2018 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. 153-1406

January 31, 2019

Distribution:

1 Electronic Copy - Ameren Missouri
1 Electronic Copy - Golder Associates

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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, 2018 through December 31, 2018.

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) monitoring wells screened in the uppermost aquifer and is displayed in **Figure 1**. No new monitoring wells were installed or decommissioned in 2018 as a part of the CCR Rule monitoring program for the LCL1. For more information on the groundwater monitoring network, see the 2018 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 2018. **Table 1** below provides a summary of the samples collected in 2018 including the number of groundwater samples that were collected, 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						
May 2018 Detection Monitoring Event	5/21/2018	5/21/2018	5/23/2018	5/23/2018	5/23/2018	5/23/2018	Detection
July 2018 Verification Sampling Event	-	-	-	7/2/2018	7/2/2018	-	Detection
November 2018 Detection Monitoring Event	11/7/2018	11/7/2018	11/9/2018	11/9/2018	11/9/2018	11/9/2018	Detection
Total Number of Samples Collected	2	2	2	3	3	2	NA

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

3.1 Detection Monitoring Program

A Detection Monitoring event was completed November 7-8, 2017. Statistical Analysis to evaluate for Statistically Significant Increases (SSI) for the November 2017 event were completed in January 2018 and are included in this report. No SSIs were determined for the November 2017 event. A table summarizing the results of the statistical analysis of the November 2017 Detection Monitoring event is provided in **Table 2**.

A Detection Monitoring event was completed May 21-23, 2018, and testing was completed for all Appendix III analytes. May 2018 detections of Appendix III analytes triggered a verification sampling event, which was completed on July 2, 2018. Statistical analysis of these data determined that there were verified SSIs. A table summarizing the results of the statistical analysis of the May 2018 Detection Monitoring event is provided in **Table 3** 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 these SSIs and is provided in **Appendix B**. This ASD demonstrates that SSIs at the monitoring wells around LCL1, Utility Waste Landfill Cell 1, are not caused by the LCL1 CCR unit and the LCL1 CCR unit remains in Detection Monitoring.

A Detection Monitoring event was completed November 7-9, 2018, and testing was performed for all Appendix III analytes. Statistical analyses to evaluate for SSIs in the November 2018 data were not completed in 2018. Results of the statistical evaluation will be included in the 2019 annual report. A table summarizing the results of the November 2018 Detection Monitoring event is provided in **Table 4** 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 included in **Figure 2** and **Figure 3**. 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 as a result 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 gradient were estimated for the downgradient CCR monitoring wells using the USEPA’s On-line Tool for Site Assessment Calculation for Hydraulic Gradient (Magnitude and Direction) (USEPA, 2016). Results from this assessment indicate that while groundwater flow direction is variable, the overall net groundwater flow at the LCL1 is generally toward the north/northeast, flowing from the bluffs toward the river. Horizontal gradients calculated by the program range from 0.0002 to 0.0010 feet/foot with an estimated net annual groundwater velocity of approximately 24 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 2018.

4.1 Sampling Issues

No notable sampling issues were encountered at the LCL1 in 2018.

5.0 ACTIVITIES PLANNED FOR 2019

Detection Monitoring is scheduled to continue on a semi-annual basis in the second and fourth quarters of 2019. Statistical analysis of the November 2018 Detection Monitoring data will be completed in 2019 and included in the 2019 Annual Report.

Tables

Table 2
November 2017 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	Predicition Limit TMW-3	TMW-3
November 2017 Detection Monitoring Event											
DATE	NA	11/7/2017	11/7/2017	NA	11/8/2017	NA	11/8/2017	NA	11/8/2017	NA	11/8/2017
pH	SU	6.77	7.11	6.2-7.44	7.36	6.437-7.305	7.02	6.303-7.517	7.13	6.55-7.207	6.80
BORON, TOTAL	µg/L	100	46.3 J	DQR	71.7 J	117.5	115	139.9	130	140	131
CALCIUM, TOTAL	µg/L	197,000	120,000	154,083	137,000	175,638	156,000	200,867	184,000	217,698	191,000
CHLORIDE, TOTAL	mg/L	4.6	21.2	14.4	4.4	3.603	3.0	6.933	6.9	8.489	6.9
FLUORIDE, TOTAL	mg/L	0.18 J	0.18 J	DQR	0.19 J	0.2269	0.22	DQR	0.18 J	DQR	0.15 J
SULFATE, TOTAL	mg/L	157	246	33.38	25.4	115	83.3	112.1	97.1	97.4	72.0
TOTAL DISSOLVED SOLIDS	mg/L	653	414	520.2	291	694.1	593	775.5	653	752.2	307

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. NA - Not applicable.
4. Prediction Limits calculated using Sanitas Software.
5. If all background values are less than the Practical Quantitation Limit (PQL) then the Double Quantification Rule (DQR) is used.
6. Values highlighted in yellow indicate a Statistically Significant Increase (SSI).
7. Values highlighted in green indicate an initial exceedance above the prediction limit that was not confirmed by Verification Sampling (not an SSI).

Prepared By: JSI
Checked By: MSG
Reviewed By: MNH

Table 3
May 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
May 2018 Detection Monitoring Event											
DATE	NA	5/21/2018	5/21/2018	NA	5/23/2018	NA	5/23/2018	NA	5/23/2018	NA	5/23/2018
pH	SU	6.81	7.03	6.2-7.44	7.02	6.437-7.305	6.96	6.303-7.517	7.01	6.55-7.207	7.00
BORON, TOTAL	µg/L	128	55.7 J	DQR	69.1 J	117.5	122	139.9	108	140	126
CALCIUM, TOTAL	µg/L	196,000	120,000	154,083	130,000	175,638	162,000	200,867	179,000	217,698	182,000
CHLORIDE, TOTAL	mg/L	6.7	2.6	14.4	3.0	3.603	3.2	6.933	6.0	8.489	7.0
FLUORIDE, TOTAL	mg/L	0.18 J	0.20 J	DQR	0.17 J	0.2269	0.26	DQR	0.25	DQR	0.19 J
SULFATE, TOTAL	mg/L	57.0	25.0	33.38	22.6	115	100 J	112.1	96.3	97.4	70.2
TOTAL DISSOLVED SOLIDS	mg/L	784	437	520.2	493	694.1	704	775.5	755	752.2	726
July 2018 Verification Sampling											
DATE	NA						7/2/2018		7/2/2018		
pH	SU						6.91		7.17		
BORON, TOTAL	µg/L						131				
CALCIUM, TOTAL	µg/L										
CHLORIDE, TOTAL	mg/L										
FLUORIDE, TOTAL	mg/L						0.25		0.25		
SULFATE, TOTAL	mg/L										
TOTAL DISSOLVED SOLIDS	mg/L						700				

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).

Prepared By: JSI
Checked By: MSG
Reviewed By: MNH

Table 4
November 2018 Detection Monitoring Results
LCL1 - Utility Waste Landfill Cell 1
Labadie Energy Center, Franklin County, MO

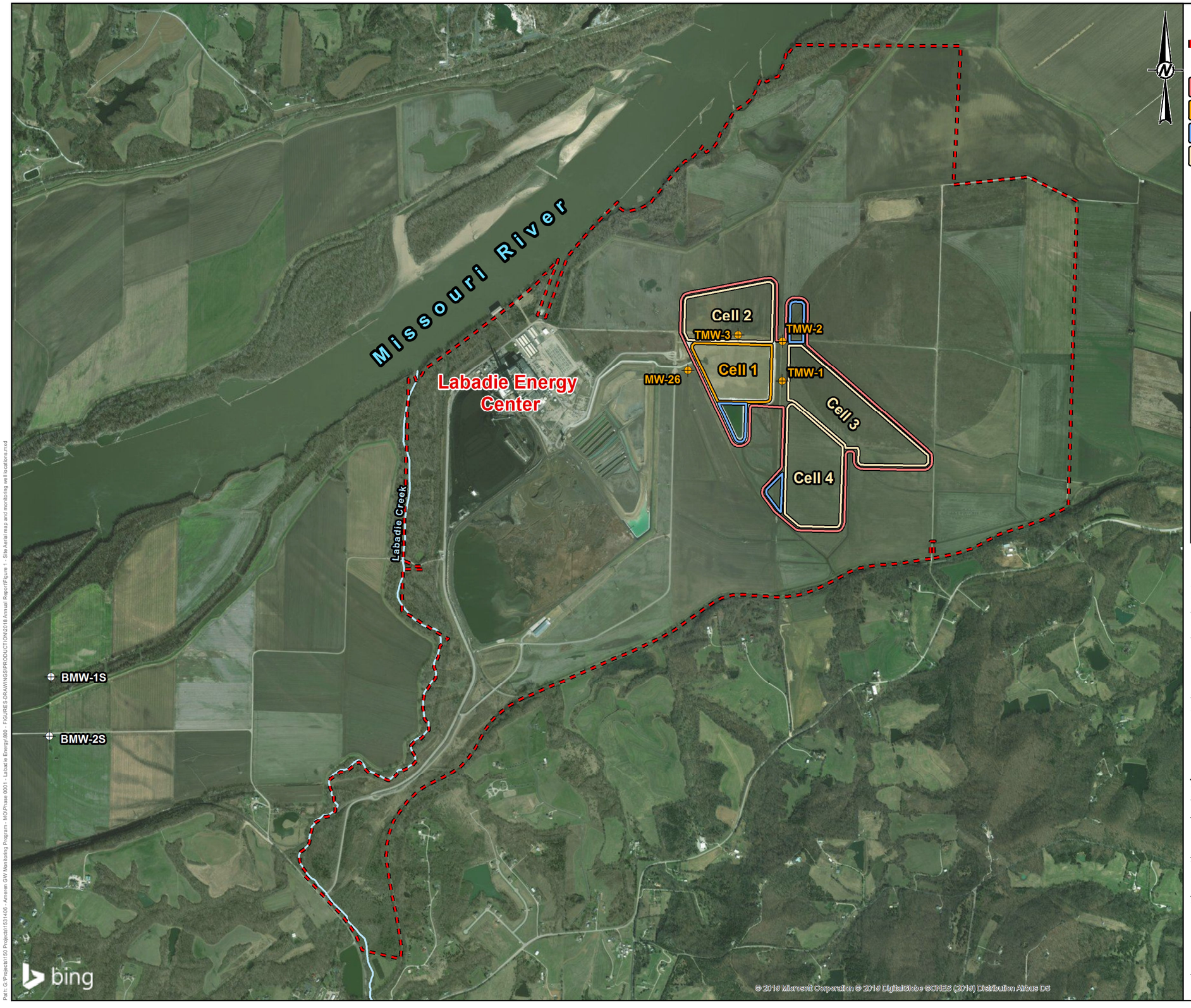
ANALYTE	UNITS	BACKGROUND					
		BMW-1S	BMW-2S	MW-26	TMW-1	TMW-2	TMW-3
November 2018 Detection Monitoring Event							
DATE	NA	11/7/2018	11/7/2018	11/9/2018	11/9/2018	11/9/2018	11/9/2018
pH	SU	6.83	7.12	7.00	6.94	6.93	6.81
BORON, TOTAL	µg/L	151	84.8 J	76.9 J	124	106	128
CALCIUM, TOTAL	µg/L	201,000	128,000	134,000	162,000	178,000	184,000
CHLORIDE, TOTAL	mg/L	5.6	1.3 J	2.7	3.7	5.5	6.7
FLUORIDE, TOTAL	mg/L	ND	ND	ND	0.29	0.21	ND
SULFATE, TOTAL	mg/L	36.7	28.4	24.8	96.8	91.0	66.9
TOTAL DISSOLVED SOLIDS	mg/L	751	958 J	494 J	677 J	686 J	720 J

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 ND.
4. NA - Not applicable.

Prepared By: JSI
Checked By: MSG
Reviewed By: MNH

Figures



LEGEND

Labadie Energy Center Property Boundary

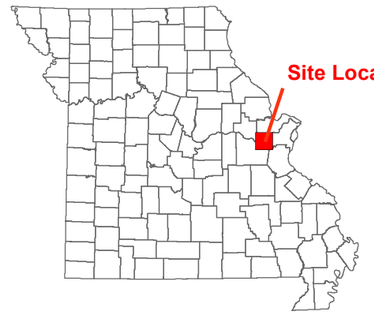
Utility Waste Landfill (UWL)

- 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 AERIAL MAP AND MONITORING WELL LOCATION

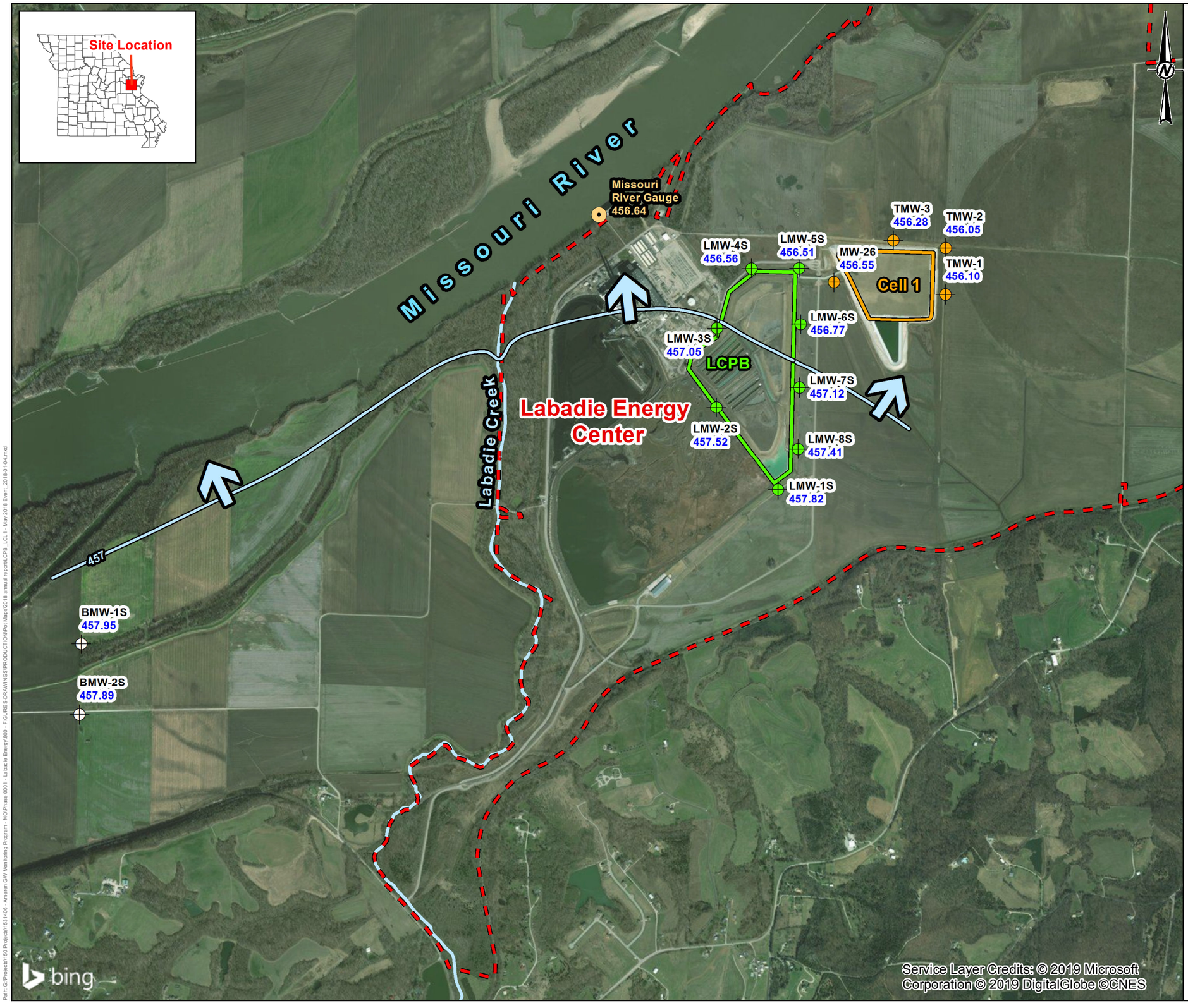
CONSULTANT
GOLDER

YYYY-MM-DD	2018-12-10
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\153 Projects\1531406 - 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



LEGEND

- Labadie Energy Center Property Boundary
- LCPB - Fly Ash Surface Impoundment
- LCL1 - Utility Waste Landfill (UWL) Cell 1

Groundwater Elevation Contours

- Groundwater Elevation Contour (FT MSL)
- = = = Inferred Groundwater Elevation Contour (FT MSL)

Ground/Surface Water Measurement Locations

- LCPB Fly Ash Surface Impoundment Monitoring Well
- Background Monitoring Well
- LCL1 Monitoring Well
- Missouri River Gauge
- Groundwater Flow Direction

NOTES

1. ALL LOCATIONS AND BOUNDARIES ARE APPROXIMATE.
2. GROUNDWATER ELEVATION MEASUREMENTS OBTAINED BY GOLDER.
3. GROUNDWATER MONITORING WELLS (EXCEPT TMW-1 AND MW-26) SURVEYED BY ZAHNER AND ASSOCIATES, INC.
4. GROUNDWATER MONITORING WELLS TMW-1 AND MW-26 INSTALLED BY RIETZ & JENS, INC. AND SURVEYED BY KDG INC.
5. GROUNDWATER ELEVATIONS DISPLAYED IN FT MSL (FEET ABOVE MEAN SEA LEVEL).
6. MISSOURI RIVER LEVEL OBTAINED FROM USGS LABADIE GAUGE 06935550.
7. 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.
4. REITZ & JENS, INC. 2014. ADDITIONAL GROUND WATER DETECTION MONITORING WELLS INSTALLATION REPORT.

0 1,500 3,000 Feet

CLIENT
AMEREN MISSOURI
LABADIE ENERGY CENTER

PROJECT
CCR GROUNDWATER MONITORING PROGRAM

TITLE
LCL1 POTENTIOMETRIC SURFACE MAP - MAY 21, 2018

CONSULTANT
GOLDER

YYYY-MM-DD	2018-12-20
PREPARED	EFT
DESIGN	JSI
REVIEW	EMS
APPROVED	MNH

PROJECT No.	PHASE	Rev.	FIGURE
153-1406	0001	0.0	2

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

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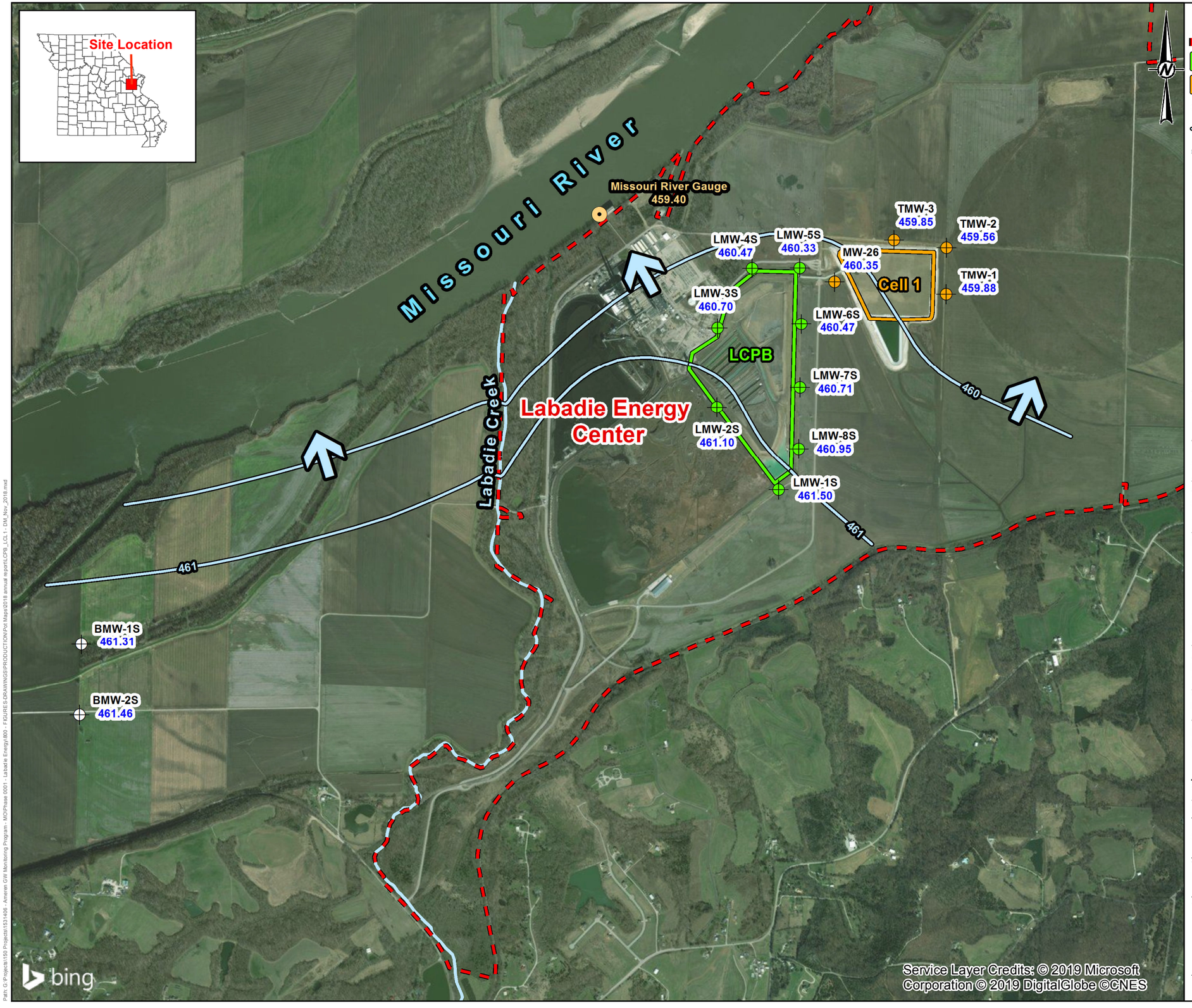

LEGEND

- Labadie Energy Center Property Boundary
- LCPB - Fly Ash Surface Impoundment
- LCL1 - Utility Waste Landfill (UWL) Cell 1

Groundwater Elevation Contours

- Groundwater Elevation Contour (FT MSL)
- = = = Inferred Groundwater Elevation Contour (FT MSL)

Ground/Surface Water Measurement Locations

- LCPB Fly Ash Surface Impoundment Monitoring Well
- Background Monitoring Well
- LCL1 Monitoring Well
- Missouri River Gauge
- Groundwater Flow Direction

NOTES

1. ALL LOCATIONS AND BOUNDARIES ARE APPROXIMATE.
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4. GROUNDWATER MONITORING WELLS TMW-1 AND MW-26 INSTALLED BY RIETZ & JENS, INC. AND SURVEYED BY KDG INC.
5. GROUNDWATER ELEVATIONS DISPLAYED IN FT MSL (FEET ABOVE MEAN SEA LEVEL).
6. MISSOURI RIVER LEVEL OBTAINED FROM USGS LABADIE GAUGE 06935550.
7. 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.
4. REITZ & JENS, INC. 2014. ADDITIONAL GROUND WATER DETECTION MONITORING WELLS INSTALLATION REPORT.

0 1,500 3,000 Feet

CLIENT
AMEREN MISSOURI
LABADIE ENERGY CENTER

PROJECT
CCR GROUNDWATER MONITORING PROGRAM

TITLE
LCL1 POTENTIOMETRIC SURFACE MAP - NOVEMBER 7, 2018

CONSULTANT
GOLDER

YYYY-MM-DD	2018-12-20
PREPARED	EFT
DESIGN	JSI
REVIEW	EMS
APPROVED	MNH

PROJECT No. 153-1406 | PHASE 0001 | Rev. 0.0 | FIGURE 3

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

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Appendices

APPENDIX A

Laboratory Analytical Data

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

December 28, 2018

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

RE: Project: AMEREN LEC LCL1
Pace Project No.: 60271161

Dear Mark Haddock:
Enclosed are the analytical results for sample(s) received by the laboratory between May 23, 2018 and May 24, 2018. 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, 12/28/18: 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
Jeffrey Ingram, Golder Associates
Eric Schneider, Golder Associates

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

CERTIFICATIONS

Project: AMEREN LEC LCL1
Pace Project No.: 60271161

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

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

SAMPLE SUMMARY

Project: AMEREN LEC LCL1
Pace Project No.: 60271161

Lab ID	Sample ID	Matrix	Date Collected	Date Received
60271161001	**L-TMW-1**	Water	05/23/18 08:55	05/24/18 03:45
60271161002	**L-TMW-2**	Water	05/23/18 10:10	05/24/18 03:45
60271161003	**L-TMW-3**	Water	05/23/18 11:35	05/24/18 03:45
60271161004	**L-MW-26**	Water	05/23/18 12:35	05/24/18 03:45
60271161005	**L-UWL-DUP-1**	Water	05/23/18 08:00	05/24/18 03:45
60271161006	**L-UWL-FB-1**	Water	05/23/18 12:25	05/24/18 03:45
60271049006	**L-BMW-1S**	Water	05/21/18 13:05	05/23/18 03:30
60271049007	**L-BMW-2S**	Water	05/21/18 10:10	05/23/18 03:30

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

SAMPLE ANALYTE COUNT

Project: AMEREN LEC LCL1
Pace Project No.: 60271161

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
60271161001	**L-TMW-1**	EPA 200.7	AGO	7	PASI-K
		SM 2320B	ZMH	1	PASI-K
		SM 2540C	JDA	1	PASI-K
		EPA 300.0	OL	3	PASI-K
60271161002	**L-TMW-2**	EPA 200.7	AGO	7	PASI-K
		SM 2320B	ZMH	1	PASI-K
		SM 2540C	JDA	1	PASI-K
		EPA 300.0	OL	3	PASI-K
60271161003	**L-TMW-3**	EPA 200.7	AGO	7	PASI-K
		SM 2320B	ZMH	1	PASI-K
		SM 2540C	JDA	1	PASI-K
		EPA 300.0	OL	3	PASI-K
60271161004	**L-MW-26**	EPA 200.7	AGO	7	PASI-K
		SM 2320B	ZMH	1	PASI-K
		SM 2540C	JDA	1	PASI-K
		EPA 300.0	OL	3	PASI-K
60271161005	**L-UWL-DUP-1**	EPA 200.7	AGO	7	PASI-K
		SM 2320B	ZMH	1	PASI-K
		SM 2540C	JDA	1	PASI-K
		EPA 300.0	OL	3	PASI-K
60271161006	**L-UWL-FB-1**	EPA 200.7	AGO	7	PASI-K
		SM 2320B	ZMH	1	PASI-K
		SM 2540C	JDA	1	PASI-K
		EPA 300.0	OL	3	PASI-K
60271049006	**L-BMW-1S**	EPA 200.7	AGO	7	PASI-K
		SM 2320B	LDB	1	PASI-K
		SM 2540C	JDA	1	PASI-K
		EPA 300.0	OL	3	PASI-K
60271049007	**L-BMW-2S**	EPA 200.7	AGO	7	PASI-K
		SM 2320B	LDB	1	PASI-K
		SM 2540C	JDA	1	PASI-K
		EPA 300.0	OL	3	PASI-K

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ANALYTICAL RESULTS

Project: AMEREN LEC LCL1
Pace Project No.: 60271161

Sample: L-TMW-1 **Lab ID: 60271161001** Collected: 05/23/18 08:55 Received: 05/24/18 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	**122**	ug/L	100	12.5	1	05/31/18 17:10	06/01/18 16:31	7440-42-8	
Calcium	**162000**	ug/L	200	53.5	1	05/31/18 17:10	06/01/18 16:31	7440-70-2	
Iron	**188**	ug/L	50.0	6.1	1	05/31/18 17:10	06/01/18 16:31	7439-89-6	
Magnesium	**43600**	ug/L	50.0	14.0	1	05/31/18 17:10	06/01/18 16:31	7439-95-4	
Manganese	**3030**	ug/L	5.0	0.73	1	05/31/18 17:10	06/01/18 16:31	7439-96-5	
Potassium	**5770**	ug/L	500	79.3	1	05/31/18 17:10	06/01/18 16:31	7440-09-7	
Sodium	**11800**	ug/L	500	157	1	05/31/18 17:10	06/01/18 16:31	7440-23-5	
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**552**	mg/L	20.0	4.9	1		06/06/18 10:18		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**704**	mg/L	5.0	5.0	1		05/30/18 11:58		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**3.2**	mg/L	1.0	0.46	1		06/02/18 20:22	16887-00-6	
Fluoride	**0.26**	mg/L	0.20	0.063	1		06/02/18 20:22	16984-48-8	
Sulfate	**100**	mg/L	10.0	2.4	10		06/03/18 17:56	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: AMEREN LEC LCL1
Pace Project No.: 60271161

Sample: L-TMW-2 **Lab ID: 60271161002** Collected: 05/23/18 10:10 Received: 05/24/18 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	**108**	ug/L	100	12.5	1	05/31/18 17:10	06/01/18 16:38	7440-42-8	
Calcium	**179000**	ug/L	200	53.5	1	05/31/18 17:10	06/01/18 16:38	7440-70-2	
Iron	**1130**	ug/L	50.0	6.1	1	05/31/18 17:10	06/01/18 16:38	7439-89-6	
Magnesium	**43100**	ug/L	50.0	14.0	1	05/31/18 17:10	06/01/18 16:38	7439-95-4	
Manganese	**2590**	ug/L	5.0	0.73	1	05/31/18 17:10	06/01/18 16:38	7439-96-5	
Potassium	**6600**	ug/L	500	79.3	1	05/31/18 17:10	06/01/18 16:38	7440-09-7	
Sodium	**10100**	ug/L	500	157	1	05/31/18 17:10	06/01/18 16:38	7440-23-5	
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**603**	mg/L	20.0	4.9	1		06/06/18 10:25		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**755**	mg/L	5.0	5.0	1		05/30/18 11:58		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**6.0**	mg/L	1.0	0.46	1		06/02/18 21:06	16887-00-6	
Fluoride	**0.25**	mg/L	0.20	0.063	1		06/02/18 21:06	16984-48-8	
Sulfate	**96.3**	mg/L	10.0	2.4	10		06/03/18 18:26	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: AMEREN LEC LCL1
Pace Project No.: 60271161

Sample: L-TMW-3 **Lab ID: 60271161003** Collected: 05/23/18 11:35 Received: 05/24/18 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	**126**	ug/L	100	12.5	1	05/31/18 17:10	06/01/18 16:40	7440-42-8	
Calcium	**182000**	ug/L	200	53.5	1	05/31/18 17:10	06/01/18 16:40	7440-70-2	
Iron	**9870**	ug/L	50.0	6.1	1	05/31/18 17:10	06/01/18 16:40	7439-89-6	
Magnesium	**38800**	ug/L	50.0	14.0	1	05/31/18 17:10	06/01/18 16:40	7439-95-4	
Manganese	**1040**	ug/L	5.0	0.73	1	05/31/18 17:10	06/01/18 16:40	7439-96-5	
Potassium	**6800**	ug/L	500	79.3	1	05/31/18 17:10	06/01/18 16:40	7440-09-7	
Sodium	**10600**	ug/L	500	157	1	05/31/18 17:10	06/01/18 16:40	7440-23-5	
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**608**	mg/L	20.0	4.9	1		06/06/18 10:31		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**726**	mg/L	5.0	5.0	1		05/30/18 11:58		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**7.0**	mg/L	1.0	0.46	1		06/02/18 21:21	16887-00-6	
Fluoride	**0.19J**	mg/L	0.20	0.063	1		06/02/18 21:21	16984-48-8	
Sulfate	**70.2**	mg/L	5.0	1.2	5		06/03/18 18:41	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: AMEREN LEC LCL1
Pace Project No.: 60271161

Sample: L-MW-26 **Lab ID: 60271161004** Collected: 05/23/18 12:35 Received: 05/24/18 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	**69.1J**	ug/L	100	12.5	1	05/31/18 17:10	06/01/18 16:42	7440-42-8	
Calcium	**130000**	ug/L	200	53.5	1	05/31/18 17:10	06/01/18 16:42	7440-70-2	
Iron	**34.0J**	ug/L	50.0	6.1	1	05/31/18 17:10	06/01/18 16:42	7439-89-6	
Magnesium	**25100**	ug/L	50.0	14.0	1	05/31/18 17:10	06/01/18 16:42	7439-95-4	
Manganese	**491**	ug/L	5.0	0.73	1	05/31/18 17:10	06/01/18 16:42	7439-96-5	
Potassium	**4350**	ug/L	500	79.3	1	05/31/18 17:10	06/01/18 16:42	7440-09-7	
Sodium	**5820**	ug/L	500	157	1	05/31/18 17:10	06/01/18 16:42	7440-23-5	
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**452**	mg/L	20.0	4.9	1		06/06/18 10:37		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**493**	mg/L	5.0	5.0	1		05/30/18 11:58		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**3.0**	mg/L	1.0	0.46	1		06/02/18 21:36	16887-00-6	
Fluoride	**0.17J**	mg/L	0.20	0.063	1		06/02/18 21:36	16984-48-8	
Sulfate	**22.6**	mg/L	2.0	0.47	2		06/03/18 18:56	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: AMEREN LEC LCL1
Pace Project No.: 60271161

Sample: L-UWL-DUP-1 **Lab ID: 60271161005** Collected: 05/23/18 08:00 Received: 05/24/18 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	**101**	ug/L	100	12.5	1	05/31/18 17:10	06/01/18 16:44	7440-42-8	
Calcium	**181000**	ug/L	200	53.5	1	05/31/18 17:10	06/01/18 16:44	7440-70-2	
Iron	**1110**	ug/L	50.0	6.1	1	05/31/18 17:10	06/01/18 16:44	7439-89-6	
Magnesium	**42800**	ug/L	50.0	14.0	1	05/31/18 17:10	06/01/18 16:44	7439-95-4	
Manganese	**2570**	ug/L	5.0	0.73	1	05/31/18 17:10	06/01/18 16:44	7439-96-5	
Potassium	**6640**	ug/L	500	79.3	1	05/31/18 17:10	06/01/18 16:44	7440-09-7	
Sodium	**10000**	ug/L	500	157	1	05/31/18 17:10	06/01/18 16:44	7440-23-5	
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**610**	mg/L	20.0	4.9	1		06/06/18 10:44		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**770**	mg/L	5.0	5.0	1		05/30/18 11:58		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**6.0**	mg/L	1.0	0.46	1		06/02/18 21:51	16887-00-6	
Fluoride	**0.25**	mg/L	0.20	0.063	1		06/02/18 21:51	16984-48-8	
Sulfate	**95.4**	mg/L	10.0	2.4	10		06/03/18 19:10	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: AMEREN LEC LCL1
Pace Project No.: 60271161

Sample: L-UWL-FB-1 **Lab ID: 60271161006** Collected: 05/23/18 12:25 Received: 05/24/18 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	**<12.5**	ug/L	100	12.5	1	05/31/18 17:10	06/01/18 16:47	7440-42-8	
Calcium	**<53.5**	ug/L	200	53.5	1	05/31/18 17:10	06/01/18 16:47	7440-70-2	
Iron	**<6.1**	ug/L	50.0	6.1	1	05/31/18 17:10	06/01/18 16:47	7439-89-6	
Magnesium	**<14.0**	ug/L	50.0	14.0	1	05/31/18 17:10	06/01/18 16:47	7439-95-4	
Manganese	**<0.73**	ug/L	5.0	0.73	1	05/31/18 17:10	06/01/18 16:47	7439-96-5	
Potassium	**<79.3**	ug/L	500	79.3	1	05/31/18 17:10	06/01/18 16:47	7440-09-7	
Sodium	**<157**	ug/L	500	157	1	05/31/18 17:10	06/01/18 16:47	7440-23-5	
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**<4.9**	mg/L	20.0	4.9	1		06/06/18 10:55		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**18.0**	mg/L	5.0	5.0	1		05/30/18 11:58		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**<0.46**	mg/L	1.0	0.46	1		06/02/18 22:06	16887-00-6	
Fluoride	**<0.063**	mg/L	0.20	0.063	1		06/02/18 22:06	16984-48-8	
Sulfate	**<0.24**	mg/L	1.0	0.24	1		06/02/18 22:06	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: AMEREN LEC LCL1
Pace Project No.: 60271161

Sample: L-BMW-1S **Lab ID: 60271049006** Collected: 05/21/18 13:05 Received: 05/23/18 03:30 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	**128**	ug/L	100	12.5	1	05/31/18 11:50	06/01/18 15:29	7440-42-8	
Calcium	**196000**	ug/L	200	53.5	1	05/31/18 11:50	06/01/18 15:29	7440-70-2	
Iron	**26300**	ug/L	50.0	6.1	1	05/31/18 11:50	06/01/18 15:29	7439-89-6	
Magnesium	**49700**	ug/L	50.0	14.0	1	05/31/18 11:50	06/01/18 15:29	7439-95-4	
Manganese	**2720**	ug/L	5.0	0.73	1	05/31/18 11:50	06/01/18 15:29	7439-96-5	
Potassium	**6360**	ug/L	500	79.3	1	05/31/18 11:50	06/01/18 15:29	7440-09-7	
Sodium	**24300**	ug/L	500	157	1	05/31/18 11:50	06/01/18 15:29	7440-23-5	
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**737**	mg/L	20.0	4.9	1		05/31/18 12:00		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**784**	mg/L	5.0	5.0	1		05/25/18 16:04		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**6.7**	mg/L	1.0	0.46	1		06/02/18 17:38	16887-00-6	
Fluoride	**0.18J**	mg/L	0.20	0.063	1		06/02/18 17:38	16984-48-8	
Sulfate	**57.0**	mg/L	5.0	1.2	5		06/04/18 17:10	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: AMEREN LEC LCL1
Pace Project No.: 60271161

Sample: L-BMW-2S **Lab ID: 60271049007** Collected: 05/21/18 10:10 Received: 05/23/18 03:30 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	**55.7J**	ug/L	100	12.5	1	05/31/18 11:50	06/01/18 15:35	7440-42-8	
Calcium	**120000**	ug/L	200	53.5	1	05/31/18 11:50	06/01/18 15:35	7440-70-2	
Iron	**15.3J**	ug/L	50.0	6.1	1	05/31/18 11:50	06/01/18 15:35	7439-89-6	
Magnesium	**18900**	ug/L	50.0	14.0	1	05/31/18 11:50	06/01/18 15:35	7439-95-4	
Manganese	**1.2J**	ug/L	5.0	0.73	1	05/31/18 11:50	06/01/18 15:35	7439-96-5	
Potassium	**6140**	ug/L	500	79.3	1	05/31/18 11:50	06/01/18 15:35	7440-09-7	
Sodium	**6770**	ug/L	500	157	1	05/31/18 11:50	06/01/18 15:35	7440-23-5	
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**377**	mg/L	20.0	4.9	1		05/31/18 12:07		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**437**	mg/L	5.0	5.0	1		05/25/18 16:04		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**2.6**	mg/L	1.0	0.46	1		06/02/18 17:52	16887-00-6	
Fluoride	**0.20J**	mg/L	0.20	0.063	1		06/02/18 17:52	16984-48-8	
Sulfate	**25.0**	mg/L	2.0	0.47	2		06/04/18 17:23	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: AMEREN LEC LCL1
Pace Project No.: 60271161

QC Batch: 528052 Analysis Method: EPA 200.7
QC Batch Method: EPA 200.7 Analysis Description: 200.7 Metals, Total
Associated Lab Samples: 60271049006, 60271049007

METHOD BLANK: 2163156 Matrix: Water
Associated Lab Samples: 60271049006, 60271049007

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Boron	ug/L	<12.5	100	12.5	06/01/18 15:09	
Calcium	ug/L	<53.5	200	53.5	06/01/18 15:09	
Iron	ug/L	<6.1	50.0	6.1	06/01/18 15:09	
Magnesium	ug/L	<14.0	50.0	14.0	06/01/18 15:09	
Manganese	ug/L	<0.73	5.0	0.73	06/01/18 15:09	
Potassium	ug/L	<79.3	500	79.3	06/01/18 15:09	
Sodium	ug/L	<157	500	157	06/01/18 15:09	

LABORATORY CONTROL SAMPLE: 2163157

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Boron	ug/L	1000	967	97	85-115	
Calcium	ug/L	10000	9510	95	85-115	
Iron	ug/L	10000	9820	98	85-115	
Magnesium	ug/L	10000	9680	97	85-115	
Manganese	ug/L	1000	937	94	85-115	
Potassium	ug/L	10000	9740	97	85-115	
Sodium	ug/L	10000	10200	102	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2163158 2163159

Parameter	Units	60271049001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Boron	ug/L	3780	1000	1000	4740	4660	96	88	70-130	2	20	
Calcium	ug/L	162000	10000	10000	174000	168000	118	66	70-130	3	20	M1
Iron	ug/L	7040	10000	10000	16800	16400	97	94	70-130	2	20	
Magnesium	ug/L	29700	10000	10000	38800	38100	91	84	70-130	2	20	
Manganese	ug/L	1680	1000	1000	2640	2590	96	91	70-130	2	20	
Potassium	ug/L	5340	10000	10000	15500	15100	102	97	70-130	3	20	
Sodium	ug/L	9220	10000	10000	19900	19300	107	101	70-130	3	20	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2163160 2163161

Parameter	Units	60271349004 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Boron	ug/L	4240	1000	1000	4930	4770	69	53	70-130	3	20	M1
Calcium	ug/L	71400	10000	10000	78900	76600	74	51	70-130	3	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.

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QUALITY CONTROL DATA

Project: AMEREN LEC LCL1
Pace Project No.: 60271161

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2163160 2163161

Parameter	Units	60271349004 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Iron	ug/L	5330	10000	10000	15200	14700	98	94	70-130	3	20	
Magnesium	ug/L	14300	10000	10000	23000	22100	87	78	70-130	4	20	
Manganese	ug/L	275	1000	1000	1200	1150	92	88	70-130	4	20	
Potassium	ug/L	4900	10000	10000	14900	14500	100	96	70-130	3	20	
Sodium	ug/L	59100	10000	10000	67200	65400	82	64	70-130	3	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

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QUALITY CONTROL DATA

Project: AMEREN LEC LCL1
Pace Project No.: 60271161

QC Batch: 528173 Analysis Method: EPA 200.7
QC Batch Method: EPA 200.7 Analysis Description: 200.7 Metals, Total
Associated Lab Samples: 60271161001, 60271161002, 60271161003, 60271161004, 60271161005, 60271161006

METHOD BLANK: 2163463 Matrix: Water
Associated Lab Samples: 60271161001, 60271161002, 60271161003, 60271161004, 60271161005, 60271161006

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Boron	ug/L	<12.5	100	12.5	06/01/18 16:18	
Calcium	ug/L	<53.5	200	53.5	06/01/18 16:18	
Iron	ug/L	<6.1	50.0	6.1	06/01/18 16:18	
Magnesium	ug/L	<14.0	50.0	14.0	06/01/18 16:18	
Manganese	ug/L	<0.73	5.0	0.73	06/01/18 16:18	
Potassium	ug/L	<79.3	500	79.3	06/01/18 16:18	
Sodium	ug/L	<157	500	157	06/01/18 16:18	

LABORATORY CONTROL SAMPLE: 2163464

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Boron	ug/L	1000	932	93	85-115	
Calcium	ug/L	10000	9440	94	85-115	
Iron	ug/L	10000	9820	98	85-115	
Magnesium	ug/L	10000	9340	93	85-115	
Manganese	ug/L	1000	913	91	85-115	
Potassium	ug/L	10000	9630	96	85-115	
Sodium	ug/L	10000	9870	99	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2163465 2163466

Parameter	Units	60271161001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Boron	ug/L	122	1000	1000	1100	1080	98	96	70-130	2	20	
Calcium	ug/L	162000	10000	10000	172000	174000	96	118	70-130	1	20	
Iron	ug/L	188	10000	10000	10000	9930	98	97	70-130	1	20	
Magnesium	ug/L	43600	10000	10000	53600	53500	99	99	70-130	0	20	
Manganese	ug/L	3030	1000	1000	3970	3970	94	94	70-130	0	20	
Potassium	ug/L	5770	10000	10000	15800	15800	101	101	70-130	0	20	
Sodium	ug/L	11800	10000	10000	22200	22200	104	104	70-130	0	20	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: AMEREN LEC LCL1
Pace Project No.: 60271161

QC Batch: 527976 Analysis Method: SM 2320B
QC Batch Method: SM 2320B Analysis Description: 2320B Alkalinity
Associated Lab Samples: 60271049006, 60271049007

METHOD BLANK: 2162949 Matrix: Water
Associated Lab Samples: 60271049006, 60271049007

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Alkalinity, Total as CaCO3	mg/L	<4.9	20.0	4.9	05/31/18 10:30	

LABORATORY CONTROL SAMPLE: 2162950

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity, Total as CaCO3	mg/L	500	508	102	90-110	

SAMPLE DUPLICATE: 2162951

Parameter	Units	60271033003 Result	Dup Result	RPD	Max RPD	Qualifiers
Alkalinity, Total as CaCO3	mg/L	436	449	3	10	

SAMPLE DUPLICATE: 2162952

Parameter	Units	60271048010 Result	Dup Result	RPD	Max RPD	Qualifiers
Alkalinity, Total as CaCO3	mg/L	457	453	1	10	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: AMEREN LEC LCL1
Pace Project No.: 60271161

QC Batch: 528700 Analysis Method: SM 2320B
QC Batch Method: SM 2320B Analysis Description: 2320B Alkalinity
Associated Lab Samples: 60271161001, 60271161002, 60271161003, 60271161004, 60271161005, 60271161006

METHOD BLANK: 2165829 Matrix: Water
Associated Lab Samples: 60271161001, 60271161002, 60271161003, 60271161004, 60271161005, 60271161006

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Alkalinity, Total as CaCO3	mg/L	<4.9	20.0	4.9	06/06/18 09:54	

LABORATORY CONTROL SAMPLE: 2165830

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity, Total as CaCO3	mg/L	500	515	103	90-110	

SAMPLE DUPLICATE: 2165833

Parameter	Units	60271160002 Result	Dup Result	RPD	Max RPD	Qualifiers
Alkalinity, Total as CaCO3	mg/L	440	514	16	10	D6

SAMPLE DUPLICATE: 2165834

Parameter	Units	60271232001 Result	Dup Result	RPD	Max RPD	Qualifiers
Alkalinity, Total as CaCO3	mg/L	326	323	1	10	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: AMEREN LEC LCL1
Pace Project No.: 60271161

QC Batch: 527158 Analysis Method: SM 2540C
QC Batch Method: SM 2540C Analysis Description: 2540C Total Dissolved Solids
Associated Lab Samples: 60271049006, 60271049007

METHOD BLANK: 2159306 Matrix: Water
Associated Lab Samples: 60271049006, 60271049007

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	<5.0	5.0	5.0	05/25/18 16:04	

LABORATORY CONTROL SAMPLE: 2159307

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Dissolved Solids	mg/L	1000	989	99	80-120	

SAMPLE DUPLICATE: 2159308

Parameter	Units	60271048010 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	519	518	0	10	

SAMPLE DUPLICATE: 2159309

Parameter	Units	60271046005 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	5690	5570	2	10	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: AMEREN LEC LCL1
Pace Project No.: 60271161

QC Batch: 527828 Analysis Method: SM 2540C
QC Batch Method: SM 2540C Analysis Description: 2540C Total Dissolved Solids
Associated Lab Samples: 60271161001, 60271161002, 60271161003, 60271161004, 60271161005, 60271161006

METHOD BLANK: 2162400 Matrix: Water
Associated Lab Samples: 60271161001, 60271161002, 60271161003, 60271161004, 60271161005, 60271161006

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	<5.0	5.0	5.0	05/30/18 11:58	

LABORATORY CONTROL SAMPLE: 2162401

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

SAMPLE DUPLICATE: 2162402

Parameter	Units	60271161001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	704	696	1	10	

SAMPLE DUPLICATE: 2162403

Parameter	Units	60271194003 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	1000	1050	5	10	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: AMEREN LEC LCL1
Pace Project No.: 60271161

QC Batch: 528267 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 60271049006, 60271049007

METHOD BLANK: 2163963 Matrix: Water
Associated Lab Samples: 60271049006, 60271049007

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Chloride	mg/L	<0.29	1.0	0.29	06/02/18 14:54	
Fluoride	mg/L	<0.19	0.20	0.19	06/02/18 14:54	

LABORATORY CONTROL SAMPLE: 2163964

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	5	4.6	91	90-110	
Fluoride	mg/L	2.5	2.4	97	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2163965 2163966

Parameter	Units	60271049001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	4.7	5	5	9.7	9.7	100	100	90-110	0	15	
Fluoride	mg/L	0.18J	2.5	2.5	2.7	2.7	101	103	90-110	1	15	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: AMEREN LEC LCL1
Pace Project No.: 60271161

QC Batch: 528268 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 60271161001, 60271161002, 60271161003, 60271161004, 60271161005, 60271161006

METHOD BLANK: 2163967 Matrix: Water
Associated Lab Samples: 60271161001, 60271161002, 60271161003, 60271161004, 60271161005, 60271161006

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Chloride	mg/L	<0.29	1.0	0.29	06/02/18 18:37	
Fluoride	mg/L	<0.19	0.20	0.19	06/02/18 18:37	
Sulfate	mg/L	<0.24	1.0	0.24	06/02/18 18:37	

LABORATORY CONTROL SAMPLE: 2163968

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	5	4.6	91	90-110	
Fluoride	mg/L	2.5	2.4	96	90-110	
Sulfate	mg/L	5	4.9	97	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2163969 2163970

Parameter	Units	60271161001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	3.2	5	5	8.3	8.2	102	99	90-110	1	15	
Fluoride	mg/L	0.26	2.5	2.5	2.9	2.8	104	102	90-110	2	15	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: AMEREN LEC LCL1
Pace Project No.: 60271161

QC Batch: 528385 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 60271049006, 60271049007

METHOD BLANK: 2164750 Matrix: Water
Associated Lab Samples: 60271049006, 60271049007

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Sulfate	mg/L	<0.24	1.0	0.24	06/04/18 08:18	

LABORATORY CONTROL SAMPLE: 2164751

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Sulfate	mg/L	5	5.1	102	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2164752 2164753

Parameter	Units	60271048003 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Sulfate	mg/L	402	250	250	667	655	106	101	90-110	2	15	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: AMEREN LEC LCL1
Pace Project No.: 60271161

QC Batch: 528386 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 60271161001, 60271161002, 60271161003, 60271161004, 60271161005

METHOD BLANK: 2164755 Matrix: Water
Associated Lab Samples: 60271161001, 60271161002, 60271161003, 60271161004, 60271161005

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Sulfate	mg/L	<0.24	1.0	0.24	06/03/18 09:14	

LABORATORY CONTROL SAMPLE: 2164756

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Sulfate	mg/L	5	4.9	98	90-110	

MATRIX SPIKE SAMPLE: 2164759

Parameter	Units	60271161001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Sulfate	mg/L	100	50	150	99	90-110	

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REPORT OF LABORATORY ANALYSIS

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QUALIFIERS

Project: AMEREN LEC LCL1
Pace Project No.: 60271161

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

D6	The precision between the sample and sample duplicate exceeded laboratory control limits.
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 LEC LCL1
Pace Project No.: 60271161

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
60271049006	**L-BMW-1S**	EPA 200.7	528052	EPA 200.7	528111
60271049007	**L-BMW-2S**	EPA 200.7	528052	EPA 200.7	528111
60271161001	**L-TMW-1**	EPA 200.7	528173	EPA 200.7	528218
60271161002	**L-TMW-2**	EPA 200.7	528173	EPA 200.7	528218
60271161003	**L-TMW-3**	EPA 200.7	528173	EPA 200.7	528218
60271161004	**L-MW-26**	EPA 200.7	528173	EPA 200.7	528218
60271161005	**L-UWL-DUP-1**	EPA 200.7	528173	EPA 200.7	528218
60271161006	**L-UWL-FB-1**	EPA 200.7	528173	EPA 200.7	528218
60271049006	**L-BMW-1S**	SM 2320B	527976		
60271049007	**L-BMW-2S**	SM 2320B	527976		
60271161001	**L-TMW-1**	SM 2320B	528700		
60271161002	**L-TMW-2**	SM 2320B	528700		
60271161003	**L-TMW-3**	SM 2320B	528700		
60271161004	**L-MW-26**	SM 2320B	528700		
60271161005	**L-UWL-DUP-1**	SM 2320B	528700		
60271161006	**L-UWL-FB-1**	SM 2320B	528700		
60271049006	**L-BMW-1S**	SM 2540C	527158		
60271049007	**L-BMW-2S**	SM 2540C	527158		
60271161001	**L-TMW-1**	SM 2540C	527828		
60271161002	**L-TMW-2**	SM 2540C	527828		
60271161003	**L-TMW-3**	SM 2540C	527828		
60271161004	**L-MW-26**	SM 2540C	527828		
60271161005	**L-UWL-DUP-1**	SM 2540C	527828		
60271161006	**L-UWL-FB-1**	SM 2540C	527828		
60271049006	**L-BMW-1S**	EPA 300.0	528267		
60271049006	**L-BMW-1S**	EPA 300.0	528385		
60271049007	**L-BMW-2S**	EPA 300.0	528267		
60271049007	**L-BMW-2S**	EPA 300.0	528385		
60271161001	**L-TMW-1**	EPA 300.0	528268		
60271161001	**L-TMW-1**	EPA 300.0	528386		
60271161002	**L-TMW-2**	EPA 300.0	528268		
60271161002	**L-TMW-2**	EPA 300.0	528386		
60271161003	**L-TMW-3**	EPA 300.0	528268		
60271161003	**L-TMW-3**	EPA 300.0	528386		
60271161004	**L-MW-26**	EPA 300.0	528268		
60271161004	**L-MW-26**	EPA 300.0	528386		
60271161005	**L-UWL-DUP-1**	EPA 300.0	528268		
60271161005	**L-UWL-DUP-1**	EPA 300.0	528386		
60271161006	**L-UWL-FB-1**	EPA 300.0	528268		

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: AMEREN LEC LCL1
Pace Project No.: 60271161

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch

Pace Analytical
www.pacelabs.com

Sample Condition Upon Receipt

WO# : 60271161

60271161

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: 296 **Type of Ice:** (Wet) Blue None

Cooler Temperature (°C): **As-read** 0.5 **Corr. Factor** +1.3 **Corrected** 1.8

Date and initials of person examining contents: JM 5/24/18

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 Check 5/24/18 Date: _____

CHAIN-OF-CUSTODY / Analytical Request Document

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

Pace Analytical™ www.pacelabs.com

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
	Ryan Feldmann
Purchase Order No.:	
Project Name:	Ameren Labadie Energy Center LCL1
Project Number	153-1406.0001F

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	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
																		Y/N	N	N	N	N	N	
1	L-TMW-1	WT	G			05/23/18	0855		6	3		3							✓	✓	✓	✓		60271161 3(BP2U) 3(BP3N) 01
2	L-TMW-2	WT	G				1010		2	1		1												BP2U BP3N 02
3	L-TMW-3	WT	G				1135																	03
4	L-MW-26	WT	G				1235																	04
5	L-UWL-DUP-1	WT	G				—																	05
6	L-UWL-FB-1	WT	G				1225																	06
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
*EPA 200.7: B, Ca, Mg, Mn, K, Na, Fe	Golder	5/23/18	1435	PACE	5/23/18	1435	
	PACE	5/23/18	1700	PACE	5/24/18	0345	1-Y Y Y Y

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Ryan Feldmann

SIGNATURE of SAMPLER: _____ DATE Signed (MM/DD/YY): 5/23/18

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

*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# : 60271049

60271049

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: 301 **Type of Ice:** Wet Blue None

JLS

Cooler Temperature (°C): **As-read** 2.8 **Corr. Factor** +0.8 **Corrected** 3.8

Date and initials of person examining contents: JLS 5/23/18

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 Cheek 5/23/18 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:

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; Ryan Feldmann
Purchase Order No.:	
Project Name:	Ameren Labadie Energy Center LCPB
Project Number:	153-1406.0001E

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					Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
																			N	N	N	N	N					60271049
1	L-LMW-1S	WT	G			5/22/18	1205		6	3		3							✓	✓	✓	✓						(3) BP2U (3) BP3N 2.0	001
2	L-LMW-2S	WT	G			5/22/18	1215		2	1		1																BP2U BP3N 2.0	002
3	L-LMW-3S	WT	G			5/22/18	1520		2	1		1																	003
4	~~L-LMW-4S~~	~~WT~~	~~G~~																										
5	~~L-LMW-5S~~	~~WT~~	~~G~~																										
6	~~L-LMW-6S~~	~~WT~~	~~G~~																										
7	L-LMW-7S	WT	G			5/22/18	1545		2	1		1							✓	✓	/	/							004
8	L-LMW-8S	WT	G			5/22/18	1405																						005
9	L-BMW-1S	WT	G			5/21/18	~~1010~~ 1305																						006
10	L-BMW-2S	WT	G			5/21/18	1010																						007
11	L-LMW-DUP-1	WT	G			5/22/18	—																						008
12	L-LMW-FB-1	WT	G			5/22/18	1210																						009

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, Mn, K, Na, Fe, Mg	Golder	5/22/18	1720		5/22/18	17:35				
		5/22/18	1800		5/23	0830	3.8	Y	Y	Y

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Ryan Feldmann

SIGNATURE of SAMPLER: _____ DATE Signed (MM/DD/YY): 5/22/18

*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 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 – DETECTION MONITORING – DATA PACKAGE 60271161

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 – LCLI – May 2018
Reviewer: T Goodwin

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

Laboratory: Pace Analytical (1) (2)
SDG #: 60271161 (1)
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) (2a)
Matrix: ☐ Air ☐ Soil/Sed. ☒ Water ☐ Waste ☐
Sample Names L-TMW-1, L-TMW-2, L-TMW-3, L-MW-26, L-UWL-DUP-1, L-UWL-FB-1, L-BMW-15, L-BMW-25

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?	☒	☐	☐	5/23/18
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)?	☑	☐	☐	TDS(18.0)
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@ L-TMW-2
	☑	☐	☐	FB-1@ L-MW-26
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)?	☑	☑ (2)	☐	Boo2) ~~Al(76)~~ (74)

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?	☐	☑	☐	B,
Recovery could not be calculated since sample contained high concentration of analyte?	☐	☐	☒	
b) Was MSD accuracy criteria met?	☐	☑	☐	Ca, B, Na,
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 Goodson Jr Date: 1/10/19

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

July 16, 2018

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

RE: Project: AMEREN MO CCR MONITORING
Pace Project No.: 60274100

Dear Mark Haddock:
Enclosed are the analytical results for sample(s) received by the laboratory on July 04, 2018. 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
John Suozzi, Golder Associates

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Lenexa, KS 66219
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CERTIFICATIONS

Project: AMEREN MO CCR MONITORING
Pace Project No.: 60274100

Kansas Certification IDs

9608 Loiret Boulevard, Lenexa, KS 66219
Missouri Certification Number: 10090
WY STR Certification #: 2456.01
Arkansas Certification #: 17-016-0
Illinois Certification #: 200030
Iowa Certification #: 118
Kansas/NELAP Certification #: E-10116
Louisiana Certification #: 03055
Nevada Certification #: KS000212018-1
Oklahoma Certification #: 9205/9935
Texas Certification #: T104704407
Utah Certification #: KS00021
Kansas Field Laboratory Accreditation: # E-92587
Missouri Certification: 10070
Missouri Certification Number: 10090

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Lenexa, KS 66219
(913)599-5665

SAMPLE SUMMARY

Project: AMEREN MO CCR MONITORING
Pace Project No.: 60274100

Lab ID	Sample ID	Matrix	Date Collected	Date Received
60274100001	**L-TMW-1**	Water	07/02/18 14:10	07/04/18 04:40
60274100002	**L-TMW-2**	Water	07/02/18 13:40	07/04/18 04:40

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SAMPLE ANALYTE COUNT

Project: AMEREN MO CCR MONITORING
Pace Project No.: 60274100

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
60274100001	**L-TMW-1**	EPA 200.7	TDS	1	PASI-K
		SM 2540C	JDA	1	PASI-K
		EPA 300.0	OL	1	PASI-K
60274100002	**L-TMW-2**	EPA 300.0	OL	1	PASI-K

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ANALYTICAL RESULTS

Project: AMEREN MO CCR MONITORING
Pace Project No.: 60274100

Sample: L-TMW-1 **Lab ID: 60274100001** Collected: 07/02/18 14:10 Received: 07/04/18 04:40 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	**131**	ug/L	100	12.5	1	07/05/18 16:00	07/12/18 22:24	7440-42-8	
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**700**	mg/L	5.0	5.0	1		07/09/18 11:21		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Fluoride	**0.25**	mg/L	0.20	0.063	1		07/15/18 00:26	16984-48-8	

REPORT OF LABORATORY ANALYSIS

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

ANALYTICAL RESULTS

Project: AMEREN MO CCR MONITORING
Pace Project No.: 60274100

Sample: L-TMW-2 **Lab ID: 60274100002** Collected: 07/02/18 13:40 Received: 07/04/18 04:40 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	**0.25**	mg/L	0.20	0.063	1		07/15/18 00:41	16984-48-8	

REPORT OF LABORATORY ANALYSIS

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

QUALITY CONTROL DATA

Project: AMEREN MO CCR MONITORING
Pace Project No.: 60274100

QC Batch: 533027 Analysis Method: EPA 200.7
QC Batch Method: EPA 200.7 Analysis Description: 200.7 Metals, Total
Associated Lab Samples: 60274100001

METHOD BLANK: 2183110 Matrix: Water
Associated Lab Samples: 60274100001

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Boron	ug/L	<12.5	100	12.5	07/12/18 21:32	

LABORATORY CONTROL SAMPLE: 2183111

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Boron	ug/L	1000	983	98	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2183112 2183113

Parameter	Units	60274082001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Boron	ug/L	2.2 mg/L	1000	1000	3120	3140	93	94	70-130	0	20	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2183199 2183200

Parameter	Units	60274099003 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Boron	ug/L	6790	1000	1000	7740	7690	95	90	70-130	1	20	

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
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QUALITY CONTROL DATA

Project: AMEREN MO CCR MONITORING
Pace Project No.: 60274100

QC Batch: 533427 Analysis Method: SM 2540C
QC Batch Method: SM 2540C Analysis Description: 2540C Total Dissolved Solids
Associated Lab Samples: 60274100001

METHOD BLANK: 2184817 Matrix: Water
Associated Lab Samples: 60274100001

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	<5.0	5.0	5.0	07/09/18 11:21	

LABORATORY CONTROL SAMPLE: 2184818

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

SAMPLE DUPLICATE: 2184819

Parameter	Units	60274099003 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	894	893	0	10	

SAMPLE DUPLICATE: 2184820

Parameter	Units	60274126003 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	414	410	1	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

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QUALITY CONTROL DATA

Project: AMEREN MO CCR MONITORING
Pace Project No.: 60274100

QC Batch: 534414 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 60274100001, 60274100002

METHOD BLANK: 2188763 Matrix: Water
Associated Lab Samples: 60274100001, 60274100002

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Fluoride	mg/L	<0.063	0.20	0.063	07/14/18 21:26	

LABORATORY CONTROL SAMPLE: 2188764

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Fluoride	mg/L	2.5	2.4	97	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

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

QUALIFIERS

Project: AMEREN MO CCR MONITORING
Pace Project No.: 60274100

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

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

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: AMEREN MO CCR MONITORING
Pace Project No.: 60274100

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
60274100001	**L-TMW-1**	EPA 200.7	533027	EPA 200.7	533115
60274100001	**L-TMW-1**	SM 2540C	533427		
60274100001	**L-TMW-1**	EPA 300.0	534414		
60274100002	**L-TMW-2**	EPA 300.0	534414		

Pace Analytical
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Sample Condition Upon Receipt

WO# : 60274100

60274100

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: 301 **Type of Ice:** (Wet) Blue None

Cooler Temperature (°C): **As-read** 2.8 **Corr. Factor** +0.0 **Corrected** 3.8

Date and initials of person examining contents: JB 7/5

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: Jann Chuck 7/5/18 Date: _____

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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: 1 of 1

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, Ryan Feldmann
Purchase Order No.:	
Project Name:	Ameren MO CCR Monitoring
Project Number:	153-1406.0001

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	Boron	Calcium	Chloride	Fluoride	Sulfate	TDS	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
																		Y/N	N	N	N	N	N	N		6027410
1	L-TMW-1	WT	G			7/2/18	1410		2	1		1							✓			✓		✓		BP2N BP3N 001
2	L-TMW-2	WT	G			7/2/18	1340		2	1		1										✓				↓ ↓ 002
3		WT	G																							
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																							

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
	Golder	07/3/18	1800		7/3	0440	3.7	Y	Y	Y

SAMPLER NAME AND SIGNATURE			Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)
PRINT Name of SAMPLER:	Ryan Feldmann					
SIGNATURE of SAMPLER:		DATE Signed (MM/DD/YY): 07/02/18				

*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 August 20, 2018 **Project No.** 1531406

TO Project File
Golder Associates

CC Amanda Derhake, Jeff Ingram

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

DATA VALIDATION SUMMARY: AMEREN – LABADIE ENERGY CENTER – LCL1 – DATA PACKAGE 60274100

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

- No data qualification was required.

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
Reviewer: T Goodwin – GW - LCL1 - VS

Project Manager: J Ingram
Project Number: 1531406
Validation Date: 8/24/2018

Laboratory: Pace Analytical
SDG #: 60274100
Analytical Method (type and no.): EPA 200.7 (Metals), SM 2540C (TDS), EPA 300.0 (Anions)
Matrix: ☐ Air ☐ Soil/Sed. ☒ Water ☐ Waste ☐ _____
Sample Names 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?	☒	☐	☐	
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, Flow, 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)?	☐	☐	☑	
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@
	☒	☑	☐	FB-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?	☑	☐	☐	
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. Goodwin Jr. Date: 8/20/2018

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

January 24, 2019

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

RE: Project: AMEREN LABADIE LCL1
Pace Project No.: 60286372

Dear Mark Haddock:
Enclosed are the analytical results for sample(s) received by the laboratory between November 08, 2018 and November 10, 2018. 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, 12/28/18: L-BMW-1S and L-BMW-2S added. Metals list trimmed.
REV-1A, 1/24/19: Project name revised.

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
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

CERTIFICATIONS

Project: AMEREN LABADIE LCL1
Pace Project No.: 60286372

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 LABADIE LCL1
Pace Project No.: 60286372

Lab ID	Sample ID	Matrix	Date Collected	Date Received
60286372001	**L-TMW-1**	Water	11/09/18 09:00	11/10/18 06:25
60286372002	**L-TMW-2**	Water	11/09/18 10:05	11/10/18 06:25
60286372003	**L-TMW-3**	Water	11/09/18 11:40	11/10/18 06:25
60286372004	**L-MW-26**	Water	11/09/18 12:45	11/10/18 06:25
60286372005	**L-UWL-DUP-1**	Water	11/09/18 09:00	11/10/18 06:25
60286372006	**L-UWL-FB-1**	Water	11/09/18 11:27	11/10/18 06:25
60286214003	**L-BMW-1S**	Water	11/07/18 10:00	11/08/18 04:02
60286214004	**L-BMW-2S**	Water	11/07/18 12:25	11/08/18 04:02

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SAMPLE ANALYTE COUNT

Project: AMEREN LABADIE LCL1
Pace Project No.: 60286372

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
60286372001	**L-TMW-1**	EPA 200.7	JGP	7	PASI-K
		SM 2320B	ZMH	1	PASI-K
		SM 2540C	RLG	1	PASI-K
		SM 3500-Fe B#4	LDB	1	PASI-K
		SM 3500-Fe B#4	RMT	1	PASI-K
		EPA 300.0	WNM	3	PASI-K
		EPA 365.4	BLA	1	PASI-K
60286372002	**L-TMW-2**	EPA 200.7	JGP	7	PASI-K
		SM 2320B	ZMH	1	PASI-K
		SM 2540C	RLG	1	PASI-K
		SM 3500-Fe B#4	LDB	1	PASI-K
		SM 3500-Fe B#4	RMT	1	PASI-K
		EPA 300.0	WNM	3	PASI-K
		EPA 365.4	BLA	1	PASI-K
60286372003	**L-TMW-3**	EPA 200.7	JGP	7	PASI-K
		SM 2320B	ZMH	1	PASI-K
		SM 2540C	RLG	1	PASI-K
		SM 3500-Fe B#4	LDB	1	PASI-K
		SM 3500-Fe B#4	RMT	1	PASI-K
		EPA 300.0	WNM	3	PASI-K
		EPA 365.4	BLA	1	PASI-K
60286372004	**L-MW-26**	EPA 200.7	JGP	7	PASI-K
		SM 2320B	ZMH	1	PASI-K
		SM 2540C	RLG	1	PASI-K
		SM 3500-Fe B#4	LDB	1	PASI-K
		SM 3500-Fe B#4	RMT	1	PASI-K
		EPA 300.0	WNM	3	PASI-K
		EPA 365.4	BLA	1	PASI-K
60286372005	**L-UWL-DUP-1**	EPA 200.7	JGP	7	PASI-K
		SM 2320B	ZMH	1	PASI-K
		SM 2540C	RLG	1	PASI-K
		SM 3500-Fe B#4	LDB	1	PASI-K
		SM 3500-Fe B#4	RMT	1	PASI-K
		EPA 300.0	WNM	3	PASI-K
		EPA 365.4	BLA	1	PASI-K
60286372006	**L-UWL-FB-1**	EPA 200.7	JGP	7	PASI-K
		SM 2320B	ZMH	1	PASI-K

REPORT OF LABORATORY ANALYSIS

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

SAMPLE ANALYTE COUNT

Project: AMEREN LABADIE LCL1
Pace Project No.: 60286372

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
		SM 2540C	RLG	1	PASI-K
		SM 3500-Fe B#4	LDB	1	PASI-K
		SM 3500-Fe B#4	RMT	1	PASI-K
		EPA 300.0	WNM	3	PASI-K
		EPA 365.4	BLA	1	PASI-K
60286214003	**L-BMW-1S**	EPA 200.7	JGP	7	PASI-K
		SM 2320B	ZMH	1	PASI-K
		SM 2540C	RLG	1	PASI-K
		SM 3500-Fe B#4	LDB	1	PASI-K
		SM 3500-Fe B#4	RMT	1	PASI-K
		EPA 300.0	WNM	3	PASI-K
		EPA 365.4	BLA	1	PASI-K
60286214004	**L-BMW-2S**	EPA 200.7	JGP	7	PASI-K
		SM 2320B	ZMH	1	PASI-K
		SM 2540C	LDF	1	PASI-K
		SM 3500-Fe B#4	LDB	1	PASI-K
		SM 3500-Fe B#4	RMT	1	PASI-K
		EPA 300.0	WNM	3	PASI-K
		EPA 365.4	BLA	1	PASI-K

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

ANALYTICAL RESULTS

Project: AMEREN LABADIE LCL1
Pace Project No.: 60286372

Sample: L-TMW-1 **Lab ID: 60286372001** Collected: 11/09/18 09:00 Received: 11/10/18 06:25 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	**124**	ug/L	100	12.5	1	11/26/18 18:00	11/27/18 14:17	7440-42-8	
Calcium	**162000**	ug/L	200	53.5	1	11/26/18 18:00	11/27/18 14:17	7440-70-2	
Iron	**368**	ug/L	50.0	6.1	1	11/26/18 18:00	11/27/18 14:17	7439-89-6	
Magnesium	**44100**	ug/L	50.0	14.0	1	11/26/18 18:00	11/27/18 14:17	7439-95-4	
Manganese	**4550**	ug/L	5.0	0.73	1	11/26/18 18:00	11/27/18 14:17	7439-96-5	
Potassium	**5880**	ug/L	500	79.3	1	11/26/18 18:00	11/27/18 14:17	7440-09-7	
Sodium	**11500**	ug/L	500	157	1	11/26/18 18:00	11/27/18 14:17	7440-23-5	
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**534**	mg/L	20.0	4.9	1		11/20/18 11:50		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**677**	mg/L	5.0	5.0	1		11/16/18 10:22		
Iron, Ferric (Calculation)	Analytical Method: SM 3500-Fe B#4								
Iron, Ferric	**0.37**	mg/L	0.050		1		11/30/18 15:46	7439-89-6	
Iron, Ferrous	Analytical Method: SM 3500-Fe B#4								
Iron, Ferrous	**<0.012**	mg/L	0.20	0.012	1		11/10/18 13:38		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**3.7**	mg/L	1.0	0.29	1		11/27/18 06:48	16887-00-6	M1
Fluoride	**0.29**	mg/L	0.20	0.19	1		11/27/18 06:48	16984-48-8	M1
Sulfate	**96.8**	mg/L	10.0	2.4	10		11/27/18 07:52	14808-79-8	M1
365.4 Total Phosphorus	Analytical Method: EPA 365.4								
Phosphorus	**<0.050**	mg/L	0.10	0.050	1		11/15/18 11:32	7723-14-0	

REPORT OF LABORATORY ANALYSIS

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

ANALYTICAL RESULTS

Project: AMEREN LABADIE LCL1
Pace Project No.: 60286372

Sample: L-TMW-2 **Lab ID: 60286372002** Collected: 11/09/18 10:05 Received: 11/10/18 06:25 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	**106**	ug/L	100	12.5	1	11/26/18 18:00	11/27/18 14:23	7440-42-8	
Calcium	**178000**	ug/L	200	53.5	1	11/26/18 18:00	11/27/18 14:23	7440-70-2	
Iron	**1970**	ug/L	50.0	6.1	1	11/26/18 18:00	11/27/18 14:23	7439-89-6	
Magnesium	**42600**	ug/L	50.0	14.0	1	11/26/18 18:00	11/27/18 14:23	7439-95-4	
Manganese	**2740**	ug/L	5.0	0.73	1	11/26/18 18:00	11/27/18 14:23	7439-96-5	
Potassium	**6640**	ug/L	500	79.3	1	11/26/18 18:00	11/27/18 14:23	7440-09-7	
Sodium	**9920**	ug/L	500	157	1	11/26/18 18:00	11/27/18 14:23	7440-23-5	
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**565**	mg/L	20.0	4.9	1		11/20/18 12:02		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**686**	mg/L	5.0	5.0	1		11/16/18 10:23		
Iron, Ferric (Calculation)	Analytical Method: SM 3500-Fe B#4								
Iron, Ferric	**1.6**	mg/L	0.050		1		11/30/18 15:46	7439-89-6	
Iron, Ferrous	Analytical Method: SM 3500-Fe B#4								
Iron, Ferrous	**0.34**	mg/L	0.20	0.012	1		11/10/18 13:47		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**5.5**	mg/L	1.0	0.29	1		11/27/18 08:24	16887-00-6	
Fluoride	**0.21**	mg/L	0.20	0.19	1		11/27/18 08:24	16984-48-8	
Sulfate	**91.0**	mg/L	10.0	2.4	10		11/27/18 08:40	14808-79-8	
365.4 Total Phosphorus	Analytical Method: EPA 365.4								
Phosphorus	**<0.050**	mg/L	0.10	0.050	1		11/15/18 11:34	7723-14-0	

REPORT OF LABORATORY ANALYSIS

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

ANALYTICAL RESULTS

Project: AMEREN LABADIE LCL1
Pace Project No.: 60286372

Sample: L-TMW-3 **Lab ID: 60286372003** Collected: 11/09/18 11:40 Received: 11/10/18 06:25 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	**128**	ug/L	100	12.5	1	11/26/18 18:00	11/27/18 14:26	7440-42-8	
Calcium	**184000**	ug/L	200	53.5	1	11/26/18 18:00	11/27/18 14:26	7440-70-2	
Iron	**9970**	ug/L	50.0	6.1	1	11/26/18 18:00	11/27/18 14:26	7439-89-6	
Magnesium	**39200**	ug/L	50.0	14.0	1	11/26/18 18:00	11/27/18 14:26	7439-95-4	
Manganese	**1400**	ug/L	5.0	0.73	1	11/26/18 18:00	11/27/18 14:26	7439-96-5	
Potassium	**6730**	ug/L	500	79.3	1	11/26/18 18:00	11/27/18 14:26	7440-09-7	
Sodium	**8410**	ug/L	500	157	1	11/26/18 18:00	11/27/18 14:26	7440-23-5	
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**589**	mg/L	20.0	4.9	1		11/20/18 12:10		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**720**	mg/L	5.0	5.0	1		11/16/18 10:23		
Iron, Ferric (Calculation)	Analytical Method: SM 3500-Fe B#4								
Iron, Ferric	**6.8**	mg/L	0.050		1		11/30/18 15:46	7439-89-6	
Iron, Ferrous	Analytical Method: SM 3500-Fe B#4								
Iron, Ferrous	**3.2**	mg/L	0.20	0.012	1		11/10/18 13:51		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**6.7**	mg/L	1.0	0.29	1		11/27/18 19:39	16887-00-6	
Fluoride	**<0.19**	mg/L	0.20	0.19	1		11/27/18 19:39	16984-48-8	
Sulfate	**66.9**	mg/L	5.0	1.2	5		11/27/18 21:01	14808-79-8	M1
365.4 Total Phosphorus	Analytical Method: EPA 365.4								
Phosphorus	**0.19**	mg/L	0.10	0.050	1		11/15/18 11:35	7723-14-0	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: AMEREN LABADIE LCL1
Pace Project No.: 60286372

Sample: L-MW-26 **Lab ID: 60286372004** Collected: 11/09/18 12:45 Received: 11/10/18 06:25 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	**76.9J**	ug/L	100	12.5	1	11/26/18 18:00	11/27/18 14:28	7440-42-8	
Calcium	**134000**	ug/L	200	53.5	1	11/26/18 18:00	11/27/18 14:28	7440-70-2	
Iron	**<6.1**	ug/L	50.0	6.1	1	11/26/18 18:00	11/27/18 14:28	7439-89-6	
Magnesium	**26000**	ug/L	50.0	14.0	1	11/26/18 18:00	11/27/18 14:28	7439-95-4	
Manganese	**36.5**	ug/L	5.0	0.73	1	11/26/18 18:00	11/27/18 14:28	7439-96-5	
Potassium	**4980**	ug/L	500	79.3	1	11/26/18 18:00	11/27/18 14:28	7440-09-7	
Sodium	**9790**	ug/L	500	157	1	11/26/18 18:00	11/27/18 14:28	7440-23-5	
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**435**	mg/L	20.0	4.9	1		11/20/18 12:15		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**494**	mg/L	5.0	5.0	1		11/16/18 10:23		
Iron, Ferric (Calculation)	Analytical Method: SM 3500-Fe B#4								
Iron, Ferric	**0.0J**	mg/L	0.050		1		11/30/18 15:46	7439-89-6	
Iron, Ferrous	Analytical Method: SM 3500-Fe B#4								
Iron, Ferrous	**<0.012**	mg/L	0.20	0.012	1		11/10/18 13:52		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**2.7**	mg/L	1.0	0.29	1		11/27/18 21:50	16887-00-6	
Fluoride	**<0.19**	mg/L	0.20	0.19	1		11/27/18 21:50	16984-48-8	
Sulfate	**24.8**	mg/L	2.0	0.48	2		11/27/18 22:06	14808-79-8	
365.4 Total Phosphorus	Analytical Method: EPA 365.4								
Phosphorus	**<0.050**	mg/L	0.10	0.050	1		11/15/18 11:36	7723-14-0	

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ANALYTICAL RESULTS

Project: AMEREN LABADIE LCL1
Pace Project No.: 60286372

Sample: L-UWL-DUP-1 **Lab ID: 60286372005** Collected: 11/09/18 09:00 Received: 11/10/18 06:25 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	**100**	ug/L	100	12.5	1	11/26/18 18:00	11/27/18 14:30	7440-42-8	
Calcium	**180000**	ug/L	200	53.5	1	11/26/18 18:00	11/27/18 14:30	7440-70-2	
Iron	**2120**	ug/L	50.0	6.1	1	11/26/18 18:00	11/27/18 14:30	7439-89-6	
Magnesium	**43000**	ug/L	50.0	14.0	1	11/26/18 18:00	11/27/18 14:30	7439-95-4	
Manganese	**2770**	ug/L	5.0	0.73	1	11/26/18 18:00	11/27/18 14:30	7439-96-5	
Potassium	**6580**	ug/L	500	79.3	1	11/26/18 18:00	11/27/18 14:30	7440-09-7	
Sodium	**10000**	ug/L	500	157	1	11/26/18 18:00	11/27/18 14:30	7440-23-5	
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**571**	mg/L	20.0	4.9	1		11/20/18 12:22		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**691**	mg/L	5.0	5.0	1		11/16/18 10:23		
Iron, Ferric (Calculation)	Analytical Method: SM 3500-Fe B#4								
Iron, Ferric	**1.8**	mg/L	0.050		1		11/30/18 15:46	7439-89-6	
Iron, Ferrous	Analytical Method: SM 3500-Fe B#4								
Iron, Ferrous	**0.33**	mg/L	0.20	0.012	1		11/10/18 13:45		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**5.5**	mg/L	1.0	0.29	1		11/27/18 22:23	16887-00-6	
Fluoride	**<0.19**	mg/L	0.20	0.19	1		11/27/18 22:23	16984-48-8	
Sulfate	**95.8**	mg/L	5.0	1.2	5		11/27/18 22:39	14808-79-8	
365.4 Total Phosphorus	Analytical Method: EPA 365.4								
Phosphorus	**<0.050**	mg/L	0.10	0.050	1		11/15/18 11:38	7723-14-0	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: AMEREN LABADIE LCL1
Pace Project No.: 60286372

Sample: L-UWL-FB-1 **Lab ID: 60286372006** Collected: 11/09/18 11:27 Received: 11/10/18 06:25 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	11/26/18 18:00	11/27/18 14:32	7440-42-8	
Calcium	**<53.5**	ug/L	200	53.5	1	11/26/18 18:00	11/27/18 14:32	7440-70-2	
Iron	**7.8J**	ug/L	50.0	6.1	1	11/26/18 18:00	11/27/18 14:32	7439-89-6	
Magnesium	**17.8J**	ug/L	50.0	14.0	1	11/26/18 18:00	11/27/18 14:32	7439-95-4	
Manganese	**16.9**	ug/L	5.0	0.73	1	11/26/18 18:00	11/27/18 14:32	7439-96-5	
Potassium	**<79.3**	ug/L	500	79.3	1	11/26/18 18:00	11/27/18 14:32	7440-09-7	
Sodium	**<157**	ug/L	500	157	1	11/26/18 18:00	11/27/18 14:32	7440-23-5	
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**<4.9**	mg/L	20.0	4.9	1		11/21/18 12:07		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**<5.0**	mg/L	5.0	5.0	1		11/16/18 10:23		
Iron, Ferric (Calculation)	Analytical Method: SM 3500-Fe B#4								
Iron, Ferric	**0.0078J**	mg/L	0.050		1		11/30/18 15:46	7439-89-6	
Iron, Ferrous	Analytical Method: SM 3500-Fe B#4								
Iron, Ferrous	**<0.012**	mg/L	0.20	0.012	1		11/10/18 13:48		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**<0.29**	mg/L	1.0	0.29	1		11/27/18 22:55	16887-00-6	
Fluoride	**<0.19**	mg/L	0.20	0.19	1		11/27/18 22:55	16984-48-8	
Sulfate	**<0.24**	mg/L	1.0	0.24	1		11/27/18 22:55	14808-79-8	
365.4 Total Phosphorus	Analytical Method: EPA 365.4								
Phosphorus	**<0.050**	mg/L	0.10	0.050	1		11/15/18 11:39	7723-14-0	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: AMEREN LABADIE LCL1
Pace Project No.: 60286372

Sample: L-BMW-1S **Lab ID: 60286214003** Collected: 11/07/18 10:00 Received: 11/08/18 04:02 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	**151**	ug/L	100	12.5	1	11/12/18 18:25	11/20/18 21:11	7440-42-8	
Calcium	**201000**	ug/L	200	53.5	1	11/12/18 18:25	11/20/18 21:11	7440-70-2	
Iron	**31100**	ug/L	50.0	6.1	1	11/12/18 18:25	11/20/18 21:11	7439-89-6	
Magnesium	**49400**	ug/L	50.0	14.0	1	11/12/18 18:25	11/20/18 21:11	7439-95-4	
Manganese	**2930**	ug/L	5.0	0.73	1	11/12/18 18:25	11/20/18 21:11	7439-96-5	
Potassium	**6100**	ug/L	500	79.3	1	11/12/18 18:25	11/20/18 21:11	7440-09-7	
Sodium	**22200**	ug/L	500	157	1	11/12/18 18:25	11/20/18 21:11	7440-23-5	
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**733**	mg/L	20.0	4.9	1		11/16/18 17:49		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**751**	mg/L	5.0	5.0	1		11/13/18 13:44		
Iron, Ferric (Calculation)	Analytical Method: SM 3500-Fe B#4								
Iron, Ferric	**27.7**	mg/L	0.050		1		11/26/18 10:55	7439-89-6	
Iron, Ferrous	Analytical Method: SM 3500-Fe B#4								
Iron, Ferrous	**3.4**	mg/L	0.20	0.012	1		11/10/18 12:13		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**5.6**	mg/L	1.0	0.29	1		11/25/18 21:02	16887-00-6	
Fluoride	**<0.19**	mg/L	0.20	0.19	1		11/25/18 21:02	16984-48-8	
Sulfate	**36.7**	mg/L	5.0	1.2	5		11/25/18 21:44	14808-79-8	
365.4 Total Phosphorus	Analytical Method: EPA 365.4								
Phosphorus	**0.86**	mg/L	0.10	0.050	1		11/14/18 16:26	7723-14-0	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: AMEREN LABADIE LCL1
Pace Project No.: 60286372

Sample: L-BMW-2S **Lab ID: 60286214004** Collected: 11/07/18 12:25 Received: 11/08/18 04:02 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	**84.8J**	ug/L	100	12.5	1	11/12/18 18:25	11/20/18 21:13	7440-42-8	
Calcium	**128000**	ug/L	200	53.5	1	11/12/18 18:25	11/20/18 21:13	7440-70-2	
Iron	**12.6J**	ug/L	50.0	6.1	1	11/12/18 18:25	11/20/18 21:13	7439-89-6	
Magnesium	**21200**	ug/L	50.0	14.0	1	11/12/18 18:25	11/20/18 21:13	7439-95-4	
Manganese	**3.5J**	ug/L	5.0	0.73	1	11/12/18 18:25	11/20/18 21:13	7439-96-5	B
Potassium	**7530**	ug/L	500	79.3	1	11/12/18 18:25	11/20/18 21:13	7440-09-7	
Sodium	**9390**	ug/L	500	157	1	11/12/18 18:25	11/20/18 21:13	7440-23-5	
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**392**	mg/L	20.0	4.9	1		11/16/18 18:05		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**958**	mg/L	5.0	5.0	1		11/13/18 06:46		L2
Iron, Ferric (Calculation)	Analytical Method: SM 3500-Fe B#4								
Iron, Ferric	**0.0J**	mg/L	0.050		1		11/26/18 10:55	7439-89-6	
Iron, Ferrous	Analytical Method: SM 3500-Fe B#4								
Iron, Ferrous	**0.36**	mg/L	0.20	0.012	1		11/10/18 12:22		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**1.3**	mg/L	1.0	0.29	1		11/21/18 23:35	16887-00-6	B
Fluoride	**<0.19**	mg/L	0.20	0.19	1		11/21/18 23:35	16984-48-8	CH
Sulfate	**28.4**	mg/L	2.0	0.48	2		11/25/18 21:58	14808-79-8	
365.4 Total Phosphorus	Analytical Method: EPA 365.4								
Phosphorus	**<0.050**	mg/L	0.10	0.050	1		11/14/18 16:29	7723-14-0	

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: AMEREN LABADIE LCL1
Pace Project No.: 60286372

QC Batch: 554744 Analysis Method: EPA 200.7
QC Batch Method: EPA 200.7 Analysis Description: 200.7 Metals, Total
Associated Lab Samples: 60286214003, 60286214004

METHOD BLANK: 2275800 Matrix: Water
Associated Lab Samples: 60286214003, 60286214004

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Boron	ug/L	<12.5	100	12.5	11/20/18 20:58	
Calcium	ug/L	<53.5	200	53.5	11/20/18 20:58	
Iron	ug/L	<6.1	50.0	6.1	11/20/18 20:58	
Magnesium	ug/L	<14.0	50.0	14.0	11/20/18 20:58	
Manganese	ug/L	1.8J	5.0	0.73	11/20/18 20:58	
Potassium	ug/L	<79.3	500	79.3	11/20/18 20:58	
Sodium	ug/L	<157	500	157	11/20/18 20:58	

LABORATORY CONTROL SAMPLE: 2275801

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Boron	ug/L	1000	1010	101	85-115	
Calcium	ug/L	10000	9880	99	85-115	
Iron	ug/L	10000	9670	97	85-115	
Magnesium	ug/L	10000	10100	101	85-115	
Manganese	ug/L	1000	975	98	85-115	
Potassium	ug/L	10000	10000	100	85-115	
Sodium	ug/L	10000	10000	100	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2275802 2275803

Parameter	Units	60286214001 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	15100	15200	125	139	70-130	1	20	M1
Calcium	ug/L		10000	10000	315000	316000	142	156	70-130	0	20	M1
Iron	ug/L		10000	10000	35100	35000	97	97	70-130	0	20	
Magnesium	ug/L		10000	10000	66600	67000	101	105	70-130	1	20	
Manganese	ug/L		1000	1000	4020	4040	98	100	70-130	0	20	
Potassium	ug/L		10000	10000	17600	17700	99	100	70-130	1	20	
Sodium	ug/L		10000	10000	62600	62800	111	113	70-130	0	20	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2275804 2275805

Parameter	Units	60286215003 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Boron	ug/L	8310	1000	1000	9270	9180	96	87	70-130	1	20	
Calcium	ug/L	220000	10000	10000	231000	228000	113	81	70-130	1	20	

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QUALITY CONTROL DATA

Project: AMEREN LABADIE LCL1
Pace Project No.: 60286372

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2275804 2275805

Parameter	Units	60286215003 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Iron	ug/L	11900	10000	10000	21500	21300	96	94	70-130	1	20	
Magnesium	ug/L	28100	10000	10000	37600	37200	95	92	70-130	1	20	
Manganese	ug/L	2110	1000	1000	3060	3030	95	93	70-130	1	20	
Potassium	ug/L	6910	10000	10000	17100	16900	102	100	70-130	1	20	
Sodium	ug/L	76500	10000	10000	87200	86600	107	100	70-130	1	20	

MATRIX SPIKE SAMPLE: 2275806

Parameter	Units	60286215005 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Boron	ug/L	113	1000	1120	101	70-130	
Calcium	ug/L	114000	10000	124000	98	70-130	
Iron	ug/L	22700	10000	32300	96	70-130	
Magnesium	ug/L	31600	10000	41000	94	70-130	
Manganese	ug/L	349	1000	1290	94	70-130	
Potassium	ug/L	4120	10000	13800	97	70-130	
Sodium	ug/L	13800	10000	23800	100	70-130	

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QUALITY CONTROL DATA

Project: AMEREN LABADIE LCL1
Pace Project No.: 60286372

QC Batch: 556876 Analysis Method: EPA 200.7
QC Batch Method: EPA 200.7 Analysis Description: 200.7 Metals, Total
Associated Lab Samples: 60286372001, 60286372002, 60286372003, 60286372004, 60286372005, 60286372006

METHOD BLANK: 2284987 Matrix: Water
Associated Lab Samples: 60286372001, 60286372002, 60286372003, 60286372004, 60286372005, 60286372006

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Boron	ug/L	<12.5	100	12.5	11/27/18 13:48	
Calcium	ug/L	<53.5	200	53.5	11/27/18 13:48	
Iron	ug/L	<6.1	50.0	6.1	11/27/18 13:48	
Magnesium	ug/L	<14.0	50.0	14.0	11/27/18 13:48	
Manganese	ug/L	0.80J	5.0	0.73	11/27/18 13:48	
Potassium	ug/L	<79.3	500	79.3	11/27/18 13:48	
Sodium	ug/L	<157	500	157	11/27/18 13:48	

LABORATORY CONTROL SAMPLE: 2284988

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Boron	ug/L	1000	979	98	85-115	
Calcium	ug/L	10000	9940	99	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	10000	100	85-115	
Sodium	ug/L	10000	10400	104	85-115	

MATRIX SPIKE SAMPLE: 2284989

Parameter	Units	60286215023 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Boron	ug/L	9300	1000	10400	112	70-130	
Calcium	ug/L	84400	10000	94400	100	70-130	
Iron	ug/L	64.8	10000	10100	101	70-130	
Magnesium	ug/L	5160	10000	15000	98	70-130	
Manganese	ug/L	113	1000	1100	99	70-130	
Potassium	ug/L	9650	10000	19700	100	70-130	
Sodium	ug/L	75600	10000	85100	96	70-130	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2284990 2284991

Parameter	Units	60286372001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Boron	ug/L	124	1000	1000	1140	1140	101	102	70-130	0	20	
Calcium	ug/L	162000	10000	10000	174000	173000	118	107	70-130	1	20	
Iron	ug/L	368	10000	10000	10400	10300	100	100	70-130	0	20	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: AMEREN LABADIE LCL1
Pace Project No.: 60286372

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2284990 2284991

Parameter	Units	60286372001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Magnesium	ug/L	44100	10000	10000	54700	54300	106	102	70-130	1	20	
Manganese	ug/L	4550	1000	1000	5620	5590	106	104	70-130	0	20	
Potassium	ug/L	5880	10000	10000	16100	16000	102	102	70-130	0	20	
Sodium	ug/L	11500	10000	10000	21900	21800	104	103	70-130	1	20	

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QUALITY CONTROL DATA

Project: AMEREN LABADIE LCL1
Pace Project No.: 60286372

QC Batch: 555675 Analysis Method: SM 2320B
QC Batch Method: SM 2320B Analysis Description: 2320B Alkalinity
Associated Lab Samples: 60286214003, 60286214004

METHOD BLANK: 2279679 Matrix: Water
Associated Lab Samples: 60286214003, 60286214004

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Alkalinity, Total as CaCO3	mg/L	<4.9	20.0	4.9	11/16/18 16:02	

LABORATORY CONTROL SAMPLE: 2279680

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity, Total as CaCO3	mg/L	500	507	101	90-110	

SAMPLE DUPLICATE: 2279681

Parameter	Units	60286398006 Result	Dup Result	RPD	Max RPD	Qualifiers
Alkalinity, Total as CaCO3	mg/L	101	101	0	10	

SAMPLE DUPLICATE: 2279682

Parameter	Units	60286349012 Result	Dup Result	RPD	Max RPD	Qualifiers
Alkalinity, Total as CaCO3	mg/L	630	637	1	10	

SAMPLE DUPLICATE: 2280829

Parameter	Units	60286214001 Result	Dup Result	RPD	Max RPD	Qualifiers
Alkalinity, Total as CaCO3	mg/L		328	0	10	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: AMEREN LABADIE LCL1
Pace Project No.: 60286372

QC Batch: 556192 Analysis Method: SM 2320B
QC Batch Method: SM 2320B Analysis Description: 2320B Alkalinity
Associated Lab Samples: 60286372001, 60286372002, 60286372003, 60286372004, 60286372005

METHOD BLANK: 2282069 Matrix: Water
Associated Lab Samples: 60286372001, 60286372002, 60286372003, 60286372004, 60286372005

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Alkalinity, Total as CaCO3	mg/L	<4.9	20.0	4.9	11/20/18 10:40	

LABORATORY CONTROL SAMPLE: 2282070

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity, Total as CaCO3	mg/L	500	513	103	90-110	

SAMPLE DUPLICATE: 2282071

Parameter	Units	60286215025 Result	Dup Result	RPD	Max RPD	Qualifiers
Alkalinity, Total as CaCO3	mg/L	58.8	64.8	10	10	

SAMPLE DUPLICATE: 2282072

Parameter	Units	60286372001 Result	Dup Result	RPD	Max RPD	Qualifiers
Alkalinity, Total as CaCO3	mg/L	534	545	2	10	

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QUALITY CONTROL DATA

Project: AMEREN LABADIE LCL1
Pace Project No.: 60286372

QC Batch: 556501 Analysis Method: SM 2320B
QC Batch Method: SM 2320B Analysis Description: 2320B Alkalinity
Associated Lab Samples: 60286372006

METHOD BLANK: 2283240 Matrix: Water
Associated Lab Samples: 60286372006

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Alkalinity, Total as CaCO3	mg/L	<4.9	20.0	4.9	11/21/18 12:04	

LABORATORY CONTROL SAMPLE: 2283241

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

SAMPLE DUPLICATE: 2283242

Parameter	Units	60287138004 Result	Dup Result	RPD	Max RPD	Qualifiers
Alkalinity, Total as CaCO3	mg/L	374	385	3	10	

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QUALITY CONTROL DATA

Project: AMEREN LABADIE LCL1
Pace Project No.: 60286372

QC Batch: 554816 Analysis Method: SM 2540C
QC Batch Method: SM 2540C Analysis Description: 2540C Total Dissolved Solids
Associated Lab Samples: 60286214003

METHOD BLANK: 2276047 Matrix: Water
Associated Lab Samples: 60286214003

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	<5.0	5.0	5.0	11/13/18 13:21	

LABORATORY CONTROL SAMPLE: 2276048

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Dissolved Solids	mg/L	1000	982	98	80-120	

SAMPLE DUPLICATE: 2276049

Parameter	Units	60286314003 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	1150	1170	2	10	

SAMPLE DUPLICATE: 2277979

Parameter	Units	60286214001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L		1600	1	10	

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QUALITY CONTROL DATA

Project: AMEREN LABADIE LCL1
Pace Project No.: 60286372

QC Batch: 555016 Analysis Method: SM 2540C
QC Batch Method: SM 2540C Analysis Description: 2540C Total Dissolved Solids
Associated Lab Samples: 60286214004

METHOD BLANK: 2276777 Matrix: Water
Associated Lab Samples: 60286214004

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	<5.0	5.0	5.0	11/13/18 06:59	

LABORATORY CONTROL SAMPLE: 2276778

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Dissolved Solids	mg/L	2000	918	46	80-120	L2

SAMPLE DUPLICATE: 2276779

Parameter	Units	60286215003 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	1020	677	41	10	D6

SAMPLE DUPLICATE: 2276780

Parameter	Units	60286215007 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	427	544	24	10	D6

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QUALITY CONTROL DATA

Project: AMEREN LABADIE LCL1
Pace Project No.: 60286372

QC Batch: 555504 Analysis Method: SM 2540C
QC Batch Method: SM 2540C Analysis Description: 2540C Total Dissolved Solids
Associated Lab Samples: 60286372001, 60286372002, 60286372003, 60286372004, 60286372005, 60286372006

METHOD BLANK: 2278837 Matrix: Water
Associated Lab Samples: 60286372001, 60286372002, 60286372003, 60286372004, 60286372005, 60286372006

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	<5.0	5.0	5.0	11/16/18 10:22	

LABORATORY CONTROL SAMPLE: 2278838

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Dissolved Solids	mg/L	1000	983	98	80-120	

SAMPLE DUPLICATE: 2278839

Parameter	Units	60286372001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	677	665	2	10	

SAMPLE DUPLICATE: 2278840

Parameter	Units	60286545003 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	437	494	12	10	D6

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: AMEREN LABADIE LCL1
Pace Project No.: 60286372

QC Batch: 554530 Analysis Method: SM 3500-Fe B#4
QC Batch Method: SM 3500-Fe B#4 Analysis Description: Iron, Ferrous
Associated Lab Samples: 60286214003, 60286214004

METHOD BLANK: 2274461 Matrix: Water
Associated Lab Samples: 60286214003, 60286214004

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Iron, Ferrous	mg/L	<0.012	0.20	0.012	11/10/18 12:07	H6

LABORATORY CONTROL SAMPLE: 2274462

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Iron, Ferrous	mg/L	2	2.0	100	90-110	H6

SAMPLE DUPLICATE: 2274464

Parameter	Units	60285787001 Result	Dup Result	RPD	Max RPD	Qualifiers
Iron, Ferrous	mg/L	1.8	1.7	4	20	H6

SAMPLE DUPLICATE: 2274465

Parameter	Units	60285787003 Result	Dup Result	RPD	Max RPD	Qualifiers
Iron, Ferrous	mg/L	0.32	0.28	13	20	H6

SAMPLE DUPLICATE: 2274466

Parameter	Units	60286214001 Result	Dup Result	RPD	Max RPD	Qualifiers
Iron, Ferrous	mg/L		13.6	1	20	H6

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: AMEREN LABADIE LCL1
Pace Project No.: 60286372

QC Batch: 554544 Analysis Method: SM 3500-Fe B#4
QC Batch Method: SM 3500-Fe B#4 Analysis Description: Iron, Ferrous
Associated Lab Samples: 60286372001, 60286372002, 60286372003, 60286372004, 60286372005, 60286372006

METHOD BLANK: 2274532 Matrix: Water
Associated Lab Samples: 60286372001, 60286372002, 60286372003, 60286372004, 60286372005, 60286372006

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Iron, Ferrous	mg/L	<0.012	0.20	0.012	11/10/18 13:31	H6

LABORATORY CONTROL SAMPLE: 2274533

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Iron, Ferrous	mg/L	2	2.0	100	90-110	H6

SAMPLE DUPLICATE: 2274535

Parameter	Units	60286215010 Result	Dup Result	RPD	Max RPD	Qualifiers
Iron, Ferrous	mg/L	<0.012	<0.012		20	H6

SAMPLE DUPLICATE: 2274537

Parameter	Units	60286372001 Result	Dup Result	RPD	Max RPD	Qualifiers
Iron, Ferrous	mg/L	<0.012	<0.012		20	H6

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: AMEREN LABADIE LCL1
Pace Project No.: 60286372

QC Batch: 556563
QC Batch Method: EPA 300.0
Analysis Method: EPA 300.0
Analysis Description: 300.0 IC Anions
Associated Lab Samples: 60286214004

METHOD BLANK: 2283534
Matrix: Water
Associated Lab Samples: 60286214004

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Chloride	mg/L	0.31J	1.0	0.29	11/21/18 18:56	
Fluoride	mg/L	<0.19	0.20	0.19	11/21/18 18:56	

LABORATORY CONTROL SAMPLE: 2283535

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	5	4.6	91	90-110	
Fluoride	mg/L	2.5	2.5	100	90-110	

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QUALITY CONTROL DATA

Project: AMEREN LABADIE LCL1
Pace Project No.: 60286372

QC Batch: 556718 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 60286214003, 60286214004

METHOD BLANK: 2284553 Matrix: Water
Associated Lab Samples: 60286214003, 60286214004

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Chloride	mg/L	<0.29	1.0	0.29	11/25/18 17:57	
Fluoride	mg/L	<0.19	0.20	0.19	11/25/18 17:57	
Sulfate	mg/L	<0.24	1.0	0.24	11/25/18 17:57	

LABORATORY CONTROL SAMPLE: 2284554

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	5	5.2	104	90-110	
Fluoride	mg/L	2.5	2.6	105	90-110	
Sulfate	mg/L	5	5.2	105	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2284555 2284556

Parameter	Units	60286214001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L		5	5	21.1	21.6	95	104	90-110	2	15	E
Fluoride	mg/L		2.5	2.5	3.0	3.2	114	121	90-110	6	15	M1
Sulfate	mg/L		500	500	1430	1420	90	88	90-110	1	15	M1

MATRIX SPIKE SAMPLE: 2284557

Parameter	Units	60286215003 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	14.5	5	19.5	100	90-110	
Fluoride	mg/L	0.29	2.5	2.9	104	90-110	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: AMEREN LABADIE LCL1
Pace Project No.: 60286372

QC Batch: 556826 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 60286372001, 60286372002

METHOD BLANK: 2284823 Matrix: Water
Associated Lab Samples: 60286372001, 60286372002

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Chloride	mg/L	<0.29	1.0	0.29	11/26/18 17:58	
Fluoride	mg/L	<0.19	0.20	0.19	11/26/18 17:58	
Sulfate	mg/L	<0.24	1.0	0.24	11/26/18 17:58	

LABORATORY CONTROL SAMPLE: 2284824

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	2.5	99	90-110	
Sulfate	mg/L	5	5.0	100	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2284825 2284826

Parameter	Units	60286358005 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	4.7	5	5	9.7	9.7	99	100	90-110	1	15	
Fluoride	mg/L	0.22	2.5	2.5	2.9	2.9	106	109	90-110	2	15	
Sulfate	mg/L	10.1	5	5	15.3	15.3	103	105	90-110	1	15	

MATRIX SPIKE SAMPLE: 2284827

Parameter	Units	60286372001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	3.7	5	5.7	38	90-110	M1
Fluoride	mg/L	0.29	2.5	1.3	40	90-110	M1
Sulfate	mg/L	96.8	50	115	37	90-110	M1

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: AMEREN LABADIE LCL1
Pace Project No.: 60286372

QC Batch: 557065 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 60286372003, 60286372004, 60286372005, 60286372006

METHOD BLANK: 2285614 Matrix: Water
Associated Lab Samples: 60286372003, 60286372004, 60286372005, 60286372006

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Chloride	mg/L	<0.29	1.0	0.29	11/27/18 19:06	
Fluoride	mg/L	<0.19	0.20	0.19	11/27/18 19:06	
Sulfate	mg/L	<0.24	1.0	0.24	11/27/18 19:06	

LABORATORY CONTROL SAMPLE: 2285615

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	5	4.6	93	90-110	
Fluoride	mg/L	2.5	2.3	93	90-110	
Sulfate	mg/L	5	4.8	96	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2285616 2285617

Parameter	Units	60286372003 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	6.7	5	5	12.0	11.7	106	100	90-110	3	15	
Fluoride	mg/L	<0.19	2.5	2.5	2.5	2.4	99	98	90-110	1	15	
Sulfate	mg/L	66.9	25	25	96.7	91.0	119	96	90-110	6	15	M1

MATRIX SPIKE SAMPLE: 2285618

Parameter	Units	60286489014 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	124	50	187	125	90-110	M1

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: AMEREN LABADIE LCL1
Pace Project No.: 60286372

QC Batch: 554773 Analysis Method: EPA 365.4
QC Batch Method: EPA 365.4 Analysis Description: 365.4 Phosphorus
Associated Lab Samples: 60286214003, 60286214004

METHOD BLANK: 2275875 Matrix: Water
Associated Lab Samples: 60286214003, 60286214004

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Phosphorus	mg/L	<0.050	0.10	0.050	11/14/18 16:24	

LABORATORY CONTROL SAMPLE: 2275876

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Phosphorus	mg/L	2	2.0	98	90-110	

MATRIX SPIKE SAMPLE: 2275877

Parameter	Units	60286214003 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Phosphorus	mg/L	0.86	2	2.7	90	90-110	

MATRIX SPIKE SAMPLE: 2278555

Parameter	Units	60286215005 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Phosphorus	mg/L	0.76	2	2.6	90	90-110	

SAMPLE DUPLICATE: 2275878

Parameter	Units	60286215003 Result	Dup Result	RPD	Max RPD	Qualifiers
Phosphorus	mg/L	0.23	0.25	9	10	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: AMEREN LABADIE LCL1
Pace Project No.: 60286372

QC Batch: 554984 Analysis Method: EPA 365.4
QC Batch Method: EPA 365.4 Analysis Description: 365.4 Phosphorus
Associated Lab Samples: 60286372001, 60286372002, 60286372003, 60286372004, 60286372005, 60286372006

METHOD BLANK: 2276694 Matrix: Water
Associated Lab Samples: 60286372001, 60286372002, 60286372003, 60286372004, 60286372005, 60286372006

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Phosphorus	mg/L	<0.050	0.10	0.050	11/15/18 11:25	

LABORATORY CONTROL SAMPLE: 2276695

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Phosphorus	mg/L	2	1.9	96	90-110	

MATRIX SPIKE SAMPLE: 2276696

Parameter	Units	60286318019 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Phosphorus	mg/L	0.18	2	2.1	98	90-110	

MATRIX SPIKE SAMPLE: 2276698

Parameter	Units	60286571003 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Phosphorus	mg/L	0.28	2	2.3	100	90-110	

SAMPLE DUPLICATE: 2276697

Parameter	Units	60286372001 Result	Dup Result	RPD	Max RPD	Qualifiers
Phosphorus	mg/L	<0.050	<0.050		10	

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REPORT OF LABORATORY ANALYSIS

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QUALIFIERS

Project: AMEREN LABADIE LCL1
Pace Project No.: 60286372

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.
CH	The continuing calibration for this compound is outside of Pace Analytical acceptance limits. The results may be biased high.
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.
H6	Analysis initiated outside of the 15 minute EPA required holding time.
L2	Analyte recovery in the laboratory control sample (LCS) was below QC limits. Results for this analyte in associated samples may be biased low.
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 LCL1
Pace Project No.: 60286372

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
60286214003	**L-BMW-1S**	EPA 200.7	554744	EPA 200.7	554814
60286214004	**L-BMW-2S**	EPA 200.7	554744	EPA 200.7	554814
60286372001	**L-TMW-1**	EPA 200.7	556876	EPA 200.7	556951
60286372002	**L-TMW-2**	EPA 200.7	556876	EPA 200.7	556951
60286372003	**L-TMW-3**	EPA 200.7	556876	EPA 200.7	556951
60286372004	**L-MW-26**	EPA 200.7	556876	EPA 200.7	556951
60286372005	**L-UWL-DUP-1**	EPA 200.7	556876	EPA 200.7	556951
60286372006	**L-UWL-FB-1**	EPA 200.7	556876	EPA 200.7	556951
60286214003	**L-BMW-1S**	SM 2320B	555675		
60286214004	**L-BMW-2S**	SM 2320B	555675		
60286372001	**L-TMW-1**	SM 2320B	556192		
60286372002	**L-TMW-2**	SM 2320B	556192		
60286372003	**L-TMW-3**	SM 2320B	556192		
60286372004	**L-MW-26**	SM 2320B	556192		
60286372005	**L-UWL-DUP-1**	SM 2320B	556192		
60286372006	**L-UWL-FB-1**	SM 2320B	556501		
60286214003	**L-BMW-1S**	SM 2540C	554816		
60286214004	**L-BMW-2S**	SM 2540C	555016		
60286372001	**L-TMW-1**	SM 2540C	555504		
60286372002	**L-TMW-2**	SM 2540C	555504		
60286372003	**L-TMW-3**	SM 2540C	555504		
60286372004	**L-MW-26**	SM 2540C	555504		
60286372005	**L-UWL-DUP-1**	SM 2540C	555504		
60286372006	**L-UWL-FB-1**	SM 2540C	555504		
60286214003	**L-BMW-1S**	SM 3500-Fe B#4	556803		
60286214004	**L-BMW-2S**	SM 3500-Fe B#4	556803		
60286372001	**L-TMW-1**	SM 3500-Fe B#4	557770		
60286372002	**L-TMW-2**	SM 3500-Fe B#4	557770		
60286372003	**L-TMW-3**	SM 3500-Fe B#4	557770		
60286372004	**L-MW-26**	SM 3500-Fe B#4	557770		
60286372005	**L-UWL-DUP-1**	SM 3500-Fe B#4	557770		
60286372006	**L-UWL-FB-1**	SM 3500-Fe B#4	557770		
60286214003	**L-BMW-1S**	SM 3500-Fe B#4	554530		
60286214004	**L-BMW-2S**	SM 3500-Fe B#4	554530		
60286372001	**L-TMW-1**	SM 3500-Fe B#4	554544		
60286372002	**L-TMW-2**	SM 3500-Fe B#4	554544		
60286372003	**L-TMW-3**	SM 3500-Fe B#4	554544		
60286372004	**L-MW-26**	SM 3500-Fe B#4	554544		
60286372005	**L-UWL-DUP-1**	SM 3500-Fe B#4	554544		
60286372006	**L-UWL-FB-1**	SM 3500-Fe B#4	554544		
60286214003	**L-BMW-1S**	EPA 300.0	556718		
60286214004	**L-BMW-2S**	EPA 300.0	556563		

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

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: AMEREN LABADIE LCL1
Pace Project No.: 60286372

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
60286214004	**L-BMW-2S**	EPA 300.0	556718		
60286372001	**L-TMW-1**	EPA 300.0	556826		
60286372002	**L-TMW-2**	EPA 300.0	556826		
60286372003	**L-TMW-3**	EPA 300.0	557065		
60286372004	**L-MW-26**	EPA 300.0	557065		
60286372005	**L-UWL-DUP-1**	EPA 300.0	557065		
60286372006	**L-UWL-FB-1**	EPA 300.0	557065		
60286214003	**L-BMW-1S**	EPA 365.4	554773		
60286214004	**L-BMW-2S**	EPA 365.4	554773		
60286372001	**L-TMW-1**	EPA 365.4	554984		
60286372002	**L-TMW-2**	EPA 365.4	554984		
60286372003	**L-TMW-3**	EPA 365.4	554984		
60286372004	**L-MW-26**	EPA 365.4	554984		
60286372005	**L-UWL-DUP-1**	EPA 365.4	554984		
60286372006	**L-UWL-FB-1**	EPA 365.4	554984		

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Sample Condition Upon Receipt

WO# : 60286372

60286372

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: 301 **Type of Ice:** (Wet) Blue None

Cooler Temperature (°C): **As-read** 3.0 4.2 **Corr. Factor** +0.0 **Corrected** 3.0 4.2

JLS

Date and initials of person examining contents: JB 11/12

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	Fe24
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: Jann Chunk Date: 11/12/18

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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:

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.:	
Project Name:	Ameren Labadie EC LCPA N&E
Project Number:	153-1406.0001I (COC #7)

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

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

ITEM #	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*	Alkalinity	Total Phosphorus	Ferrous Iron	Ferric Iron	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D. 60286372
																		Requested Analysis Filtered (Y/N)	N	N	N	N	N		
1	L-TMW-1	WT	G			11/9/18	0900		12	6	3	3							/	/	/	/	/		001
2	L-TMW-2	WT	G				1005		4	2	1	1							/	/	/	/	/		002
3	L-TMW-3	WT	G				1140		4	2	1	1							/	/	/	/	/		003
4	L-MW-26	WT	G				1245		4	2	1	1							/	/	/	/	/		004
5	L-UWL-DUP-1	WT	G				—		4	2	1	1							/	/	/	/	/		005
6	L-UWL-FB-1	WT	G				1127		4	2	1	1							/	/	/	/	/		006
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
*EPA 200.7: Ba, Li, Mo, Fe, Mg, Mn, K, Na *EPA 200.8: As	Golder	11/9/18	1430	PACE	11/9/18	1430
		11/9/18	1700		11/10	0675

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

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Tommy Golden

SIGNATURE of SAMPLER: Tommy Golden

DATE Signed (MM/DD/YY): 11/9/18

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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:	Mark Haddock (mhaddock@golder.com)	Attention:	
Address:	13515 Barrett Parkway Drive, Ste 260	Copy To:	Jeffrey Ingram	Company Name:	
	Ballwin, MO 63021			Address:	
Email To:	maddock@golder.com	Purchase Order No.:		Pace Quote Reference:	
Phone: 636-724-9191	Fax: 636-724-9323	Project Name:	Ameren Labadie EC LCL1	Pace Project Manager:	Jamie Church
Requested Due Date/TAT:	Standard	Project Number:	153-1406.0001F (COC #6)	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	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																	Y/N	N	N	N		
1	L-TMW-1	WT	G			11/9/18	0700		12	6	3	3							1	1	1		
2	L-TMW-2	WT	G			"	0805		4	2	1	1							1	1	1		
3	L-TMW-3	WT	G			"	1140		4	"	"	"							"	"	"		
4	L-MW-26	WT	G			"	1245		4														
5	L-UWL-DUP-1	WT	G			"	—		4														
6	L-UWL-FB-1	WT	G			"	1127		4	"	"	"							J	"	"		
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			
*EPA 200.7: B, Ca	Tommy Gaudet / Golder	11/9/18	1430	[illegible] / PACE	11/9/18	1430				
	[illegible] / PACE	11/9/18	1700	[illegible]	11/10/18	0825	3.0	Y	Y	Y
							4.8	Y	Y	Y

SAMPLER NAME AND SIGNATURE			Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)
PRINT Name of SAMPLER:	Tommy Gaudet					
SIGNATURE of SAMPLER:	[signature]	DATE Signed (MM/DD/YY): 11/9/18				

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Sample Condition Upon Receipt

WO# : 60286214

60286214

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 ☐ x5

Packing Material: Bubble Wrap ☐ Bubble Bags ☐ Foam ☐ None ☐ Other ☑ Ziplc x5

Thermometer Used: T-299 Type of Ice: Wet ☑ Blue None x5

Cooler Temperature (°C): As-read 0.9/2.2 Corr. Factor +0.1 Corrected 1.0/2.3

Date and initials of person examining contents: 11-8-18 HF DLB

Temperature should be above freezing to 6°C 0.4/0.5/2.3 0.5/0.6/2.4

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: Jann Chunk 11/9/18 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 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.:	
Project Name:	Ameren Labadie EC LCPB
Project Number:	153-1406.0001E (COC #4)

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	Metals*	Chloride/Fluoride/Sulfate	TDS	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
																		Y/N	N	N	N		60286214
1	L-LMW-1S	WT	G			11/7/18	1310		4	2	1	1							✓	✓	✓	2BP2U BP3S BP3N	001
2	L-LMW-2S	WT	G																				
3	L-LMW-3S	WT	G			11/7/18	1530		4	2	1	1							✓	✓	✓	2BP2U BP3S BP3N	002
4	L-LMW-4S	WT	G																				
5	L-LMW-5S	WT	G																				
6	L-LMW-6S	WT	G																				
7	~~L-LMW-7S~~ L-MS-1	WT	G			11/7/18	1310		4	2	1	1							✓	✓	✓	2BP2U BP3S BP3N	
8	~~L-LMW-8S~~ L-MSD-1	WT	G			11/7/18	1310		4	2	1	1							✓	✓	✓	↓ ↓ ↓	
9	L-BMW-1S	WT	G			11/7/18	1000		4	2	1	1							✓	✓	✓		003
10	L-BMW-2S	WT	G			11/7/18	1225		4	2	1	1							✓	✓	✓	↓ ↓ ↓	004
11	L-LMW-DUP-1	WT	G																				
12	L-LMW-FB-1	WT	G			11/7/18	1525		4	2	1	1							✓	✓	✓	2BP2U BP3S BP3N	005

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 ~~MS/MSD-1~~	Eric Schedler	11/7/18	1735	Holly Fowler DASI	11.8.18	0402	1.0	Y	Y	Y
							2.3			
							0.5			
							0.6			
							2.4			

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Eric Schedler

SIGNATURE of SAMPLER: Eric Schedler DATE Signed (MM/DD/YY): 11/07/18

*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.

COC #2

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Sample Condition Upon Receipt

WO# : 60286214

60286214

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-301 **Type of Ice:** (Wet) Blue None

Cooler Temperature (°C): **As-read** 2.7,2.9 **Corr. Factor** +0.0 **Corrected** 2.7,2.9

Date and initials of person examining contents: AC 11/9

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	Ferrous Iron
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: Jana Church 11/9/18 Date: _____

11/8/18

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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:	Mark Haddock (mhaddock@golder.com)	Attention:	
Address:	13515 Barrett Parkway Drive, Ste 260	Copy To:	Jeffrey Ingram	Company Name:	
	Ballwin, MO 63021			Address:	
Email To:	maddock@golder.com	Purchase Order No.:		Pace Quote Reference:	
Phone:	636-724-9191 Fax: 636-724-9323	Project Name:	Ameren Labadie EC LCPA N&E	Pace Project Manager:	Jamie Church
Requested Due Date/TAT:	Standard	Project Number:	153-1406.0001 (COC #5)	Pace Profile #:	9285

REGULATORY AGENCY: NPDES (GROUND WATER) DRINKING WATER; UST RCRA OTHER _____

Site Location STATE: MO

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

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*	Alkalinity	Total Phosphorus	Ferrous Iron	Ferric Iron										Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
																		Y/N	N	N	N	N	N													
1	L-LMW-1S	WT	G																																
2	L-LMW-2S	WT	G			11/8/18	1445		4	2	1	1																							2BP2U BP3N BP3S -006
3	L-LMW-3S	WT	G				1515																												
4	L-LMW-4S	WT	G			11/8/18	~~1335~~ (2)		4	2	1	1																							2BP2U BP3N BP3S -007
5	L-LMW-5S	WT	G				~~1335~~ (2)																												-008
6	L-LMW-6S	WT	G				1055 (2)																												-009
7	L-LMW-7S	WT	G				1055																												-010
8	L-LMW-8S	WT	G				0915																												-011
9	L-BMW-1S	WT	G																																
10	L-BMW-2S	WT	G																																
11	L-LMW-DUP-1	WT	G			11/8/18	—		4	2	1	1																							2BP2U BP3N BP3S -017
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: Ba, Li, Mo, Fe, Mg, Mn, K, Na *EPA 200.8: As	[signature] / Golder	11/8/18	1735	[signature] via cat post	11/9/18	03:12	2.7	4	4	4
							2.9	4	4	4

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER:

SIGNATURE of SAMPLER: DATE Signed (MM/DD/YY):

Pace Analytical
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11/8/18

CHAIN-OF-CUSTODY / Analytical Request Document

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	Ballwin, MO 63021			Address:	
Email To:	maddock@golder.com	Purchase Order No.:		Pace Quote Reference:	
Phone:	636-724-9191 Fax: 636-724-9323	Project Name:	Ameren Labadie EC LCPB	Pace Project Manager:	Jamie Church
Requested Due Date/TAT:	Standard	Project Number:	153-1406.0001E (COC #4)	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

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	Preservatives: H_2SO_4	Preservatives: HNO_3	Preservatives: HCl	Preservatives: NaOH	Preservatives: $Na_2S_2O_3$	Preservatives: Methanol	Preservatives: Other	Analysis Test Y/N	Requested Analysis Filtered (Y/N): Metals*	Chloride/Fluoride/Sulfate	TDS	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
																		Y/N	N	N	N		
1	L-LMW-1S	WT	G																				
2	L-LMW-2S	WT	G			11/8/18	1445		4	2	1	1											-006
3	L-LMW-3S	WT	G																				
4	L-LMW-4S	WT	G			11/8/18	1515		4	2	1	1											-007
5	L-LMW-5S	WT	G			11/8/18	1335		1	1	1	1											-008
6	L-LMW-6S	WT	G			11/8/18	1225																-009
7	L-LMW-7S	WT	G			11/8/18	1055																-010
8	L-LMW-8S	WT	G			11/8/18	0915		1	1	1	1											-011
9	L-BMW-1S	WT	G																				
10	L-BMW-2S	WT	G																				
11	L-LMW-DUP-1	WT	G			11/8/18	—		4	2	1	1											-017
12	L-LMW-FB-1	WT	G																				

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS
*EPA 200.7: B, Ca	[signature] / Golder	11/8/18	1735				

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER:

SIGNATURE of SAMPLER: | DATE Signed (MM/DD/YY):

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

*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.

11/7/18

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Email To:	maddock@golder.com	Purchase Order No.:		Pace Quote Reference:	
Phone:	636-724-9191 Fax: 636-724-9323	Project Name:	Ameren Labadie EC LCPA N&E	Pace Project Manager:	Jamie Church
Requested Due Date/TAT:	Standard	Project Number:	153-1406.0001! (COC #5)	Pace Profile #:	9285

REGULATORY AGENCY

NPDES (GROUND WATER) DRINKING WATER

UST RCRA OTHER _____

Site Location STATE: MO

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

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*	Alkalinity	Total Phosphorus	Ferrous Iron	Ferric Iron										Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
	Requested Analysis Filtered (Y/N)																		N	N	N	N	N											
1	L-LMW-1S	WT	G			11/7/18	1310		4	2	1	1							/	/	/	/	/											-012
2	L-LMW-2S	WT	G																														
3	L-LMW-3S	WT	G			11/7/18	1530		4	2	1	1							/	/	/	/	/											-013
4	L-LMW-4S	WT	G																														
5	L-LMW-5S	WT	G																														
6	L-LMW-6S	WT	G																														
7	~~L-LMW-7S~~ LMW-MS-1	WT	G			11/7/18	1310		4	2	1	1							/	/	/	/	/											-012
8	~~L-LMW-8S~~ LMW-MSD-1	WT	G				1310																										-014
9	L-BMW-1S	WT	G				1000																										-015
10	L-BMW-2S	WT	G				1225																										
11	L-LMW-DUP-1	WT	G																														
12	L-LMW-FB-1	WT	G			11/7/18	1535		4	2	1	1							/	/	/	/	/											-016

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS
*EPA 200.7: Ba, Li, Mo, Fe, Mg, Mn, K, Na *EPA 200.8: As	Golder	11/8/18	1735				

SAMPLER NAME AND SIGNATURE					
PRINT Name of SAMPLER:					
SIGNATURE of SAMPLER:	DATE Signed (MM/DD/YY):	Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

MEMORANDUM

DATE January 7, 2019 **Project No.** 1531406

TO Project File
Golder Associates

CC

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

DATA VALIDATION SUMMARY: AMEREN – LABADIE ENERGY CENTER – NOVEMBER 2018 – CCR – DATA PACKAGE 60286372R1

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

- Analysis of Ferrous Iron for all samples was initiated outside of the 15-minute EPA required holding time, the detections in samples were qualified as estimates (J) or non-detect and estimates (UJ).
- 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).
- When a compound was detected in a blank (i.e. method, field, rinsate), and the sample results were greater than the MDL and less than the PQL the results were recorded at the PQL value and qualified as non-detects (U). When a compound was detected in a blank (i.e. method, field, rinsate), and the sample results were greater than the PQL and less than ten times the blank results the results were recorded at the result value and qualified as estimates (J).
- When a sample or field duplicate RPD was not met, associated samples were qualified as estimates (J). If the results were less than the MDL (MDC for radionuclide analysis) or detected in a blank below the PQL the results were qualified as non-detects and estimates (UJ).

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 - LCLI - CCR - Nov 2018
Reviewer: T Goodwin

Project Manager: J Ingram
Project Number: 1531406
Validation Date: 1/9/19

Laboratory: Pace Analytical
SDG #: 60286372 r1
Analytical Method (type and no.): Metals(200.7), Alk(2320B), TDS(2540C), Fe(3500), Anions(300.0), P(365.4)
Matrix: ☐ Air ☐ Soil/Sed. ☒ Water ☐ Waste ☐ _____
Sample Names L-TMW-1, L-TMW-2, L-TMW-3, L-MW-26, L-BMW-1S, L-BMW-2S, L-UWL-DUP-1, L-UWL-FB-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?	☒	☐	☐	11/7 & 11/9/18
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, Flow, 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?	☐	☑	☐	Fe^{2+}
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)?	☐	☐	☐	See Notes
b) Were analytes detected in the field blank(s)?	☑	☐	☐	Fe(7.8), Mg(17.8), Mn(16.9), Fe^{3+}(0.008),
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?	☐	☑	☐	TDS [4004]

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)?	☐	☑	☐	F^-(200)
c) Were lab duplicates analyzed (note original and duplicate samples)?				
	☒	☐	☐	
d) Were lab dup. precision criteria met (note RPD)?	☐	☑	☐	TDS(41)[4004] (12)[2001-06]

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?	☐	☑	☐	
Recovery could not be calculated since sample contained high concentration of analyte?	☐	☐	☒	
c) Were MS/MSD precision criteria met?	☐	☐	☐	

Comments/Notes:

MB
[4003-04] Mn(1.8); [4004] Cl^-(0.31)
[2001-06] Mn(0.80)

QA LEVEL II - INORGANIC DATA EVALUATION CHECKLIST

Data Qualification:

Sample Name	Constituent(s)	Result	Qualifier	Reason
All Samples	Ferrous Iron (Fe^{2+})	—	J/UJ	Analyzed Outside EPA Hold Time
L-TMW-1	TDS	677	J	Sample duplicate exceeded limits; Result > MDL
L-TMW-2	↓	686	J	↓ ↓
L-TMW-3		720	J	
L-MW-26		494	J	
L-BMW-2S		958	J	
↓	Manganese (Mn)	5.0	U	Detected in Method Blank; Result < MDL
↓	Chloride (Cl^-)	1.3	J	↓ Result > MDL
L-UWL-DUP-1	TDS	691	J	SD; Result > MDL
↓	Fluoride (F^-)	0.19	UJ	RPD exceeded limit; Result < MDL
L-UWL-FB-1	TDS	5.0	UJ	SD; Result < MDL

Signature: Tommy J. Goodwin Date: 1/7/19

APPENDIX B

Alternative Source Demonstration – May 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

November 1, 2018

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 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 and May 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 from the November 2017 and May 2018 samples. 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. During this process, no Statistically Significant Increase's (SSI) were identified. In May 2018, another Detection Monitoring event was completed, and 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.

4.0 REVIEW OF THE STATISTICALLY SIGNIFICANT INCREASE

Two monitoring wells had confirmed SSIs during the May 2018 sampling event; TMW-1 and TMW-2. These wells are screened in the upper portion of the alluvial aquifer just below the average seasonal low for groundwater. As shown on **Figure 1**, TMW-1 and TMW-2 are located north and east of the LCL1 and east of the generating plant and the two surface impoundments near the plant (LCPA and LCPB).

Based on Golder's review of the pre-disposal data discussed in Section 3.2 above, and our comparison of those 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.

Table 1 displays the May 2018 SSIs, the Practical Quantitation Limits (PQL), the UPLs calculated using baseline, pre-CCR placement and background well values, as well as the results since baseline sampling. Most of these SSIs (all but TDS) are at levels slightly above the Practical Quantitation Limit (PQL) provided by the laboratory and the UPL values generated from baseline sampling events. While these values do represent an SSI, it is important to note they are very low values and close to the PQL value the laboratory can accurately detect.

Table 1: Review of Statistically Significant Increases

Constituent	Well ID	Units	PQL	UPL Based on Baseline Events	UPL Based on Pre-CCR Placement Results	UPL based on Background Wells	Baseline Sampling Event Range	November 2017 Result	May 2018 Result	June 2018 Result
Boron	TMW-1	µg/L	100	117.5	111.2	122.0	81.6 J - 107	115	122	131
Fluoride	TMW-1	mg/L	0.20	0.2269	0.3201	0.2507	0.17 J - 0.21	0.22	0.26	0.25
Total Dissolved Solids	TMW-1	mg/L	5.0	694.1	754.1	780	559 - 647	593	704	700
Fluoride	TMW-2	mg/L	0.20	DQR	NA	0.2507	0.13 J - 0.2 J	0.18 J	0.25	0.25

Notes:

1) mg/L – milligrams per liter, µg/L – micrograms per liter.
2) PQL – practical quantitation limit.
3) UPL – upper prediction limit. UPL's calculated using sanitas software.
4) UPL based on baseline events uses intrawell statistical methods to calculate a UPL
5) Pre-CCR Placement UPL uses intrawell statistical methods from state UWL sampling events to calculate an UPL.
6) UPL based on background wells uses an interwell statistical method and pools baseline data from BMW-1S and BMW-2S to calculate a UPL.
7) NA – Not Applicable.
8) Pre-CCR placement UPL calculated using data from the state monitoring program prior to October 27, 2016.

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.

- Review of groundwater results in adjacent and background monitoring wells.
- 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 November 2017 and May 2018 groundwater chemistries.

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

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.

5.1.1.1 Fluoride SSI at TMW-1

As shown on **Figure 2**, current fluoride concentrations in monitoring well TMW-1 are similar to those reported prior to the operation of the LCL1. Fluoride concentrations have varied between 0.12 mg/L and 0.28 mg/L over the entire historical monitoring period. 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 2**, 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 0.06 mg/L higher than the result reported for the verification sampling event. Additionally, prior to CCR being placed in the unit, fluoride values were reported at higher levels (0.28 mg/L) then are currently present. This demonstrates that values at TMW-1 are currently lower than those prior to the receipt of CCR at the LCL1. 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, a sample was collected for state rule monitoring within the same week as those collected for CCR Rule sampling. The result from this sample were 0.18 mg/L, which is 0.08 mg/L below the value collected for CCR Rule sampling. This further demonstrates that there is significant natural variability within this aquifer, especially for low level results, such as these near the laboratory PQL where laboratory testing inaccuracy and variability are also possible.

5.1.1.2 Fluoride SSI at TMW-2

TMW-2 is not part of the state monitoring program and was installed specifically for CCR Rule monitoring. As shown on **Figure 2** prior to CCR placement in the LCL1, fluoride concentrations in TMW-2 ranged from 0.13 J to 0.20 J mg/L. Since the operation permit was issued for the LCL1, fluoride results in this well have varied between 0.15 J and 0.25 mg/L. Of these results, both the detection monitoring event and the verification sample were at values of 0.25 mg/L, which is 0.05 mg/L over the PQL. Therefore, both results were just over the PQL causing an SSI.

When values from background monitoring wells that were installed approximately 3 miles west of the facility in the alluvial aquifer where no CCR impacts exist are used, a UPL of 0.2507 is calculated. This value for the background UPL is above both the May 2018 result and verification sampling result. This demonstrates that values in TMW-2 are still below the limits calculated using background wells.

[1] Given that the CCR material was not placed in LCL1 until after a multi-layer liner system was installed, it is not likely that the decreased concentrations at TMW-1 or TMW-2 observed during CCR sampling are a result of isolation of previous release of CCR materials.

Much like the fluoride concentrations at TMW-1, a limited number of baseline sampling events has caused an artificial SSI at TMW-2. Based on these data, it is Golder's opinion that the variability in fluoride concentrations over time is not a result of CCR from the LCL1 that is influencing the groundwater, but is a result of groundwater geochemical variability or other sources not related to the LCL1.

5.1.2 Total Dissolved Solids at TMW-1

TDS alone is not considered to be a CCR Indicator (EPRI 2018, EPRI 2012) and the values for TDS are largely based on the concentration of major ions in groundwater (calcium, magnesium, sodium, potassium, carbonates, chloride, and sulfate). Results from the May 2018 and subsequent verification sampling event were 704 and 700 mg/L, respectively. These values are just above the calculated UPL for TMW-1 based on the 8 original baseline sampling events of 694.1 mg/L.

Sample results collected as a part of the state UWL permitting prior to October 2016 ranged between 568 to 732 mg/L and a calculated UPL using this data is 754.1 mg/L. As shown on **Figure 3**, if only the TDS results reported prior to placement of CCR waste are used, the calculated UPL is 754.1 mg/L. This is approximately 60 mg/L higher than the UPL calculated from the eight baseline samples and 54 mg/L higher than the result reported for the verification sampling event. From this, it is clear that 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 TDS in this well[2]. If the historical data that incorporates more natural variability are used to supplement the results collected during the CCR rule baseline period, no SSI would be triggered for TDS in TMW-1.

In addition, the pre-CCR based prediction limit of 754.1 mg/L is also within the range of TDS concentrations reported for upgradient background wells BMW-1S and BMW-2S. The calculated UPL for TDS in background wells BMW-1S and BMW-2S during baseline sampling is 780 mg/L. This further demonstrates that TDS in this aquifer is naturally variable and that the calculated SSIs for TMW-1 do not represent impacts from the LCL1, but instead are due to natural variability within the alluvial aquifer.

5.1.3 Boron Concentrations at TMW-1

Based on the EPRI (2012, 2017) reports, boron is a key indicator of CCR impacts because boron is typically present in CCR leachate, does not have many anthropogenic sources, and is highly mobile and reactive in most hydrogeological enviroments. Boron values obtained during the May 2018 and subsequent verification sampling event were 122 and 131 µg/L, respecitively. **Figure 4**, displays boron values at TMW-1 as well as background wells BMW-1S and BMW-2S. The UPL for pooled background data is 122 µg/L when calculated based on the initial baseline sampling events. This value is the same as the value obtained at TMW-1 in the May 2018. However, if all background data collected to date is used, including the results collected from BMW-1S and BMW-2S in November 2017 and May 2018, a calculated UPL for background would be 143.9 µg/L (**Figure 5**). Both the May 2018 and the July 2018 verification sampling events are below that UPL from background monitoring wells upgradient of the facility.

Additionally, as a part of the state UWL monitoring program, TMW-1 was sampled for boron on May 25, 2018 (two days after the May 2018 sampling event). Results from this sampling event showed boron concentrations at 103 µg/L. This result is below the TMW-1 UPL and the pooled background UPL.

[2] Given that the CCR material was not placed in LCL1 until after a multi-layer 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.

All of this data indicates that 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 boron in this well for the baseline time period. This data also displays the natural variability present in the alluvial aquifer and the possible innacuracy of laboratory testing with results in May 2018 ranging 19 ug/L in the matter of two day for samples collected very close to the laboratory PQL. The boron values above the UPL at TMW-1 are not the result of a release from the LCL1, but rather due to natural variability wihin the alluvial aquifer and innacurray of laboratory testing at very low levels near the PQL.

5.2 Geochemical Analysis

During both the November 2017 and May 2018 Detection Monitoring events, major cation and anion concentrations were collected. These data were used to compare major ion chemistry between the November 2017 sampling event where no apparent SSIs were identified, and from the May 2018 sampling event where four (4) apparent SSIs were identified. **Table 3** contains the values of the major cations and anions from both the November 2017 and May 2018 sampling events. These data were used in the generation of the Stiff and Piper diagrams discussed below.

5.2.1 Stiff Diagrams

Stiff diagrams visually display the major cation and anion data. **Figure 6** displays the Stiff diagrams from the November 2017 and May 2018 Detection Monitoring events. Data from November 2017 event display nearly identical distribution to that of May 2018 monitoring wells. If impacts from the LCL1 were causing the apparent SSIs of boron, fluoride and/or TDS at TMW-1 or TMW-2, 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 from the shallow alluvial aquifer in the compliance wells around the LCL1. As shown by the results of the Piper diagram, groundwater chemistry at each individual downgradient well around the UWL are very similar. If CCR impacts from the LCL1 were causing the apparent SSIs of boron, fluoride and/or TDS at TMW-1 or TMW-2 then a shift in groundwater chemistry would be expected. This figure demonstrates that there has not been a shift in groundwater chemistry between the two sampling events.

Additionally, a comparison of this diagram with those in the LCPB ASD show that groundwater chemistry in the LCL1 wells 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 SSIs at the LCL1 were not caused by impacts from the LCL1. The SSIs appear to be caused by numerous factors, but is primarily caused by 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 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 background monitoring wells and historical data, 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 the November 2017 and the May 2018 Detection Monitoring events. 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 and TMW-2 are not caused by impacts from the LCL1.

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Tables

Table 3

Major Cation and Anion Concentrations

LCL1 - Alternative Source Demonstration

Labadie Energy Center, Franklins 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-MW-26 11/8/2017	4.98	3.93	137	24.4	4.4	25.4	408
L-MW-26 5/23/2018	5.82	4.35	130	25.1	3.0	22.6	452
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-2 11/8/2017	25.2	6.76	184	49.3	6.9	97.1	583
L-TMW-2 5/23/2018	10.1	6.60	179	43.1	6.0	96.3	603
L-TMW-3 11/8/2017	9.0	6.79	191	42.2	6.9	72.0	592
L-TMW-3 5/23/2018	10.6	6.80	182	38.8	7.0	70.2	608

Notes:

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

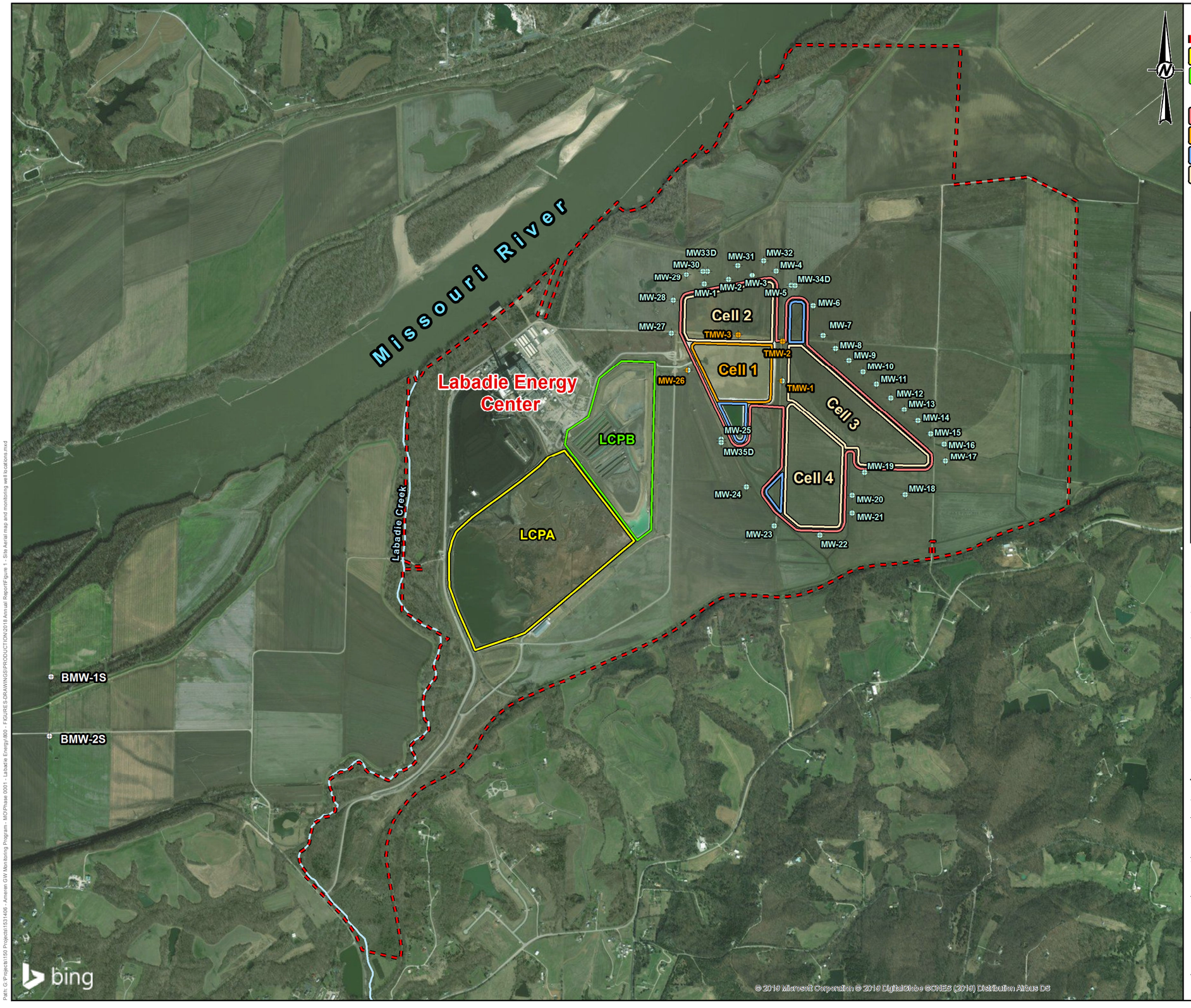
2) mg/L - milligrams per liter.

Prepared by: JSI

Checked by: JAP

Reviewed by: MNH

Figures



LEGEND

- Labadie Energy Center Property Boundary
- LCPA - Bottom Ash Surface Impoundment
- LCPB - Fly Ash Surface Impoundment

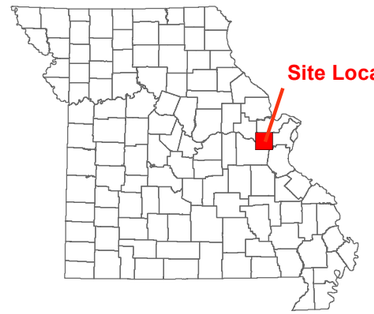
Utility Waste Landfill (UWL)

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

Ground/Surface Elevation Measurement Location

- UWL Monitoring Well
- Background Monitoring Well
- UWL CCR Rule and Solid Waste Disposal Area Monitoring Well
- UWL Solid Waste Disposal Area Monitoring

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.

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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.

0 750 1,500 3,000 Feet

CLIENT
AMEREN MISSOURI
LABADIE ENERGY CENTER

PROJECT
GROUNDWATER MONITORING PROGRAM

TITLE
SITE LOCATION AERIAL MAP AND MONITORING WELL LOCATION

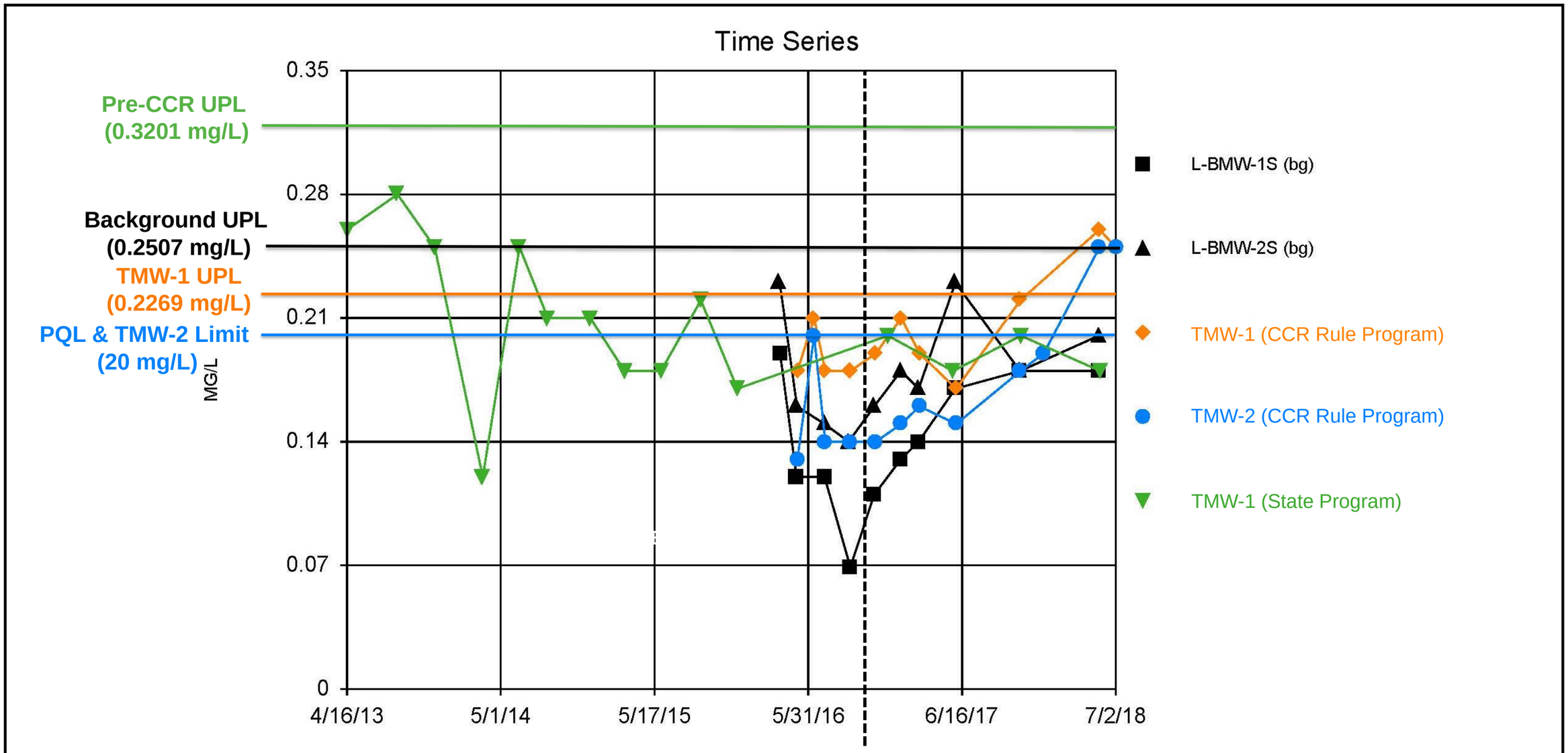
CONSULTANT
GOLDER

YYYY-MM-DD	2018-10-17
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:
1 in
0

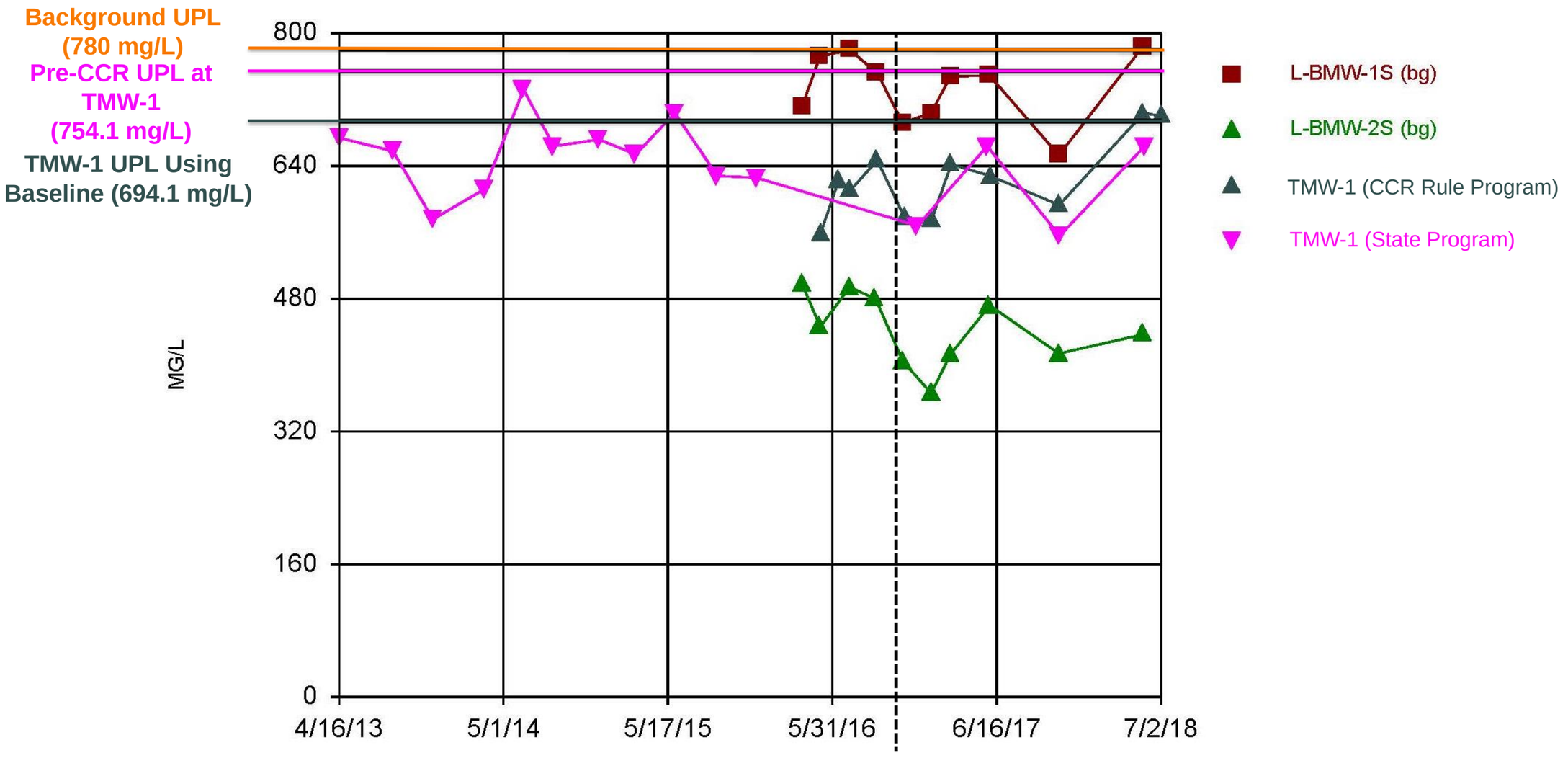
Path: G:\Projects\1531406 - Ameren GW Monitoring Program - MO\Phase 0001 - Labadie Energy\800 - FIGURES-DRAWINGS\PRODUCTION\2018 Annual Report\Figure 1 - Site Aerial map and monitoring well locations.mxd



Notes

1) mg/L – milligrams per liter.
2) PQL – Practical Quantitation Limit.
3) UPL – Upper Prediction Limit.
4) Double Quantification Rule used as UPL for TMW-2.

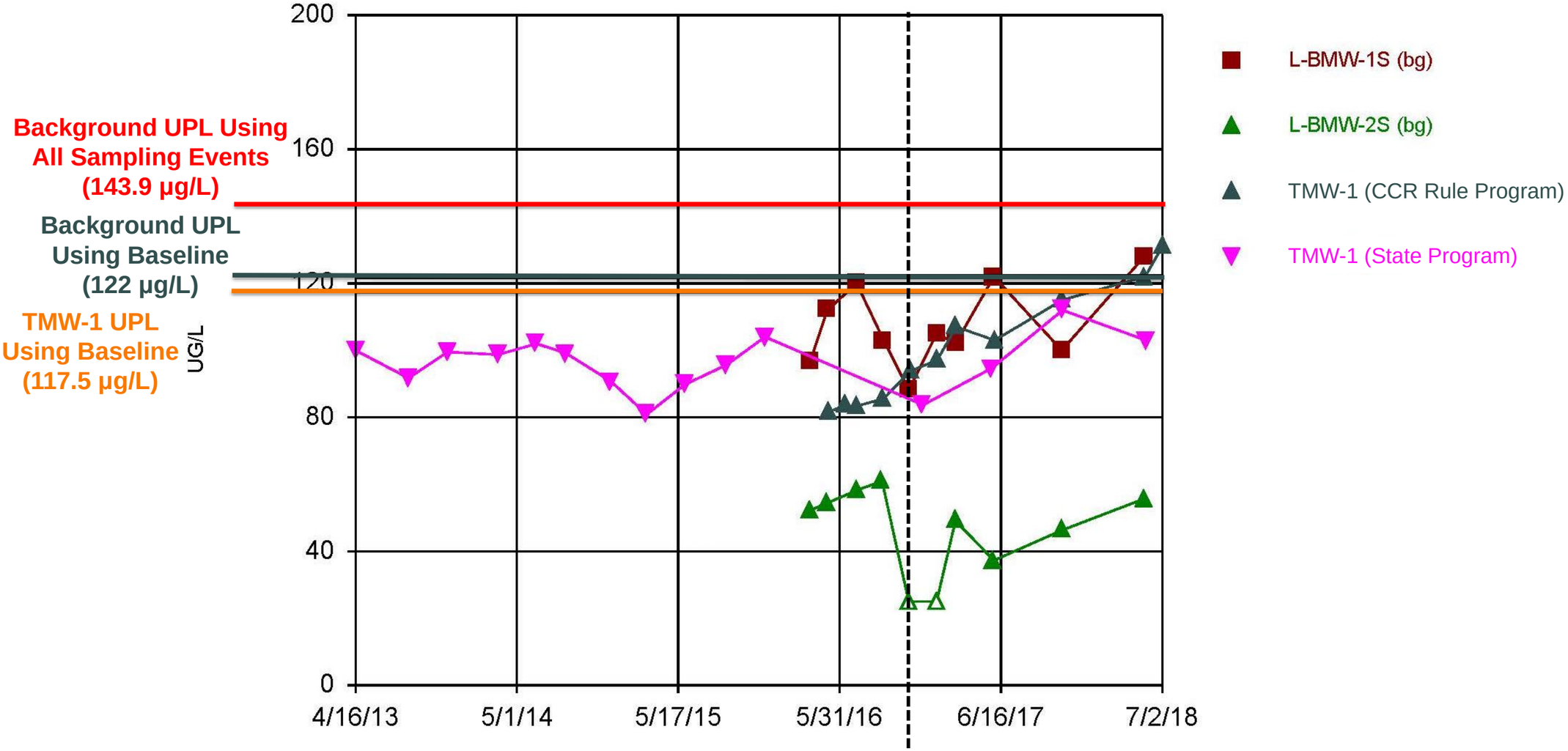
CLIENT/PROJECT **AMEREN MISSOURI** **LABADIE ENERGY CENTER**							TITLE **Fluoride Time Series Plot**			
DRAWN JSI	CHECKED JAP	REVIEWED MNH	DATE 2018/10/18	SCALE N/A	FILE NO. N/A	JOB NO. 1531406.0001G	DWG NO. N/A	SUBTITLE N/A	REV. NO. N/A	FIGURE **2**



Notes

1) mg/L – milligrams per liter.
2) PQL – Practical Quantitation Limit.
3) UPL – Upper Prediction Limit.
4) Double Quantification Rule used as UPL for TMW-2.

CLIENT/PROJECT **AMEREN MISSOURI** **LABADIE ENERGY CENTER**							TITLE **Total Dissolved Solids Time Series Plot**			
DRAWN JSI	CHECKED JAP	REVIEWED MNH	DATE 2018/10/18	SCALE N/A	FILE NO. N/A	JOB NO. 1531406.0001G	DWG NO. N/A	SUBTITLE N/A	REV. NO. N/A	FIGURE **3**



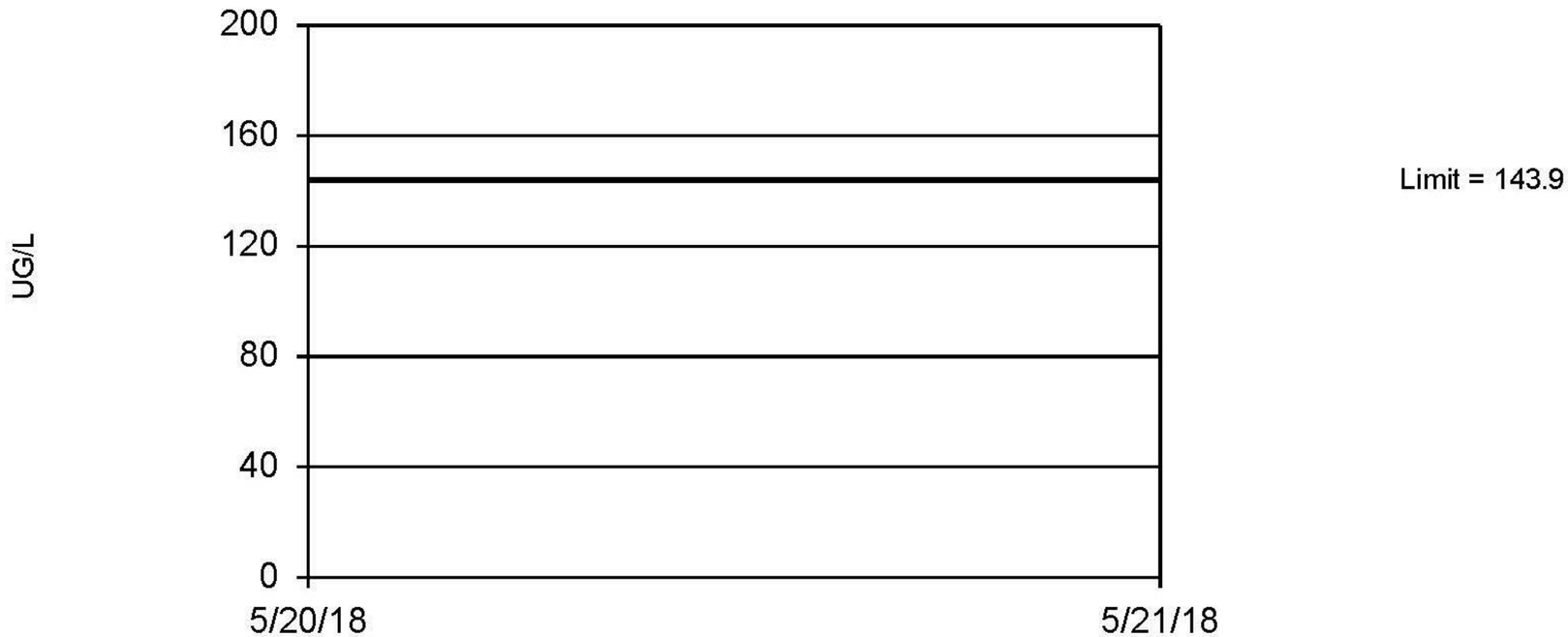
Notes

1) µg/L – micrograms per liter.
2) PQL – Practical Quantitation Limit.
3) UPL – Upper Prediction Limit.

CLIENT/PROJECT **AMEREN MISSOURI** **LABADIE ENERGY CENTER**							TITLE **Boron Time Series Plot**			
DRAWN JSI	CHECKED JAP	REVIEWED MNH	DATE 2018/10/18	SCALE N/A	FILE NO. N/A	JOB NO. 1531406.0001G	DWG NO. N/A	SUBTITLE N/A	REV. NO. N/A	FIGURE **4**

Prediction Limit

Interwell Parametric

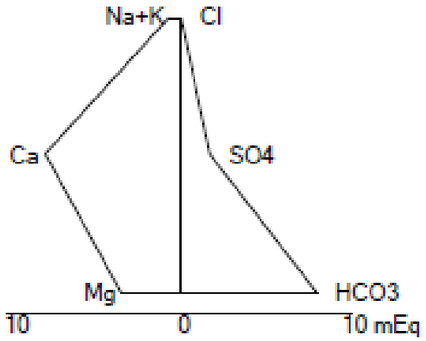


Background Data Summary: Mean=77.05, Std. Dev.=33.8, n=20, 10% NDs. Insufficient data to test for seasonality; not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9156, critical = 0.868. Kappa = 1.978 (c=7, w=4, 1 of 2, event alpha = 0.05132). Report alpha = 0.007498. Individual comparison alpha = 0.00188. Assumes 4 future values.

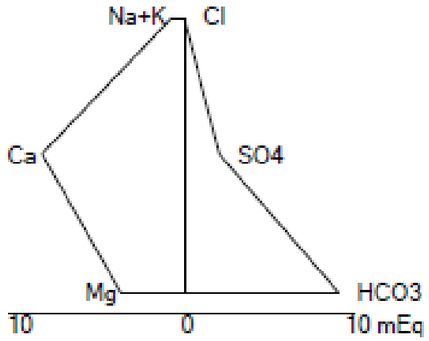
Notes

1) Calculated with pooled background results from BMW-1S and BMW-2S using Sanitas Software.

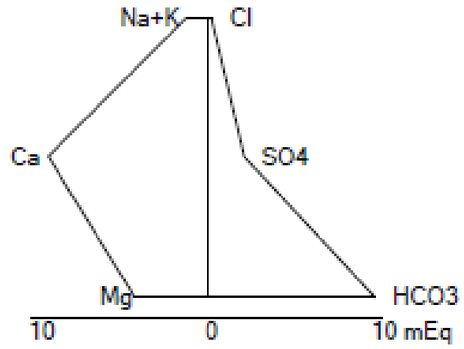
CLIENT/PROJECT						TITLE				
AMEREN MISSOURI **LABADIE ENERGY CENTER**				GOLDER		**Boron UPL Using All Available Background Data**				
DRAWN JSI	CHECKED JAP	REVIEWED MNH	DATE 2018/10/18	SCALE N/A	FILE NO. N/A	JOB NO. 1531406.0001G	DWG NO. N/A	SUBTITLE N/A	REV. NO. N/A	FIGURE **5**



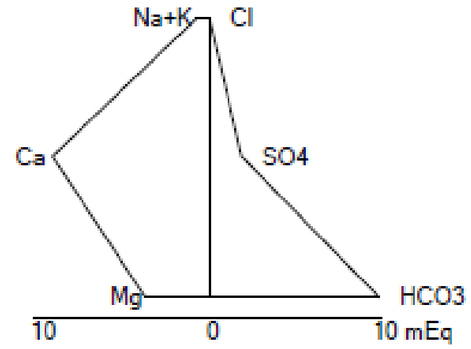
L-TMW-1 11/8/2017



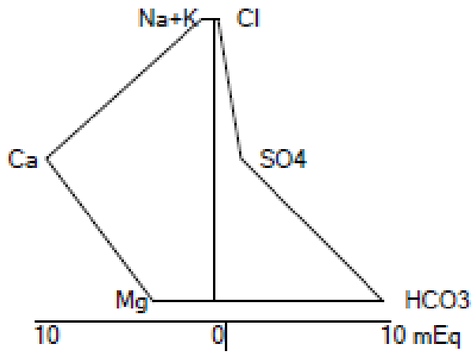
L-TMW-1 5/23/2018



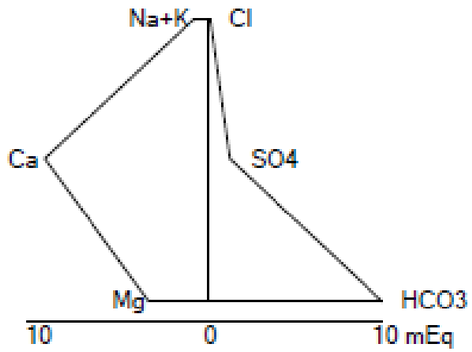
L-TMW-2 11/8/2017



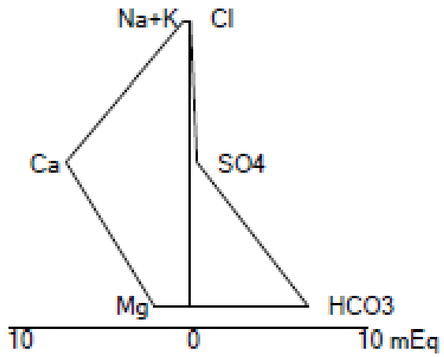
L-TMW-2 5/23/2018



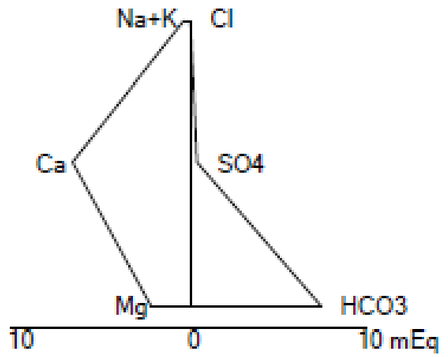
L-TMW-3 11/8/2017



L-TMW-3 5/23/2018



L-MW-26 11/8/2017



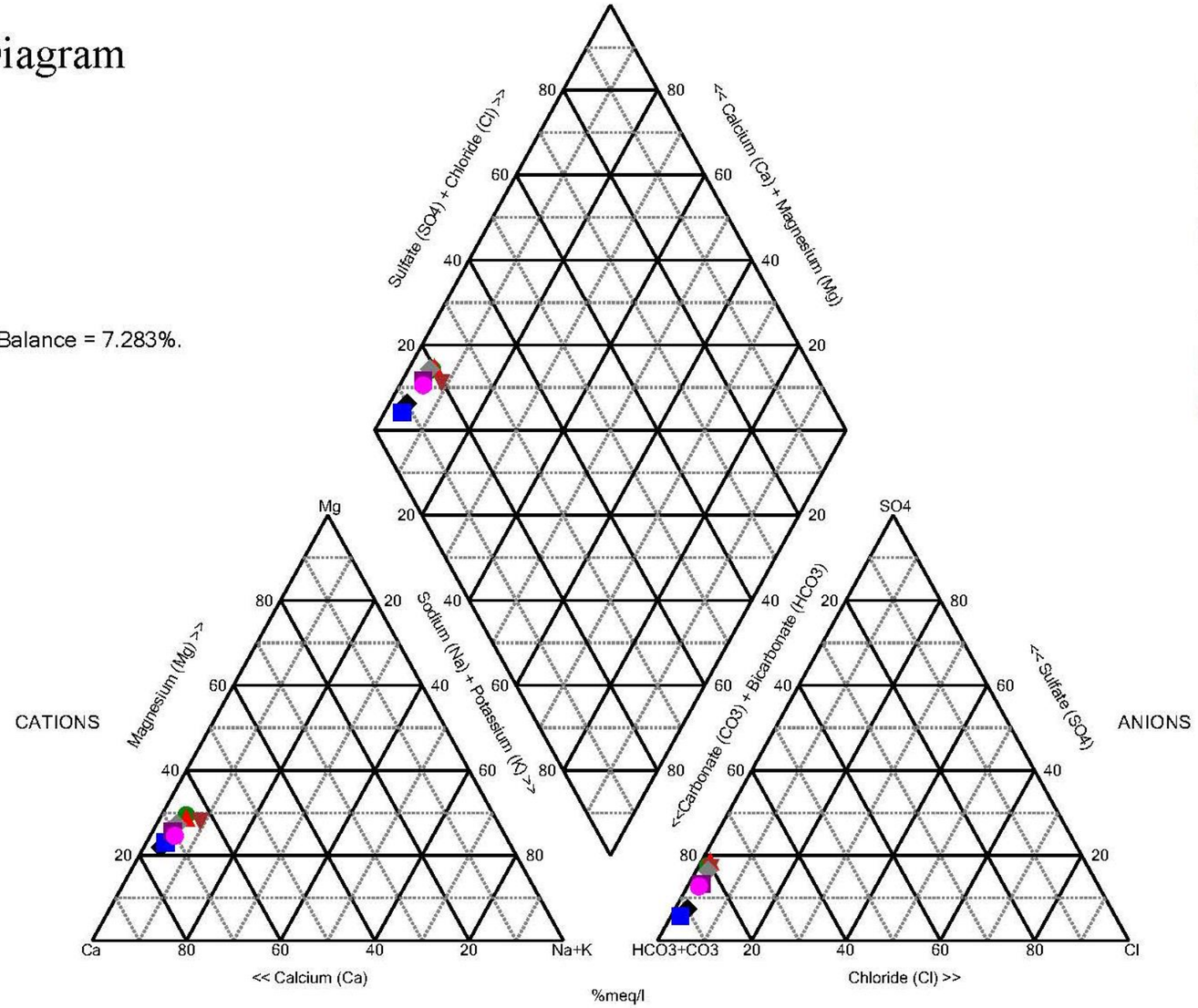
L-MW-26 5/23/2018

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**				GOLDER			**LCL1 Stiff Diagrams**		
DRAWN JSI	CHECKED JAP	REVIEWED MNH	DATE 2018/10/18	SCALE N/A	FILE NO. N/A	JOB NO. 1531406.0001G	DWG NO. N/A	SUBTITLE N/A	REV. NO. N/A	FIGURE **6**

Piper Diagram

Cation-Anion Balance = 7.283%.



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 **LCL1 Piper Diagram**			
DRAWN JSI	CHECKED JAP	REVIEWED MNH	DATE 2018/10/18	SCALE N/A	FILE NO. N/A	JOB NO. 1531406.0001G	DWG NO. N/A	SUBTITLE N/A	REV. NO. N/A	FIGURE **7**

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