED FOR POTENTIOMETRIC SURFACE CONTOURING

REFERENCES

1. ZAHNER AND ASSOCIATES, INC. 2016. LOT CONSOLIDATION PLAT OF "LABADIE ENERGY CENTER" - PREPARED FOR AMEREN MISSOURI. REVISED JUNE 15, 2016.
2. COORDINATE SYSTEM: NAD 1983 STATEPLANE MISSOURI EAST FIPS 2,401 FEET.
3. USGS (UNITED STATES GEOLOGICAL SURVEY), NATIONAL WATER INFORMATION SYSTEM, USGS GAUGE 06935550 MISSOURI RIVER NEAR LABADIE, MO.

0 1,000 2,000 3,000 4,000 5,000 6,000 Feet

CLIENT
AMEREN MISSOURI
LABADIE ENERGY CENTER

PROJECT
CCR GROUNDWATER MONITORING PROGRAM

TITLE
NOVEMBER 4, 2019 POTENTIOMETRIC SURFACE MAP

CONSULTANT
GOLDER

YYYY-MM-DD	2019-11-22
PREPARED	EMS
DESIGN	JSI
REVIEW	TJG
APPROVED	CMR

PROJECT No.
153-140601

FIGURE
P4

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: 11in x 17in

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golder.com