



GOLDER

2019 Annual Groundwater Monitoring and Corrective Action Report

Meramec Energy Center, St. Louis County, Missouri, USA

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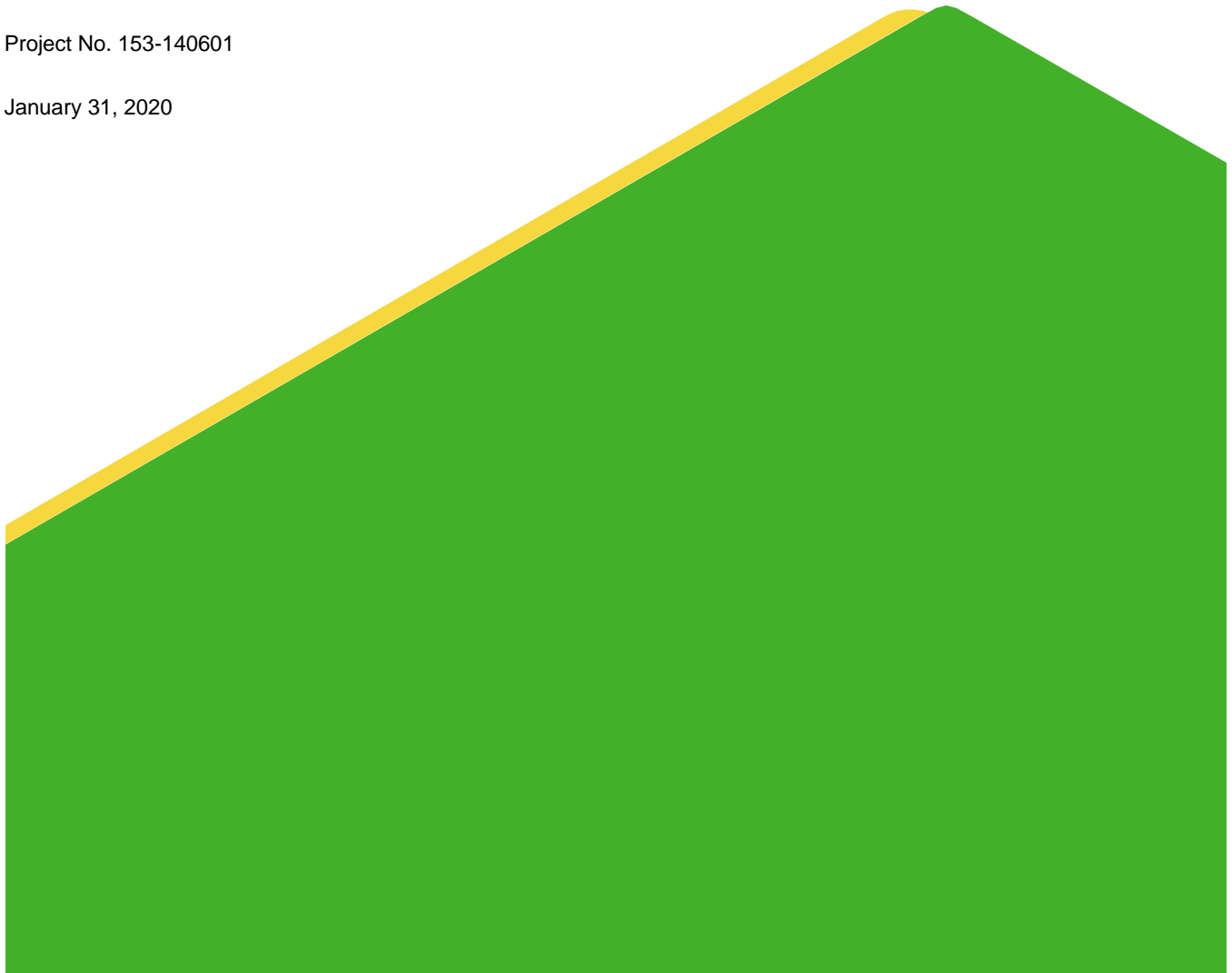


Table of Contents

1.0 INTRODUCTION..... 1

 1.1 Overview of CCR Rule Activities Prior to 2019..... 1

2.0 2019 ACTIVITIES AND CURRENT STATUS OF THE RCPA GROUNDWATER MONITORING PROGRAM..... 1

3.0 INSTALLATION OR DECOMMISSIONING OF MONITORING WELLS 2

4.0 GROUNDWATER SAMPLING RESULTS AND DISCUSSION 2

 4.1 Detection Monitoring Program 2

 4.2 Assessment Monitoring Program..... 3

 4.2.1 Nature and Extent Evaluation 4

 4.3 Groundwater Elevation, Flow Rate and Direction 4

 4.4 Sampling Issues..... 5

5.0 ACTIVITIES PLANNED FOR 2020..... 5

TABLES

- Table 1** - MEC Groundwater Monitoring Programs Monitoring Wells
- Table 2** - Summary of Well Construction Details
- Table 3** - Summary of Groundwater Sampling Dates
- Table 4** - November 2018 Detection Monitoring Results
- Table 5** - August 2019 Detection Monitoring Results
- Table 6** - November-December 2019 Detection Monitoring Results
- Table 7** - November 2018 Assessment Monitoring Results
- Table 8** - August 2019 Assessment Monitoring Results
- Table 9** - November-December 2019 Assessment Monitoring Results

FIGURES

- Figure 1** - Site Location Aerial Map and Monitoring Well Locations

APPENDICES

- APPENDIX A** - Corrective Measures Assessment and Certification
- APPENDIX B** - Laboratory Analytical Data
- APPENDIX C** - November 2018 Assessment Monitoring Statistical Evaluation
- APPENDIX D** - August 2019 Assessment Monitoring Statistical Evaluation
- APPENDIX E** - Nature and Extent Technical Memorandum
- APPENDIX F** - 2019 Potentiometric Surface Maps

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 Surface Impoundments at the Meramec Energy Center (MEC) are subject to the requirements of the CCR Rule. This Annual Report for the MEC describes CCR Rule groundwater monitoring activities from January 1, 2019 through December 31, 2019.

1.1 Overview of CCR Rule Activities Prior to 2019

The CCR Rule was published in the Federal Register on April 17, 2015. This rule required CCR surface impoundments and landfills to monitor groundwater around these CCR units. Prior to the first major deadline of October 17, 2017, Ameren completed the following tasks: (1) installation of a groundwater monitoring well system; (2) a Statistical Method Certification; (3) a Groundwater Monitoring Plan (GMP) that details design, installation, development, sampling procedures, as well as statistical methods; and (4) eight baseline groundwater sampling events for all Appendix III and Appendix IV parameters of the CCR Rule. In November 2017, the first Detection Monitoring event was completed. Results from this event demonstrated some Appendix III parameters were present at concentrations that were a Statistically Significant Increase (SSI) over background and were then verified in January 2018 testing. In accordance with the CCR Rule, Ameren placed a “Notification of the Establishment of a CCR Assessment Monitoring Program” and began Assessment Monitoring within 90 days. Results from the Assessment Monitoring events for the MEC indicated the presence of molybdenum, lithium, and arsenic at a Statistically Significant Level (SSL) over the site-specific Groundwater Protection Standard (GWPS) in several of the compliance monitoring wells. As required, Ameren placed a “Notification of the Detection of Statistically Significant Levels Above CCR Groundwater Protection Standards” on its website and commenced an assessment of potential Corrective Measures.

2.0 2019 ACTIVITIES AND CURRENT STATUS OF THE MEC GROUNDWATER MONITORING PROGRAM

The Surface Impoundments at the MEC are currently in Corrective Action with Detection and Assessment Monitoring continuing concurrently. In 2019, Ameren Missouri completed a Corrective Measures Assessment (CMA). Due to the complexities of the site, the 60-day extension was used for the completion of the CMA. The CMA was placed on Ameren’s publicly available website (Ameren’s publicly available website is at: <https://www.ameren.com/company/environment-and-sustainability/managing-coal-combustion>) in May 2019 as required by the CCR Rule (§257.96(a)) and is provided in **Appendix A**. On May 30, 2019 Ameren held its public meeting on the findings of the CMA and accepted public comments. Ameren reviewed the comments and in August 2019 provided a response to the public comments, which is provided on Ameren’s publicly available website. After reviewing the options from the CMA and public comments, on August 30, 2019, Ameren selected a final remedy of source control through installation of a low permeability cover system and use of Monitored Natural Attenuation (MNA). As required by the CCR Rule (§257.97(a)), a report discussing this remedy selection as well as a certification by a Professional Engineer was placed in the operating record. After selecting a remedy, a Corrective Action Groundwater Monitoring Program was established within 90 days as required by the CCR Rule (§257.98(a)). Certifications of the Corrective Action Statistical Analysis Plan (SAP) and Groundwater Monitoring System (GMS) are provided on Ameren’s publicly available website. Additionally, Ameren plans to

finish closure for all of the surface impoundments at the MEC by the end of 2022. Detection and Assessment Monitoring continued on a semi-annual basis and the results are discussed in more detail below.

3.0 INSTALLATION OR DECOMMISSIONING OF MONITORING WELLS

There are currently two (2) different networks used for monitoring the MEC Surface Impoundments, the monitoring well network established under §257.91 used for Detection and Assessment Monitoring and the network established under §257.98 used for Corrective Action Monitoring. **Table 1** (in text) provides a list of the monitoring wells used for each program and the location of the monitoring wells is provided in **Figure 1**. In addition, a summary of well construction details is provided in **Table 2**.

For the Detection and Assessment Groundwater Monitoring Network, all but two (2) monitoring wells are the same as in years past. Well construction diagrams for the previously used wells are provided in the 2017 Annual Report for this CCR Unit. MW-9 (AMW-1) and MW-10 (AMW-2) were added to the network to satisfy the requirements of §257.95(g)(1), which required at least one (1) additional monitoring well be installed at the downgradient facility boundary. The well construction diagrams for these wells can be found in the 2018 Annual Report for the MEC.

MW-11S, MW-11D, MW-12S, and MW-12D are currently proposed monitoring wells and their proposed locations are provided in **Figure 1**. Well construction diagrams for these monitoring wells will be provided in the 2020 Annual Report.

Table 1 - MEC Groundwater Monitoring Programs Monitoring Wells

Detection and Assessment Groundwater Monitoring Program Wells	Corrective Action Groundwater Monitoring Program Wells
BMW-1	TP-1
BMW-2	TP-2
MW-1	MW-11S*
MW-2	MW-11D*
MW-3	MW-12S*
MW-4	MW-12D*
MW-5	Notes: 1) * - MW-11S, MW-11D, MW-12S, and MW-12D have not yet been installed and the locations are proposed.
MW-6	
MW-7	
MW-8	
MW-9 (AMW-1)	
MW-10 (AMW-2)	

4.0 GROUNDWATER SAMPLING RESULTS AND DISCUSSION

The following sections review the sampling events completed for the MEC Surface Impoundments in 2019. **Table 3** provides a summary of the groundwater samples collected in 2019 including the number of samples, the date of the sample collection, and the monitoring program for the samples. **Appendix B** provides laboratory analytical data for CCR Rule sampling events.

4.1 Detection Monitoring Program

A Detection Monitoring event was completed November 19-20, 2018. The statistical analyses to evaluate for SSIs for the November 2018 event were not completed until 2019 and are included in this report. No new SSIs were determined for the November 2018 event. **Table 4** summarizes the results and the statistical analysis of the November 2018 Detection Monitoring event.

A Detection Monitoring event was scheduled for May 2019, however due to flooding the event was completed August 12-14, 2019, and testing was completed for all Appendix III analytes. Statistical analysis of the data determined that there were SSIs. Detections of Appendix III analytes triggered a verification sampling event, which was completed October-December 2019. **Table 5** summarizes the results and the statistical analysis of the August 2019 Detection Monitoring event. MW-9 (AMW-1) and MW-10 (AMW-2) were added to the Detection and Assessment Monitoring Well Networks for this event.

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

A Detection Monitoring event was completed November-December 2019 and testing was performed for all Appendix III analytes. Statistical analyses to evaluate for SSIs in the November-December 2019 data were not completed in 2019 and this statistical evaluation will be included in the 2020 Annual Report. **Table 6** summarizes the results of the November-December 2019 Detection Monitoring event.

4.2 Assessment Monitoring Program

An Assessment Monitoring event was completed November 19-20, 2018 and testing was completed for Appendix IV parameters that were detected during the April 2018 sampling event. The statistical evaluation for this event was completed in 2019 and therefore is included in this report. **Table 7** summarizes the results of the November 2018 Assessment Monitoring event. Based on the results from the analysis, one new SSL over the GWPS was noted for lithium at MW-7 during the November 2018 sampling event. The results from this analysis and a table that displays the site-specific GWPS are provided in **Appendix C**. A summary of the SSLs at corresponding wells is as follows:

- Arsenic at MW-4 and MW-5
- Lithium at MW-6 and MW-7
- Molybdenum at MW-6, MW-7 and MW-8

An Assessment Monitoring event was completed August 2019, and testing was completed for all Appendix IV analytes. Statistical analysis of the data is provided in **Appendix D**. Lithium at MW-7, which was added as an SSL in the November 2018 sampling event, is no longer an SSL. The other SSLs at the MEC have not changed, and a summary of SSLs from the August 2019 event is as follows:

- Arsenic at MW-4 and MW-5
- Lithium at MW-6
- Molybdenum at MW-6, MW-7 and MW-8

Table 8 summarizes the results of the August 2019 Assessment Monitoring event. MW-9 (AMW-1) and MW-10 (AMW-2) were added to the Detection and Assessment Monitoring Well Networks for this event. During the statistical analysis of the August 2019 sampling event, the site specific GWPS used to determine SSLs were updated in accordance with the Statistical Analysis Plan.

Since the August 2019 event was the first Assessment Monitoring sampling event for monitoring wells MW-9 (AMW-1) and MW-10 (AMW-2), resampling for all detected Appendix IV parameters was completed in October-

December 2019 and the results for this sampling event are included in the August 2019 Assessment Monitoring sampling results shown in **Table 8**.

On November 18-19 and December 20, 2019, the November-December 2019 Assessment Monitoring event was completed. This sampling event analyzed the Appendix IV constituents detected in groundwater during the initial Assessment Monitoring event of 2019 (detected parameters from the August 2019 event). **Table 9** summarizes the results of the November-December 2019 Assessment Monitoring event; however, statistical analyses to evaluate for SSLs over GWPS were not completed in 2019. Results of the statistical evaluation will be included in the 2020 Annual Report.

Statistical evaluations to determine if there is a concentration at an SSL above the site GWPS for MW-9 (AMW-1) and MW-10 (AMW-2) were not completed in 2019. As outlined in the Statistical Analysis Plan for this site, a minimum of four (4) samples are required to complete an SSL statistical evaluation. Statistical analysis for these monitoring wells will begin with the analysis of the November 2019 data, and will be included in the 2020 Annual Report.

4.2.1 Nature and Extent Evaluation

As required by the CCR Rule, after an SSL is determined to be above the site GWPS, an investigation into the nature and extent of impacts to groundwater must be initiated. Groundwater sampling for nature and extent was completed with an initial event in November 2018 and a second event in August 2019. A technical memorandum summarizing the results is provided in **Appendix E**. Results from this investigation were used for the CMA, remedy selection, and to select the Corrective Action monitoring well network.

4.3 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 **Appendix F**. As shown on the potentiometric surface maps, groundwater flow within the uppermost aquifer is dynamic and influenced by seasonal changes in the water level in the adjacent Mississippi and Meramec Rivers. 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 northeast (bluffs) to the southwest (Mississippi and Meramec Rivers) under normal river conditions is expected. However, during periods of high river levels, groundwater flow can temporarily reverse in localized areas. During these times of high river stage and temporary flow direction changes, horizontal groundwater gradients generally decrease, and little net movement of groundwater occurs.

Groundwater flow direction and hydraulic gradient were estimated for the monitoring wells at the MEC using commercially available software. Results from this assessment indicate that while groundwater flow direction is somewhat variable, the overall net groundwater flow at the Meramec Surface Impoundments is from the bluffs toward the rivers. Horizontal gradients calculated by the program for the CCR Rule wells (excluding MW-1) range from 0.0002 to 0.004 feet/foot with an estimated net annual groundwater velocity of approximately 79 feet per year in the prevailing downgradient direction.

4.4 Sampling Issues

Some of the wells used for sampling at the MEC are located in the floodplain near the confluence of the Meramec and Mississippi Rivers. Of these, MW-9 (AMW-1) and TP-1 are very close to the Meramec River on the west side of the MEC property. These monitoring wells can be submerged by very minor flooding events that occur multiple times per year. This flooding caused a delay in the planned sampling dates and in 2019, it is estimated that these wells were at least partially submerged during the following dates:

- January 1-5
- March 11-August 8
- September 18-December 1
- February 26-March 2
- August 22-September 3

In addition to MW-9 (AMW-1) and TP-1, other monitoring wells at the MEC are also located in the floodplain near the confluence of the Meramec and Mississippi Rivers. These monitoring wells can be submerged by minor flooding events that can occur multiple times per year. This caused a delay in the planned sampling dates of some of the monitoring wells. In 2019, it is estimated that at least one of the other monitoring wells was partially submerged during the following dates:

- March 14-July 31
- October 2-November 4

On January 9, July 18, August 7, August 12, November 18, and December 10, 2019, Golder performed post-flood monitoring well inspections at the MEC and during 2019, the following monitoring wells had been impacted by flooding at least one (1) time:

- MW-3
- MW-5
- TP-1

After determination that flooding impacts had affected monitoring wells, the wells were re-developed to remove floodwater impacts to the wells prior to groundwater elevation measurements or the collection of groundwater samples. After successful re-development each monitoring well was returned to service.

On October 3, 2019 during the collection of water levels, it was discovered that TP-2 had been hit by a piece of equipment and the protective cover for the well had been bent. Further inspection of the monitoring well determined that no damaged had been sustained by the PVC riser pipe of the piezometer, just the protective cover. Replacement of the protective cover is scheduled for 2020.

During the November 2018 sampling at MW-5, an arsenic value was detected that appeared to be an anomaly. On January 25, 2019 a re-sample at MW-5 was completed and confirmed that the November result was an anomaly. The January result is used for the statistical analysis.

No other notable sampling issues were encountered in 2019.

5.0 ACTIVITIES PLANNED FOR 2020

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

Corrective Action sampling is also scheduled to begin in the second quarter of 2020. After the initial sampling event, a subsequent event for all Appendix III and detected Appendix IV parameters will be completed. A second semi-annual Corrective Action event for all Appendix III and the detected Appendix IV parameters is also scheduled to be completed in the fourth quarter 2020.

Tables

Table 2
Summary of Well Construction Details
MEC Surface Impoundments
Meramec Energy Center, St. Louis County , MO

Monitoring Well ID	Installation Date	Location ⁴		Top of Casing Elevation	Ground Surface Elevation	Top of Screen Elevation	Base of Well	Total Depth
		Northing ¹	Easting ¹	(FT MSL) ²	(FT MSL) ²	(FT MSL) ²	(FT MSL) ²	(FT BGS) ³
CCR RULE COMPLIANCE NETWORK								
MW-1	1/23/2016	937676.9	865954.1	406.43	404.1	370.2	365.0	39.1
MW-2	1/23/2016	937325.1	864864.5	398.62	396.1	367.0	361.8	34.3
MW-3	1/22/2016	936750.8	864447.2	397.12	394.6	369.2	364.0	30.6
MW-4	1/22/2016	935618.0	864629.8	404.10	402.0	364.1	358.9	43.1
MW-5	1/22/2016	934874.4	864781.0	402.93	400.8	350.4	340.2	60.6
MW-6	1/21/2016	933905.2	865153.5	418.12	415.8	373.4	363.2	52.7
MW-7	1/24/2016	934334.4	866242.5	417.94	415.7	373.2	363.0	52.7
MW-8	1/24/2016	935303.6	866797.8	423.37	421.0	355.8	345.6	75.4
BMW-1	4/7/2016	935220.4	867989.4	419.08	416.8	366.4	356.2	60.6
BMW-2	1/25/2016	937927.1	866342.2	409.02	406.8	369.3	364.1	42.7
MW-9 (AMW-1)	6/20/2018	935106.5	864425.3	393.71	391.1	369.8	359.5	31.6
MW-10 (AMW-2)	6/19/2018	934137.4	867158.9	405.62	402.8	367.3	357.0	45.8
CORRECTIVE ACTION MONITORING WELL NETWORK								
TP-1	6/20/2018	935109.7	864437.0	393.71	390.7	306.1	301.0	89.7
TP-2	6/18/2018	934151.5	867171.1	405.22	402.4	316.9	311.8	90.6

Notes:

- 1) Horizontal Datum: State Plane Coordinates NAD83 (2000) Missouri East Zone feet.
- 2) FT MSL- Feet above mean sea level.
- 3) FT BGS - Feet below ground surface.
- 4) Vertical Datum: NAVD88 feet.

Table 3
Summary of Groundwater Sampling Dates
MEC Surface Impoundments
Meramec Energy Center, St. Louis County, MO

Groundwater Monitoring Wells	Date of Sample Collection					Number of Samples
	January 2019 MW-5 Statistical Resample	August 2019 Assessment/ Detection Monitoring Sampling	August 2019 Nature and Extent Sampling	October - December 2019 Verification/ Assessment Monitoring Sampling	November - December 2019 Assessment/ Detection Monitoring Sampling	
CCR Rule Compliance Monitoring Well Network						
BMW-1	-	8/13/2019	-	-	11/18/2019	2
BMW-2	-	8/13/2019	-	-	11/18/2019	2
MW-1	-	8/14/2019	-	-	11/18/2019	2
MW-2	-	8/12/2019	-	-	11/19/2019	2
MW-3	-	8/12/2019	-	-	11/19/2019	2
MW-4	-	8/12/2019	-	-	11/18/2019	2
MW-5	1/24/2019	8/13/2019	-	10/3/2019	11/18/2019	4
MW-6	-	8/13/2019	-	-	11/18/2019	2
MW-7	-	8/13/2019	-	10/3/2019	11/18/2019	3
MW-8	-	8/13/2019	-	-	11/18/2019	2
MW-9	-	8/13/2019	-	12/10/2019	12/20/2019	3
MW-10	-	8/14/2019	-	10/17/2019	11/18/2019	3
Nature and Extent Sampling						
TP-1	-	-	8/14/2019	-	-	1
TP-2	-	-	8/13/2019	-	-	1
Detection or Assessment Monitoring	Assessment	Assessment/ Detection	Assessment/ Detection	Assessment/ Detection	Assessment/ Detection	NA

Notes:

- 1.) Detection Monitoring Events tested for Appendix III Parameters.
- 2.) Verification Sampling Events tested for Appendix III Parameters with initial exceedances that have not already been verified.
- 3.) Assessment Monitoring Events tested for Appendix IV Parameters.
- 4.) "-" No sample collected.
- 5.) NA - Not applicable.

Table 4
November 2018 Detection Monitoring Results
MEC Surface Impoundments
Meramec Energy Center, St. Louis County, MO

ANALYTE	UNITS	PREDICTION LIMITS	BACKGROUND		GROUNDWATER MONITORING WELLS							
			BMW-1	BMW-2	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8
November 2018 Detection Monitoring Event												
DATE	NA	NA	11/19/2018	11/19/2018	11/20/2018	11/19/2018	11/19/2018	11/19/2018	11/19/2018	11/19/2018	11/19/2018	11/19/2018
pH	SU	6.352-7.76	7.24	7.03	6.84	6.73	6.90	7.20	7.54	6.56	6.97	6.79
BORON, TOTAL	µg/L	476.5	468	98.0 J	52.3 J	4,380	9,320	9,630	7,040	12,800	23,700	9,130
CALCIUM, TOTAL	µg/L	115,956	103,000	98,000	132,000	119,000	152,000	179,000	137,000	358,000	390,000	171,000
CHLORIDE, TOTAL	mg/L	248	137	12.8	43.1	31.3	35.7	51.1	43.9	18.0	54.4	24.5
FLUORIDE, TOTAL	mg/L	0.5034	0.43	0.35	0.30	ND	ND	ND	0.22	ND	0.31 J	0.22
SULFATE, TOTAL	mg/L	127	63.4	25.7	103	315	388	483	277	632	1,210	470
TOTAL DISSOLVED SOLIDS	mg/L	832	640	481	628	796	875	895	817	1,430	1,960	936

NOTES:

1. Unit Abbreviations: µg/L - micrograms per liter, mg/L - milligrams per liter, SU - standard units.
2. J - Result is an estimated value.
3. ND - Constituent was analyzed for, but was not detected above the Method Detection Limit (MDL) and is considered a non-detect. Values displayed as ND.
4. NA - Not applicable.
5. Prediction Limits calculated using Sanitas Software.
6. If all background values are less than the Practical Quantitation Limit (PQL) then the Double Quantification Rule (DQR) is used.
7. Values highlighted in yellow indicate a Statistically Significant Increase (SSI).
8. Values highlighted in green indicate an initial exceedance above the prediction limit that was not confirmed by Verification Sampling (not an SSI).
9. There were no new initial exceedances for the November 2018 event; therefore, no Verification Sampling was necessary.

Table 5
August 2019 Detection Monitoring Results
MEC Surface Impoundments
Meramec Energy Center, St. Louis County, Missouri

ANALYTE	UNITS	PREDICTION LIMITS	BACKGROUND		GROUNDWATER MONITORING WELLS									
			BMW-1	BMW-2	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9	MW-10
August 2019 Detection Monitoring Event														
DATE	NA	NA	8/12/2019	8/13/2019	8/14/2019	8/12/2019	8/12/2019	8/12/2019	8/13/2019	8/13/2019	8/13/2019	8/13/2019	8/13/2019	8/14/2019
pH	SU	6.441-7.704	7.72	6.80	6.77	6.47	6.63	6.85	6.49	6.53	7.07	6.87	6.85	6.71
BORON, TOTAL	µg/L	697.4	354	81.4 J	48.4 J	4,980	9,420	9,120	6,710	14,500	22,700	8,880	5,420	1,740
CALCIUM, TOTAL	µg/L	123,335	102,000	104,000	131,000	135,000	175,000	181,000	162,000	320,000	354,000	197,000	135,000	197,000
CHLORIDE, TOTAL	mg/L	248	96.2	13.0	44.2	27.5	22.0 J	48.9	41.3	8.3	53.0	30.9	35.2	82.7
FLUORIDE, TOTAL	mg/L	0.5057	0.46	0.29	0.24	0.15 J	0.13 J	0.18 J	0.24	0.24	0.82	0.37	0.20 J	0.21
SULFATE, TOTAL	mg/L	212	53.0	25.9	106	324	363 J	465	339	516	841	462	222	211
TOTAL DISSOLVED SOLIDS	mg/L	832	620	483	696	817	968 J	1,090	957	1,310	1,840	1,060	830	1,110
October-December 2019 Verification Sampling Event														
DATE	NA	NA							10/3/2019		10/3/2019		12/10/2019	10/17/2019
pH	SU	6.441-7.704							6.87		6.87		7.12	6.85
BORON, TOTAL	µg/L	697.4											3,860	1,780
CALCIUM, TOTAL	µg/L	123,335											118,000	208,000
CHLORIDE, TOTAL	mg/L	248												
FLUORIDE, TOTAL	mg/L	0.5057								0.54				
SULFATE, TOTAL	mg/L	212											133	
TOTAL DISSOLVED SOLIDS	mg/L	832							898					961

NOTES:

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

Table 6
November-December 2019 Detection Monitoring Results
MEC Surface Impoundments
Meramec Energy Center, St. Louis County, MO

ANALYTE	UNITS	BACKGROUND		GROUNDWATER MONITORING WELLS									
		BMW-1	BMW-2	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9	MW-10
November-December 2019 Detection Monitoring Event													
DATE	NA	11/18/2019	11/18/2019	11/18/2019	11/19/2019	11/19/2019	11/18/2019	11/18/2019	11/18/2019	11/18/2019	11/18/2019	12/20/2019	11/18/2019
pH	SU	6.64	6.86	6.71	6.45	6.61	6.85	7.03	6.70	7.09	6.92	6.99	6.78
BORON, TOTAL	µg/L	485	118	45.6 J	5,000	9,110	9,740	7,670	14,000	27,500	9,880	3,440	1,720
CALCIUM, TOTAL	µg/L	122,000	107,000	137,000	134,000	171,000	190,000	170,000	333,000	431,000	186,000	106,000	226,000
CHLORIDE, TOTAL	mg/L	94.4	13.3	46.1	27.8	23.9	50.3	42.3	20.2	67.5	26.1	33.1	65.1
FLUORIDE, TOTAL	mg/L	0.62	0.31	0.30	0.17 J	0.13 J	0.16 J	0.23	0.11 J	0.55	0.28	0.21	0.15 J
SULFATE, TOTAL	mg/L	32.9	26.4	110	305	315	472	352	557	960	497	127	197
TOTAL DISSOLVED SOLIDS	mg/L	599	468	655	770	848	1,000	932	1,270	1,870	937	634	1,030

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.

Table 7
November 2018 Assessment Monitoring Results
MEC Surface Impoundments
Meramec Energy Center, St. Louis County, MO

ANALYTE	UNITS	BACKGROUND		GROUNDWATER MONITORING WELLS							
		BMW-1	BMW-2	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8
Field Parameters											
DATE	NA	11/19/2018	11/19/2018	11/20/2018	11/19/2018	11/19/2018	11/19/2018	11/19/2018	11/19/2018	11/19/2018	11/19/2018
DISSOLVED OXYGEN	mg/L	0.18	0.15	0.12	0.86	0.71	0.58	0.83	0.15	6.03	0.11
pH	SU	7.24	7.03	6.84	6.73	6.90	7.20	7.54	6.56	6.97	6.79
REDOX POTENTIAL	mV	41.7	-136.9	-33.0	-39.8	-39.0	-45.0	-37.5	-33.7	-29.3	-41.6
SPECIFIC CONDUCTIVITY	mS/cm	1.266	0.985	0.820	1.060	1.171	1.292	1.083	1.230	1.570	0.880
TURBIDITY	NTU	4.50	4.18	4.88	2.81	3.21	4.30	4.61	1.60	0.02	4.74
Appendix IV Parameters											
ARSENIC, TOTAL	µg/L	1.4	1.1	0.68 J	1.7	7.8	14.8	19.7	2.9	2.6	5.8
BARIUM, TOTAL	µg/L	204	524	370	299	232	200	195	49.4	37.9	168
CHROMIUM, TOTAL	µg/L	0.11 J	0.45 J	0.36 J	0.31 J	ND	0.25 J	0.14 J	0.12 J	0.25 J	ND
FLUORIDE, TOTAL	mg/L	0.43	0.35	0.30	ND	ND	ND	0.22	ND	0.31 J	0.22
LITHIUM, TOTAL	µg/L	15.0	6.5 J	5.3 J	6.4 J	ND	23.3	18.1	131	48.6	33.7
MOLYBDENUM, TOTAL	µg/L	4.6 J	ND	ND	ND	3.6 J	51.1	101	135	461	183
RADIUM [226 + 228]	pCi/L	2.676	1.607	1.663 J	2.160	2.410	ND	1.399	ND	1.376 J	2.474

NOTES:

- Unit Abbreviations: µg/L - micrograms per liter, mg/L - milligrams per liter, SU - standard units, pCi/L - picocuries per liter, mV - millivolts, mS/cm - millisiemens per centimeter, NTU - nephelometric turbidity unit.
- J - Result is an estimated value.
- 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.
- NA - Not applicable.
- Radium [226 + 228] is reported as the sum of Radium 226 and Radium 228 activity concentrations unless the sum of Radium 226 and Radium 228 Minimum Detectable Concentrations (MDC) is higher in which case it is displayed as ND.
- Statistical Analysis for the Assessment Monitoring data is provided in Appendix C.
- Arsenic result at MW-5 is from the January 2019 re-sample.

Table 8
August 2019 Assessment Monitoring Results
MEC Surface Impoundments
Meramec Energy Center, St. Louis County, MO

ANALYTE	UNITS	BACKGROUND		GROUNDWATER MONITORING WELLS												
		BMW-1	BMW-2	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9	MW-10	MW-9	MW-10	
Field Parameters																
DATE	NA	8/13/2019	8/13/2019	8/14/2019	8/12/2019	8/12/2019	8/12/2019	8/13/2019	8/13/2019	8/13/2019	8/13/2019	8/13/2019	8/13/2019	8/14/2019	12/10/2019	10/17/2019
DISSOLVED OXYGEN	mg/L	0.36	1.08	0.34	0.20	0.41	1.51	0.23	0.46	5.69	0.62	0.93	0.37	31.05	0.16	
pH	SU	7.72	6.80	6.77	6.47	6.63	6.85	6.49	6.53	7.07	6.87	6.85	6.71	7.12	6.85	
REDOX POTENTIAL	mV	-134.7	-99.2	13.1	-103.5	-108.9	-114.0	89.2	68.4	19.8	-69.4	53.8	104.2	-81.9	57.9	
SPECIFIC CONDUCTIVITY	mS/cm	0.928	0.882	1.03	1.196	1.291	1.458	1.36	1.63	2.130	1.353	1.23	1.53	2.692	1.58	
TURBIDITY	NTU	7.32	0.74	4.68	4.88	4.26	5.07	4.16	8.22	1.40	9.80	4.44	4.73	0.23	4.18	
Appendix IV Parameters																
ANTIMONY, TOTAL	µg/L	0.23 J	ND	ND	ND	ND	ND	0.11 J	ND	0.39 J	ND	ND	ND	ND	-	
ARSENIC, TOTAL	µg/L	2.1	0.86 J	0.66 J	1.5	7.5	13.9	23.0	2.6	2.8	5.7	15.8	11.8	17.1	12.5	
BARIUM, TOTAL	µg/L	210	502	341	301	196	168	230	44.1	37.0	102	247	162	207	181	
BERYLLIUM, TOTAL	µg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	
CADMIUM, TOTAL	µg/L	ND	ND	ND	ND	ND	ND	0.048 J	0.31 J	0.36 J	0.099 J	ND	ND	ND	-	
CHROMIUM, TOTAL	µg/L	0.086 J	0.16 J	0.22 J	0.32 J	0.11 J	ND	0.18 J	ND	0.18 J	ND	ND	0.11 J	0.10 J	-	
COBALT, TOTAL	µg/L	ND	ND	ND	ND	ND	ND	ND	5.4	ND	ND	ND	1.6 J	ND	ND	
FLUORIDE, TOTAL	mg/L	0.46	0.29	0.24	0.15 J	0.13 J	0.18 J	0.24	0.24	0.82	0.37	0.20 J	0.21	0.25	0.29	
LEAD, TOTAL	µg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	4.0 J	ND	-	
LITHIUM, TOTAL	µg/L	6.8 J	ND	ND	ND	ND	14.0	12.2	122	36.2	27.8	13.8	37.4	9.8 J	35.0	
MERCURY, TOTAL	µg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	
MOLYBDENUM, TOTAL	µg/L	3.7 J	ND	ND	ND	7.5 J	51.5	96.3	123	463	186	37.8	4.5 J	37.6	6.6 J	
RADIUM [226 + 228]	pCi/L	1.514 J	ND	ND	ND	1.092 J	ND	1.599	ND	ND	ND	1.706 J	1.865 J	ND	ND	
SELENIUM, TOTAL	µg/L	0.12 J	ND	0.11 J	0.15 J	0.10 J	ND	ND	0.087 J	8.6	0.11 J	ND	ND	ND	ND	
THALLIUM, TOTAL	µg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	

NOTES:

1. Unit Abbreviations: µg/L - micrograms per liter, mg/L - milligrams per liter, SU - standard units, pCi/L - picocuries per liter, mV - millivolts, mS/cm - millisiemens per centimeter, NTU - nephelometric turbidity unit.
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. Radium [226 + 228] is reported as the sum of Radium 226 and Radium 228 activity concentrations unless the sum of Radium 226 and Radium 228 Minimum Detectable Concentrations (MDC) is higher in which case it is displayed as ND.
6. Statistical Analysis for the Assessment Monitoring data is provided in Appendix D.
7. "-" Not Sampled.

Table 9
November-December 2019 Assessment Monitoring Results
MEC Surface Impoundments
Meramec Energy Center, St. Louis County, MO

ANALYTE	UNITS	BACKGROUND		GROUNDWATER MONITORING WELLS									
		BMW-1	BMW-2	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9	MW-10
Field Parameters													
DATE	NA	11/18/2019	11/18/2019	11/18/2019	11/19/2019	11/19/2019	11/18/2019	11/18/2019	11/18/2019	11/18/2019	11/18/2019	12/20/2019	11/18/2019
DISSOLVED OXYGEN	mg/L	0.21	0.29	0.27	0.18	0.18	0.13	0.65	2.13	3.81	0.62	0.48	0.13
pH	SU	6.64	6.86	6.71	6.45	6.61	6.85	7.03	6.70	7.09	6.92	6.99	6.78
REDOX POTENTIAL	mV	-16.0	-150.4	144.4	29.9	43.3	-154.2	-161.7	-50.7	82.5	-104.0	-146.0	-121.2
SPECIFIC CONDUCTIVITY	mS/cm	1.05	0.86	1.06	1.20	1.26	1.442	1.326	1.596	2.201	1.230	1.018	1.560
TURBIDITY	NTU	9.80	3.43	4.30	3.44	3.05	8.66	4.13	8.66	2.59	8.63	2.27	1.82
Appendix IV Parameters													
ARSENIC, TOTAL	µg/L	4.7	1.3	0.69 J	1.8	7.4	16.1	21.8	3.9	2.6	6.4	18.6	10.7
BARIUM, TOTAL	µg/L	292	558	368	309	200	199	240	51.0	42.6	142	192	180
COBALT, TOTAL	µg/L	3.2 J	ND	ND	ND	ND	ND	ND	4.2 J	ND	ND	ND	2.8 J
FLUORIDE, TOTAL	mg/L	0.62	0.31	0.30	0.17 J	0.13 J	0.16 J	0.23	0.11 J	0.55	0.28	0.21	0.15 J
LITHIUM, TOTAL	µg/L	14.4	6.5 J	ND	7.7 J	7.4 J	18.6	17.9	127	52.2	36.5	16.1	36.6
MOLYBDENUM, TOTAL	µg/L	5.9 J	ND	ND	ND	7.7 J	52.4	98.6	132	373	221	34.2	2.7 J
RADIUM [226 + 228]	pCi/L	1.839	1.386	ND	ND	ND	ND	1.761	ND	ND	ND	ND	ND
SELENIUM, TOTAL	µg/L	0.15 J	ND	ND	0.12 J	0.089 J	0.093 J	0.093 J	ND	8.2	0.088 J	ND	0.093 J

NOTES:

1. Unit Abbreviations: µg/L - micrograms per liter, mg/L - milligrams per liter, SU - standard units, and pCi/L - picocuries per liter, mV - millivolts, mS/cm - millisiemens per centimeter, NTU - nephelometric turbidity unit.
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. Radium [226 + 228] is reported as the sum of Radium 226 and Radium 228 activity concentrations unless the sum of Radium 226 and Radium 228 Minimum Detectable Concentrations (MDC) is higher in which case it is displayed as ND.

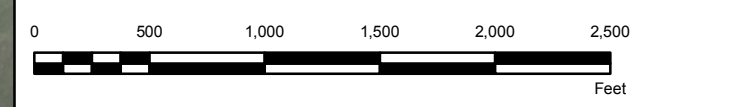
Figures

PATH: G:\Projects\150 Projects\1531406 - Ameren GW Monitoring Program - ICD Phase 004 - Meramec Energy 800 - FIGURES-DRAWINGS-PRODUCTION\2019 Annual Report\Figure 1 - Monitoring Well Location Map.mxd PRINTED ON: 2020-01-29 AT 3:08:05 PM



LEGEND

- - - Meramec Energy Center Property Boundary
- Meramec Surface Impoundments
- Groundwater Monitoring Wells Used for CCR Rule Monitoring**
- Detection/Assessment Monitoring Well Network
- Corrective Action Monitoring Well Network
- Proposed Corrective Action Monitoring Wells



NOTE(S)

- 1.) ALL BOUNDARIES AND LOCATIONS ARE APPROXIMATE.
- 2.) LOCATIONS FOR MW-11 AND MW-12 ARE PROPOSED, THESE WELLS HAVE NOT YET BEEN INSTALLED.
- 3.) SOME MONITORING WELLS OFFSET FOR CLARIFICATION.

REFERENCE(S)

- 1.) AMEREN MISSOURI MERAMEC ENERGY CENTER, MERAMEC PROPERTY CONTROL MAP, FEBRUARY 2011.
- 2.) COORDINATE SYSTEM: NAD 1983 STATE PLANE MISSOURI EAST FIPS 2,401 FEET.

CLIENT
AMEREN MISSOURI
MERAMEC ENERGY CENTER

PROJECT
GROUNDWATER MONITORING PROGRAM



TITLE
SITE LOCATION AERIAL MAP AND MONITORING WELL LOCATIONS

CONSULTANT	YYYY-MM-DD	2020-01-22
DESIGNED	JSI	
PREPARED	EMS	
REVIEWED	TJG	
APPROVED	CMR	

PROJECT NO. 153140601 REV. 0 FIGURE 1



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

APPENDIX A

Corrective Measures Assessment and Certification



HALEY & ALDRICH, INC.
6500 Rockside Road
Suite 200
Cleveland, OH 44131
216.739.0555

MEMORANDUM


April 2019
Project No. 132002

**SUBJECT: Demonstration for 60-Day Extension – Corrective Measures Assessment (CMA)
Coal Combustion Residual (CCR) Surface Impoundments
(MCPA, MCPB, MCPC, and MCPD)
Ameren Missouri Meramec Energy Center
St. Louis County, Missouri**

Pursuant to CFR Title 40 Chapter I Subchapter I Part 257 Subpart D §257.96(a) (CCR Rule), I certify that Ameren Missouri, St. Louis, Missouri (Ameren) has demonstrated the need for additional time beyond the regulatory time period of 90 days to complete the assessment of corrective measures due to site-specific conditions and the evaluation of remedial treatment alternatives in support of an informed CMA process.

In the case of the assessment for the following surface impoundments; MCPA, MCPB, MCPC, and MCPD the site has complex hydrogeological conditions. In addition, Ameren is in the process of reviewing possible groundwater remedies, and ongoing discussions with third-party experts regarding effectivity and implementation of critical steps in the treatment and remedy assessment process. Based on these site-specific conditions and related groundwater treatment alternatives evaluations in support of the CMA by Ameren, the CCR Rule allows for a 60-day extension to complete the CMA process.

This certification as submitted, is to the best of my knowledge, accurate and complete.

Signed: 

Certifying Engineer
Print Name: Steven F. Putrich, P.E.
Missouri License No.: 2014035813
Title: CCR Practice Lead, Senior Consulting Engineer
Company: Haley & Aldrich, Inc.

Professional Engineer's Seal



CORRECTIVE MEASURES ASSESSMENT
AMEREN MISSOURI MERAMEC ENERGY CENTER
ST. LOUIS COUNTY, MISSOURI

by
Haley & Aldrich, Inc.
Cleveland, Ohio

for
Ameren Missouri
St. Louis, Missouri

May 2019



Overview

This Corrective Measures Assessment (CMA) was prepared by Haley & Aldrich, Inc. (Haley & Aldrich) for Union Electric Company d/b/a Ameren Missouri (Ameren) to evaluate five regulated Coal Combustion Residual (CCR) surface impoundments (CCR Units) located at the Ameren Meramec Energy Center (MEC) located in St. Louis County, Missouri. The CMA was completed in accordance with requirements stated in the U.S. Environmental Protection Agency's (USEPA) rule entitled *Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities*. 80 Fed. Reg. 21302 (Apr. 17, 2015) (promulgating 40 CFR §257.61); 83 Fed. Reg. 36435 (July 30, 2018) (amending 40 CFR §257.61) (CCR Rule).

Ameren implemented groundwater monitoring under the CCR Rule through a phased approach to allow for a graduated response and evaluation of steps to address groundwater quality associated with the CCR Units. Assessment monitoring completed in 2018 evaluated the presence and concentration of constituents in groundwater specified in the CCR Rule (i.e. Appendix IV). Of the CCR 23 parameters evaluated, only three constituents of concern (COC), arsenic, lithium and molybdenum, exceeded the Groundwater Protection Standards (GWPS) established for the MEC in a very limited number of wells and to a limited extent. More specifically, arsenic excursions occur in only two wells; lithium in only one well and molybdenum in only three wells. As described in **Section 3.3.1**, 95% of Appendix IV parameters tested complied with CCR Rule requirements.

Ameren completed a detailed environmental evaluation of the regulated surface impoundments and surrounding area, including voluntary, supplemental surface water sampling. In 2018, risk evaluations were undertaken to identify whether current groundwater conditions pose an unacceptable risk to human health and the environment, and whether corrective measures mitigate such an unacceptable risk, if present. The risk evaluations concluded that there are **no adverse effects on human health or the environment currently or under reasonably anticipated future uses** from either surface water or groundwater due to CCR management practices at MEC.

In performing this CMA, Haley & Aldrich considered the following: presence and distribution of arsenic, lithium and molybdenum, site configuration, hydrogeologic setting, and the results of the detailed risk evaluation. CCR is managed in impoundments that extend to a depth of approximately 30 feet (ft) below ground surface (bgs). Groundwater within the Meramec and Mississippi River valley alluvium ranges in thickness from not present (zero thickness) at the aquifer pinch-out along the bedrock bluff to the northeast of the MEC, up to greater than 95 ft thick where the bedrock surface has been eroded by the Meramec and Mississippi Rivers. Although groundwater flow direction is influenced by elevation changes of surface water in the Mississippi and Meramec Rivers, groundwater generally/predominantly flows to the southwest, flowing from the bluffs toward the rivers.

To provide a comprehensive CMA, this effort included four CCR Unit closure and groundwater remediation alternatives, including:

- Alternative 1: Closure in place (CIP) with low permeability capping and monitored natural attenuation (MNA);
- Alternative 2: CIP with low permeability capping and in-situ groundwater treatment;
- Alternative 3: CIP with low permeability capping, hydraulic containment (HC) of groundwater, and ex-situ groundwater treatment; and

- Alternative 4: Closure by removal (CBR) with MNA.

These four alternatives were evaluated based on the threshold criteria provided in the CCR Rule and then compared to three of the four balancing criteria stated in the CCR Rule. The four balancing criteria consider:

1. The long- and short-term effectiveness and protectiveness of the potential remedy(s), along with the degree of certainty that the remedy will prove successful;
2. The effectiveness of the remedy in controlling the source to reduce further releases;
3. The ease or difficulty of implementing a potential remedy; and
4. The degree to which community concerns are addressed by a potential remedy.

Balancing criteria four, which considers community concerns, will be evaluated following a public information session scheduled for May 2019.

The following observations are made regarding closure scenarios and groundwater remedial alternatives for the CCR Units and are described more fully in this report:

- **Cap Integrity and Hydrogeologic Conditions:** For all CIP alternatives, Ameren intends to install a geomembrane cap and cover system that exceeds by two orders-of-magnitude the performance criteria set forth in the CCR Rule and is referred to in this CMA as a "low permeability cap." Vertical infiltration via precipitation is virtually eliminated following installation of the geomembrane cover system. The CCR Units are situated **above** the groundwater table during normal river conditions which could account for such limited groundwater impacts notwithstanding the MEC's 65 years of operation.
- **No Risk:** Risk assessment evaluations confirm that the CCR Units, even prior to closure, present **no unacceptable risk** to human health or the environment. In fact, concentration levels of arsenic, lithium and molybdenum would need to be **more than 600, more than 24,000 and more than 13,000 times higher**, respectively, than currently measured levels before an adverse impact in the Mississippi River could occur. Therefore, since no adverse risk currently exists, implementation of any of the remedies considered will not result in a meaningful reduction in risk.
- **Groundwater Compliance:** Post-closure, and based on the outcome of geochemical attenuation modeling, concentration levels for lithium and molybdenum are predicted to reduce below GWPS within five years following in situ treatment (See **Figures 4-2, 4-3 and 4-4**), with arsenic reduction modeled to occur in 11 years. Ameren has retained XDD Environmental (XDD) to evaluate and develop in-situ groundwater treatment methods to address arsenic, lithium and molybdenum.
- **Excavation Timeframe:** As described in an Extraction & Transportation Study prepared by the Lochmueller Group, removal of large volumes of CCR stored at the MEC creates extensive logistical challenges – including excavation, transportation, and disposal, and could take decades to complete during which time the impoundments would remain open and would be subject to ongoing infiltration from precipitation.

- **Groundwater Treatment:** Laboratory testing performed by XDD indicates that through modifications to groundwater pH, arsenic concentrations can decrease to below action levels earlier than the modeled estimates. Bench-scale testing and in-situ treatment evaluations are ongoing and will be completed this summer.

In accordance with §257.98, Ameren will implement a groundwater monitoring program to document the effectiveness of the selected remedial alternative. Corrective measures are considered complete when monitoring reflects groundwater downgradient of the CCR Units does not exceed the Appendix IV GWPS for three consecutive years. USEPA is in the process of modifying certain CCR Rule requirements and, depending upon the nature of such changes, assessments made herein could be modified or supplemented to reflect such future regulatory revisions. See *Federal Register* (March 15, 2018; 83 FR 11584).

Table of Contents

	Page
Overview	i
List of Tables	vi
List of Figures	vi
List of Acronyms and Abbreviations	vii
1. Introduction	1
1.1 FACILITY DESCRIPTION/BACKGROUND	1
1.2 SITE CHARACTERIZATION WORK SUMMARY	1
1.3 GROUNDWATER MONITORING	2
1.4 CORRECTIVE MEASURES ASSESSMENT PROCESS	3
1.5 RISK REDUCTION AND OF REMEDY	3
2. Groundwater Conceptual Site Model	5
2.1 SITE SETTING	5
2.2 SITE TOPOGRAPHY	5
2.3 GEOLOGY AND HYDROGEOLOGY	5
2.4 GROUNDWATER PROTECTION STANDARDS	8
2.5 NATURE AND EXTENT OF GROUNDWATER IMPACTS	8
2.6 SURFACE WATER SAMPLING	9
3. Risk Assessment and Exposure Evaluation	10
3.1 APPROACH	10
3.2 CONCEPTUAL SITE MODEL	11
3.3 RESULTS	11
3.3.1 Alluvial Aquifer	11
3.3.2 Surface Water	12
3.3.3 National Pollutant Discharge Elimination System Outfall	12
3.4 CONCLUSION	12
3.4.1 Trace Elements in Coal Ash	13
3.4.2 Arsenic	14
3.4.3 Lithium	15
3.4.4 Molybdenum	15
3.5 EVALUATION OF RISK IN THE CORRECTIVE MEASURES ASSESSMENT	16
4. Corrective Measures Alternatives	17
4.1 CORRECTIVE MEASURES ASSESSMENT GOALS	17

Table of Contents

	Page	
4.2	GROUNDWATER MODELING	17
4.3	GROUNDWATER TREATMENT EVALUATION	17
4.4	CORRECTIVE MEASURES ALTERNATIVES	18
4.4.1	Alternative 1 – Closure in Place with Capping and Monitored Natural Attenuation	18
4.4.2	Alternative 2 – CIP with Capping and In-Situ Groundwater Treatment	19
4.4.3	Alternative 3 – CIP with Capping and Hydraulic Containment Through Groundwater Pumping and Ex-situ Treatment	20
4.4.4	Alternative 4 – Closure by Removal with Monitored Natural Attenuation	20
5.	Comparison of Corrective Measures Alternatives	22
5.1	EVALUATION CRITERIA	22
5.2	COMPARISON OF ALTERNATIVES	22
5.2.1	The Long- and Short-Term Effectiveness and Protectiveness of the Potential Remedy, along with the Degree of Certainty that the Remedy will Prove Successful	22
5.2.2	The Effectiveness of the Remedy in Controlling the Source to Reduce Further Releases	26
5.2.3	The Ease or Difficulty of Implementing a Potential Remedy	28
6.	Summary	31
	References	32
	Tables	
	Figures	
	Appendix A – Surface Water Screening Tables	
	Appendix B – What You Need to Know About Lithium	
	Appendix C – What You Need to Know About Molybdenum	
	Appendix D – Extraction and Transportation Assessment	

List of Tables

Table No.	Title
I	Groundwater Analytical Results – Appendix IV Constituents

List of Figures

Figure No.	Title
1-1	Site Location Map
1-2	Site Features
2-1	Monitoring Well Locations with Statistically Significant Levels Above the GWPS
2-2	Surface Water Sampling Locations
4-1	Remedial Alternatives Roadmap
4-2	Modeled Arsenic Concentrations After Capping and Closing the CCR Units and Groundwater Remediation
4-3	Modeled Lithium Concentrations After Capping and Closing the CCR Units and Groundwater Remediation
4-4	Modeled Molybdenum Concentrations After Capping and Closing the CCR Units and Groundwater Remediation

List of Acronyms and Abbreviations

Ameren	Ameren Missouri
AMSL	Above Mean Sea Level
bgs	Below Ground Surface
Burns & McDonnell	Burns & McDonnell Engineering Company, Inc.
CBR	Closure by Removal
CCR	Coal Combustion Residuals
CIP	Closure In-Place
CMA	Corrective Measures Assessment
cm/sec	Centimeters per Second
COC	Constituents of Concern
CSM	Conceptual Site Model
ft	Feet
Golder	Golder Associates Inc.
GMP	Groundwater Monitoring Plan
GWPS	Groundwater Protection Standards
Haley & Aldrich	Haley & Aldrich, Inc.
HC	Hydraulic Containment
Lochmueller	Lochmueller Group
MM CY	Million Cubic Yards
MEC	Meramec Energy Center
MSD	Metropolitan Sewer District
mg/kg	Milligrams per kilogram
mg/l	Milligrams per liter
MNA	Monitored Natural Attenuation
N&E	Nature and Extent
NAS	U.S. National Academy of Sciences
O&M	Operations and Maintenance
ORP	Oxidation Reduction Potential
ppm	Parts per Million
PRB	Permeable Reactive Barrier
RDA	Recommended Daily Allowance
RO	Reverse Osmosis
SSI	Statistically Significant Increase
SSL	Statistically Significant Level
ug/L	Micrograms per liter
UL	Tolerable Upper Limit
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
XDD	XDD Environmental

1. Introduction

Haley & Aldrich, Inc. (Haley & Aldrich) has prepared this Corrective Measures Assessment (CMA) for the Coal Combustion Residual (CCR) surface impoundments (CCR Units) located at the Ameren Missouri (Ameren) Meramec Energy Center (MEC) located in St. Louis County, Missouri. Ameren has conducted detailed geologic and hydrogeologic investigations under the USEPA rule entitled *Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities*. 80 Fed. Reg. 21302 (Apr. 17, 2015) (promulgating 40 CFR §257.61); 83 Fed. Reg. 36435 (July 30, 2018) (amending 40 CFR §257.61) (CCR Rule). These investigations were, in part, related to determination of requirements related to the potential for both closure and groundwater corrective action.

This CMA includes a summary of the results of groundwater and site investigations at the MEC. Groundwater impacted by the surface impoundments exceeds statistically-derived GWPS for only three constituents: arsenic, lithium and molybdenum at only five monitoring locations. Of these parameters, USEPA has developed drinking water standards only for arsenic. This report evaluates potential corrective measures to address these limited exceedances of the GWPS.

1.1 FACILITY DESCRIPTION/BACKGROUND

The MEC was constructed in the 1950's in a then-rural area of St Louis County on approximately 480-acres (**Figure 1-1**). A Metropolitan Sewer District (MSD) treatment plant is located to the immediate north of the facility and residential homes are located in the bluffs area above the MEC. Multiple impoundments are located on the property. In 2018, Ameren proactively closed 36 acres located adjacent to the Meramec River¹ with additional closures scheduled for 2021 and in 2023 following retirement of the facility. Site features are shown on **Figure 1-2**.



Meramec Energy Center

Over the past 17 years, Ameren has been able to beneficially use approximately 79% of the fly ash and 26% of the bottom ash produced by the MEC with the remaining CCR managed in the active on-site surface impoundments. The estimated volume of CCR within the CCR Units and exempt units is estimated at approximately 5.2 million cubic yards (MM CY).

1.2 SITE CHARACTERIZATION WORK SUMMARY

Hydrogeologic Assessments were completed in 1988 by Woodward-Clyde Consultants and CH2MHill in 1997. Golder Associates Inc. (Golder) completed subsurface investigations pursuant to the CCR Rule.

¹ The cover system installed by Ameren complied with the performance requirements set forth in 40 CFR part §257.102(3)

Ameren also voluntarily conducted surface water sampling. All these activities delineated the site-specific geology and hydrogeology to support the development of a hydrogeologic Conceptual Site Model (CSM). The investigation activities at the MEC included:

- Soil borings and sampling;
- Geotechnical testing;
- Well and piezometer installation;
- Slug testing; and
- Groundwater sampling.

Findings from these extensive and updated series of geologic, hydrogeologic and surface water investigations have produced a robust CSM that supports the CMA activities discussed in this report.

1.3 GROUNDWATER MONITORING

One groundwater monitoring system encompasses all MEC impoundments and is used to monitor facility groundwater. Groundwater monitoring under the CCR Rule occurs through a phased approach to allow for a graduated response (i.e., baseline, detection, and assessment monitoring as applicable) and evaluation of steps to address groundwater quality associated with a CCR unit. Golder prepared a Groundwater Monitoring Plan (GMP) as required by the CCR Rule. The GMP presents the design of the groundwater monitoring system, groundwater sampling and analysis procedures, and groundwater statistical analysis methods.



Groundwater Monitoring Well Locations

Monitoring wells were installed in January and April 2016 and includes two background wells (BMW-1 and BMW-2) and eight downgradient monitoring wells (MW-1 through MW-8) located around the perimeter of the various impoundments. The monitoring wells are screened in the alluvial aquifer below the base elevation of the CCR Units.

Detection monitoring sampling events occurred in 2017 and 2018. The results of the sampling events were then compared to background, or natural groundwater values, using statistical methods to determine if Appendix III constituents at the base of the CCR Units were present at concentrations above background, called statistically significant increases (SSI). Detection of Appendix III analytes triggered a verification sampling event in January 2018 and verified SSIs. The results of this analysis indicated SSIs necessitating the establishment of an Assessment Monitoring Program and respective notification of the same.

CCR Rule Monitoring Constituents			
Appendix III	Boron		Antimony
	Calcium		Arsenic
	Chloride		Barium
	Fluoride		Beryllium
	Sulfate		Cadmium
	pH		Chromium
	Tot. Dissolved Solids		Cobalt
		Appendix IV	Fluoride
			Lead
			Lithium
			Mercury
			Molybdenum
			Selenium
			Thallium
			Radium 226 & 228

During the Assessment Monitoring phase, CCR groundwater monitoring well samples were collected during April, May and November 2018 and subsequently analyzed for Appendix IV constituents. Appendix IV analytical results for the baseline and Assessment Monitoring events are summarized in **Table I**.

1.4 CORRECTIVE MEASURES ASSESSMENT PROCESS

The CMA process involves development of groundwater remediation technologies that will result in the following threshold criteria: protection of human health and the environment, attainment of GWPS, source control, COC removal and compliance with standards for waste management. Once these technologies are demonstrated to meet these criteria, they are then compared to one another with respect to long- and short-term effectiveness, source control, and implementability. Input from the community on such proposed measures will occur as part of a public meeting scheduled for May 2019.

1.5 RISK REDUCTION AND OF REMEDY

The CCR Rule at §257.97 (Selection of Remedy) at (b)(1) requires that remedies must be protective of human health and the environment. Further, at (c) the CCR Rule requires that in selecting a remedy, the owner or operator of the CCR unit shall consider specific evaluation factors, including the risk reduction achieved by each of the proposed corrective measures. Each of the evaluation factors listed here and discussed in **Section 4** are those that consider risk to human health or the environment.

- (1)(i) Magnitude of reduction of existing risks;
- (1)(ii) Magnitude of residual risks in terms of likelihood of further releases due to CCR remaining following implementation of a remedy;
- (1)(iv) Short-term risks that might be posed to the community or the environment during implementation of such a remedy, including potential threats to human health and the environment associated with excavation, transportation, and re-disposal of contaminant;

(1)(vi) Potential for exposure of humans and environmental receptors to remaining wastes, considering the potential threat to human health and the environment associated with excavation, transportation, re-disposal, or containment;

(4) Potential risks to human health and the environment from exposure to contamination prior to completion of the remedy²;

(5)(i) Current and future uses of the aquifer;

(5)(ii) Proximity and withdrawal rate of users; and

(5)(iv) The potential damage to wildlife, crops, vegetation, and physical structures caused by exposure to CCR constituents.

² Factors 4 and 5 are not part of the CMA evaluation process as described in §257.97(d)(4), §257.97(d)(5)(i)(ii)(iv); rather they are factors the owner or operator must consider as part of the schedule for remedy implementation.

2. Groundwater Conceptual Site Model

To evaluate the magnitude of risk reduction, the degree of existing risk must first be identified. Prior risk evaluations and data collected are summarized below.

2.1 SITE SETTING

The MEC Site is at the southernmost point in St. Louis County, Missouri approximately 18 miles southwest of downtown St. Louis. The area around the facility is fully developed and public drinking water is provided by American Water of Missouri. There are no users of groundwater at or near the MEC site.

2.2 SITE TOPOGRAPHY

The MEC is in a topographically low area in a valley at the confluence of the Meramec and Mississippi Rivers. Ground surface elevation around the surface impoundments ranges between 395 ft to 421 ft above mean sea level (AMSL). The existing Site grade is as much as 20 ft above the original ground surface. Topographically higher terrain is located west of the Meramec River Valley. The terrain to the east of the Site consists of topographically higher terrain, at elevations generally ranging from 450 AMSL ft to as high as 550 ft AMSL.



Topographic Map

2.3 GEOLOGY AND HYDROGEOLOGY

The geology immediately surrounding the MEC is composed of two distinctly different geological terrains; (1) floodplain deposits of the Mississippi and Meramec River Valleys and (2) older sedimentary bedrock formations. Most of the MEC, including all the plant infrastructure and the CCR Units lie within these floodplain deposits. The river valley area is comprised of floodplain and alluvial deposits that are the result of the water flow and deposition of the Mississippi and Meramec River³.

³ 40 CFR Part 257, Groundwater Monitoring Plan Meramec Energy Center, St. Louis County, Missouri (Golder 2017)

Geologic Cross Section (West to East)

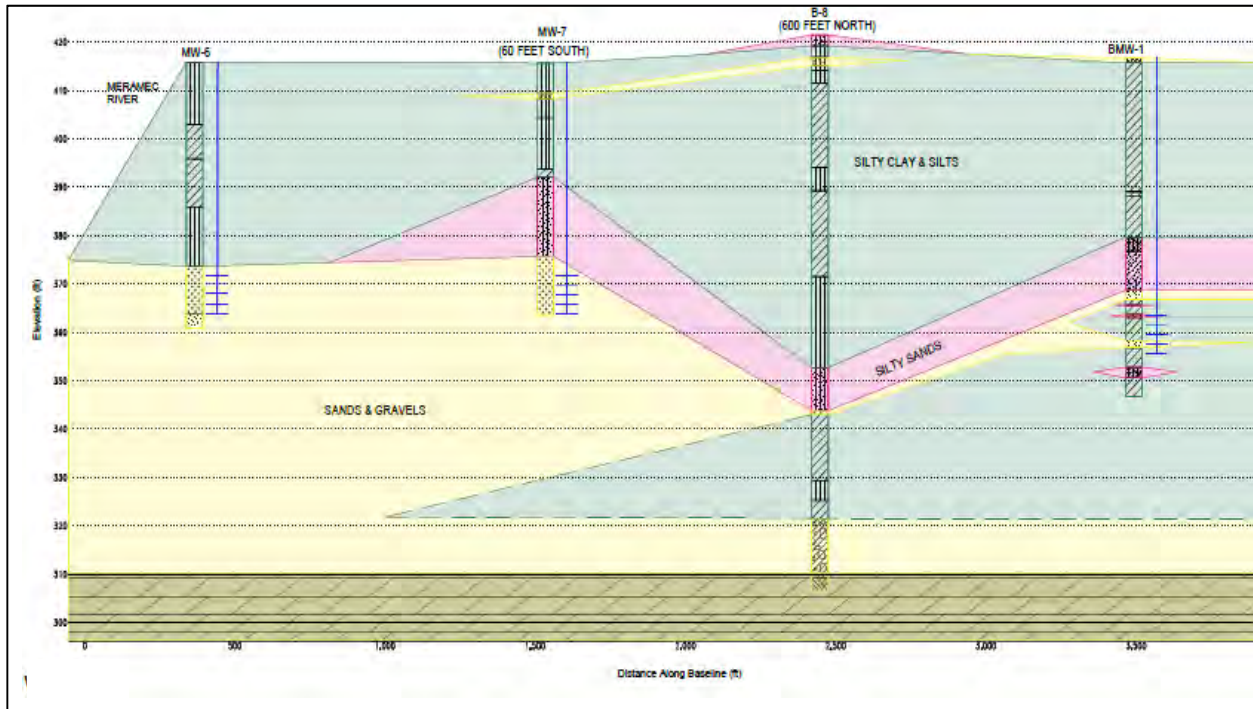


Image from Figure A-3, 2017 Groundwater Monitoring Plan (Golder 2017)

As shown in the geologic cross-section the alluvial materials on the east side of the MEC tend to have more silty clays and fine sands. Alluvial materials to the west, closer to the Meramec River, include coarser materials, including fine-to medium-grained sand with clay, silt, and some gravels⁴.

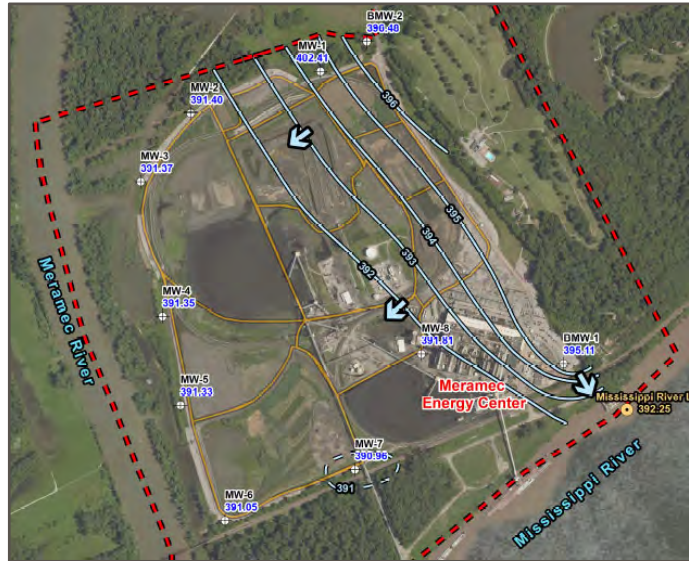
The uppermost aquifer is the alluvial silt, sand and gravel deposits associated with the Meramec and Mississippi River Valley alluvium. These channel deposits are intermixed with a wide variety of clay/silty clay floodplain deposits and, therefore, can appear at varying depths. However, sandy/gravelly units were encountered at many locations at approximately 360-370 ft AMSL, likely deposited from a historic meander of the Meramec River. These alluvial deposits overlie Mississippian-age limestone and shale of the Meramecian Series. The alluvial aquifer varies in thickness from 0 ft thick at the aquifer pinch-out along the bedrock bluff to the northeast of the MEC, up to greater than 95 ft thick where the bedrock surface has been eroded by the Meramec and Mississippi Rivers.

Groundwater flow direction and levels within the alluvial aquifer is dynamic and influenced by seasonal changes in water levels of the adjacent rivers. Under normal conditions, groundwater flows from the bluffs toward the rivers and generally towards the southwest. However, during periods of high river levels, groundwater flow can temporarily reverse in localized areas and decrease in horizontal gradient with little net movement of groundwater occurs⁵.

⁴ Hydrogeologic Assessment (CH2MHILL, 1997).

⁵ 2018 Annual Groundwater Monitoring and Corrective Action Report (Golder 2019).

Groundwater flow direction and gradient were estimated for the downgradient CCR Units 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 is from the bluffs toward the rivers. There are no users of groundwater of the alluvial aquifer at MEC. All private and public wells recorded within a one-mile radius of the facility are upgradient of the facility or located on the opposite side of the Meramec River and are therefore isolated from the MEC. Horizontal gradients determined by CCR Rule compliance wells (not including background or MW-1) range from 0.0002 to 0.0005 ft/ft with an estimated net annual groundwater velocity of approximately 16 ft per year.



Groundwater Flow Map-May 17, 2018
 Image from Figure C2, 2018 Annual Groundwater Monitoring and Corrective Action Report (Golder 2019)

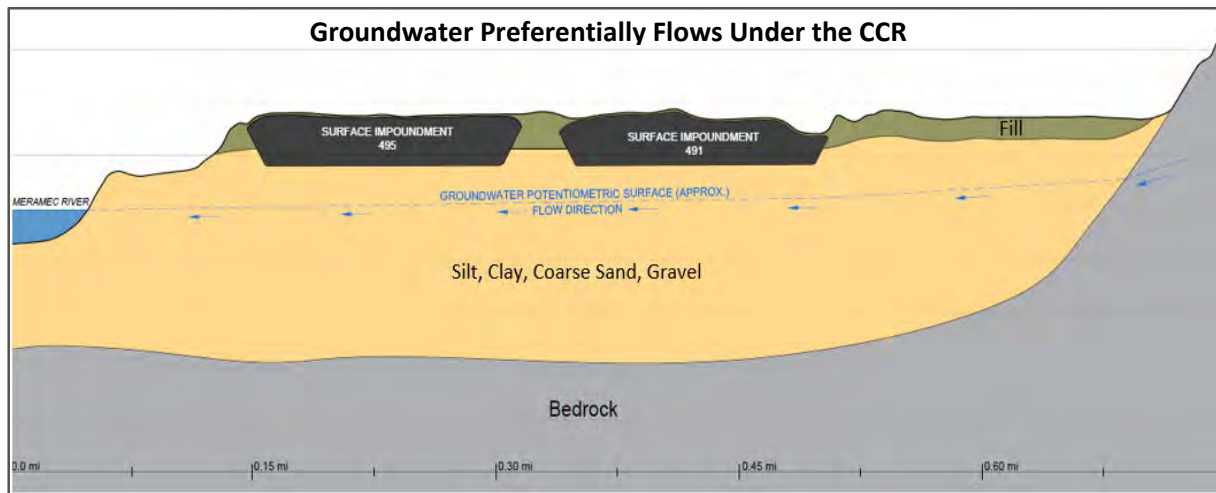


Image from Figure 2-2, MEC Groundwater Model Report (Burns & McDonnell 2019)

The existing Site grade is as much as 20 ft above the original ground surface the original grade of the plant was increased during construction by using fill material. The surface impoundments were made by excavating silts and clays and using the materials as fill beneath the plant as well as for surface impoundment berms (CH2MHILL, 1997). The surface impoundments were excavated approximately 10-20 ft below the original grade. Therefore, present day CCR thickness is estimated to be typically 20 to 30 ft below the present Site grade. As reflected above, the bottom elevations of the CCR is **higher** than the normal groundwater table. As such, groundwater flows under the surface impoundments.

Vertical hydraulic gradients are based on comparing the groundwater elevations in the monitoring wells to the water levels in the active surface impoundments. On average, the groundwater elevation of the impoundments is approximately 9 to 30 ft higher than the alluvial groundwater zone but can change seasonally based on river levels. During high river level conditions, the difference in groundwater elevation between the surface impoundments and the alluvial groundwater zone is the smallest.

2.4 GROUNDWATER PROTECTION STANDARDS

Golder completed a statistical evaluation of groundwater samples using the methods and procedures outlined in the Groundwater Monitoring Plan’s *Statistical Analysis Plan* (Golder 2017) to develop site-specific GWPS for each Appendix IV constituents.

Groundwater results were compared to the site-specific GWPS. As shown on **Figure 2-1**, statistically significant levels (SSL) above the GWPS are limited to five monitoring wells: arsenic at MW-4, MW-5; lithium at MW-6; molybdenum at MW-6, MW-7 and MW-8.

2.5 NATURE AND EXTENT OF GROUNDWATER IMPACTS

Ameren initiated a nature and extent (N&E) investigation as required by the CCR Rule in 2018 by installing two monitoring wells and two temporary piezometers (N&E wells). The N&E wells are screened in two different, depth zones of the alluvial aquifer: shallow zone and deep zone. Well screen lengths range from 5 to 10 ft long and total depths range from approximately 31 to 91 ft bgs.

Analytical results from the N&E wells indicate arsenic concentrations are limited in their extent to the shallow zone of the alluvial aquifer to the west of the CCR Units. Arsenic concentrations to the west of the CCR Units are similar to the Assessment Monitoring results, but decrease to less than the GWPS, 10 micrograms per liter (ug/L) in the deep alluvial zone. Monitoring wells to the south near the Mississippi River are similar to those near the CCR Units to the north, with concentrations below the GWPS for arsenic.

Based on the analytical results from the N&E wells molybdenum concentrations are limited in extent in the alluvial aquifer towards both the Meramec River to the west and toward the Mississippi River to the south. Results from the N&E wells are below the GWPS (100 ug/L) in both the shallow and deep alluvial aquifer samples.

Analytical results from the N&E wells also indicate that lithium concentrations west of the CCR Units are below the GWPS. Results to the south of the CCR Units nearer to the Mississippi River are consistent with the Assessment Monitoring wells to the south of the CCR Units with results that are very close in range (36 to 42.7 ug/L) to the GWPS of Lithium (40 ug/L).

Parameter	Site GWPS	Units
Antimony	6	µg/L
Arsenic	10	µg/L
Barium	2000	µg/L
Beryllium	4	µg/L
Cadmium	5	µg/L
Chromium	100	µg/L
Cobalt	6	µg/L
Fluoride	4	mg/l
Lead	15	µg/L
Lithium	40	µg/L
Mercury	2	µg/L
Molybdenum	100	µg/L
Radium 226+228	5	pCi/L
Selenium	50	µg/L
Thallium	2	µg/L

Groundwater Protection Standards
 ug/L – micrograms per liter
 mg/l – milligrams per liter
 pCi/L – picoCuries per liter

The extent of contamination is limited to the alluvial aquifer and the results from the N&E wells were used to develop corrective measures alternatives.

2.6 SURFACE WATER SAMPLING

Ash management operations at the MEC have not impacted adjacent surface water bodies. Ameren voluntarily collected samples of surface water from the Mississippi River, Meramec River and Creek/Drainage surface water along the northern boundary of the facility. Golder collected surface water samples from 12 locations in the Mississippi River and 9 locations in the Meramec River. At each sample location, shallow samples were collected near the surface of the river. Where the depth of water was greater than four feet, a second sample was collected mid-depth in the river (referred to here as a deep sample). A total of 40 samples were collected from the Mississippi River and a total of 26 samples were collected in the Meramec River. In addition, shallow surface water samples were collected from three locations in the creek / drainage bed that runs along the northwestern boundary of the MEC. A total of six samples were collected in the creek. Surface water sampling locations are shown on **Figure 2-2**.

Samples were analyzed for the same Appendix III and Appendix IV CCR constituents listed in **Section 1.3**, with the exception of radium (all CCR monitoring well data are below the GWPS for radium). Sample results were also compared to human health and ecological risk-based screening levels. The screening levels and comparison of the surface water results to the screening levels are provided in **Appendix A**.

In summary, the results of this investigation demonstrate that the Mississippi River and Meramec River sampling **do not** show evidence of impact of CCR constituents derived from the surface impoundments⁶.

⁶ In some samples, the concentrations of arsenic, lead, or thallium are above risk-based screening levels, however, the results are statistically **no different** in upstream and downstream samples indicating that the CCR Units are not the source of the constituents detected in the rivers.

3. Risk Assessment and Exposure Evaluation

As described in this report, Ameren has conducted detailed environmental evaluations of the MEC and its environs. These investigations have been detailed in a risk evaluation report available to the public on the Ameren website:

- February 2018: Human Health and Ecological Assessment of the Meramec Energy Center. Available at: <https://www.ameren.com/-/media/corporate-site/files/environment/ccr-rule/2017/groundwater-monitoring/Meramec-haley-aldrich-report.ashx?la=en&hash=76A0B8C34676EA9D3A7C8F61284917F50E02ED46>

The purpose of this risk evaluation was to identify whether current groundwater conditions pose a risk to human health and the environment and, if so, whether the corrective measures identified in this report mitigate such risk.

3.1 APPROACH

The risk evaluation provided in the 2018 risk assessment report evaluated the environmental setting of the MEC, which has been in operation for 65 years, including its location and ash management operations at the facility. Golder provided information on groundwater location and direction, the rate(s) of groundwater flow, and where waterbodies may intercept groundwater flow.

A conceptual model was then developed based on this physical setting information and used to identify what human populations could contact groundwater and/or surface water in the area of the facility. This information was also used to identify locations where ecological populations could come into contact with surface water. Based on this conceptual model approach, Ameren’s environmental consultants and risk assessors identified surface water sampling locations to allow evaluation of potential impact to the environment. Sampling results were then evaluated, as appropriate, on both a human health and ecological risk basis.

Human health risk assessment is a process used to estimate the chance that contact with constituents in the environment may result in harm to people. Generally, there are four components to the process (USEPA, 1989): (1) Hazard Identification, (2) Toxicity Assessment, (3) Exposure Assessment, and (4) Risk Characterization.

The USEPA develops “screening levels” of constituent concentrations in groundwater (and other media) that are considered protective of specific human exposures. These screening levels are referred to as “Regional Screening Levels” and are published by USEPA and updated twice yearly (USEPA, 2018a). In developing the screening levels, USEPA uses a specific target risk level (component 4) combined with an assumed exposure scenario (component 3) and toxicity information from USEPA (component 2) to derive an estimate of a concentration of a constituent in an environmental medium, for example groundwater, (component 1) that is protective of a person in that exposure scenario (for example, drinking water). Similarly, ecological screening levels for surface water are developed by Federal agencies to be protective of the wide range of potential aquatic ecological resources, or receptors.

Risk-based screening levels are designed to provide a conservative estimate of the concentration to which a receptor (human or ecological) can be exposed without experiencing adverse health effects.

Due to the conservative methods used to derive risk-based screening levels, it can be assumed with reasonable certainty that concentrations below screening levels will not result in adverse health effects, and that no further evaluation is necessary. Concentrations above conservative risk-based screening levels do not necessarily indicate that a potential risk exists but indicate that further evaluation may be warranted.

The surface water and groundwater data were evaluated using human health risk-based and ecological risk-based screening levels drawn from Federal sources. The screening levels are used to determine if the concentration levels of constituents could pose an unacceptable risk to human health or the environment. The evaluation also considers whether constituents are present in groundwater and surface water above screening levels, and if so, if the results could be due to the ash management operations.

3.2 CONCEPTUAL SITE MODEL

There are no on-site users of alluvial groundwater adjacent to the MEC. As documented in the 2018 risk assessment report, all private and public wells recorded within a one-mile radius of the facility are upgradient of the facility or located on the opposite side of the Meramec River and, therefore, such groundwater is isolated from the facility (see the February 2018 report for more details).

3.3 RESULTS

3.3.1 Alluvial Aquifer

Figure 1-2 shows the location of the CCR monitoring wells at the MEC CCR Unit. A summary of the screening results is presented in the following table.

Table: Assessment Monitoring Reflects High Percentage Compliance

	Meramec Energy Center – Shallow Alluvial Aquifer
Percent of Assessment Monitoring Parameter Compliance	95%
Percent of Assessment Monitoring Parameter Results Requiring Corrective Action (Constituents)	5% Arsenic, Lithium, Molybdenum

The striking aspect of the analysis is how few results are above conservative GWPS applicable to the Site, given that the wells are located directly adjacent to and at the base of the surface impoundments, and the facility has been in operation for 65 years. Note that out of the 1,818 groundwater analyses conducted, only 76 results are above the GWPS. Put another way, over 95% of the groundwater results for the CCR Rule monitoring wells located at the edges of the MEC surface impoundments (MW-1 through MW-8) are below the GWPS.

3.3.2 Surface Water

The Mississippi River and the Meramec River sampling results do not show evidence of impact of constituents derived from MEC⁷.

There are no analytical results for the Mississippi River that are above drinking water screening levels with the exception of arsenic and thallium in one sampling location and the MEC is not the source⁸.

3.3.3 National Pollutant Discharge Elimination System Outfall

The outfalls for the MEC are identified as 003 and 009 and are shown on **Figure 2-2**. These are permitted outfalls under the National Pollutant Discharge Elimination System program. The outfall effluent water is tested for toxicity on a periodic basis as required by the permit. The biological toxicity testing results for Outfalls 003 and 009 at the MEC shows no evidence of aquatic toxicity in the outfall effluent.

3.4 CONCLUSION

The sampling results for the Mississippi River, the Meramec River, and the adjacent creek-drainage area are important. Although groundwater at the edge of the impoundment(s) shows that three constituents are present in some wells to a very limited extent above the GWPS, less than 5% of the results are above a GWPS, and the adjacent surface water bodies do not show evidence of impact of constituents derived from the surface impoundments at MEC. This is important because the absence of concentrations above risk-based screening levels means that there is not a significant pathway of exposure.

Impacts to groundwater do not mean that surface waters are impaired. The degree of interface between groundwater and surface waters is variable and complex and dependent upon a variety of factors including gradient and flow rate. It is possible, however, to determine the maximum concentration level that would need to be present on-site in groundwater and still be protective of the surface water environment. Groundwater and surface waters flow at very different rates and volumes and ultimately all such waters near the MEC flow towards the Mississippi River. The Mississippi is the largest river system in North America and as groundwater at the facility flows into the river, it is diluted by more than 100,000 times.

This conservative estimate of dilution is used to further understand how high an arsenic, lithium, or molybdenum groundwater concentration would have to be to potentially have an adverse impact on the Mississippi River. The tables below show how this factor is applied to the most conservative of the human health and ecological risk-based screening levels for surface water.

⁷ There are no analytical results for the Meramec River that are above drinking water screening levels, with the exception of lead. The total lead results upstream and downstream are similar and, thus, indicative of normal river conditions. Furthermore, all dissolved concentrations of lead are below the screening level, indicating that lead is associated with particulate in the river. In addition, groundwater samples on-site indicate that lead is either below screening levels or non-detected, thus, indicating that lead in the river is not attributable to the surface impoundments. Lead is not a COC at the MEC under the CCR Rule.

⁸ The arsenic concentrations in the Mississippi River, Meramec River, and the creek/drainage along the northern portion of the facility are slightly above the human health recreational screening levels, however, the concentrations are statistically no different in upstream and downstream samples for both arsenic and thallium indicating that the facility is not the source of the arsenic and thallium detected in the rivers.

CALCULATING RISK-BASED SCREENING LEVELS FOR MEC GROUNDWATER BASED ON THE MISSISSIPPI RIVER

	Estimated Dilution Factor for the Mississippi River	100,000			
Constituents	Lowest of the Human Health and Ecological Screening Levels (mg/L)	Groundwater Risk-Based Screening Level* (mg/L)	Maximum MEC Groundwater Concentration (mg/L)		Ratio Between Groundwater Risk-Based Screening Level and the Maximum MEC Groundwater Concentration
Arsenic	0.00014	14	0.0221	M-MW-5	>600
Lithium	0.04	4000	0.164	M-MW-6	>24,000
Molybdenum	0.1	10000	0.717	M-MW-7	>13,000

CALCULATING RISK-BASED SCREENING LEVELS FOR MEC GROUNDWATER BASED ON THE MERAMEC RIVER

	Estimated Dilution Factor for the Meramec River	700			
Constituents	Lowest of the Human Health and Ecological Screening Levels (mg/L)	Groundwater Risk-Based Screening Level* (mg/L)	Maximum MEC Groundwater Concentration (mg/L)		Ratio Between Groundwater Target Level and the Maximum MEC Groundwater Concentration
Arsenic	0.00014	0.098	0.0221	M-MW-5	>4
Lithium	0.04	28	0.164	M-MW-6	>100
Molybdenum	0.1	70	0.717	M-MW-7	>90

*Where the Groundwater Risk-Based Screening Level = Screening Level x Dilution Factor.

The groundwater alternative risk-based screening levels are calculated in units of milligrams of constituent per liter of water (mg/L). One mg/L is equivalent to one part per one million parts.

The tables identify the maximum groundwater concentrations of arsenic, lithium, and molybdenum detected in the MEC monitoring wells. The comparison between the target levels and the maximum concentrations indicates that there is a wide margin of safety between the two values. This margin is shown in the last column of each table. To illustrate, concentration levels of arsenic, lithium, and molybdenum would need to be **more than 600, 24,000, and 13,000 times higher**, respectively, than currently measured levels before an adverse impact in the Mississippi River could occur.

The comprehensive evaluation summarized here demonstrates that there are no adverse impacts on human health from either surface water or groundwater uses resulting from coal ash management practices at the MEC.

3.4.1 Trace Elements in Coal Ash

All of the inorganic minerals and elements that are present in coal ash are also present naturally in our environment. Arsenic, lithium, and molybdenum are referred to as trace elements, so called because they are present in soils (and in coal ash) at such low concentrations (in the milligrams per kilogram (mg/kg) or part per million (ppm) range). Together, the trace elements generally make up less

than 1 percent of the total mass of these materials. To put these concentrations into context, a mg/kg or ppm is equivalent to:

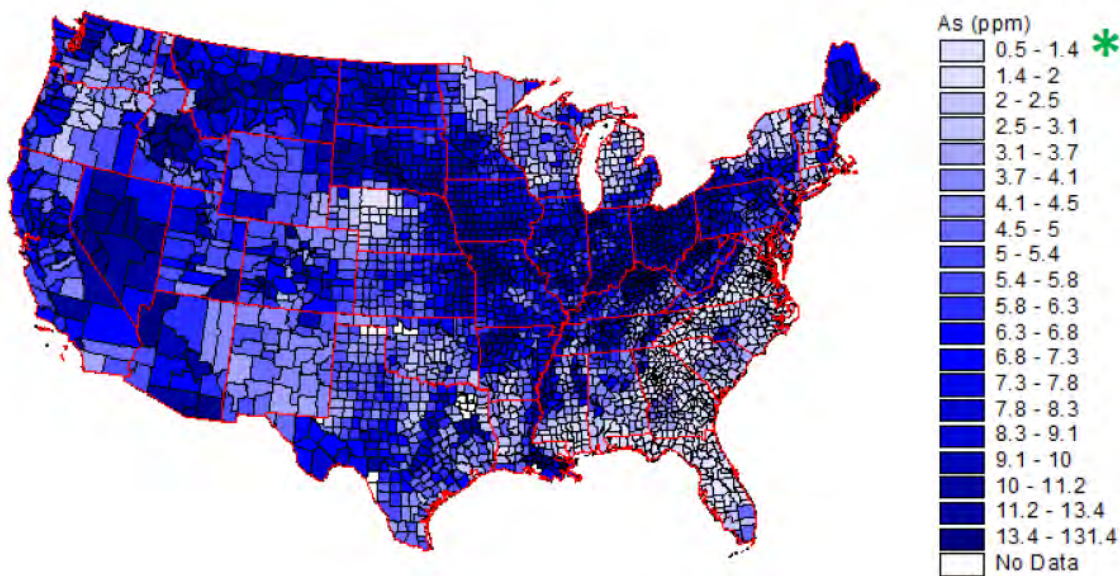
- 1 penny in a large container holding \$10,000 worth of pennies, or
- 1 second in 11.5 days, or
- 1 inch in 15.8 miles

All of the constituents present in coal ash occur naturally in our environment. U.S. Geological Survey (USGS) data demonstrate the presence of these constituents in the soils across the U.S. These soils are found in our backyards, schools, parks, etc., and because of their presence in soil, these constituents are also present in the foods we eat. Some of these constituents are present in our vitamins, such as molybdenum. Thus, we are exposed to these trace elements in our natural environment every day, and in many ways.

3.4.2 Arsenic

Arsenic is present in soils across the U.S. The USGS map of arsenic in surface soils in the U.S. is shown below.

Arsenic is Present in our Natural Environment – Background Levels in Soils in the U.S.



Source: USGS. 2013. National Geochemical Survey. <http://mrddata.usgs.gov/geochem/doc/averages/countydata.htm>

* The USEPA regional screening level for arsenic in residential soil at a one in one million risk level is 0.61 mg/kg (USEPA, 2018a). Thus, the arsenic concentration in the majority of the soils in the U.S. are above the one in one million risk level.

Because arsenic is naturally present in soils and rocks, it is also naturally present in our groundwaters and surface waters. Just as for soil, there are background levels of constituents in groundwater. Constituent concentrations in groundwater that is upgradient of a source represent background conditions. To demonstrate a release to groundwater by a source, concentrations downgradient of the

source must be greater than the background/upgradient concentrations at a statistically significant level for a consistent period of time. Thus, it is not surprising that arsenic is present in both of the CCR background wells for the MEC.

3.4.3 Lithium

Lithium is present in groundwater at the MEC at levels above the GWPS in one well location. The fact sheet in **Appendix B** provides information on lithium so that the groundwater data can be considered in context. There is no public exposure to groundwater at the MEC and concentration levels of lithium in adjacent surface waters are all well below health-based regulatory standards.

Lithium is naturally occurring in soils and water. Primary dietary sources of lithium are grains and vegetables, dairy products and meat. Estimates for daily dietary intake of lithium have been reported from different sources and varies amongst different countries. Ranges have included 0.0168 – 0.105 mg Li/day to 2.310 – 5.600 mg Li/day from food and water.

Lithium is used medicinally in the U.S. and globally as the leading treatment for bipolar disease. Adult daily dosages are approximately 900 mg/day or higher, and recommended doses for children are approximately 600 mg/day.

However, there are limited studies on lithium of the type upon which to base a toxicity value to use in human health risk assessment. USEPA has derived a provisional toxicity value (i.e., the value does not have the normal level of review or confidence compared to final toxicity values published by USEPA) that equates to a drinking water screening level of 0.04 mg/L, and a general intake of 0.14 mg/day for an adult. Note that this level is below many estimates of daily intake in humans presented above, and well below the typical therapeutic doses presented above.

3.4.4 Molybdenum

Haley & Aldrich has prepared a fact sheet (**Appendix C**) that provides information on molybdenum so that the groundwater data can be considered in context. There is no public exposure to groundwater at the MEC and concentration levels of molybdenum in adjacent surface waters are all well below health-based regulatory standards.

As discussed in more detail in **Appendix C**, molybdenum is an essential nutrient for humans, and the Institute of Medicine of the U.S. National Academy of Sciences (NAS) has provided recommended daily allowances (RDA) and tolerable upper limits (UL) to be used as guidelines for vitamins and supplements and other exposures (NAS, 2001).

The RDA for a nutrient is “the average daily dietary nutrient intake level sufficient to meet the nutrient requirement of nearly all (97 to 98 percent) health individuals” (NAS, 2001). The RDA for molybdenum for adults set by the NAS in 2001 is 0.045 mg/day and is based on the amount of molybdenum needed to achieve a steady healthy balance in the body for the majority of the population.

The UL for molybdenum set by the NAS is 2 mg/day. This level is based on an evaluation of the potential toxicity of molybdenum at high levels of intake. Based on the UL, a safe drinking water level for molybdenum is 0.6 mg/L or 600 ug/L, or six-fold higher than the level set by USEPA of 0.1 mg/L or 100 ug/L in the CCR Rule. This difference serves to underscore the conservatism of the USEPA value when evaluating groundwater under the CCR Rule. Below is a chart that depicts groundwater and surface

water samples collected from Ameren’s four energy centers and compares concentration levels based on both the NAS tolerable upper limit and the GWPS established by the USEPA in the CCR Rule. As reflected in the chart, over 90% of the groundwater results across all four energy centers and all but **one sample** at Meramec are below the standard the National Academy of Science developed for vitamins and supplements.

	Labadie	Meramec	Rush Island	Sioux
Groundwater				
Number of Samples	208	88	77	244
Molybdenum greater than CCR GWPS of 0.1 mg/L (a)	81	35	38	77
Molybdenum greater than NAS standard of 0.6 mg/L (b)	3	1	11	49
Surface Water				
Number of Samples	67	74	50	80
Molybdenum greater than 0.1 mg/L (a)	0	0	0	0

Notes:

mg/L - milligrams per liter.

(a) - Drinking water-based groundwater protection standard specified in the CCR Rule.

(b) - Alternative health-protective drinking water screening level based on the National Academy of Sciences review of molybdenum.

3.5 EVALUATION OF RISK IN THE CORRECTIVE MEASURES ASSESSMENT

In summary, there are no adverse impacts resulting from coal ash management practices at the MEC on human health or the environment from either surface water or groundwater uses. There are no users of groundwater near the MEC or its CCR units. In fact, as described above, concentrations of arsenic, lithium, and molybdenum detected in groundwater would need to be **more than 600, 24,000, and 13,000 times higher**, respectively, before such an unacceptable risk could exist under current and reasonable anticipated future uses.

Although the purpose of this CMA is to evaluate remedies to address assumed risks from the SSLs, the current conditions at the MEC, even prior to closure, do not pose an unacceptable risk to human health or the environment. Therefore, the risk-based evaluation provides additional support for the selection of a remedy moving forward.

4. Corrective Measures Alternatives

4.1 CORRECTIVE MEASURES ASSESSMENT GOALS

The overall goal of this CMA is to identify and evaluate the appropriateness of potential corrective measures to prevent further releases of Appendix IV constituents above their GWPS, to remediate releases of Appendix IV constituents detected during groundwater monitoring above their GWPS that have already occurred, and to restore groundwater in the affected area to conditions that do not exceed the GWPS for these Appendix IV constituents. The corrective measures evaluation that is discussed below and subsequent sections provides an analysis of the effectiveness of four potential corrective measures in meeting the requirements and objectives of remedies as described under §257.97 (also shown graphically on **Figure 4-1**). This assessment also meets the requirements promulgated in §257.96 which require the assessment to evaluate:

- The performance, reliability, ease of implementation, and potential impacts of appropriate potential remedies, including safety impacts, cross-media impacts, and control of exposure to residual contamination;
- The time required to complete the remedy; and
- The institutional requirements, such as state or local permit requirements or other environmental or public health requirements that may substantially affect implementation of the remedy.

The criteria listed above are included in the balancing criteria considered during the corrective measures evaluation, described in **Section 5**.

4.2 GROUNDWATER MODELING

Modeling is an analytical tool used to create estimates based on computer-simulated conditions. Groundwater flow and geochemical modeling⁹ performed by Burns & McDonnell Engineering Company, Inc. (Burns & McDonnell) evaluated the hydrogeologic and geochemical conditions at the CCR Unit. Burns & McDonnell used the numerical computer code MODFLOW to simulate groundwater flow and the software package MT3DMS to simulate groundwater transport of dissolved phase constituents.

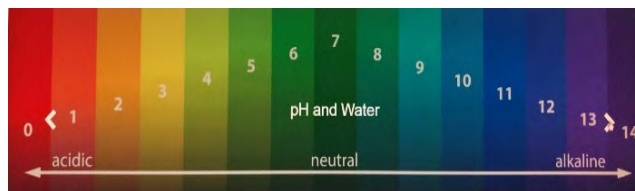
4.3 GROUNDWATER TREATMENT EVALUATION

In-situ treatment to reduce the concentrations of dissolved metals in groundwater can occur via stabilization of metals through precipitation of a metal compound, co-precipitation of the target metal within the structure of another compound, and/or sorption of the target metal onto other compounds in the subsurface. In simple terms, groundwater amendments are injected into the aquifer to create a chemical reaction that attenuates metals through precipitation or sorption.

⁹ Groundwater flow modeling was performed using MODFLOW 2000 supported by Groundwater Vistas as the graphical user interface.

Chemical precipitation is an available and demonstrated groundwater treatment technology recognized by USEPA¹⁰. Groundwater geochemistry (including oxidation reduction potential (ORP)) can greatly impact metals mobility at a site, where some metal compounds may be more soluble under highly oxidative (positive ORP) conditions while others are more soluble under reduced conditions (negative ORP). Also, the solubilities of many metal compounds are highly dependent on pH.

Ameren has retained XDD Environmental to research and develop appropriate treatment options for arsenic, lithium, and molybdenum and is performing bench-scale treatability studies to demonstrate the effectiveness of treatment options on a site-specific basis. Laboratory results indicate that through pH adjustments arsenic concentrations at the MEC will fall to below action levels. Appropriate treatment trains for molybdenum and lithium at the MEC are under evaluation and bench-scale treatment results for all four of Ameren's energy centers are expected to be completed in the Summer of 2019.



pH and Water (USGS - Water Science School publication).

4.4 CORRECTIVE MEASURES ALTERNATIVES

Corrective measures can terminate when groundwater impacted by the CCR Units does not exceed the Appendix IV GWPS for three consecutive years of groundwater monitoring. In accordance with §257.97, the groundwater corrective measures to be considered must meet, at a minimum, the following threshold criteria:

1. Be protective of human health and the environment;
2. Attain the GWPS;
3. Control the source(s) of releases so as to reduce or eliminate, to the maximum extent feasible, further releases of COCs to the environment;
4. Remove from the environment as much of the contaminated material that was released from the CCR unit as is feasible, considering factors such as avoiding inappropriate disturbance of sensitive ecosystems; and
5. Comply with standards (regulations) for waste management.

The remedial alternatives presented below contemplate both CIP (Alternative 1 through 3) and CBR (Alternative 4) of the unit. Both closure methods are expressly authorized under the CCR Rule.

4.4.1 Alternative 1 – Closure in Place with Capping and Monitored Natural Attenuation

The regulated surface impoundments would be closed in place with a low-permeability geomembrane and soil protective layer to reduce infiltration of surface water to groundwater thereby isolating source material. This cap selection exceeds regulatory requirements by more than two orders of magnitude ($<1 \times 10^{-7}$ centimeters per second (cm/sec) planned versus 1×10^{-5} cm/sec required by the CCR Rule). Over time, decreased surface water infiltration and porewater flux through the CCR would allow the concentration of COCs in downgradient groundwater to decline and overall groundwater concentrations

¹⁰EPA, "Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category: EPA's Response to Public Comments; Part 7 of 10", SE05958A6, p. 7-20

of COCs to attenuate. Geochemical modeling results indicate that the dissolved phase plume of arsenic, lithium, and molybdenum remaining above the GWPS post-closure would remain stable and within the MEC property boundary long-term as such levels attenuate. The timelines for MNA duration for arsenic, lithium, and molybdenum are shown on **Figures 4-2, 4-3, and 4-4**, respectively.

CIP can be completed safely, in compliance with applicable federal and state regulations, and be protective of public health and the environment. In general, CIP consists of installing a cap/cover designed to significantly reduce infiltration from surface water or rainwater, resist erosion, contain CCR materials, and prevent exposures to CCR. For this alternative, Ameren would install a geomembrane cover layer with a permeability that is 100 times lower than what the CCR Rule requires thus further reducing infiltration. At the MEC, site preparation, construction and installation of cap and cover systems take approximately 12 to 18 months and additional closure activities are planned for 2021 with all remaining closures expected to be completed within four years.

MNA is a viable remedial technology recognized by both state and federal regulators that is applicable to inorganic compounds in groundwater. The USEPA defines MNA as “the reliance on natural attenuation processes to achieve site-specific remediation objectives within a time frame that is reasonable compared to that offered by other more active methods”. The ‘natural attenuation processes’ that are at work in such a remediation approach include a variety of physical, chemical, or biological processes that, under favorable conditions, act without human intervention to reduce the mass, toxicity, mobility, volume, or concentration of contaminants in soil or groundwater. These in-situ processes include biodegradation; dispersion; dilution; sorption; volatilization; radioactive decay; and chemical or biological stabilization, transformation, or destruction of contaminants (USEPA, 2015). When combined with a low-permeability cap to address the source by limiting the infiltration of precipitation into and through the CCR, MNA can over time reduce concentrations of arsenic, lithium, and molybdenum in groundwater at the waste boundary.

Following the installation of the cap system, Ameren would implement post-closure care activities. Post closure care includes long-term groundwater monitoring until such time that groundwater conditions return to below regulatory levels and cap system maintenance. Future development of the capped surface could be used for solar photovoltaic arrays or other site staging/ancillary operational needs.

4.4.2 Alternative 2 – CIP with Capping and In-Situ Groundwater Treatment

Similar to Alternative 1, the regulated surface impoundments would be CIP with a low-permeability ($<1 \times 10^{-7}$ cm/sec) geomembrane to reduce infiltration of surface water to groundwater and to isolate source material. COCs would be addressed through in-situ injection of groundwater amendments downgradient of the regulated surface impoundments, or through the installation of a permeable reactive barrier (PRB). Over time, decreased surface water infiltration and porewater flux would allow the concentration of COCs to attenuate and active remediation (injections or PRB replenishment) could cease.

Following the installation of the low-permeability cover and in-situ treatment system (via a trench or injection wells), Ameren would implement post-closure care activities that include periodic amendment injections or periodic replenishment of the treatment reagents within the PRB, long-term groundwater sampling to monitor treatment system performance, and cover system maintenance. Based upon laboratory testing performed by XDD, the timeline for in-situ treatment is expected to be less than Alternative 1 as shown on **Figures 4-2, 4-3, and 4-4**.

Future development of the capped surface could be used for solar photovoltaic arrays or other site staging/ancillary operational needs.

4.4.3 Alternative 3 – CIP with Capping and Hydraulic Containment Through Groundwater Pumping and Ex-situ Treatment

The regulated surface impoundments would be closed in place with a low-permeability ($<1 \times 10^{-7}$ cm/sec) geomembrane to reduce infiltration of surface water to groundwater and isolate source material. Pumping wells would be used to hydraulically control the migration of constituents downgradient. However, pumping wells would generate large volumes of effluent that would require ex-situ treatment, likely with an ion exchange or a reverse osmosis (RO) treatment system. Both treatment systems are complex with ongoing operation and maintenance and would generate a secondary waste stream – including regeneration/replacement of the ion exchange media or concentration reject water from the RO system. Approvals and permitting would be required for the construction and installation of the treatment systems and discharge of the treated groundwater.

Implementation of a large-scale hydraulic containment (HC) system will require a detailed design effort with bench scale testing to verify groundwater treatment. Pilot testing, such as pumping tests and additional groundwater modeling, will be needed to verify the hydraulic capture zone. While HC is a widely used remediation technology, it has not been commonly used as part of a large-scale CCR unit closure strategy.

The timeline for active treatment is expected to be comparable to Alternatives 1 and 2 because treatment would continue until source concentrations attenuate to levels less than the GWPS. With active groundwater pumping along the boundary of the impoundments, such process creates a waste stream that must be permitted and managed prior to discharge back into the Meramec River.

Following the installation of the low-permeability cover, groundwater pumping well network, and ex-situ treatment system, Ameren would implement post-closure care activities that includes operation and maintenance of the hydraulic containment (HC) system, long-term groundwater sampling to monitor HC system performance, and cover system maintenance. Future development of the capped surface could be used for solar photovoltaic arrays or other site staging/ancillary operational needs.

4.4.4 Alternative 4 – Closure by Removal with Monitored Natural Attenuation

This alternative evaluates the removal of CCR from the impoundments at the Site. While this alternative would eliminate (through removal) the source, it takes over 20 years to implement during which time the impoundments would remain open and the ponded ash subject to ongoing infiltration for the duration of the removal activities. As with Alternatives 1 and 2, concentrations of COCs in downgradient groundwater would decline via natural attenuation processes.

The MEC is located in a heavily developed area of St. Louis County and, as a consequence, any large scale excavation operation would have several potential community impacts, safety concerns and challenges. Given the magnitude of the total estimated haul volume (5.2 MM CY) along with the travel distance to one or more off-site and potentially out of state landfills, injuries and fatalities would be likely. A study completed by the Lochmueller Group (Lochmueller) (**Appendix D**) estimated that the time period needed to transport material off-site to a commercial landfill could be 20 years or greater.

As the report makes clear, there is simply a limit on how much excavation and roundtrip truck hauls can occur on a given eight-hour workday. The Lochmueller study bases its time estimate on assumed productivity rates that are subject to potential disruptions (e.g., weather conditions, truck synchronizing, available landfill capacity, travel route traffic congestion, road enhancements, etc.) that could impact overall CBR timeframe. The study identified productivity targets for other Ameren facilities at approximately 200 truckloads a day (**one every 2.5 minutes**).

The presence of a nearby school just up the road from the MEC negatively impacts transportation to and from the site. It is likely that the frequency of hauling trips would need to be reduced during school days to accommodate community concerns. Haulers would need to avoid trips past the school during school arrival and departure times, thereby reducing the hauling workday from 8 hours to 5 ½ to 6 hours. Additionally, further review of local restrictions and approvals would be required to verify that any selected landfill, particularly if located in Illinois, could receive the ash for disposal.

Excavated materials from the MEC would not be suitable for beneficial use applications, due to the ash production quality and chemical reactions that occurred during the placement of class C fly ash via wet sluicing. Traditional beneficial use applications for class C fly ash, such as replacement for cement in the production of ready-mix concrete and concrete related products require the materials to be capable of reacting chemically to produce cementitious bonds. The capability to produce these chemical reactions have been expended with the wet-sluicing process of CCR into the surface impoundments. In addition, historical F ash materials at MEC site have already been recovered and utilized as part of the Taum Sauk reconstruction project. No recoverable F ash is available from the site¹¹.

Technical and logistical challenges of implementing a large-scale ash removal project also need to be considered (removal of CCR over 30-ft deep adjacent to the Meramec and Mississippi rivers). Removal activities will be difficult and require implementation of CCR stabilization methods and temporary staging/stockpiling of material for drying prior to transportation off-site; these considerations will affect productivity and increase removal duration. Excavation and construction safety during the removal duration is another major concern due to heavy equipment (bulldozers, excavators, front end loaders, off-road trucks) and dump truck operation within the active MEC site. Additional community impacts associated with the use of heavy equipment and truck traffic are also a consideration for this alternative. During the long removal period (20-years or more), the ash in the non-closed impoundments remain exposed to infiltration via precipitation.

¹¹ Information provided by Ameren technical staff, May 10, 2019.

5. Comparison of Corrective Measures Alternatives

The purpose of this section is to evaluate, compare, and rank the six corrective measures alternatives using the balancing criteria described in §257.97.

5.1 EVALUATION CRITERIA

In accordance with §257.97, remedial alternatives that satisfy the threshold criteria are then compared to four balancing (evaluation) criteria. The balancing criteria allow a comparative analysis for each corrective measure, thereby providing the basis for final corrective measure selection. The four balancing criteria include the following:

1. The long- and short-term effectiveness and protectiveness of the potential remedy(s), along with the degree of certainty that the remedy will prove successful;
2. The effectiveness of the remedy in controlling the source to reduce further releases;
3. The ease or difficulty of implementing a potential remedy; and
4. The degree to which community concerns are addressed by a potential remedy.

Public input and feedback will be considered following the public information session to be held in May 2019.

5.2 COMPARISON OF ALTERNATIVES

This section compares the alternatives to each other based on evaluation of the balancing criteria listed above. The goal of this analysis is to identify the alternative that is technologically feasible, relevant and readily implementable, provides adequate protection to human health and the environment, and minimizes impacts to the community.

A graphic is provided within each subsection below to provide a visual snapshot of the favorability of each alternative, where green represents favorable, yellow represents less favorable, and red represents unfavorable.

5.2.1 The Long- and Short-Term Effectiveness and Protectiveness of the Potential Remedy, along with the Degree of Certainty that the Remedy will Prove Successful

This balancing criterion takes into consideration the following sub criteria relative to the long-term and short-term effectiveness of the remedy, along with the anticipated success of the remedy.

5.2.1.1 *Magnitude of reduction of existing risks*

As summarized in **Section 3**, no unacceptable risk to human health and the environment exists with respect to the surface impoundments. Therefore, none of the remedial alternatives are necessary to reduce an assumed risk posed by Appendix IV constituents in groundwater because no such adverse risk currently exists. However, other types of impacts can be posed by the various remedial alternatives considered here. The remedial alternatives that pose the least external impact are Alternative 1 (CIP with MNA) because it involves the least amount of construction and operations and maintenance activities and associated impacts, and Alternative 2 (CIP with in-situ treatment) since treatment will

reduce concentrations of constituents in groundwater short-term without generating a secondary waste stream. Alternative 4 (CBR with MNA) has the highest risk to human health and the environment related to excessive and prolonged truck traffic, which increases the likelihood of roadway accidents during the period of time needed to complete the CBR project. Construction of the treatment system and the cap will be required for Alternative 3 (CIP with HC) and a waste stream including a high volume of effluent will be generated posing additional risk but this alternative, like Alternatives 1 and 2, pose a lesser risk than Alternative 4.

	Alternative 1 CIP with Cap & MNA	Alternative 2 CIP with Cap & In-Situ GW Treatment	Alternative 3 CIP with Cap & Hydraulic Containment	Alternative 4 CBR with MNA
Category 1 - Subcriteria i) Magnitude of reduction of risks				

5.2.1.2 *Magnitude of residual risks in terms of likelihood of further releases due to CCR remaining following implementation of a remedy*

Alternative 4 (CBR with MNA) has the lowest long-term residual risk in that the source material is removed. However, implementation of this alternative would take 20 years or greater to implement during which time the source material (ash) is subject to ongoing infiltration (because it remains open to the environment during removal), relative to the other alternatives. For Alternatives 1 through 3, the CCR would be CIP with the installation of a low permeability (<1 x 10⁻⁷ cm/s) geomembrane that virtually eliminates infiltration of precipitation and isolates the source material. Dissolved phase COCs to groundwater are addressed through MNA process. Alternatives 2 and 3 also provide additional measures to address potential groundwater impacts through in-situ treatment and hydraulic controls. but Alternative 3 will result in an additional waste stream.

	Alternative 1 CIP with Cap & MNA	Alternative 2 CIP with Cap & In-Situ GW Treatment	Alternative 3 CIP with Cap & Hydraulic Containment	Alternative 4 CBR with MNA
Category 1 - Subcriteria ii) Magnitude of residual risk in terms of likelihood of further release				

5.2.1.3 *The type and degree of long-term management required, including monitoring, operation, and maintenance*

Alternative 1 (CIP with MNA) is the most favorable alternative with respect to this criterion because it requires the least amount of long-term management and involves no mechanical systems as part of the remedy. Alternative 4 (CBR with MNA) is least favorable because off-site removal is estimated to take 20 years or greater to complete and is logistically complex with transportation and coordination with off-site disposers (commercial landfills). The remaining alternatives fall between Alternatives 1 and 4 because they involve active remediation systems to implement and/or maintain throughout their remediation life cycle.

	Alternative 1 CIP with Cap & MNA	Alternative 2 CIP with Cap & In-Situ GW Treatment	Alternative 3 CIP with Cap & Hydraulic Containment	Alternative 4 CBR with MNA
Category 1 - Subcriteria iii) Type and degree of long-term management required				

5.2.1.4 Short-term risks that might be posed to the community or the environment during implementation of such a remedy

The highest short-term impact posed to the community or environment would be during implementation of Alternative 4 (CBR with MNA), making this alternative the least favorable. Potential environmental impacts include noise and emissions from heavy equipment, the potential for a release during excavation and dewatering, and fugitive dust emissions. Community impacts include general impacts to the community due to increased truck traffic on public roads during the entire project duration, along with an increased potential for traffic accidents and fatalities, noise, and truck emissions.

For Alternatives 1 (CIP with MNA), 2 (CIP with in-situ treatment), and 3 (CIP with HC), risk to the community during implementation is considered the same and would be minimal compared to Alternative 4. Periodic sampling of the monitoring well network to verify treatment system effectiveness will pose no risk to the community.

	Alternative 1 CIP with Cap & MNA	Alternative 2 CIP with Cap & In-Situ GW Treatment	Alternative 3 CIP with Cap & Hydraulic Containment	Alternative 4 CBR with MNA
Category 1 - Subcriteria iv) Short term risk to community or environment during implementation				

5.2.1.5 Time until full protection is achieved

There is currently no unacceptable risk to human health and the environment associated with groundwater at the regulated surface impoundments; therefore, protection is already achieved. Based upon predictive modeling, Alternative 1 (CIP with MNA) arsenic concentrations will attain GWPS in approximately 27 years (see **Figures 4-2, 4-3, and 4-4**). Alternatives 2 (CIP with in-situ treatment) and 3 (CIP with HC) take the least amount of time for COC concentrations to attain the GWPS (see **Figures 4-2, 4-3, and 4-4**) but a waste stream is produced by implementation of Alternative 3. These two alternatives are favorable given the shorter timeframe to achieve concentrations less than the GWPS.

Alternative 4 (CBR with MNA) could take approximately 20 years or greater to fully implement followed by a period of groundwater monitoring to verify natural attenuation of the existing groundwater plume, which makes this alternative unfavorable. As detailed in the Lochmueller report, implementation is limited mainly by the amount of material that can be excavated and hauled during a workday, disposal facility capacity, and the volume of ash.

	Alternative 1 CIP with Cap & MNA	Alternative 2 CIP with Cap & In-Situ GW Treatment	Alternative 3 CIP with Cap & Hydraulic Containment	Alternative 4 CBR with MNA
Category 1 - Subcriteria v) Time until full protection is achieved				

5.2.1.6 Potential for exposure of humans and environmental receptors to remaining wastes, considering the potential threat to human health and the environment associated with excavation, transportation, re-disposal, or containment

Alternatives 1 (CIP with MNA), 2 (CIP with in-situ treatment), and 3 (CIP with HC) all have similar, minimal potential for exposure of humans and environmental receptors during regrading and cap construction; monitoring well system installation; and installation of the in-situ treatment system, or HC system. Alternative 1 (CIP with MNA) is the most favorable alternative since, aside from capping, no additional contact with CCR or impacted groundwater would be needed. Alternative 2 (CIP with in-situ treatment) is also favorable because treatment occurs below ground and no waste stream is generated. Alternative 3 (CIP with HC) is slightly less favorable since a secondary waste stream will be generated and will need to be managed either onsite or offsite, which creates a potential for exposure.

Alternative 4 (CBR with MNA) has high potential for exposure which makes this alternative the least favorable remedy for this criterion. A high potential for exposure exists during the excavation and transport of the CCR over local roadways, if Alternative 4 is implemented.

	Alternative 1 CIP with Cap & MNA	Alternative 2 CIP with Cap & In-Situ GW Treatment	Alternative 3 CIP with Cap & Hydraulic Containment	Alternative 4 CBR with MNA
Category 1 - Subcriteria vi) Potential for exposure of humans and environmental receptors to remaining wastes				

5.2.1.7 Long-term reliability of the engineering and institutional controls

Alternatives 1 (CIP with MNA), 2 (CIP with in-situ treatment), and 3 (CIP with HC) are expected to have high long-term reliability, as capping and long-term monitoring are common methods for long-term waste management. HC and ex-situ treatment (Alternatives 3) are considered reliable, proven technologies and would have high long-term reliability, but rely require bench scale testing and rely on mechanical systems to operate. Of the CIP alternatives, Alternative 1 (CIP with MNA) is considered the most favorable because no additional ongoing Operations and Maintenance (O&M) would be needed, other than periodic groundwater sampling and verification of decreasing concentrations.

For Alternatives 1 through 3, which include CIP, institutional controls such as the recording of an environmental covenant restricting the use of groundwater can easily be implemented because the surface impoundments are located on property owned by Ameren.

Alternative 4 (CBR with MNA) engineering and institutional controls would have high long-term reliability because the CCR will have been removed from the surface impoundments. With the CCR no longer in place, no additional engineering and institutional controls are anticipated.

	Alternative 1 CIP with Cap & MNA	Alternative 2 CIP with Cap & In-Situ GW Treatment	Alternative 3 CIP with Cap & Hydraulic Containment	Alternative 4 CBR with MNA
Category 1 - Subcriteria vii) Long-term reliability of engineering and institutional controls				

5.2.1.8 Potential need for replacement of the remedy

Closure of the surface impoundments by CBR (Alternative 4) is considered permanent and can be effective in appropriate circumstances. From the perspective of needing to replace the remedy, source removal (Alternative 4) is permanent but takes decades to implement.

Alternatives 1 (CIP with MNA), 2 (CIP with in-situ treatment), and 3 (CIP with HC) are expected to have permanent closures with capping in place. Should monitoring results indicate that the selected remedial alternative is not effective at reducing the concentration of COCs over time, alternate and/or additional active remedial methods for groundwater may be considered in the future.

	Alternative 1 CIP with Cap & MNA	Alternative 2 CIP with Cap & In-Situ GW Treatment	Alternative 3 CIP with Cap & Hydraulic Containment	Alternative 4 CBR with MNA
Category 1 - Subcriteria viii) Potential need for replacement of the remedy				

5.2.1.9 Long- and short-term effectiveness and protectiveness criterion summary

The graphic below provides a summary of the long- and short-term effectiveness and protectiveness of the potential remedy, along with the degree of certainty that the remedy will prove successful. Alternative 1 (CIP with MNA) is the most favorable, while Alternative 4 (CBR with MNA) is the least favorable. Alternative 1 is expected to be effective both short- and long-term and does not include additional treatment technology aside from MNA. Alternative 2 (CIP with in-situ treatment) is comparable to Alternative 1 because it has a shorter potential timeframe to meet the GWPS despite requiring treatment, but no secondary waste stream is generated. A secondary waste stream is generated under Alternative 3 (CIP with HC). Alternative 4 (CBR with MNA) will require a lengthy construction period, and therefore is not effective in the short-term, and creates short-term risk (for 20 plus years) to the community during construction. Further, to implement Alternative 4 (CBR and MNA) the CCR Units will be open to the environment during the 20 plus year removal process resulting in no source control for decades.

	Alternative 1 CIP with Cap & MNA	Alternative 2 CIP with Cap & In-Situ GW Treatment	Alternative 3 CIP with Cap & Hydraulic Containment	Alternative 4 CBR with MNA
CATEGORY 1 Long- and Short Term Effectiveness, Protectiveness, and Certainty of Success				

5.2.2 The Effectiveness of the Remedy in Controlling the Source to Reduce Further Releases

This balancing criterion takes into consideration the ability of the remedy to control a future release, and the extensiveness of treatment technologies that will be required.

5.2.2.1 The extent to which containment practices will reduce further releases

For remedial Alternatives 1 (CIP with MNA), 2 (CIP with in-situ treatment), and 3 (CIP with HC) installation of the low permeability cap will reduce the infiltration of surface water into the surface impoundments and decrease the flux of COCs to groundwater over time. Groundwater mounding and

an associated outward hydraulic gradient present during operation is expected to dissipate after closure. Alternatives 2 and 3 are considered the most favorable because treatment technologies will be implemented to further limit down-gradient migration of COCs in groundwater.

Under Alternative 4 (CBR with MNA), no further releases are anticipated following removal of the CCR material. However, the implementation of Alternative 4 is anticipated to require multiple decades to complete with MNA monitoring following completion of construction. During the period of construction, there would be no source control of the Appendix IV constituents because the CCR Units will be open to the environment.

For Alternatives 2 (CIP with in-situ treatment) and 3 (CIP with HC), additional containment or treatment practices (in-situ treatment and HC with ex-situ treatment) will address COCs in groundwater migrating downgradient from the surface impoundments, achieving the performance criteria at the waste boundary. Alternative 3, however, will create additional waste streams requiring management on and off-site. Alternative 1 will not have an additional containment technology beyond natural attenuation but is expected to reduce the concentrations below the GWPS over time.

	Alternative 1 CIP with Cap & MNA	Alternative 2 CIP with Cap & In-Situ GW Treatment	Alternative 3 CIP with Cap & Hydraulic Containment	Alternative 4 CBR with MNA
Category 2 - Subcriteria i) Extent to which containment practices will reduce further releases				

5.2.2.2 The extent to which treatment technologies may be used

No groundwater treatment technologies, other than natural attenuation, will be used for Alternatives 1 and 4. There would be no ongoing operation and maintenance of a treatment technology, other than periodic groundwater monitoring. Alternative 1 relies only on low-permeability capping, and therefore is the most favorable.

Alternative 2 will use one additional technology, in-situ treatment, while Alternatives 3 will use two additional technologies, HC and ex-situ treatment. The operation of an ex-situ treatment system will create a secondary waste stream, such as concentrated reject water (RO) requiring off-site disposal, or depleted resin (ion exchange) requiring regeneration or off-site disposal.

	Alternative 1 CIP with Cap & MNA	Alternative 2 CIP with Cap & In-Situ GW Treatment	Alternative 3 CIP with Cap & Hydraulic Containment	Alternative 4 CBR with MNA
Category 2 - Subcriteria ii) Extent to which treatment technologies may be used				

5.2.2.3 Effectiveness of the remedy in controlling the source to reduce further releases summary

The graphic below provides a summary of the effectiveness of the remedial alternatives to control the source to reduce further releases. Alternative 2 (CIP with in-situ treatment) is the most favorable, while Alternatives 1 (CIP with MNA), 3 (CIP with HC), and 4 (CBR with MNA) are the least favorable. The construction period for Alternative 2 (CIP with in-situ treatment) is expected to be brief and will begin

treating groundwater at the unit boundary immediately. Further releases under Alternative 4 (CBR with MNA) will not be addressed until construction is complete.

	Alternative 1 CIP with Cap & MNA	Alternative 2 CIP with Cap & In-Situ GW Treatment	Alternative 3 CIP with Cap & Hydraulic Containment	Alternative 4 CBR with MNA
CATEGORY 2 Effectiveness in controlling the source to reduce further releases				

5.2.3 The Ease or Difficulty of Implementing a Potential Remedy

This balancing criterion takes into consideration technical and logistical challenges required to implement a remedy, including practical considerations such as equipment availability and disposal facility capacity.

5.2.3.1 Degree of difficulty associated with constructing the technology

CIP with a low permeability cap will be straightforward and can be implemented with common construction methods for Alternatives 1 (CIP with MNA), 2 (CIP with in-situ treatment), and 3 (CIP with HC). No construction difficulties are anticipated if Alternatives 1, 2, and 3 are implemented. Specialty equipment or contractors are not required. Alternative 2 may be slightly more difficult to implement should a subsurface trench be required for a permeable barrier and Alternative 3 does require construction and installation of a treatment system. For Alternative 1, no additional treatment technology is needed other than monitoring wells for groundwater monitoring.

Alternative 4 (CBR with MNA) will be difficult to implement due to technical and logistical challenges. Alternative 4 will include large-scale excavation adjacent to the Meramec River and the transportation of 5.2 MM CY of CCR over local roadways. Alternative 4 will include large-scale construction, specialty equipment and contractors, long project durations, and significant technical challenges.

	Alternative 1 CIP with Cap & MNA	Alternative 2 CIP with Cap & In-Situ GW Treatment	Alternative 3 CIP with Cap & Hydraulic Containment	Alternative 4 CBR with MNA
Category 3 - Subcriteria i) Degree of difficulty associated with constructing the technology				

5.2.3.2 Expected operational reliability of the technologies

Alternative 1 (CIP with MNA) is considered the most favorable from an operational perspective because capping with MNA has a proven track record and requires limited O&M. Alternatives 2 and 3 are expected to be reliable but will utilize additional groundwater treatment technologies. Alternative 4 (CBR with MNA) is considered a reliable alternative as all CCR material would be removed, although implementation would be challenging.

	Alternative 1 CIP with Cap & MNA	Alternative 2 CIP with Cap & In-Situ GW Treatment	Alternative 3 CIP with Cap & Hydraulic Containment	Alternative 4 CBR with MNA
Category 3 - Subcriteria ii) Expected operational reliability of the technologies				

5.2.3.3 *Need to coordinate with and obtain necessary approvals and permits from other agencies*

Alternative 1 (CIP with MNA) is the most favorable since the implementation of the remedy is straightforward and only includes capping and MNA. Alternative 4 (CBR with MNA) will require confirmation that off-site landfills are permitted to accept the ash and that there are no local siting restrictions that apply and permitting for large-scale construction will likely be required. Permitting is expected to be straightforward for CIP Alternatives 2 and 3. Additional approval and permitting may be required for Alternative 2 (CIP with in-situ treatment) because this alternative includes subsurface application of groundwater amendments and permitting would likely be required for Alternative 3 for treated groundwater discharge.

	Alternative 1 CIP with Cap & MNA	Alternative 2 CIP with Cap & In-Situ GW Treatment	Alternative 3 CIP with Cap & Hydraulic Containment	Alternative 4 CBR with MNA
Category 3 - Subcriteria iii) Need to coordinate with and obtain necessary approvals and permits from other agencies				

5.2.3.4 *Availability of necessary equipment and specialists*

Alternative 1 (CIP with MNA) is the most favorable since specialty equipment and specialists will not be required to implement the MNA remedy. Equipment needed to implement Alternatives 2 and 3 are expected to be readily available.

Alternative 4 (CBR with MNA) is the least favorable since specialty remediation contractors will be needed to implement full removal, which will include large-scale construction and transportation of material to off-site disposal facilities.

	Alternative 1 CIP with Cap & MNA	Alternative 2 CIP with Cap & In-Situ GW Treatment	Alternative 3 CIP with Cap & Hydraulic Containment	Alternative 4 CBR with MNA
Category 3 - Subcriteria iv) Availability of necessary equipment and specialists				

5.2.3.5 *Available capacity and location of needed treatment, storage, and disposal services*

The Lochmueller Study assists in the evaluation of the CBR alternative (Alternative 4) by evaluating available capacity at an Illinois landfill reasonably proximate to the MEC that could potentially receive CCR for disposal. Three such landfills were identified in the main report text associated with material disposal from a separate Ameren site. However, further work would be required to confirm that the landfills identified are permitting to accept the ash for disposal and that there are no local siting restrictions preventing those landfills from accepting the ash material. Due to the disposal requirements, Alternative 4 (CBR with MNA) is the least favorable alternative.

Because the regulated surface impoundments will be CIP for Alternatives 1, 2, and 3, treatment, storage, and disposal services for CCR material will not be needed. Temporary stockpiling of CCR during regrading and capping can be completed within the current boundaries of the ash unit. Alternative 1 is the most favorable alternative since no active treatment is included. For Alternative 3, the ex-situ treatment system will generate a concentrated waste stream which will require off-site transportation and disposal that the other alternatives would not require.

	Alternative 1 CIP with Cap & MNA	Alternative 2 CIP with Cap & In-Situ GW Treatment	Alternative 3 CIP with Cap & Hydraulic Containment	Alternative 4 CBR with MNA
<i>Category 3 - Subcriteria v)</i> Available capacity and location of needed treatment, storage, and disposal services				

5.2.3.6 *Ease or difficulty of implementation summary*

The graphic below provides a summary of the ease or difficulty that will be needed to implement each alternative. Alternative 1 (CIP with MNA) is the most favorable, while Alternative 4 (CBR with MNA) is the least favorable.

	Alternative 1 CIP with Cap & MNA	Alternative 2 CIP with Cap & In-Situ GW Treatment	Alternative 3 CIP with Cap & Hydraulic Containment	Alternative 4 CBR with MNA
CATEGORY 3 Ease of implementation				

6. Summary

This Corrective Measures Assessment has evaluated the following alternatives:

- Alternative 1 – Closure in Place with Capping and Monitored Natural Attenuation
- Alternative 2 – CIP with Capping and In-Situ Groundwater Treatment
- Alternative 3 – CIP with Capping and Hydraulic Containment Through Groundwater Pumping and Ex-situ Treatment
- Alternative 4 – Closure by Removal with Monitored Natural Attenuation

In accordance with §257.97, each of these alternatives has been evaluated in the context of the following threshold criteria:

- Be protective of human health and the environment;
- Attain the GWPS;
- Control the source(s) of releases so as to reduce or eliminate, to the maximum extent feasible, further releases of COCs to the environment;
- Remove from the environment as much of the contaminated material that was released from the CCR units as is feasible, considering factors such as avoiding inappropriate disturbance of sensitive ecosystems; and
- Comply with standards (regulations) for waste management.

In addition, in accordance with §257.97(c), each of the alternatives has been evaluated in the context of the following balancing criteria:

- The long- and short-term effectiveness and protectiveness of the potential remedy(s), along with the degree of certainty that the remedy will prove successful based on consideration of eight factors.
- The effectiveness of the remedy in controlling the source to reduce further releases based on consideration of the extent to which containment practices will reduce further releases and the extent to which treatment technologies may be used.
- The ease or difficulty of implementing a potential remedy(s) based on consideration of five types of factors

This Corrective Measures Assessment, and the input received during the public comment period, will be used to identify a final corrective measure for implementation at the MEC.

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TABLES

TABLE I
GROUNDWATER ANALYTICAL RESULTS - APPENDIX IV CONSTITUENTS
CORRECTIVE MEASURES ASSESSMENT
AMEREN MERAMEC ENERGY CENTER - ST. LOUIS COUNTY, MISSOURI

Monitoring Well ID	Date Sampled	Antimony Total ug/L	Arsenic Total ug/L	Barium Total ug/L	Beryllium Total ug/L	Cadmium Total ug/L	Chromium Total ug/L	Fluoride Total mg/L	Cobalt Total ug/L	Lead Total ug/L	Lithium Total ug/L	Mercury Total ug/L	Molybdenum Total ug/L	Selenium Total ug/L	Thallium Total ug/L	
	Site GWPS	6	10	2000	4	5	100	4	6	15	40	2	100	50	2	
BMW-1	5/13/2016	0.71 J	1.2	254	1 U	0.5 U	1 U	0.42	5 U	5 U	16	0.2 U	5.6 J	0.39 J	1 U	
	6/16/2016	1 U	1.3	239	1 U	0.5 U	0.50 J	0.42	5 U	5 U	12	0.2 U	6.6 J	0.32 J	1 U	
	7/19/2016	0.081 J	5.5	232	1 U	0.5 U	0.47 J	0.37	5 U	5 U	15.2	0.2 U	6.8 J	1 U	1 U	
	9/7/2016	0.62 J	0.99 J	237	1 U	0.5 U	1 U	0.38	5 U	5 U	13.4	0.2 U	7.2 J	0.36 J	1 U	
	11/10/2016	0.64 J	1.1	230	1 U	0.5 U	0.46 J	0.44	5 U	5 U	14.2	0.2 U	20 U	0.29 J	1 U	
	1/6/2017	1 U	0.89 J	241	1 U	0.5 U	1 U	0.44	5 U	5 U	14.6	0.2 U	5.4 J	0.19 J	1 U	
	3/7/2017	0.60 J	2.1	221	1 U	0.5 U	1.8	0.39	5 U	5 U	14.9	0.2 U	6.7 J	0.18 J	1 U	
	6/14/2017	0.60 J	1.7	224	1 U	0.5 U	1 U	0.38	5 U	5 U	12.8	0.2 U	6.4 J	0.11 J	1 U	
	11/6/2017							0.48								
	4/4/2018	0.51 J	1.9	237	1 U	0.5 U	0.11 J	0.18 J	5 U	10 U	13.8	0.2 U	4.3 J	1 U	1 U	
	5/17/2018		1.5	251				1 U	0.36			500 UO		5.1 J		
11/19/2018		1.4	204				0.11 J	0.43			15		4.6 J			
BMW-2	3/29/2016	1 U	0.80 J	485	1 U	0.5 U	0.62 J	0.38	5 U	5 U	5.7 J	0.2 U	20 U	1 U	1 U	
	5/13/2016	1 U	1.3	538	1 U	0.5 U	1 U	0.34	5 U	3.1 J	8.3 J	0.2 U	20 U	1 U	1 U	
	7/19/2016	0.63 J	1.2	503	1 U	0.5 U	0.36 J	0.25	5 U	5 U	6.8 J	0.2 U	0.53 J	0.28 J	1 U	
	9/7/2016	1 U	1.2	534	1 U	0.5 U	0.65 J	0.34	5 U	3.5 J	10 U	0.2 U	20 U	1 U	1 U	
	11/10/2016	1 U	1.6	528	1 U	0.5 U	0.66 J	0.28	5 U	5 U	6.9 J	0.2 U	20 U	1 U	1 U	
	1/6/2017	1 U	1.8	553	1 U	0.5 U	1 U	0.26	5 U	5 U	7.5 J	0.2 U	20 U	1 U	1 U	
	3/7/2017	1 U	1.5	566	1 U	0.5 U	1.2	0.28	5 U	5 U	7.4 J	0.2 U	20 U	1 U	1 U	
	6/14/2017	1 U	1.8	547	1 U	0.5 U	1 U	0.27	5 U	2.5 J	5.6 J	0.2 U	20 U	1 U	1 U	
	11/6/2017							0.28								
	4/4/2018	1 U	1.1	537	1 U	0.31 J	0.45 J	0.10 J	5 U	10 U	9.3 J	0.2 U	20 U	1 U	1 U	
	5/17/2018		1.7	566				1 U	0.31			500 UO		10 U		
11/19/2018		1.1	524				0.45 J	0.35			6.5 J		20 U			
MW-1	3/29/2016	0.063 J	0.83 J	352	1 U	0.042 J	0.97 J	0.3	1.5 J	5 U	10 U	0.2 U	20 U	1 U	1 U	
	5/17/2016	1 U	0.63 J	375	1 U	0.5 U	1 U	0.3	5 U	4.3 J	10 U	0.041 J	0.84 J	1 U	1 U	
	7/18/2016	1 U	0.49 J	374	1 U	0.5 U	0.79 J	0.25	5 U	4.9 J	10 U	0.2 U	20 U	1 U	1 U	
	9/8/2016	1 U	0.62 J	378	1 U	0.5 U	0.88 J	0.22	5 U	5 U	10 U	0.2 U	20 U	1 U	1 U	
	11/10/2016	1 U	0.46 J	364	1 U	0.5 U	0.77 J	0.24	5 U	5 U	10 U	0.2 U	20 U	1 U	1 U	
	1/6/2017	1 U	0.38 J	357	1 U	0.5 U	1 U	0.25	5 U	5 U	10 U	0.2 U	20 U	1 U	1 U	
	3/7/2017	1 U	0.67 J	372	1 U	0.5 U	1 U	0.25	5 U	5 U	10 U	0.2 U	20 U	1 U	0.064 J	
	6/14/2017	0.032 J	1 U	374	0.23 J	0.5 U	1.6	0.23	5 U	5 U	10 U	0.2 U	20 U	1 U	0.076 J	
	11/6/2017							0.26								
	4/4/2018	0.028 J	0.71 J	359	0.17 J	0.22 J	0.74 J	0.069 J	5 U	10 U	7.1 J	0.2 U	20 U	0.10 J	1 U	
	5/18/2018		1.2	358				0.52 J	0.28			500 UO		10 U		
11/20/2018		0.68 J	370				0.36 J	0.3			5.3 J		20 U			
MW-2	3/29/2016	1 U	2	471	1 U	0.5 U	0.74 J	0.17 J	5 U	2.6 J	10 U	0.2 U	1.2 J	1 U	1 U	
	5/16/2016	1 U	2.5	500	1 U	0.5 U	1 U	0.16 J	5 U	2.8 J	6.0 J	0.040 J	20 U	1 U	1 U	
	7/18/2016	1 U	1.4	490	1 U	0.5 U	0.43 J	0.11 J	5 U	5 U	6.1 J	0.2 U	2.1 J	1 U	1 U	
	9/8/2016	1 U	1.6	515	1 U	0.5 U	1.3	0.088 J	5 U	2.7 J	10 U	0.2 U	20 U	1 U	1 U	
	11/10/2016	1 U	1.3	491	1 U	0.5 U	0.70 J	0.11 J	5 U	5 U	6.0 J	0.2 U	20 U	1 U	1 U	
	1/6/2017	1 U	1.5	456	1 U	0.5 U	1 U	0.093 J	5 U	5 U	10 U	0.2 U	20 U	1 U	1 U	
	3/7/2017	1 U	1.8	466	1 U	0.5 U	1.7	0.11 J	5 U	5 U	5.2 J	0.2 U	20 U	1 U	1 U	
	6/14/2017	1 U	1.6	393	1 U	0.5 U	1 U	0.2 U	5 U	2.4 J	3.2 J	0.2 U	2.5 J	1 U	1 U	
	11/6/2017							0.11 J								
	1/2/2018							0.15 J								
	4/4/2018	0.16 J	1.8	324	1 U	0.5 U	0.16 J	0.2 U	5 U	10 U	8.2 J	0.2 U	20 U	1 U	1 U	
5/17/2018		2.5	328				1 U	0.13 J			500 UO		10 U			
11/19/2018		1.7	299				0.31 J	0.2 U			6.4 J		20 U			
MW-3	3/29/2016	1 U	4.6	238	1 U	0.5 U	0.93 J	0.14 J	1.0 J	5 U	10 U	0.2 U	2.5 J	1 U	1 U	
	5/17/2016	1 U	6.1	255	1 U	0.5 U	1 U	0.14 J	5 U	5 U	8.0 J	0.041 J	1.9 J	1 U	1 U	
	7/18/2016	1 U	1 UO	253	1 U	0.5 U	0.50 J	0.082 J	5 U	5 U	7.1 J	0.2 U	3.4 J	1 U	1 U	
	9/8/2016	1 U	7.7	270	1 U	0.5 U	1 U	0.076 J	1.0 J	5 U	10 U	0.2 U	20 U	1 U	1 U	
	11/10/2016	1 U	7.8	244	1 U	0.5 U	0.52 J	0.091 J	1.5 J	5 U	5.6 J	0.2 U	20 U	1 U	1 U	
	1/6/2017	1 U	6.6	201	1 U	0.5 U	1 U	0.079 J	5 U	5 U	5.1 J	0.2 U	3.1 J	1 U	1 U	
	3/7/2017	1 U	7.9	217	1 U	0.5 U	1 U	0.13 J	5 U	5 U	8.1 J	0.2 U	5.0 J	1 U	0.053 J	
	6/14/2017	0.031 J	7.1	206	1 U	0.5 U	1 U	0.2 U	1.7 J	2.5 J	3.7 J	0.2 U	5.2 J	1 U	0.061 J	
	11/6/2017							0.2 U								
	4/4/2018	1 U	8.1	253	1 U	0.11 J	0.34 J	0.2 U	5 U	10 U	9.0 J	0.2 U	2.6 J	1 U	1 U	
	5/17/2018		8.3	264				0.64 J	0.12 J			500 UO		10 U		
11/19/2018		7.8	232				1 U	0.2 U			10 U		3.6 J			

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GROUNDWATER ANALYTICAL RESULTS - APPENDIX IV CONSTITUENTS
CORRECTIVE MEASURES ASSESSMENT
AMEREN MERAMEC ENERGY CENTER - ST. LOUIS COUNTY, MISSOURI

Monitoring Well ID	Date Sampled	Antimony Total	Arsenic Total	Barium Total	Beryllium Total	Cadmium Total	Chromium Total	Fluoride Total	Cobalt Total	Lead Total	Lithium Total	Mercury Total	Molybdenum Total	Selenium Total	Thallium Total	
	Site GWPS	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	mg/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	
		6	10	2000	4	5	100	4	6	15	40	2	100	50	2	
MW-4	3/29/2016	1 U	10.5	222	1 U	0.5 U	0.68 J	0.21	5 U	5 U	22.4	0.2 U	51.7	1 U	1 U	
	5/16/2016	1 U	13	222	0.47 J	0.5 U	1 U	0.21	5 U	3.6 J	22.7	0.2 U	49.7	1 U	1 U	
	7/19/2016	1 U	13.3 J	216	1 U	0.5 U	1	0.15 J	5 U	5 U	23.2	0.2 U	54	1 U	1 U	
	9/8/2016	1 U	13.7	229	1 U	0.5 U	0.61 J	0.13 J	5 U	5 U	20.3	0.2 U	52.5	1 U	1 U	
	11/10/2016	1 U	14.5	213	1 U	0.5 U	0.56 J	0.16 J	5 U	5 U	26.3	0.2 U	54.4	1 U	1 U	
	1/6/2017	1 U	13.3	214	1 U	0.5 U	1 U	0.12 J	5 U	2.7 J	22.4	0.2 U	50.4	1 U	1 U	
	3/7/2017	1 U	14.6	228	1 U	0.5 U	1 U	0.18 J	5 U	5 U	23.5	0.2 U	53.8	1 U	1 U	
	6/14/2017	1 U	14.8	219	0.23 J	0.5 U	1 U	0.12 J	5 U	5 U	20.9	0.2 U	56	1 U	1 U	
	11/6/2017							0.14 J								
	4/4/2018	0.027 J	14.4	214	0.28 J	0.16 J	0.33 J	0.2 U	5 U	10 U	27	0.2 U	55	0.12 J	1 U	
	5/17/2018		15	218				1 U	0.18 J			500 UO		55.6		
11/19/2018		14.8	200				0.25 J	0.2 U			23.3		51.1			
MW-5	3/29/2016	1 U	8	289	1 U	0.5 U	0.42 J	0.25	5 U	5 U	19.6	0.2 U	82.2	1 U	1 U	
	5/13/2016	1 U	13.4	292	1 U	0.5 U	1 U	0.25	5 U	4.2 J	21.2	0.2 U	74.4	1 U	1 U	
	7/19/2016	1 U	17.1	293	1 U	0.5 U	1 U	0.21	5 U	3.3 J	20.9	0.2 U	84	1 U	1 U	
	9/8/2016	1 U	18.7	301	1 U	0.5 U	0.42 J	0.16 J	5 U	3.2 J	18.3	0.2 U	83.8	1 U	1 U	
	11/10/2016	1 U	19.9	305	1 U	0.5 U	0.37 J	0.25 J	5 U	5 U	25.3	0.2 U	90.4	1 U	1 U	
	1/6/2017	1 U	20.6	304	1 U	0.052 J	1 U	0.17 J	5 U	5 U	22.9	0.2 U	96.5	1 U	1 U	
	3/7/2017	1 U	21.9	312	1 U	0.5 U	1 U	0.21	5 U	5 U	23.1	0.2 U	93.7	1 U	1 U	
	6/14/2017	1 U	21	308	1 U	0.5 U	1 U	0.16 J	5 U	5 U	20.2	0.2 U	97.3	1 U	1 U	
	11/6/2017							0.18 J								
	4/5/2018	1 U	22.1	245	1 U	0.5 U	0.22 J	0.10 J	5 U	10 U	26.2	0.2 U	98.3	1 U	1 U	
	5/18/2018		22.1	259				1 U	0.24			500 UO		105		
	11/19/2018		1.8	195				0.14 J	0.22			18.1		101		
	1/24/2019		19.7													
MW-6	3/30/2016	0.062 J	5	75.4	1 U	0.5 U	0.37 J	0.17 J	0.86 J	5 U	129	0.2 U	137	1 U	1 U	
	5/13/2016	1 U	8.3	94.4	1 U	0.5 U	1 U	0.15 J	0.74 J	5 U	164	0.2 U	124	1 U	1 U	
	7/19/2016	1 U	1 U	72.5	1 U	0.5 U	1 U	0.13 J	5.7	5 U	130	0.2 U	129	1 U	1 U	
	9/8/2016	1 U	4.8	69.3	1 U	0.5 U	1 U	0.097 J	3.8 J	5 U	123	0.2 U	120	1 U	1 U	
	11/10/2016	0.066 J	3	66.8	1 U	0.5 U	0.54 J	0.38	6.1	5 U	130	0.2 U	135	1 U	1 U	
	1/6/2017	1 U	2.5	66.5	1 U	0.050 J	1 U	0.10 J	6.5	5 U	138	0.2 U	163	1 U	1 U	
	3/7/2017	0.030 J	4	66.3	1 U	0.5 U	1 U	0.16 J	5.7	2.7 J	140	0.2 U	157	1 U	0.038 J	
	6/15/2017	0.073 J	2.3	59.6	1 U	0.027 J	1 U	0.12 J	7.8	5 U	129	0.2 U	147	1 U	1 U	
	11/6/2017							0.3								
	4/3/2018	0.043 J	4.9	53.8	0.36 J	0.069 J	2.4	0.13 J	4.1 J	10 U	144	0.2 U	134	1 U	1 U	
	5/18/2018		5.5	55				0.71 J	0.15 J					140		
11/19/2018		2.9	49.4				0.12 J	0.2 U					131			
MW-7	3/29/2016	0.41 J	2.6	57.4	1 U	0.081 J	0.91 J	0.31	5 U	5 U	37.8	0.2 U	451	1.5	1 U	
	5/13/2016	0.37 J	3.8	59.6	1 U	0.11 J	1 U	0.36	1.2 J	5 U	40.3	0.2 U	338	0.55 J	1 U	
	7/19/2016	0.065 J	3.7	49.1	1 U	0.5 U	0.74 J	0.25	5 U	5 U	50.9	0.2 U	359	1 U	1 U	
	9/7/2016	0.40 J	2.4	44.8	1 U	0.5 U	1 U	0.52	5 U	5 U	43.6	0.2 U	351	10.3	1 U	
	11/10/2016	0.39 J	2.4	43.3	1 U	0.22 J	0.57 J	0.6	5 U	5 U	58.3	0.2 U	331	12.9	1 U	
	1/6/2017	1 U	2.4	51.5	1 U	0.33 J	1 U	0.64	5 U	2.7 J	71.1	0.2 U	297	16.6	1 U	
	3/7/2017	0.44 J	2.5	56	1 U	0.20 J	1 U	0.3	5 U	2.8 J	74.2	0.2 U	314	7.7	0.11 J	
	6/15/2017	0.39 J	2.1	36.3	1 U	0.14 J	1.5	0.46	5 U	5 U	38.1	0.2 U	717	0.61 J	0.13 J	
	11/6/2017							0.61								
	1/3/2018							0.35								
	4/3/2018	0.42 J	3.2	41.8	0.35 J	0.22 J	1 U	0.31 J	5 U	10 U	62	0.2 U	502	0.45 J	0.12 J	
	5/18/2018		4.8	40.2				1 U	0.4			287 J		560		
	11/19/2018		2.6	37.9				0.25 J	0.31 J			48.6		461		

TABLE I
GROUNDWATER ANALYTICAL RESULTS - APPENDIX IV CONSTITUENTS
CORRECTIVE MEASURES ASSESSMENT
AMEREN MERAMEC ENERGY CENTER - ST. LOUIS COUNTY, MISSOURI

Monitoring Well ID	Date Sampled	Antimony Total	Arsenic Total	Barium Total	Beryllium Total	Cadmium Total	Chromium Total	Fluoride Total	Cobalt Total	Lead Total	Lithium Total	Mercury Total	Molybdenum Total	Selenium Total	Thallium Total	
		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	mg/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
	Site GWPS	6	10	2000	4	5	100	4	6	15	40	2	100	50	2	
MW-8	3/30/2016	0.060 J	6.6	179	1 U	0.5 U	0.88 J	0.29	5 U	5 U	27.6	0.2 U	229	1 U	1 U	
	5/16/2016	1 U	6.2	218	1 U	0.5 U	1 U	0.28	5 U	4.8 J	30.4	0.047 J	204	1 U	1 U	
	7/19/2016	0.38 J	2.1	236	1 U	0.11 J	1 U	0.23	5 U	5 U	32	0.2 U	215	9	1 U	
	9/8/2016	1 U	5.6	234	1 U	0.5 U	1 U	0.20 J	5 U	5 U	26.1	0.2 U	211	1 U	1 U	
	11/10/2016	1 U	5.9	211	1 U	0.5 U	1 U	0.21	5 U	5 U	30.8	0.2 U	212	1 U	1 U	
	1/6/2017	1 U	5.2	226	1 U	0.052 J	1 U	0.34	5 U	5 U	32.2	0.2 U	207	1 U	1 U	
	3/7/2017	0.37 J	6.1	240	1 U	0.5 U	1.2	0.22	5 U	5.2	33	0.2 U	213	1 U	1 U	
	6/14/2017	1 U	5.8	227	1 U	0.5 U	1 U	0.2	5 U	5 U	31.4	0.2 U	190	1 U	1 U	
	11/6/2017							0.23								
	4/5/2018	1 U	6	199	1 U	0.035 J	0.20 J	0.20 J	0.2 UO	5 U	3.4 J	32.4	0.2 U	192	1 U	1 U
	5/17/2018		6.5	196				1 U	0.23			500 UO		205		
11/19/2018		5.8	168				1 U	0.22			33.7		183			
AMW-1	11/20/2018	1 U	18	325	1 U	0.5 U	0.19 J	0.19 J	5 U	10 U	16.4	0.2 U	39.1	1 U	1 U	
AMW-2	11/19/2018	1 U	11.7	147	1 U	0.5 U	0.23 J	0.3	5 U	10 U	36	0.2 U	4.3 J	1 U	1 U	
TP-1	11/20/2018	1 U	1.9	386	1 U	0.039 J	0.17 J	0.3	5 U	4.1 J	17.2	0.2 U	3.1 J	1 U	1 U	
TP-2	11/19/2018	1 U	3.8	58.8	1 U	0.5 U	1 U	0.36	5 U	10 U	42.7	0.2 U	6.2 J	1 U	1 U	

Notes:

49 Bold denotes concentration exceeding the GWPS

Blank cells - Constituent not included in this analysis.

mg/L - milligrams per liter.

ug/L - micrograms per liter.

GWPS - Groundwater Protection Standard.

Qualifiers:

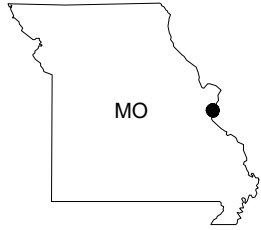
J - Value is estimated.

U - Constituent was not detected, value is the reporting limit.

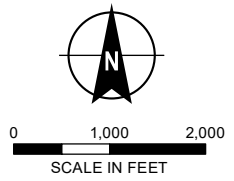
O - Value identified as an outlier.

Site GWPS is either the MCL/Health Based GWPS or based on background levels (calculated as described in the Statistical Analysis Plan for Assessment Monitoring), whichever is higher.
 GWPS and background values calculated using baseline sampling results from monitoring wells BMW-1 and BMW-2.

FIGURES



- LEGEND**
- MERMEC ENERGY CENTER PROPERTY BOUNDARY
 - ACTIVE SURFACE IMPOUNDMENT
 - EXEMPT SURFACE IMPOUNDMENT
 - CAPPED AND CLOSED SURFACE IMPOUNDMENT



NOTES
 1. ALL LOCATIONS AND BOUNDARIES ARE APPROXIMATE.
 2. IMAGERY SOURCE: ESRI



CORRECTIVE MEASURES ASSESSMENT
 AMEREN MISSOURI MERAMEC ENERGY CENTER
 ST. LOUIS COUNTY, MISSOURI

SITE LOCATION MAP

MAY 2019

FIGURE 1-1

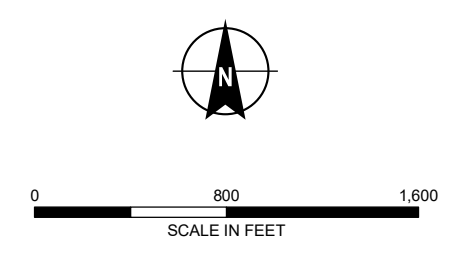
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LEGEND

- CCR GROUNDWATER MONITORING WELL
- REGULATED SURFACE IMPOUNDMENT
- ACTIVE SURFACE IMPOUNDMENT
- CAPPED AND CLOSED SURFACE IMPOUNDMENT
- EXEMPT SURFACE IMPOUNDMENT
- MERAMEC ENERGY CENTER PROPERTY BOUNDARY

- NOTES**
1. ALL LOCATIONS AND BOUNDARIES ARE APPROXIMATE.
 2. CCR - COAL COMBUSTION RESIDUALS.
 3. AERIAL IMAGERY SOURCE: ESRI



HALEY ALDRICH CORRECTIVE MEASURES ASSESSMENT
AMEREN MERAMEC ENERGY CENTER
ST. LOUIS COUNTY, MISSOURI

SITE FEATURES














MAY 2019

FIGURE 1-2

GIS FILE PATH: \\haleyaldrich.com\share\cde_common\Projects\132002 - Ameren Ash Pond Closure Assessment\005-Meramec\GIS\Maps\2019_05\132002_008_0002_MW_ABOVE_GWPS.mxd — USER: hwachholz — LAST SAVED: 5/14/2019 9:27:28 AM



LEGEND

-  CCR GROUNDWATER MONITORING WELL
-  NATURE AND EXTENT MONITORING WELL
-  NATURE AND EXTENT PIEZOMETER
-  REGULATED SURFACE IMPOUNDMENT
-  ACTIVE SURFACE IMPOUNDMENT
-  CAPPED AND CLOSED SURFACE IMPOUNDMENT
-  EXEMPT SURFACE IMPOUNDMENT
-  MERAMEC ENERGY CENTER PROPERTY BOUNDARY
-  MW-4 As = ARSENIC CONCENTRATION ABOVE THE GWPS
-  MW-5 As = ARSENIC CONCENTRATION ABOVE THE GWPS
-  MW-6 Li = LITHIUM CONCENTRATION ABOVE THE GWPS
-  MW-7 Mo = MOLYBDENUM CONCENTRATION ABOVE THE GWPS
-  MW-8 Mo = MOLYBDENUM CONCENTRATION ABOVE THE GWPS

NOTES

1. ALL LOCATIONS AND BOUNDARIES ARE APPROXIMATE.
2. CCR - COAL COMBUSTION RESIDUALS.
3. GWPS- GROUNDWATER PROTECTION STANDARD
4. AERIAL IMAGERY SOURCE: ESRI

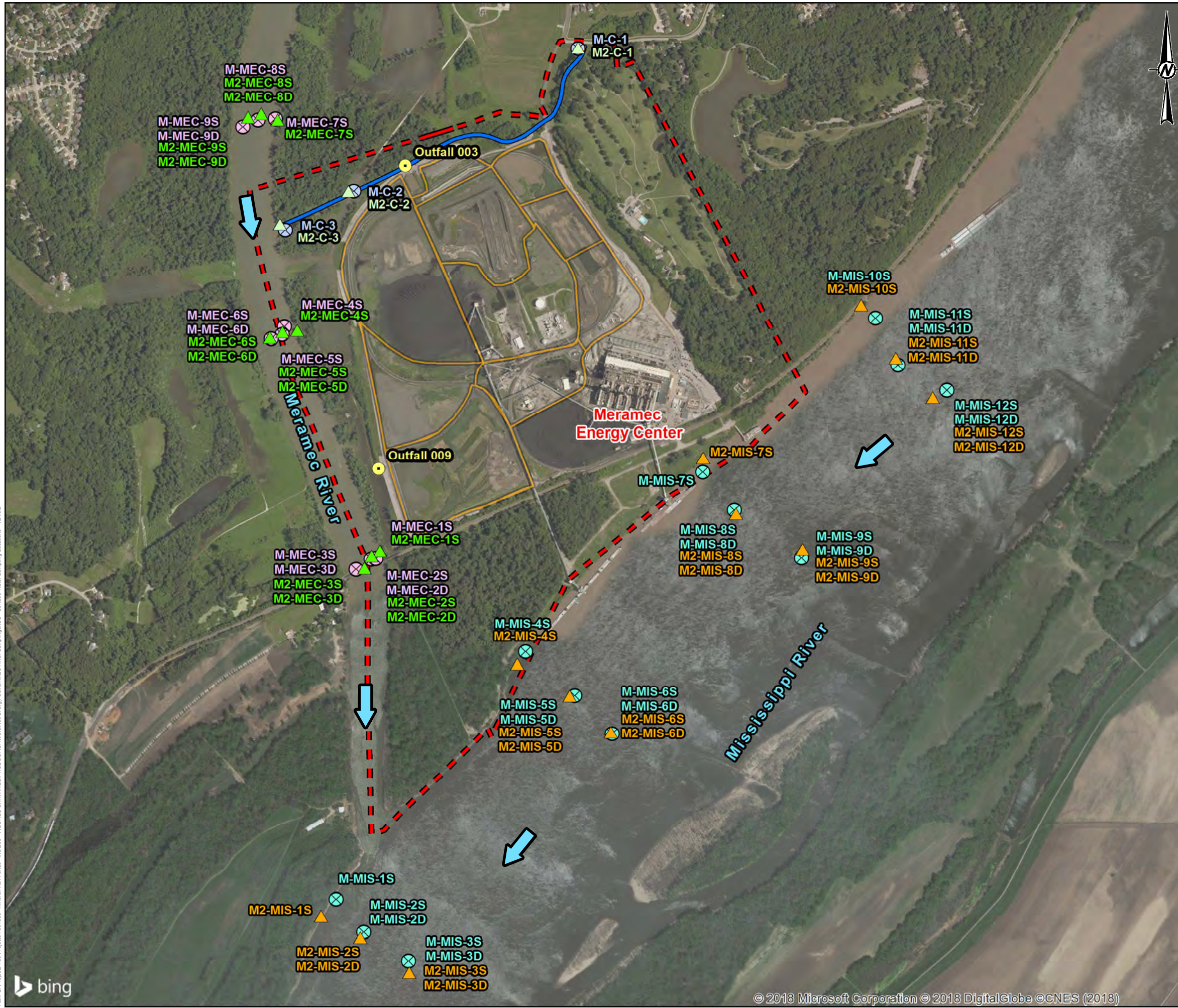


HALEY ALDRICH CORRECTIVE MEASURES ASSESSMENT
AMEREN MERAMEC ENERGY CENTER
ST. LOUIS COUNTY, MISSOURI

MONITORING WELL LOCATIONS WITH STATISTICALLY SIGNIFICANT LEVELS ABOVE THE GWPS

MAY 2019

FIGURE 2-1



LEGEND

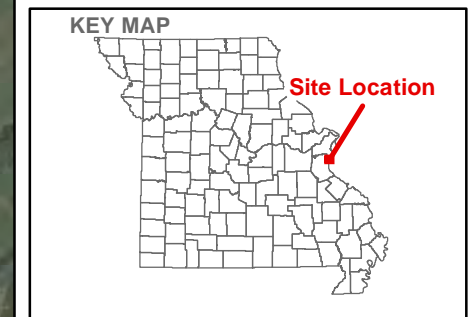
- Meramec Energy Center Property Boundary
- Unnamed Creek/Drainage
- NPDES Outfall Location
- All Surface Impoundments

May 2018 Surface Water Samples (M2)

- Small Creek/Drainage Sample
- Meramec River Sample
- Mississippi River Sample

September 2017 Surface Water Samples (M)

- Small Creek/Drainage Sample
- Meramec River Sample
- Mississippi River Sample
- Surface Water Flow Direction

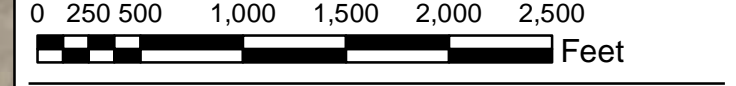


NOTES

1. ALL LOCATIONS AND BOUNDARIES ARE APPROXIMATE.
2. SAMPLE LOCATIONS BASED ON HANDHELD TRIMBLE GPS MEASUREMENTS. SAMPLE LOCATION REPRESENTS CENTERPOINT BETWEEN SAMPLE STARTING AND ENDING LOCATION.
3. PREFIX M- USED FOR SAMPLES COLLECTED IN SEPTEMBER 2017 AND M2- USED FOR SAMPLES COLLECTED IN MAY 2018.
4. NPDES - NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

REFERENCES

- 1.) AMEREN MISSOURI MERAMEC ENERGY CENTER, MERAMEC PROPERTY CONTROL MAP, FEBRUARY 2011.
- 2.) COORDINATE SYSTEM: NAD 1983 STATEPLANE MISSOURI EAST FIPS 2401 FEET.



CLIENT
 AMEREN MISSOURI
 MERAMEC ENERGY CENTER



PROJECT
 AMEREN HYDROGEOLOGICAL CONSULTING

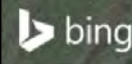
TITLE
 SURFACE WATER SAMPLING LOCATIONS
 MERAMEC ENERGY CENTER

CONSULTANT		YYYY-MM-DD	2018-05-31
		PREPARED	JS
		DESIGN	JS
		REVIEW	JSI
		APPROVED	MNH

PROJECT No. 130-1560 PHASE 0006

Figure 2-2

Path: G:\Projects\130-1560 - Ameren Air Ponds - FIGURES-DRAWINGS\PRODUCTION\Meramec Energy Center\Meramec River Sampling Locations - V2.mxd

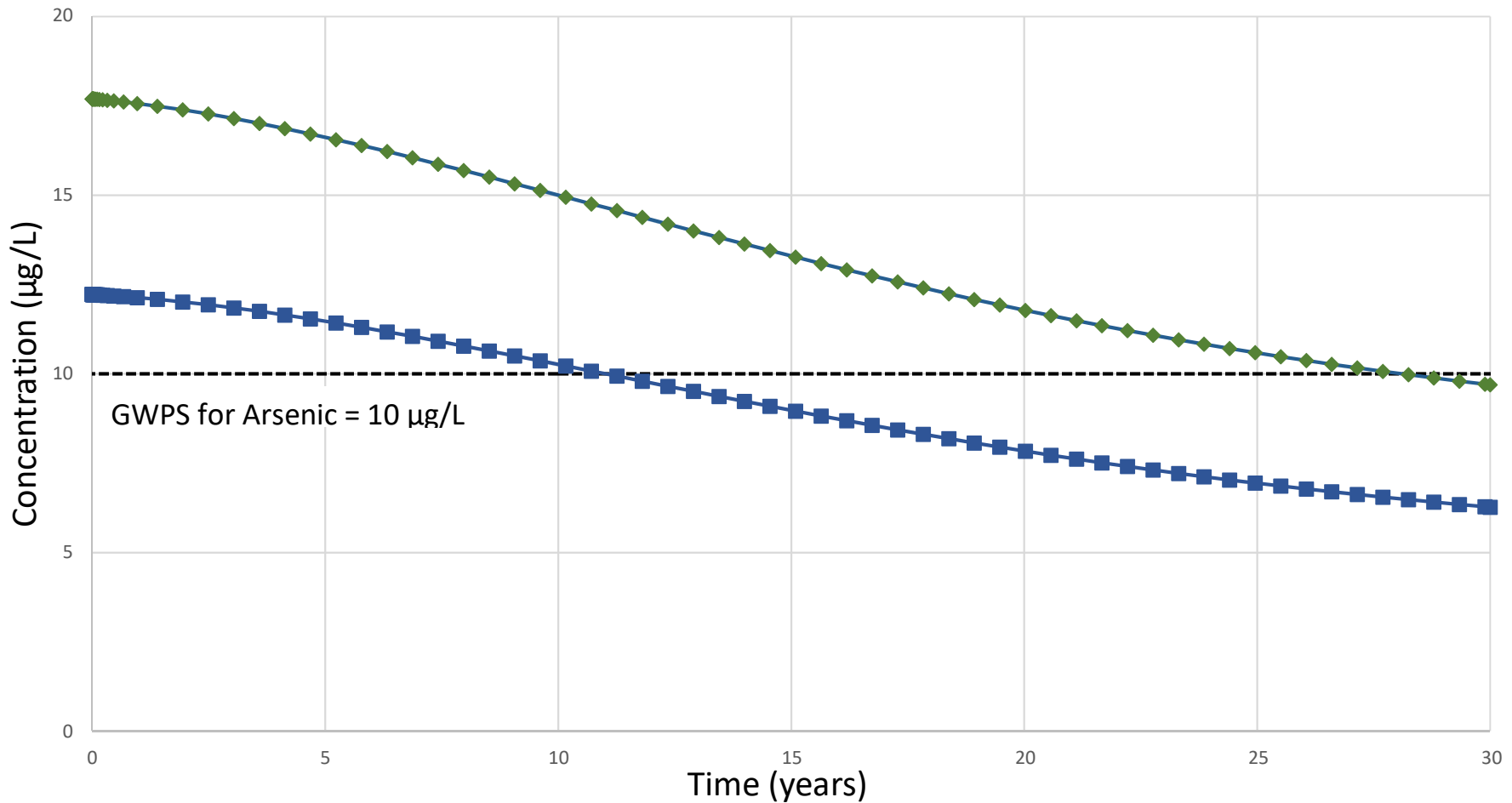


IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: 11in

FIGURE 4-1
REMEDIAL ALTERNATIVE ROADMAP
CORRECTIVE MEASURES ASSESSMENT
COAL COMBUSTION RESIDUAL (CCR) SURFACE IMPOUNDMENTS
MERAMEC ENERGY CENTER - ST. LOUIS COUNTY, MISSOURI

Alternative Number	Remedial Alternative Description	Surface Impoundments Closure Description	Groundwater Remedy Components		
			A. Groundwater Remedy Approach	B. Groundwater Treatment Method	C. Post-Closure Actions
1	Closure In Place (CIP) with Capping and Monitored Natural Attenuation (MNA)	CIP with Geomembrane and Soil Cap	Natural Attenuation with Monitoring Mitigate off-site migration of groundwater with CCR constituents above GWPS through process of natural attenuation	No Active Treatment No active treatment technologies for groundwater to address CCR constituents	MNA Long-term groundwater monitoring to confirm reduction of CCR constituents
2	CIP with Capping and In-Situ Groundwater Treatment	CIP with Geomembrane and Soil Cap	Subsurface Treatment System Mitigate off-site migration of groundwater with CCR constituents above GWPS using in-situ treatment technology	In-Situ Treatment Subsurface treatment to reduce Appendix IV constituent concentrations in groundwater	In-Situ Treatment Long-Term Continue periodic in-situ treatment of groundwater to maintain reduction of CCR constituents in groundwater
3	CIP with Capping and Hydraulic Containment through Groundwater Pumping and Ex-Situ Treatment	CIP with Geomembrane and Soil Cap	Hydraulic Containment Mitigate off-site migration of groundwater with CCR constituents above GWPS using extraction wells	Ex-Situ Treatment Treatment system (ion exchange or reverse osmosis) to remove CCR constituents from groundwater	Pump & Treat Long-Term Operate groundwater treatment system long-term to maintain reduction of CCR constituents in groundwater
4	Closure by Removal (CBR) with MNA	CBR	Natural Attenuation with Monitoring Mitigate off-site migration of groundwater with CCR constituents above GWPS through process of natural attenuation	No Active Treatment No active treatment technologies for groundwater to address CCR constituents	MNA Long-term groundwater monitoring to confirm reduction of CCR constituents

Modeled Arsenic Concentrations After Capping and Closing the MEC CCR Impoundments



◆ Arsenic Concentrations After Capping and Closing the MEC CCR Impoundments - Green ■ Arsenic Concentrations After Capping and Closing with Insitu Treatment - Blue

Notes:

µg/L = micrograms per Liter

CCR = Coal Combustion Residual

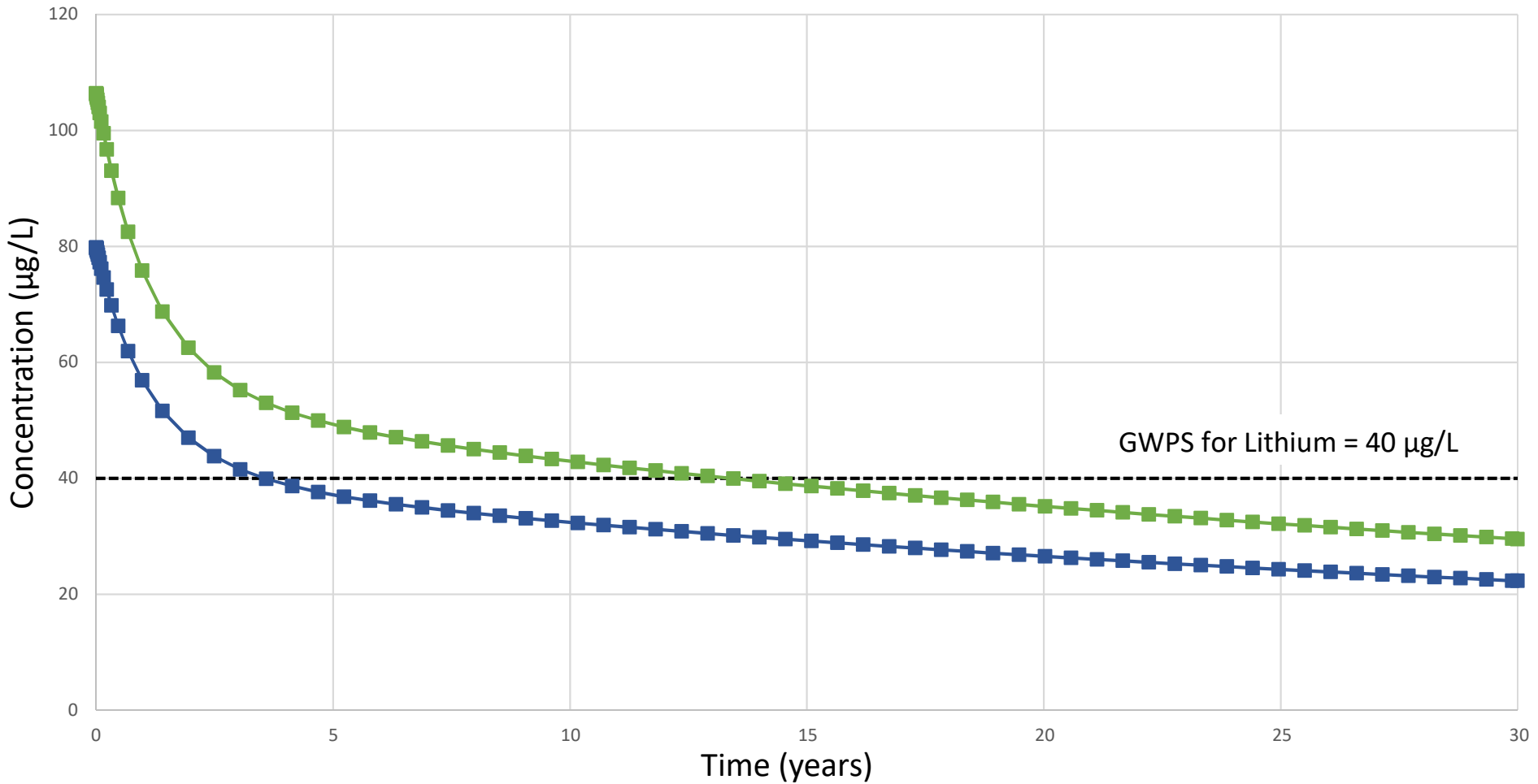
GWPS = Groundwater Protection Standard

MEC = Meramec Energy Center



Figure 4-2
Modeled Arsenic Concentrations
After Capping and Closing the
CCR Units and Groundwater
Remediation

Modeled Lithium Concentrations After Capping and Closing the MEC CCR Impoundments



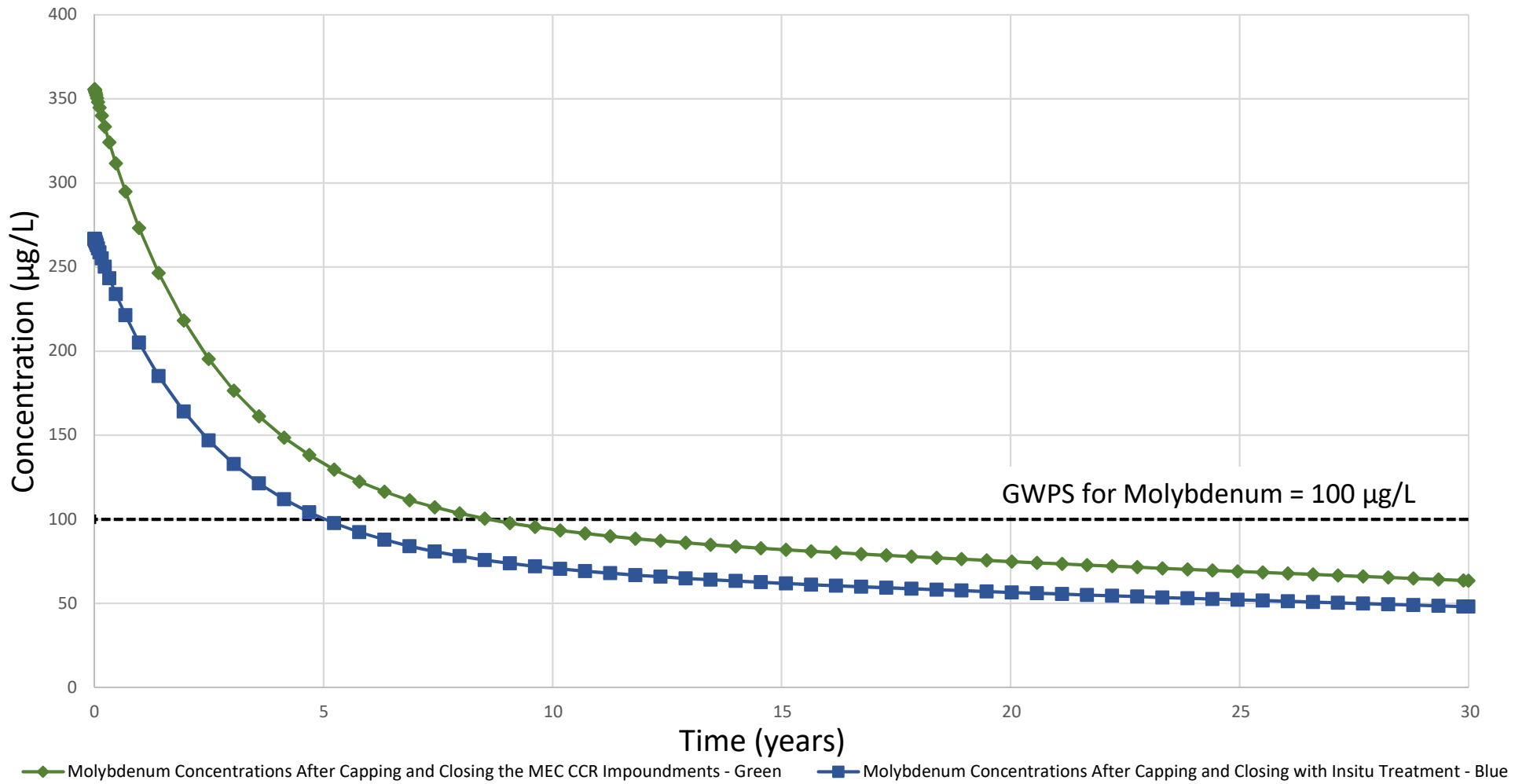
■ Lithium Concentrations After Capping and Closing the MEC CCR Impoundments - Green
 ■ Lithium Concentrations After Capping and Closing with Insitu Treatment - Blue

Notes:
 µg/L = micrograms per Liter
 CCR = Coal Combustion Residuals
 GWPS = Groundwater Protection Standard
 MEC = Meramec Energy Center



Figure 4-3
 Modeled Lithium Concentrations After Capping and Closing the CCR Units and Groundwater Remediation

Modeled Molybdenum Concentrations After Capping and Closing the MEC CCR Impoundments



Notes:

- µg/L = micrograms per Liter
- CCR = Coal Combustion Residuals
- GWPS = Groundwater Protection Standard
- MEC = Meramec Energy Center



Figure 4-4
Modeled Molybdenum Concentrations After Capping and Closing the CCR Units and Groundwater Remediation

APPENDIX A

Surface Water Screening Tables

TABLES

1	HUMAN HEALTH SCREENING LEVELS
2	ECOLOGICAL SCREENING LEVELS – MISSISSIPPI AND MERAMEC RIVERS
3	ECOLOGICAL SCREENING LEVELS – UNNAMED CREEK/DRAINAGE
4	SUMMARY OF SCREENING RESULTS
5a	COMPARISON OF MAY 2018 MERAMEC AND MISSISSIPPI RIVER SURFACE WATER RESULTS TO HUMAN HEALTH DRINKING WATER SCREENING LEVELS - TOTAL (UNFILTERED) SAMPLE RESULTS
5b	COMPARISON OF MAY 2018 MERAMEC AND MISSISSIPPI RIVER SURFACE WATER TO HUMAN HEALTH DRINKING WATER SCREENING LEVELS - DISSOLVED (FILTERED) SAMPLE RESULTS
5c	COMPARISON OF SEPTEMBER 2017 MERAMEC AND MISSISSIPPI RIVER SURFACE WATER RESULTS TO HUMAN HEALTH DRINKING WATER SCREENING LEVELS - TOTAL (UNFILTERED) SAMPLE RESULTS
5d	COMPARISON OF SEPTEMBER 2017 MERAMEC AND MISSISSIPPI RIVER SURFACE WATER TO HUMAN HEALTH DRINKING WATER SCREENING LEVELS - DISSOLVED (FILTERED) SAMPLE RESULTS
6a	COMPARISON OF MAY 2018 MERAMEC AND MISSISSIPPI RIVER SURFACE WATER RESULTS TO HUMAN HEALTH RECREATIONAL SCREENING LEVELS - TOTAL (UNFILTERED) SAMPLE RESULTS
6b	COMPARISON OF MAY 2018 MERAMEC AND MISSISSIPPI RIVER SURFACE WATER TO HUMAN HEALTH RECREATIONAL SCREENING LEVELS - DISSOLVED (FILTERED) SAMPLE RESULTS
6c	COMPARISON OF SEPTEMBER 2017 MERAMEC AND MISSISSIPPI RIVER SURFACE WATER RESULTS TO HUMAN HEALTH RECREATIONAL SCREENING LEVELS - TOTAL (UNFILTERED) SAMPLE RESULTS
6d	COMPARISON OF SEPTEMBER 2017 MERAMEC AND MISSISSIPPI RIVER SURFACE WATER TO HUMAN HEALTH RECREATIONAL SCREENING LEVELS - DISSOLVED (FILTERED) SAMPLE RESULTS
7a	COMPARISON OF MAY 2018 MERAMEC AND MISSISSIPPI RIVER SURFACE WATER RESULTS TO ECOLOGICAL SCREENING LEVELS - TOTAL (UNFILTERED) SAMPLE RESULTS
7b	COMPARISON OF MAY 2018 MERAMEC AND MISSISSIPPI RIVER SURFACE WATER TO ECOLOGICAL SCREENING LEVELS - DISSOLVED (FILTERED) SAMPLE RESULTS

Appendix A
Meramec Energy Center Surface Water Screening Tables – TOC

7c	COMPARISON OF SEPTEMBER 2017 MERAMEC AND MISSISSIPPI RIVER SURFACE WATER RESULTS TO ECOLOGICAL SCREENING LEVELS - TOTAL (UNFILTERED) SAMPLE RESULTS
7d	COMPARISON OF SEPTEMBER 2017 MERAMEC AND MISSISSIPPI RIVER SURFACE WATER TO ECOLOGICAL SCREENING LEVELS - DISSOLVED (FILTERED) SAMPLE RESULTS
8a	COMPARISON OF MAY 2018 UNNAMED CREEK/DRAINAGE SURFACE WATER RESULTS TO HUMAN HEALTH DRINKING WATER SCREENING LEVELS- TOTAL (UNFILTERED) SAMPLE RESULTS
8b	COMPARISON OF MAY 2018 UNNAMED CREEK/DRAINAGE SURFACE WATER RESULTS TO HUMAN HEALTH DRINKING WATER SCREENING LEVELS - DISSOLVED (FILTERED) SAMPLE RESULTS
8c	COMPARISON OF SEPTEMBER 2017 UNNAMED CREEK/DRAINAGE SURFACE WATER RESULTS TO HUMAN HEALTH DRINKING WATER SCREENING LEVELS- TOTAL (UNFILTERED) SAMPLE RESULTS
8d	COMPARISON OF SEPTEMBER 2017 UNNAMED CREEK/DRAINAGE SURFACE WATER RESULTS TO HUMAN HEALTH DRINKING WATER SCREENING LEVELS - DISSOLVED (FILTERED) SAMPLE RESULTS
9a	COMPARISON OF MAY 2018 UNNAMED CREEK/DRAINAGE SURFACE WATER RESULTS TO HUMAN HEALTH RECREATIONAL SCREENING LEVEL- TOTAL (UNFILTERED) SAMPLE RESULTS
9b	COMPARISON OF MAY 2018 UNNAMED CREEK/DRAINAGE SURFACE WATER RESULTS TO HUMAN HEALTH RECREATIONAL SCREENING LEVEL - DISSOLVED (FILTERED) SAMPLE RESULTS
9c	COMPARISON OF SEPTEMBER 2017 UNNAMED CREEK/DRAINAGE SURFACE WATER RESULTS TO HUMAN HEALTH RECREATIONAL SCREENING LEVEL- TOTAL (UNFILTERED) SAMPLE RESULTS
9d	COMPARISON OF SEPTEMBER 2017 UNNAMED CREEK/DRAINAGE SURFACE WATER RESULTS TO HUMAN HEALTH RECREATIONAL SCREENING LEVEL - DISSOLVED (FILTERED) SAMPLE RESULTS
10a	COMPARISON OF MAY 2018 UNNAMED CREEK/DRAINAGE SURFACE WATER RESULTS TO ECOLOGICAL SCREENING LEVELS- TOTAL (UNFILTERED) SAMPLE RESULTS
10b	COMPARISON OF MAY 2018 UNNAMED CREEK/DRAINAGE SURFACE WATER RESULTS TO ECOLOGICAL SCREENING LEVELS - DISSOLVED (FILTERED) SAMPLE RESULTS
10c	COMPARISON OF SEPTEMBER 2017 UNNAMED CREEK/DRAINAGE SURFACE WATER RESULTS TO ECOLOGICAL SCREENING LEVELS- TOTAL (UNFILTERED) SAMPLE RESULTS

Appendix A
Meramec Energy Center Surface Water Screening Tables – TOC

10d COMPARISON OF SEPTEMBER 2017 UNNAMED CREEK/DRAINAGE SURFACE
WATER RESULTS TO ECOLOGICAL SCREENING LEVELS - DISSOLVED (FILTERED)
SAMPLE RESULTS

TABLE 1
HUMAN HEALTH SCREENING LEVELS
AMEREN MISSOURI MERAMEC ENERGY CENTER
ST. LOUIS COUNTY, MISSOURI

Constituent	CASRN	Drinking Water Screening Levels (mg/L)			Surface Water Screening Levels (mg/L)	
		MCLs (b)	SMCLs (b)	November 2018 USEPA Tapwater RSLs (c)	Drinking Water (d)	Recreational Use (a) (e)
Antimony	7440-36-0	0.006	NA	0.0078 (m)	0.006	0.64
Arsenic	7440-38-2	0.01	NA	0.000052	0.01	0.00014 (i)
Barium	7440-39-3	2	NA	3.8	2	NA
Beryllium	7440-41-7	0.004	NA	0.025	0.004	NA
Boron	7440-42-8	NA	NA	4	4	NA
Cadmium	7440-43-9	0.005	NA	0.0092	0.005	NA
Calcium	7440-70-2	NA	NA	NA	NA	NA
Chloride	7647-14-5	NA	250	NA	250	NA
Chromium	16065-83-1 (g)	0.1 (j)	NA	22 (n)	0.1	NA
Cobalt	7440-48-4	NA	NA	0.006	0.006	NA
Fluoride	16984-48-8	4	2	0.8	4	NA
Lead	7439-92-1	0.015 (k)	NA	0.015	0.015	NA
Lithium	7439-93-2	NA	NA	0.04	0.04	NA
Mercury	7487-94-7 (h)	0.002 (l)	NA	0.0057 (o)	0.002	NA
Molybdenum	7439-98-7	NA	NA	0.1	0.1	NA
Radium 226/228 (pCi/L)	RADIUM226228	5	NA	NA	5	NA
Selenium	7782-49-2	0.05	NA	0.1	0.05	4.2
Sulfate	7757-82-6	NA	250	NA	250	NA
Thallium	7440-28-0	0.002	NA	0.0002 (f)	0.002	0.00047
Total Dissolved Solids	TDS	NA	500	NA	500	NA
pH (std)	PHFLD	NA	6.5 - 8.5	NA	6.5 - 8.5	NA

Notes:

AWQC - Ambient Water Quality Criteria. NA - not available.

CASRN - Chemical Abstracts Service Registry Number.

GWPS - Groundwater Protection Standard. RSL - Risk-based Screening Levels (USEPA).

HI - Hazard Index (noncancer child). TR - Target Risk (carcinogenic).

MCL - Maximum Contaminant Level. USEPA - United States Environmental Protection Agency.

mg/L - milligram per liter.

- (a) - USEPA National Recommended Water Quality Criteria. USEPA Office of Water and Office of Science and Technology.
<https://www.epa.gov/wqc/national-recommended-water-quality-criteria-human-health-criteria-table>
 USEPA AWQC Human Health for the Consumption of Organism Only apply to total concentrations.
- (b) - USEPA 2018 Edition of the Drinking Water Standards and Health Advisories. Spring 2018.
<http://water.epa.gov/drink/contaminants/index.cfm>
- (c) - USEPA Regional Screening Levels (November 2018). Values for tapwater.
http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/Generic_Tables/index.htm
- (d) - Selected Drinking Water Screening Level uses the following hierarchy:
 Federal USEPA MCL for Drinking Water.
 Federal USEPA SMCL for Drinking Water.
 Federal November 2018 USEPA Tapwater RSL.
- (e) - The selected Human Health Recreational Use Screening Level is the Federal USEPA AWQC for Human Health Consumption of Organism Only.
- (f) - RSL for Thallium (Soluble Salts) used for Thallium.
- (g) - CAS number for Trivalent Chromium.
- (h) - CAS number for Mercuric Chloride.
- (i) - Value applies to inorganic form of arsenic only.
- (j) - Value for Total Chromium.
- (k) - Lead Treatment Technology Action Level is 0.015 mg/L.
- (l) - Value for Inorganic Mercury.
- (m) - RSL for Antimony (metallic) used for Antimony.
- (n) - RSL for Chromium (III), Insoluble Salts used for Chromium.
- (o) - RSL for Mercuric Chloride used for Mercury.

**TABLE 2
ECOLOGICAL SCREENING LEVELS - MISSISSIPPI AND MERAMEC RIVERS
AMEREN MISSOURI MERAMEC ENERGY CENTER
ST. LOUIS COUNTY, MISSOURI**

Constituent	CASRN	Federal Water Quality Criteria (mg/L)							
		Site-Specific USEPA Aquatic Life AWQC - 2018 Hardness Data Freshwater Acute (a)		Site-Specific USEPA Aquatic Life AWQC - 2018 Hardness Data Freshwater Chronic (a)		Site-Specific USEPA Aquatic Life AWQC - 2017 Hardness Data Freshwater Acute (b)		Site-Specific USEPA Aquatic Life AWQC - 2017 Hardness Data Freshwater Chronic (b)	
		Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved
Antimony	7440-36-0	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	7440-38-2	0.34	0.34	0.15	0.15	0.34	0.34	0.15	0.15
Barium	7440-39-3	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	7440-41-7	NA	NA	NA	NA	NA	NA	NA	NA
Boron	7440-42-8	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	7440-43-9	0.0036 (c)	0.0033 (d)	0.0013 (c)	0.0012 (d)	0.0042 (f)	0.0038 (g)	0.0015 (f)	0.0013 (g)
Calcium	7440-70-2	NA	NA	NA	NA	NA	NA	NA	NA
Chloride	16887-00-6	860	NA	230	NA	860	NA	230	NA
Chromium	7440-47-3	3.1 (e,c)	0.97 (e,d)	0.15 (e,c)	0.13 (e,d)	3.5 (e,f)	1.1 (e,g)	0.17 (e,f)	0.14 (e,g)
Cobalt	7440-48-4	NA	NA	NA	NA	NA	NA	NA	NA
Fluoride	16984-48-8	NA	NA	NA	NA	NA	NA	NA	NA
Lead	7439-92-1	0.19 (c)	0.13 (d)	0.0073 (c)	0.0051 (d)	0.23 (f)	0.15 (g)	0.0089 (f)	0.0060 (g)
Lithium	7439-93-2	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	7439-97-6	0.0016	0.0014	0.00091	0.00077	0.0016	0.0014	0.00091	0.00077
Molybdenum	7439-98-7	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	7782-49-2	NA	NA	3.1	NA	NA	NA	3.1	NA
Sulfate	14808-79-8	NA	NA	NA	NA	NA	NA	NA	NA
Thallium	7440-28-0	NA	NA	NA	NA	NA	NA	NA	NA
Total Dissolved Solids	TDS	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

AWQC - USEPA Ambient Water Quality Criteria.

CASRN - Chemical Abstracts Service Registry Number.

CMC - Criterion Maximum Concentration.

- (a) - USEPA National Recommended Water Quality Criteria. USEPA Office of Water and Office of Science and Technology.
<http://water.epa.gov/scitech/swguidance/standards/criteria/current/index.cfm>
Total values provided. Values adjusted for site-specific hardness using hardness data collected in May 2018 - see note (c).
USEPA provides AWQC for both total and dissolved results.
- (b) - USEPA National Recommended Water Quality Criteria. USEPA Office of Water and Office of Science and Technology.
<http://water.epa.gov/scitech/swguidance/standards/criteria/current/index.cfm>
Total values provided. Values adjusted for site-specific hardness using hardness data collected in September 2017 - see note (f).
USEPA provides AWQC for both total and dissolved results.
- (c) - Hardness dependent value for total metals. Site-specific total recoverable mean hardness value for the Mississippi and Meramec Rivers of 192 mg/L as CaCO₃ used.
- (d) - Hardness dependent value for total metals adjusted for dissolved fraction. Site-specific total recoverable mean hardness value for the Mississippi and Meramec Rivers of 192 mg/L as CaCO₃ used.
- (e) - Value for trivalent chromium used.
- (f) - Hardness dependent value for total metals. Site-specific total recoverable mean hardness value for the Mississippi and Meramec Rivers of 224 mg/L as CaCO₃ used.
- (g) - Hardness dependent value for total metals adjusted for dissolved fraction. Site-specific total recoverable mean hardness value for the Mississippi and Meramec Rivers of 224 mg/L as CaCO₃ used.

**TABLE 3
ECOLOGICAL SCREENING LEVELS - UNAMED CREEK/DRAINAGE
AMEREN MISSOURI MERAMEC ENERGY CENTER
ST. LOUIS COUNTY, MISSOURI**

Constituent	CASRN	Federal Water Quality Criteria (mg/L)							
		Site-Specific USEPA Aquatic Life AWQC - 2018 Hardness Data Freshwater Acute (a)		Site-Specific USEPA Aquatic Life AWQC - 2018 Hardness Data Freshwater Chronic (a)		Site-Specific USEPA Aquatic Life AWQC - 2017 Hardness Data Freshwater Acute (b)		Site-Specific USEPA Aquatic Life AWQC - 2017 Hardness Data Freshwater Chronic (b)	
		Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved
Antimony	7440-36-0	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	7440-38-2	0.34	0.34	0.15	0.15	0.34	0.34	0.15	0.15
Barium	7440-39-3	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	7440-41-7	NA	NA	NA	NA	NA	NA	NA	NA
Boron	7440-42-8	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	7440-43-9	0.0040 (c)	0.0037 (d)	0.0015 (c)	0.0013 (d)	0.0048 (f)	0.0043 (g)	0.0017 (f)	0.0015 (g)
Calcium	7440-70-2	NA	NA	NA	NA	NA	NA	NA	NA
Chloride	16887-00-6	860	NA	230	NA	860	NA	230	NA
Chromium	7440-47-3	3.4 (e,c)	1.1 (e,d)	0.16 (e,c)	0.14 (e,d)	3.9 (e,f)	1.2 (e,g)	0.19 (e,f)	0.16 (e,g)
Cobalt	7440-48-4	NA	NA	NA	NA	NA	NA	NA	NA
Fluoride	16984-48-8	NA	NA	NA	NA	NA	NA	NA	NA
Lead	7439-92-1	0.22 (c)	0.15 (d)	0.0084 (c)	0.0057 (d)	0.27 (f)	0.18 (g)	0.011 (f)	0.0069 (g)
Lithium	7439-93-2	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	7439-97-6	0.0016	0.0014	0.00091	0.00077	0.0016	0.0014	0.00091	0.00077
Molybdenum	7439-98-7	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	7782-49-2	NA	NA	3.1	NA	NA	NA	3.1	NA
Sulfate	14808-79-8	NA	NA	NA	NA	NA	NA	NA	NA
Thallium	7440-28-0	NA	NA	NA	NA	NA	NA	NA	NA
Total Dissolved Solids	TDS	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

AWQC - USEPA Ambient Water Quality Criteria.

CASRN - Chemical Abstracts Service Registry Number.

CMC - Criterion Maximum Concentration.

- (a) - USEPA National Recommended Water Quality Criteria. USEPA Office of Water and Office of Science and Technology.
<http://water.epa.gov/scitech/swguidance/standards/criteria/current/index.cfm>
Total values provided. Values adjusted for site-specific hardness using hardness data collected in May 2018 - see note (c).
USEPA provides AWQC for both total and dissolved results.
- (b) - USEPA National Recommended Water Quality Criteria. USEPA Office of Water and Office of Science and Technology.
<http://water.epa.gov/scitech/swguidance/standards/criteria/current/index.cfm>
Total values provided. Values adjusted for site-specific hardness using hardness data collected in September 2017 - see note (f).
USEPA provides AWQC for both total and dissolved results.
- (c) - Hardness dependent value for total metals. Site-specific total recoverable mean hardness value for the Unnamed Creek/Drainage of 215 mg/L as CaCO₃ used.
- (d) - Hardness dependent value for total metals adjusted for dissolved fraction. Site-specific total recoverable mean hardness value for the Unnamed Creek/Drainage of 215 mg/L as CaCO₃ used.
- (e) - Value for trivalent chromium used.
- (f) - Hardness dependent value for total metals. Site-specific total recoverable mean hardness value for the Unnamed Creek/Drainage of 256 mg/L as CaCO₃ used.
- (g) - Hardness dependent value for total metals adjusted for dissolved fraction. Site-specific total recoverable mean hardness value for the Unnamed Creek/Drainage of 256 mg/L as CaCO₃ used.

TABLE 4
SUMMARY OF SCREENING RESULTS
AMEREN MISSOURI MERAMEC ENERGY CENTER
ST. LOUIS COUNTY, MISSOURI

Constituent	Meramec River - Human Health Drinking Water						Meramec River - Human Health Recreational					
	Dissolved			Total			Dissolved			Total		
	Upstream	Adjacent	Downstream	Upstream	Adjacent	Downstream	Upstream	Adjacent	Downstream	Upstream	Adjacent	Downstream
Antimony												
Arsenic							9 : 9 100%	9 : 9 100%	10 : 10 100%	9 : 9 100%	9 : 9 100%	10 : 10 100%
Barium												
Beryllium												
Boron												
Cadmium												
Calcium												
Chloride												
Chromium												
Cobalt												
Fluoride												
Lead				3 : 9 33%	2 : 9 22%	1 : 10 10%						
Lithium												
Mercury												
Molybdenum												
pH												
Selenium												
Sulfate												
Thallium												
TDS												
Radium 226/228												

Notes:
 Blank cells - no results above screening levels for the specified constituent / media.
 Number of exceedences : total number of samples.

TABLE 4
SUMMARY OF SCREENING RESULTS
AMEREN MISSOURI MERAMEC ENERGY CENTER
ST. LOUIS COUNTY, MISSOURI

Constituent	Meramec River - Ecological						Mississippi River - Human Health Drinking Water					
	Dissolved			Total			Dissolved			Total		
	Upstream	Adjacent	Downstream	Upstream	Adjacent	Downstream	Upstream	Adjacent	Downstream	Upstream	Adjacent	Downstream
Antimony												
Arsenic								2 : 20	10%			
Barium												
Beryllium												
Boron												
Cadmium												
Calcium												
Chloride												
Chromium												
Cobalt												
Fluoride												
Lead				8 : 9	89%	6 : 9	67%	7 : 10	70%			
Lithium												
Mercury												
Molybdenum												
pH												
Selenium												
Sulfate												
Thallium								2 : 20	10%			
TDS												
Radium 226/228												

Notes:
 Blank cells - no results above screening levels for the specified constituent / media.
 Number of exceedences : total number of samples.

TABLE 4
SUMMARY OF SCREENING RESULTS
AMEREN MISSOURI MERAMEC ENERGY CENTER
ST. LOUIS COUNTY, MISSOURI

Constituent	Mississippi River - Human Health Recreational						Mississippi River - Ecological					
	Dissolved			Total			Dissolved			Total		
	Upstream	Adjacent	Downstream	Upstream	Adjacent	Downstream	Upstream	Adjacent	Downstream	Upstream	Adjacent	Downstream
Antimony												
Arsenic	10 : 10 100%	20 : 20 100%	10 : 10 100%	10 : 10 100%	20 : 20 100%	10 : 10 100%						
Barium												
Beryllium												
Boron												
Cadmium												
Calcium												
Chloride												
Chromium												
Cobalt												
Fluoride												
Lead										1 : 10 10%		
Lithium												
Mercury												
Molybdenum												
pH												
Selenium												
Sulfate												
Thallium		2 : 20 10%										
TDS												
Radium 226/228												

Notes:
 Blank cells - no results above screening levels for the specified constituent / media.
 Number of exceedences : total number of samples.

TABLE 4
SUMMARY OF SCREENING RESULTS
AMEREN MISSOURI MERAMEC ENERGY CENTER
ST. LOUIS COUNTY, MISSOURI

Constituent	Unnamed Creek/Drainage - Human Health Drinking Water		Unnamed Creek/Drainage - Human Health Recreational		Unnamed Creek/Drainage - Ecological	
	Dissolved	Total	Dissolved	Total	Dissolved	Total
Antimony						
Arsenic			6 : 6 100%	6 : 6 100%		
Barium						
Beryllium						
Boron						
Cadmium						
Calcium						
Chloride						
Chromium						
Cobalt						
Fluoride						
Lead						
Lithium						
Mercury						
Molybdenum						
pH						
Selenium						
Sulfate						
Thallium						
TDS		1 : 6 17%				
Radium 226/228						

Notes:
 Blank cells - no results above screening levels for the specified constituent / media.
 Number of exceedences : total number of samples.

TABLE 5a
COMPARISON OF MAY 2018 MERAMEC AND MISSISSIPPI RIVER SURFACE WATER RESULTS -
TO HUMAN HEALTH DRINKING WATER SCREENING LEVELS -
TOTAL (UNFILTERED) SAMPLE RESULTS (a)
AMEREN MISSOURI MERAMEC ENERGY CENTER
ST. LOUIS COUNTY, MISSOURI

Constituent	CAS	Units	Federal Water Quality Screening Levels			Selected Drinking Water Screening Level (h)	Meramec River Upstream					Meramec River Adjacent					Meramec River Downstream				
			USEPA MCLs (b)	USEPA SMCLs (b)	USEPA Tapwater RSLs (c)		M2-MEC-7S	M2-MEC-8D	M2-MEC-8S	M2-MEC-9D	M2-MEC-9S	M2-MEC-4S	M2-MEC-5D	M2-MEC-5S	M2-MEC-6D	M2-MEC-6S	M2-MEC-1S	M2-MEC-2D	M2-MEC-2S	M2-MEC-3D	M2-MEC-3S
			Antimony*	7440-36-0	mg/L		0.006	NA	0.0078	0.006											
Arsenic	7440-38-2	mg/L	0.01	NA	0.000052	0.01	0.00061 J	0.00064 J	0.00061 J	0.00063 J	0.00064 J	0.00062 J	0.00061 J	0.00058 J	0.00064 J	0.00069 J	0.00069 J	0.00066 J	0.00061 J	0.00059 J	0.00069 J
Barium	7440-39-3	mg/L	2	NA	3.8	2	0.134	0.139	0.133	0.14	0.133	0.135	0.14	0.135	0.139	0.136	0.135	0.141	0.137	0.137	0.135
Beryllium	7440-41-7	mg/L	0.004	NA	0.025	0.004	0.00017 J	0.00017 J													
Boron	7440-42-8	mg/L	NA	NA	4	4						0.0151 J				0.0142 J	0.0151 J	0.0143 J	0.0139 J	0.0139 J	
Cadmium	7440-43-9	mg/L	0.005	NA	0.0092	0.005															
Calcium	7440-70-2	mg/L	NA	NA	NA	NA	28.6	28.8	28.3	29.1	28.3	28.8	28.9	28.9	28.7	29	28.6	28.9	29.3	28.3	28.5
Chloride	16887-00-6	mg/L	NA	NA	250	250	6.4	6.5	6.5	6.5	6.5	6.4	6.4	6.5	6.5	6.4	6.5	6.4	6.7	6.4	6.3
Chromium	7440-47-3	mg/L	0.1 (e)	NA	22 (f)	0.1															
Cobalt	7440-48-4	mg/L	NA	NA	0.006	0.006															
Fluoride	16984-48-8	mg/L	4	NA	2	4	0.074 J	0.12 J	0.12 J	0.12 J	0.12 J	0.12 J	0.12 J	0.12 J	0.12 J	0.12 J	0.12 J	0.12 J	0.12 J	0.12 J	0.11 J
Lead	7439-92-1	mg/L	0.015 (g)	NA	0.015	0.015	0.0081 J	0.0092 J	0.0077 J	0.0086 J	0.005 J	0.0071 J	0.0094 J	0.0057 J	0.0114	0.0054 J	0.0065 J	0.0097 J	0.0062 J	0.0096 J	0.0067 J
Lithium	7439-93-2	mg/L	NA	NA	0.04	0.04															
Mercury*	7439-97-6	mg/L	0.002	NA	0.0057 (d)	0.002															
Molybdenum	7439-98-7	mg/L	NA	NA	0.1	0.1															
Selenium	7782-49-2	mg/L	0.05	NA	0.1	0.05															
Sulfate	14808-79-8	mg/L	NA	NA	250	250	12.2	13.3	13.1	15.4	13.1	13	12.9	12.9	13	12.8	13.2	12.9	13	12.9	12.9
Thallium*	7440-28-0	mg/L	0.002	NA	0.0002	0.002															
Total Hardness as CaCO3	471-34-1	mg/L	NA	NA	NA	NA	135	135	133	137	133	135	136	136	135	136	136	137	138	134	135
Total Dissolved Solids	TDS	mg/L	NA	NA	500	500	163	165	166	160	134	162	163	169	163	179	260	177	172	177	173

Notes:
Blank cells - Non-detect value. mg/L - milligrams per liter.
* - Constituent was not detected in any samples. NA - Not Available.
CAS - Chemical Abstracts Service. RSL - Regional Screening Level.
J - Estimated value. SMCL - Secondary Maximum Contaminant Level.
MCL - Maximum Contaminant Level. USEPA - United States Environmental Protection Agency.

 Detected Concentration > Selected Drinking Water Screening Level.

- (a) - Surface water samples collected in May 2018.
- (b) - USEPA 2018 Edition of the Drinking Water Standards and Health Advisories. Spring 2018. <http://water.epa.gov/drink/contaminants/index.cfm>
- (c) - USEPA Regional Screening Levels (November 2018). Values for tapwater. http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/Generic_Tables/index.htm
- (d) - RSL for Mercuric Chloride used for Mercury.
- (e) - The drinking water standard or MCL for chromium is based on total chromium.
- (f) - Value for trivalent chromium used. USEPA provides a screening level for hexavalent chromium that is not a drinking water standard, the basis of which has been questioned by USEPA's Science Advisory Board.
- (g) - The Action Level presented is recommended in the USEPA Drinking Water Standards.
- (h) - Selected Drinking Water Screening Level uses the following hierarchy:
Federal USEPA MCL for Drinking Water.
Federal USEPA SMCL for Drinking Water.
Federal November 2018 USEPA Tapwater RSL.

**TABLE 5a
COMPARISON OF MAY 2018 MERAMEC AND MISSISSIPPI RIVER SURFACE WATER RESULTS -
TO HUMAN HEALTH DRINKING WATER SCREENING LEVELS -
TOTAL (UNFILTERED) SAMPLE RESULTS (a)
AMEREN MISSOURI MERAMEC ENERGY CENTER
ST. LOUIS COUNTY, MISSOURI**

Constituent	CAS	Units	Federal Water Quality Screening Levels			Selected Drinking Water Screening Level (h)	Mississippi River Upstream					Mississippi River Adjacent											
			USEPA MCLs (b)	USEPA SMCLs (b)	USEPA Tapwater RSLs (c)		M2-MIS-10S	M2-MIS-11D	M2-MIS-11S	M2-MIS-12D	M2-MIS-12S	M2-MIS-4S	M2-MIS-5D	M2-MIS-5S	M2-MIS-6D	M2-MIS-6S	M2-MIS-7S	M2-MIS-8D	M2-MIS-8S	M2-MIS-9D	M2-MIS-9S		
Antimony*	7440-36-0	mg/L	0.006	NA	0.0078	0.006																	
Arsenic	7440-38-2	mg/L	0.01	NA	0.000052	0.01	0.0034	0.0034	0.0031	0.0023	0.0024	0.0034	0.0029	0.003	0.0021	0.0022	0.0033	0.0031	0.0034	0.002	0.0021		
Barium	7440-39-3	mg/L	2	NA	3.8	2	0.139	0.146	0.136	0.106	0.118	0.136	0.122	0.131	0.105	0.0973	0.137	0.144	0.14	0.0934	0.1		
Beryllium	7440-41-7	mg/L	0.004	NA	0.025	0.004	0.00017 J		0.0002 J							0.00018 J							
Boron	7440-42-8	mg/L	NA	NA	4	4	0.0659 J	0.058 J	0.0522 J	0.0368 J	0.0408 J	0.0656 J	0.0503 J	0.0531 J	0.0341 J	0.0347 J	0.0651 J	0.0561 J	0.0576 J	0.0345 J	0.0338 J		
Cadmium	7440-43-9	mg/L	0.005	NA	0.0092	0.005																	
Calcium	7440-70-2	mg/L	NA	NA	NA	NA	61.1	61.7	57.2	51.8	54	61	56.4	58.4	50.2	50.4	62.5	58.9	60.1	48.3	49.6		
Chloride	16887-00-6	mg/L	NA	NA	250	250	24.5	24.6	24.6	28.4	28.3	23.2	24.1	24	28.8	29	23.2	23.6	23.6	30.4	29.6		
Chromium	7440-47-3	mg/L	0.1 (e)	NA	22 (f)	0.1	0.0044 J	0.0056	0.0047 J	0.0043 J	0.0045 J	0.0044 J	0.0029 J	0.0045 J	0.0043 J	0.003 J	0.0035 J	0.0053	0.0039 J	0.0028 J	0.004 J		
Cobalt	7440-48-4	mg/L	NA	NA	0.006	0.006	0.0018 J	0.0022 J	0.0019 J	0.0021 J	0.0022 J	0.002 J	0.0016 J	0.0019 J	0.0015 J	0.0015 J	0.0017 J	0.0025 J	0.002 J	0.0014 J	0.0015 J		
Fluoride	16984-48-8	mg/L	4	2	0.8	4	0.35	0.32	0.32	0.25	0.26	0.29 J	0.24	0.25	0.19 J	0.18 J	0.3	0.27	0.27	0.18 J	0.17 J		
Lead	7439-92-1	mg/L	0.015 (g)	NA	0.015	0.015	0.0063 J	0.0087 J	0.0067 J	0.0069 J	0.0068 J	0.0052 J	0.0048 J	0.0071 J	0.0071 J	0.0065 J	0.006 J	0.0061 J	0.005 J	0.004 J	0.0059 J		
Lithium	7439-93-2	mg/L	NA	NA	0.04	0.04	0.026	0.0232	0.0202	0.0095 J	0.012	0.0252	0.0176	0.0189	0.0092 J	0.0096 J	0.028	0.0229	0.0227	0.0068 J	0.0076 J		
Mercury*	7439-97-6	mg/L	0.002	NA	0.0057 (d)	0.002																	
Molybdenum	7439-98-7	mg/L	NA	NA	0.1	0.1	0.002 J	0.0023 J	0.0017 J	0.0012 J	0.0013 J	0.002 J	0.0014 J	0.0016 J	0.0013 J	0.00097 J	0.0023 J	0.0016 J	0.0018 J	0.0013 J	0.0012 J		
Selenium	7782-49-2	mg/L	0.05	NA	0.1	0.05				0.0068 J													
Sulfate	14808-79-8	mg/L	NA	250	NA	250	132	107	105	53.9	54.5	127	85.1	90.3	44.9	44.5	128	105	105	39.7	42.4		
Thallium*	7440-28-0	mg/L	0.002	NA	0.0002	0.002																	
Total Hardness as CaCO3	471-34-1	mg/L	NA	NA	NA	NA	250	253	235	214	222	253	232	239	206	207	256	242	246	200	205		
Total Dissolved Solids	TDS	mg/L	NA	500	NA	500	440	392	389	347	426	446	400	379	319	330	442	469	401	298	225		

Notes:
 Blank cells - Non-detect value. mg/L - milligrams per liter.
 * - Constituent was not detected in any samples. NA - Not Available.
 CAS - Chemical Abstracts Service. RSL - Regional Screening Level.
 J - Estimated value. SMCL - Secondary Maximum Contaminant Level.
 MCL - Maximum Contaminant Level. USEPA - United States Environmental Protection Agency.

Detected Concentration > Selected Drinking Water Screening Level.

- (a) - Surface water samples collected in May 2018.
- (b) - USEPA 2018 Edition of the Drinking Water Standards and Health Advisories. Spring 2018.
<http://water.epa.gov/drink/contaminants/index.cfm>
- (c) - USEPA Regional Screening Levels (November 2018). Values for tapwater.
http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/Generic_Tables/index.htm
- (d) - RSL for Mercuric Chloride used for Mercury.
- (e) - The drinking water standard or MCL for chromium is based on total chromium.
- (f) - Value for trivalent chromium used. USEPA provides a screening level for hexavalent chromium that is not a drinking water standard, the basis of which has been questioned by USEPA's Science Advisory Board.
- (g) - The Action Level presented is recommended in the USEPA Drinking Water Standards.
- (h) - Selected Drinking Water Screening Level uses the following hierarchy:
 Federal USEPA MCL for Drinking Water.
 Federal USEPA SMCL for Drinking Water.
 Federal November 2018 USEPA Tapwater RSL.

TABLE 5a
COMPARISON OF MAY 2018 MERAMEC AND MISSISSIPPI RIVER SURFACE WATER RESULTS -
TO HUMAN HEALTH DRINKING WATER SCREENING LEVELS -
TOTAL (UNFILTERED) SAMPLE RESULTS (a)
AMEREN MISSOURI MERAMEC ENERGY CENTER
ST. LOUIS COUNTY, MISSOURI

Constituent	CAS	Units	Federal Water Quality Screening Levels			Selected Drinking Water Screening Level (h)	Mississippi River Downstream								
			USEPA MCLs (b)	USEPA SMCLs (b)	USEPA Tapwater RSLs (c)		M2-MIS-1S	M2-MIS-2D	M2-MIS-2S	M2-MIS-3D	M2-MIS-3S				
Antimony*	7440-36-0	mg/L	0.006	NA	0.0078	0.006									
Arsenic	7440-38-2	mg/L	0.01	NA	0.000052	0.01	0.0022	0.0031	0.0032	0.0025	0.0026				
Barium	7440-39-3	mg/L	2	NA	3.8	2	0.142	0.139	0.138	0.111	0.11				
Beryllium	7440-41-7	mg/L	0.004	NA	0.025	0.004		0.00029 J		0.00022 J	0.00018 J				
Boron	7440-42-8	mg/L	NA	NA	4	4	0.0413 J	0.0623 J	0.0642 J	0.0407 J	0.044 J				
Cadmium	7440-43-9	mg/L	0.005	NA	0.0092	0.005	0.00065 J		0.00045 J						
Calcium	7440-70-2	mg/L	NA	NA	NA	NA	50.7	61.9	62	53	53.4				
Chloride	16887-00-6	mg/L	NA	250	NA	250	16.2	23.3	23.4	26	25.6				
Chromium	7440-47-3	mg/L	0.1 (e)	NA	22 (f)	0.1	0.0021 J	0.0041 J	0.005	0.0035 J	0.0036 J				
Cobalt	7440-48-4	mg/L	NA	NA	0.006	0.006	0.0011 J	0.0024 J	0.0021 J	0.002 J	0.0022 J				
Fluoride	16984-48-8	mg/L	4	2	0.8	4	0.18 J	0.26	0.26	0.2	0.21				
Lead	7439-92-1	mg/L	0.015 (g)	NA	0.015	0.015	0.0049 J	0.0059 J	0.006 J	0.0068 J	0.0062 J				
Lithium	7439-93-2	mg/L	NA	NA	0.04	0.04	0.0155	0.022	0.0252	0.0119	0.0137				
Mercury*	7439-97-6	mg/L	0.002	NA	0.0057 (d)	0.002									
Molybdenum	7439-98-7	mg/L	NA	NA	0.1	0.1	0.0012 J	0.0021 J	0.0023 J	0.0015 J	0.0015 J				
Selenium	7782-49-2	mg/L	0.05	NA	0.1	0.05									
Sulfate	14808-79-8	mg/L	NA	250	NA	250	73.2	109	104	63.4	66.7				
Thallium*	7440-28-0	mg/L	0.002	NA	0.0002	0.002									
Total Hardness as CaCO3	471-34-1	mg/L	NA	NA	NA	NA	215	254	254	214	219				
Total Dissolved Solids	TDS	mg/L	NA	500	NA	500	303	423	404	351	348				

Notes:

Blank cells - Non-detect value.

* - Constituent was not detected in any samples.

CAS - Chemical Abstracts Service.

J - Estimated value.

MCL - Maximum Contaminant Level.

mg/L - milligrams per liter.

NA - Not Available.

RSL - Regional Screening Level.

SMCL - Secondary Maximum Contaminant Level.

USEPA - United States Environmental Protection Agency.

Detected Concentration > Selected Drinking Water Screening Level.

(a) - Surface water samples collected in May 2018.

(b) - USEPA 2018 Edition of the Drinking Water Standards and Health Advisories. Spring 2018.

<http://water.epa.gov/drink/contaminants/index.cfm>

(c) - USEPA Regional Screening Levels (November 2018). Values for tapwater.

http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/Generic_Tables/index.htm

(d) - RSL for Mercuric Chloride used for Mercury.

(e) - The drinking water standard or MCL for chromium is based on total chromium.

(f) - Value for trivalent chromium used. USEPA provides a screening level for hexavalent chromium that is not a drinking water standard, the basis of which has been questioned by USEPA's Science Advisory Board.

(g) - The Action Level presented is recommended in the USEPA Drinking Water Standards.

(h) - Selected Drinking Water Screening Level uses the following hierarchy:

Federal USEPA MCL for Drinking Water.


Federal USEPA SMCL for Drinking Water.

Federal November 2018 USEPA Tapwater RSL.

TABLE 5b
COMPARISON OF MAY 2018 MERAMEC AND MISSISSIPPI RIVER SURFACE WATER RESULTS -
TO HUMAN HEALTH DRINKING WATER SCREENING LEVELS -
DISSOLVED (FILTERED) SAMPLE RESULTS (a)
AMEREN MISSOURI MERAMEC ENERGY CENTER
ST. LOUIS COUNTY, MISSOURI

Constituent	CAS	Units	Federal Water Quality Screening Levels			Selected Drinking Water Screening Level (h)	Meramec River Upstream					Meramec River Adjacent					Meramec River Downstream				
			USEPA MCLs (b)	USEPA SMCLs (b)	USEPA Tapwater RSLs (c)		M2-MEC-7S	M2-MEC-8D	M2-MEC-8S	M2-MEC-9D	M2-MEC-9S	M2-MEC-4S	M2-MEC-5D	M2-MEC-5S	M2-MEC-6D	M2-MEC-6S	M2-MEC-1S	M2-MEC-2D	M2-MEC-2S	M2-MEC-3D	M2-MEC-3S
Antimony*	7440-36-0	mg/L	0.006	NA	0.0078	0.006															
Arsenic	7440-38-2	mg/L	0.01	NA	0.000052	0.01	0.00058 J	0.00058 J	0.00065 J	0.00059 J	0.00059 J	0.00061 J	0.00056 J	0.00066 J	0.00056 J	0.00064 J	0.00063 J	0.00062 J	0.0006 J	0.00061 J	0.00059 J
Barium	7440-39-3	mg/L	2	NA	3.8	2	0.13	0.127	0.128	0.127	0.128	0.127	0.128	0.13	0.128	0.127	0.127	0.128	0.128	0.129	0.13
Beryllium	7440-41-7	mg/L	0.004	NA	0.025	0.004						0.00018 J	0.00018 J	0.00019 J		0.00018 J	0.00018 J	0.00019 J	0.00024 J	0.00018 J	
Boron	7440-42-8	mg/L	NA	NA	4	4									0.0129 J	0.0129 J					
Cadmium	7440-43-9	mg/L	0.005	NA	0.0092	0.005															
Calcium	7440-70-2	mg/L	NA	NA	NA	NA	28.4	28.4	28.2	28.2	28.5	28.3	28.3	28.7	28.6	28.4	28.1	28.2	28.4	28.5	28.8
Chromium*	7440-47-3	mg/L	0.1 (e)	NA	22 (f)	0.1															
Cobalt*	7440-48-4	mg/L	NA	NA	0.006	0.006															
Lead	7439-92-1	mg/L	0.015 (g)	NA	0.015	0.015															
Lithium	7439-93-2	mg/L	NA	NA	0.04	0.04															
Mercury*	7439-97-6	mg/L	0.002	NA	0.0057 (d)	0.002															
Molybdenum	7439-98-7	mg/L	NA	NA	0.1	0.1															
Selenium	7782-49-2	mg/L	0.05	NA	0.1	0.05															
Thallium	7440-28-0	mg/L	0.002	NA	0.0002	0.002															

Notes:
 Blank cells - Non-detect value.
 * - Constituent was not detected in any samples.
 CAS - Chemical Abstracts Service.
 J - Estimated value.
 MCL - Maximum Contaminant Level.
 mg/L - milligrams per liter.
 NA - Not Available.
 RSL - Regional Screening Level.
 SMCL - Secondary Maximum Contaminant Level.
 USEPA - United States Environmental Protection Agency.

 Detected Concentration > Selected Drinking Water Screening Level.

- (a) - Surface water samples collected in May 2018.
- (b) - USEPA 2018 Edition of the Drinking Water Standards and Health Advisories. Spring 2018.
<http://water.epa.gov/drink/contaminants/index.cfm>
- (c) - USEPA Regional Screening Levels (November 2018). Values for tapwater.
http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/Generic_Tables/index.htm
- (d) - RSL for Mercuric Chloride used for Mercury.
- (e) - The drinking water standard or MCL for chromium is based on total chromium.
- (f) - Value for trivalent chromium used. USEPA provides a screening level for hexavalent chromium that is not a drinking water standard, the basis of which has been questioned by USEPA's Science Advisory Board.
- (g) - The Action Level presented is recommended in the USEPA Drinking Water Standards.
- (h) - Selected Drinking Water Screening Level uses the following hierarchy:
 Federal USEPA MCL for Drinking Water.
 Federal USEPA SMCL for Drinking Water.
 Federal November 2018 USEPA Tapwater RSL.

TABLE 5b
COMPARISON OF MAY 2018 MERAMEC AND MISSISSIPPI RIVER SURFACE WATER RESULTS -
TO HUMAN HEALTH DRINKING WATER SCREENING LEVELS -
DISSOLVED (FILTERED) SAMPLE RESULTS (a)
AMEREN MISSOURI MERAMEC ENERGY CENTER
ST. LOUIS COUNTY, MISSOURI

Constituent	CAS	Units	Federal Water Quality Screening Levels			Selected Drinking Water Screening Level (h)	Mississippi River Upstream					Mississippi River Adjacent											
			USEPA MCLs (b)	USEPA SMCLs (b)	USEPA Tapwater RSLs (c)		M2-MIS-10S	M2-MIS-11D	M2-MIS-11S	M2-MIS-12D	M2-MIS-12S	M2-MIS-4S	M2-MIS-5D	M2-MIS-5S	M2-MIS-6D	M2-MIS-6S	M2-MIS-7S	M2-MIS-8D	M2-MIS-8S	M2-MIS-9D	M2-MIS-9S		
Antimony*	7440-36-0	mg/L	0.006	NA	0.0078	0.006																	
Arsenic	7440-38-2	mg/L	0.01	NA	0.000052	0.01	0.0023	0.0021	0.0022	0.0015	0.0016	0.002 J	0.0521	0.052	0.0014	0.0015	0.0024	0.0023	0.0021	0.0014	0.0014	0.0014	0.0014
Barium	7440-39-3	mg/L	2	NA	3.8	2	0.0969	0.0829	0.0856	0.066	0.0727	0.0981	0.0823	0.0848	0.0634	0.0698	0.096	0.0899	0.0906	0.065	0.0665	0.0665	0.0665
Beryllium	7440-41-7	mg/L	0.004	NA	0.025	0.004																	
Boron	7440-42-8	mg/L	NA	NA	4	4	0.0648 J	0.0502 J	0.0538 J	0.0343 J	0.0369 J	0.068 J	0.0501 J	0.0514 J	0.0328 J	0.0346 J	0.0675 J	0.0578 J	0.059 J	0.0336 J	0.0331 J	0.0331 J	0.0331 J
Cadmium	7440-43-9	mg/L	0.005	NA	0.0092	0.005																	
Calcium	7440-70-2	mg/L	NA	NA	NA	NA	62.8	57.7	60.1	49.5	52.6	61.5	53.6	55	51.8	52.7	64.7	59.4	0.00046 J	50.6	52.2	52.2	52.2
Chromium*	7440-47-3	mg/L	0.1 (e)	NA	22 (f)	0.1																	
Cobalt*	7440-48-4	mg/L	NA	NA	0.006	0.006																	
Lead	7439-92-1	mg/L	0.015 (g)	NA	0.015	0.015		0.003 J				0.0042 J											
Lithium	7439-93-2	mg/L	NA	NA	0.04	0.04	0.0246	0.016	0.0172	0.0079 J	0.011	0.0269	0.0156	0.0192	0.0046 J	0.0074 J	0.0255	0.0213	0.0219	0.0054 J			
Mercury*	7439-97-6	mg/L	0.002	NA	0.0057 (d)	0.002																	
Molybdenum	7439-98-7	mg/L	NA	NA	0.1	0.1	0.002 J	0.0017 J	0.002 J	0.0014 J	0.0018 J	0.0022 J	0.0016 J	0.0019 J	0.0015 J	0.0014 J	0.0024 J	0.0017 J	0.0021 J	0.0012 J	0.0015 J	0.0015 J	0.0015 J
Selenium	7782-49-2	mg/L	0.05	NA	0.1	0.05																	
Thallium	7440-28-0	mg/L	0.002	NA	0.0002	0.002							0.0506	0.0512									

Notes:

- Blank cells - Non-detect value.
- * - Constituent was not detected in any samples.
- CAS - Chemical Abstracts Service.
- J - Estimated value.
- MCL - Maximum Contaminant Level.
- mg/L - milligrams per liter.
- NA - Not Available.
- RSL - Regional Screening Level.
- SMCL - Secondary Maximum Contaminant Level.
- USEPA - United States Environmental Protection Agency.

Detected Concentration > Selected Drinking Water Screening Level.

- (a) - Surface water samples collected in May 2018.
- (b) - USEPA 2018 Edition of the Drinking Water Standards and Health Advisories. Spring 2018.
<http://water.epa.gov/drink/contaminants/index.cfm>
- (c) - USEPA Regional Screening Levels (November 2018). Values for tapwater.
http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/Generic_Tables/index.htm
- (d) - RSL for Mercuric Chloride used for Mercury.
- (e) - The drinking water standard or MCL for chromium is based on total chromium.
- (f) - Value for trivalent chromium used. USEPA provides a screening level for hexavalent chromium that is not a drinking water standard, the basis of which has been questioned by USEPA's Science Advisory Board.
- (g) - The Action Level presented is recommended in the USEPA Drinking Water Standards.
- (h) - Selected Drinking Water Screening Level uses the following hierarchy:
 Federal USEPA MCL for Drinking Water.
 Federal USEPA SMCL for Drinking Water.
 Federal November 2018 USEPA Tapwater RSL.

TABLE 5b
COMPARISON OF MAY 2018 MERAMEC AND MISSISSIPPI RIVER SURFACE WATER RESULTS -
TO HUMAN HEALTH DRINKING WATER SCREENING LEVELS -
DISSOLVED (FILTERED) SAMPLE RESULTS (a)
AMEREN MISSOURI MERAMEC ENERGY CENTER
ST. LOUIS COUNTY, MISSOURI

Constituent	CAS	Units	Federal Water Quality Screening Levels			Selected Drinking Water Screening Level (h)	Mississippi River Downstream							
			USEPA MCLs (b)	USEPA SMCLs (b)	USEPA Tapwater RSLs (c)		M2-MIS-1S	M2-MIS-2D	M2-MIS-2S	M2-MIS-3D	M2-MIS-3S			
Antimony*	7440-36-0	mg/L	0.006	NA	0.0078	0.006								
Arsenic	7440-38-2	mg/L	0.01	NA	0.000052	0.01	0.0018	0.0025	0.0023	0.0021	0.0019			
Barium	7440-39-3	mg/L	2	NA	3.8	2	0.109	0.0917	0.0941	0.0732	0.0798			
Beryllium	7440-41-7	mg/L	0.004	NA	0.025	0.004	0.00018 J							
Boron	7440-42-8	mg/L	NA	NA	4	4	0.0408 J	0.0666 J	0.0573 J	0.0435 J	0.0479 J			
Cadmium	7440-43-9	mg/L	0.005	NA	0.0092	0.005								
Calcium	7440-70-2	mg/L	NA	NA	NA	NA	48.5	58.5	61.8	50.8	54			
Chromium*	7440-47-3	mg/L	0.1 (e)	NA	22 (f)	0.1								
Cobalt*	7440-48-4	mg/L	NA	NA	0.006	0.006								
Lead	7439-92-1	mg/L	0.015 (g)	NA	0.015	0.015		0.0034 J		0.0035 J	0.004 J			
Lithium	7439-93-2	mg/L	NA	NA	0.04	0.04	0.0136	0.0207	0.0231	0.0106	0.0131			
Mercury*	7439-97-6	mg/L	0.002	NA	0.0057 (d)	0.002								
Molybdenum	7439-98-7	mg/L	NA	NA	0.1	0.1	0.0015 J	0.0024 J	0.0017 J	0.0017 J	0.0021 J			
Selenium	7782-49-2	mg/L	0.05	NA	0.1	0.05								
Thallium	7440-28-0	mg/L	0.002	NA	0.0002	0.002								

Notes:

Blank cells - Non-detect value.

* - Constituent was not detected in any samples.

CAS - Chemical Abstracts Service.

J - Estimated value.

MCL - Maximum Contaminant Level.

mg/L - milligrams per liter.

NA - Not Available.

RSL - Regional Screening Level.

SMCL - Secondary Maximum Contaminant Level.

USEPA - United States Environmental Protection Agency.

Detected Concentration > Selected Drinking Water Screening Level.

(a) - Surface water samples collected in May 2018.

(b) - USEPA 2018 Edition of the Drinking Water Standards and Health Advisories. Spring 2018.

<http://water.epa.gov/drink/contaminants/index.cfm>

(c) - USEPA Regional Screening Levels (November 2018). Values for tapwater.

http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/Generic_Tables/index.htm

(d) - RSL for Mercuric Chloride used for Mercury.

(e) - The drinking water standard or MCL for chromium is based on total chromium.

(f) - Value for trivalent chromium used. USEPA provides a screening level for hexavalent chromium that is not a drinking water standard, the basis of which has been questioned by USEPA's Science Advisory Board.

(g) - The Action Level presented is recommended in the USEPA Drinking Water Standards.

(h) - Selected Drinking Water Screening Level uses the following hierarchy:

Federal USEPA MCL for Drinking Water.

Federal USEPA SMCL for Drinking Water.

Federal November 2018 USEPA Tapwater RSL.

TABLE 5c
COMPARISON OF SEPTEMBER 2017 MERAMEC AND MISSISSIPPI RIVER SURFACE WATER RESULTS -
TO HUMAN HEALTH DRINKING WATER SCREENING LEVELS -
TOTAL (UNFILTERED) SAMPLE RESULTS (a)
AMEREN MISSOURI MERAMEC ENERGY CENTER
ST. LOUIS COUNTY, MISSOURI

Constituent	CAS	Units	Federal Water Quality Screening Levels			Selected Drinking Water Screening Level (h)	Meramec River																	
			USEPA MCLs (b)	USEPA SMCLs (b)	USEPA Tapwater RSLs (c)		River Upstream				River Adjacent				River Downstream									
							M-MEC-7S	M-MEC-8S	M-MEC-9D	M-MEC-9S	M-MEC-4S	M-MEC-5S	M-MEC-6D	M-MEC-6S	M-MEC-1S	M-MEC-2D	M-MEC-2S	M-MEC-3D	M-MEC-3S					
Antimony*	7440-36-0	mg/L	0.006	NA	0.0078	0.006			0.0038															
Arsenic	7440-38-2	mg/L	0.01	NA	0.000052	0.01	0.0018	0.0014	0.0013	0.0012	0.0018	0.0016	0.0014	0.0013	0.0016	0.0014	0.0015	0.0014	0.0015	0.0014	0.0015	0.0014	0.0015	
Barium	7440-39-3	mg/L	2	NA	3.8	2	0.186	0.18	0.193	0.186	0.193	0.19	0.194	0.18	0.19	0.195	0.191	0.188	0.188	0.19				
Beryllium*	7440-41-7	mg/L	0.004	NA	0.025	0.004																		
Boron	7440-42-8	mg/L	NA	NA	4	4	0.0305	0.0256	0.0248	0.0257	0.0749	0.0609	0.0289	0.0282	0.0364	0.0305	0.0312	0.0336	0.0306					
Cadmium*	7440-43-9	mg/L	0.005	NA	0.0092	0.005																		
Calcium	7440-70-2	mg/L	NA	NA	NA	NA	44.1	43.1	43.9	42.9	44.4	44.6	44.1	42.9	44	44.9	44	43.1	43.7					
Chloride	16887-00-6	mg/L	NA	250	NA	250	20.6	19.8	19.9	20	20.3	20.4	19.6	19.8	19.6	19.8	19.9	19.5	20					
Chromium	7440-47-3	mg/L	0.1	(e)	NA	22	0.0013			0.0018	0.0014	0.00092	0.0011	0.0012	0.0018	0.0015		0.0014	0.0009					
Cobalt	7440-48-4	mg/L	NA	NA	0.006	0.006			0.00073	0.00085														
Fluoride	16984-48-8	mg/L	4	2	0.8	4	0.18	0.17	0.17	0.18	0.18	0.18	0.18	0.17	0.18	0.18	0.18	0.18	0.18					
Lead	7439-92-1	mg/L	0.015	(g)	NA	0.015	0.0172	0.0112	0.0205	0.0196	0.0175	0.0139	0.018	0.014	0.0142	0.0146	0.0155	0.0143						
Lithium	7439-93-2	mg/L	NA	NA	0.04	0.04			0.0042			0.0057			0.0035									
Mercury*	7439-97-6	mg/L	0.002	NA	0.0057	(d)																		
Molybdenum	7439-98-7	mg/L	NA	NA	0.1	0.1						0.0016					0.0014							
Selenium	7782-49-2	mg/L	0.05	NA	0.1	0.05																		
Sulfate	14808-79-8	mg/L	NA	250	NA	250	24.3	23.4	23.1	23.1	26.7	26.6	23.2	23.2	24.5	23.1	23.9	23.3	23.3					
Thallium*	7440-28-0	mg/L	0.002	NA	0.0002	0.002								0.000073	0.000075									
Total Hardness as CaCO3	HARDNESS	mg/L	NA	NA	NA	NA	212	211	214	209	212	214	213	209	214	219	213	209	213					
Total Dissolved Solids	TDS	mg/L	NA	500	NA	500	242	240	229	248	254	250	227	247	245	249	238	224	245					

Notes:
 Blank cells - Non-detect value.
 * - Constituent was not detected in any samples.
 CAS - Chemical Abstracts Service.
 J - Estimated value.
 MCL - Maximum Contaminant Level.
 mg/L - milligrams per liter.
 NA - Not Available.
 RSL - Regional Screening Level.
 SMCL - Secondary Maximum Contaminant Level.
 USEPA - United States Environmental Protection Agency.

Detected Concentration > Selected Drinking Water Screening Level.

- (a) - Surface water samples collected in September 2017.
- (b) - USEPA 2018 Edition of the Drinking Water Standards and Health Advisories. Spring 2018. <http://water.epa.gov/drink/contaminants/index.cfm>
- (c) - USEPA Regional Screening Levels (November 2018). Values for tapwater. http://www.epa.gov/reg3hwmd/risk/human/tb-concentration_table/Generic_Tables/index.htm
- (d) - RSL for Mercuric Chloride used for Mercury.
- (e) - The drinking water standard or MCL for chromium is based on total chromium.
- (f) - Value for trivalent chromium used. USEPA provides a screening level for hexavalent chromium that is not a drinking water standard, the basis of which has been questioned by USEPA's Science Advisory Board.
- (g) - The Action Level presented is recommended in the USEPA Drinking Water Standards.
- (h) - Selected Drinking Water Screening Level uses the following hierarchy:
 Federal USEPA MCL for Drinking Water.
 Federal USEPA SMCL for Drinking Water.
 Federal November 2018 USEPA Tapwater RSL.

TABLE 5c
COMPARISON OF SEPTEMBER 2017 MERAMEC AND MISSISSIPPI RIVER SURFACE WATER RESULTS -
TO HUMAN HEALTH DRINKING WATER SCREENING LEVELS -
TOTAL (UNFILTERED) SAMPLE RESULTS (a)
AMEREN MISSOURI MERAMEC ENERGY CENTER
ST. LOUIS COUNTY, MISSOURI

Constituent	CAS	Units	Federal Water Quality Screening Levels			Selected Drinking Water Screening Level (h)	Mississippi River																				
			USEPA MCLs (b)	USEPA SMCLs (b)	USEPA Tapwater RSLs (c)		River Upstream									River Adjacent						River Downstream					
							M-MIS-10S	M-MIS-11D	M-MIS-11S	M-MIS-12D	M-MIS-12S	M-MIS-4S	M-MIS-5D	M-MIS-5S	M-MIS-6D	M-MIS-6S	M-MIS-7S	M-MIS-8D	M-MIS-8S	M-MIS-9D	M-MIS-9S	M-MIS-1S	M-MIS-2D	M-MIS-2S	M-MIS-3D	M-MIS-3S	
Antimony*	7440-36-0	mg/L	0.006	NA	0.0078	0.006														0.0035							
Arsenic	7440-38-2	mg/L	0.01	NA	0.000052	0.01	0.003	0.0028	0.003	0.0024	0.0022	0.0032	0.0028	0.0027	0.0024	0.0023	0.0035	0.0029	0.0027	0.0022	0.0022	0.0028	0.003	0.0024	0.0026		
Barium	7440-39-3	mg/L	2	NA	3.8	2	0.102	0.0987	0.103	0.081	0.0807	0.106	0.0976	0.0967	0.081	0.0825	0.124	0.0999	0.0978	0.0783	0.078	0.133	0.103	0.0859	0.11		
Beryllium*	7440-41-7	mg/L	0.004	NA	0.025	0.004																					
Boron	7440-42-8	mg/L	NA	NA	4	4	0.0953	0.0822	0.0858	0.0547	0.0573	0.0943	0.0803	0.0755	0.0593	0.0587	0.0981	0.0842	0.0846	0.0548	0.0535	0.0801	0.0902	0.0888	0.0665	0.0674	
Cadmium*	7440-43-9	mg/L	0.005	NA	0.0092	0.005																					
Calcium	7440-70-2	mg/L	NA	NA	NA	NA	57	56	56.8	52.6	52.4	57.9	55.8	52.4	51.5	52.1	59.5	56.6	55.1	50.7	51.1	59.4	57.1	57.5	52	52.9	
Chloride	16887-00-6	mg/L	NA	250	NA	250	24.9	24.6	24.7	25.4	25.7	25	24.6	24.7	25.7	25.9	25.1	24.7	24.9	26	26	24	24.7	24.7	24.8	24.9	
Chromium	7440-47-3	mg/L	0.1	(e)	NA	22	0.1	0.00072	0.0018	0.0015	0.0013	0.0014	0.0013	0.0014	0.002	0.0013	0.0016	0.0018	0.0015	0.0012	0.0012	0.00093	0.0016		0.0016	0.0012	0.002
Cobalt	7440-48-4	mg/L	NA	NA	0.006	0.006																					
Fluoride	16984-48-8	mg/L	4	2	0.8	4	0.37	0.35	0.35	0.27	0.28	0.37	0.32	0.33	0.27	0.27	0.37	0.34	0.34	0.26	0.26	0.32	0.35	0.34	0.3	0.31	
Lead	7439-92-1	mg/L	0.015	(g)	NA	0.015	0.0028			0.0035	0.0026	0.0037	0.0035			0.0028	0.0043	0.0032	0.0034		0.0033	0.0056	0.0033	0.0027	0.0029		
Lithium	7439-93-2	mg/L	NA	NA	0.04	0.04	0.0321	0.0288	0.0284	0.0169	0.012	0.032	0.0277	0.0215	0.0172	0.0158	0.0331	0.0255	0.0267	0.0123	0.0113	0.0266	0.0323	0.0302	0.0193	0.021	
Mercury*	7439-97-6	mg/L	0.002	NA	0.0057	(d)	0.0029	0.0026	0.0025	0.002	0.002	0.0026	0.0024	0.0024	0.0026	0.0027	0.0032	0.0024	0.0023	0.0022	0.0021	0.0029	0.0027	0.0028	0.0024	0.0025	
Molybdenum	7439-98-7	mg/L	NA	NA	0.1	0.1	0.0029	0.0026	0.0025	0.002	0.002	0.0026	0.0024	0.0024	0.0026	0.0027	0.0032	0.0024	0.0023	0.0022	0.0021	0.0029	0.0027	0.0028	0.0024	0.0025	
Selenium	7782-49-2	mg/L	0.05	NA	0.1	0.05						0.005															
Sulfate	14808-79-8	mg/L	NA	250	NA	250	140	130	129	71	69.8	140	111	110	61.8	63.2	140	120	123	57.2	57.6	109	130	123	87.9	88.4	
Thallium*	7440-28-0	mg/L	0.002	NA	0.0002	0.002										0.00016							0.000062				
Total Hardness as CaCO3	HARDNESS	mg/L	NA	NA	NA	NA	236	233	235	230	230	238	234	221	226	227	245	237	229	223	224	243	235	240	224	226	
Total Dissolved Solids	TDS	mg/L	NA	500	NA	500	398	391	384	300	309	393	374	357	290	303	408	389	373	288	277	355	393	390	332	328	

Notes:
Blank cells - Non-detect value.
* - Constituent was not detected in any samples.
CAS - Chemical Abstracts Service.
J - Estimated value.
MCL - Maximum Contaminant Level.
mg/L - milligrams per liter.
NA - Not Available.
RSL - Regional Screening Level.
SMCL - Secondary Maximum Contaminant Level.
USEPA - United States Environmental Protection Agency.

Detected Concentration > Selected Drinking Water Screening Level.
(a) - Surface water samples collected in September 2017.
(b) - USEPA 2018 Edition of the Drinking Water Standards and Health Advisories. Spring 2018. <http://water.epa.gov/drink/contaminants/index.cfm>
(c) - USEPA Regional Screening Levels (November 2018). Values for tapwater. http://www.epa.gov/reg3hwmd/risk/human/tb-concentration_table/Generic_Tables/index.htm
(d) - RSL for Mercuric Chloride used for Mercury.
(e) - The drinking water standard or MCL for chromium is based on total chromium.
(f) - Value for trivalent chromium used. USEPA provides a screening level for hexavalent chromium that is not a drinking water standard, the basis of which has been questioned by USEPA's Science Advisory Board.
(g) - The Action Level presented is recommended in the USEPA Drinking Water Standards.
(h) - Selected Drinking Water Screening Level uses the following hierarchy:
Federal USEPA MCL for Drinking Water.
Federal USEPA SMCL for Drinking Water.
Federal November 2018 USEPA Tapwater RSL.

TABLE 5d
COMPARISON OF SEPTEMBER 2017 MERAMEC AND MISSISSIPPI RIVER SURFACE WATER RESULTS -
TO HUMAN HEALTH DRINKING WATER SCREENING LEVELS -
DISSOLVED (FILTERED) SAMPLE RESULTS (a)
AMEREN MISSOURI MERAMEC ENERGY CENTER
ST. LOUIS COUNTY, MISSOURI

Constituent	CAS	Units	Federal Water Quality Screening Levels			Selected Drinking Water Screening Level (h)	Meramec River													
			USEPA MCLs (b)	USEPA SMCLs (b)	USEPA Tapwater RSLs (c)		River Upstream				River Adjacent				River Downstream					
							M-MEC-7S	M-MEC-8S	M-MEC-9D	M-MEC-9S	M-MEC-4S	M-MEC-5S	M-MEC-6D	M-MEC-6S	M-MEC-1S	M-MEC-2D	M-MEC-2S	M-MEC-3D	M-MEC-3S	
Antimony*	7440-36-0	mg/L	0.006	NA	0.0078	0.006														
Arsenic	7440-38-2	mg/L	0.01	NA	0.000052	0.01	0.0016	0.0013	0.0011	0.0011	0.0014	0.0013	0.0012	0.0011	0.0013	0.0012	0.0011	0.0011	0.0011	0.0012
Barium	7440-39-3	mg/L	2	NA	3.8	2	0.167	0.166	0.176	0.172	0.18	0.177	0.173	0.171	0.172	0.174	0.18	0.176		
Beryllium*	7440-41-7	mg/L	0.004	NA	0.025	0.004														
Boron	7440-42-8	mg/L	NA	NA	4	4	0.0281	0.0266	0.0263	0.025	0.0625	0.0596	0.0282	0.027	0.0359	0.0285	0.0341	0.0314	0.0289	
Cadmium*	7440-43-9	mg/L	0.005	NA	0.0092	0.005														
Calcium	7440-70-2	mg/L	NA	NA	NA	NA	41.2	40.2	41.9	41.2	43.2	42.8	42.1	41.2	41.1	41	41.3	41.7	41.9	
Chromium	7440-47-3	mg/L	0.1 (e)	NA	22 (f)	0.1														
Cobalt	7440-48-4	mg/L	NA	NA	0.006	0.006								0.00073		0.00074				
Lead	7439-92-1	mg/L	0.015 (g)	NA	0.015	0.015														
Lithium	7439-93-2	mg/L	NA	NA	0.04	0.04														
Mercury*	7439-97-6	mg/L	0.002	NA	0.0057 (d)	0.002					0.0013									
Molybdenum	7439-98-7	mg/L	NA	NA	0.1	0.1														
Selenium	7782-49-2	mg/L	0.05	NA	0.1	0.05														
Thallium	7440-28-0	mg/L	0.002	NA	0.0002	0.002								0.000057					0.00005	

Notes:

Blank cells - Non-detect value.

* Constituent was not detected in any samples.

-- - Constituent not included in this analysis.

CAS - Chemical Abstracts Service.

MCL - Maximum Contaminant Level.

mg/L - milligrams per liter.

NA - Not Available.

RSL - Risk-Based Screening Level.

SMCL - Secondary Maximum Contaminant Level.

USEPA - United States Environmental Protection Agency.

Detected Concentration > Selected Drinking Water Screening Level.

(a) - Surface water samples collected in September 2017.

(b) - USEPA 2018 Edition of the Drinking Water Standards and Health Advisories. Spring 2018.

<http://water.epa.gov/drink/contaminants/index.cfm>

(c) - USEPA Regional Screening Levels (November 2018). Values for tapwater.

http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/Generic_Tables/index.htm

(d) - RSL for Mercuric Chloride used for Mercury.

(e) - The drinking water standard or MCL for chromium is based on total chromium.

(f) - Value for trivalent chromium used. USEPA provides a screening level for hexavalent chromium

that is not a drinking water standard, the basis of which has been questioned by USEPA's Science Advisory Board.

(g) - The Action Level presented is recommended in the USEPA Drinking Water Standards.

(h) - Selected Drinking Water Screening Level uses the following hierarchy:


Federal USEPA MCL for Drinking Water.

Federal USEPA SMCL for Drinking Water.

Federal November 2018 USEPA Tapwater RSL.

TABLE 6a
COMPARISON OF MAY 2018 MERAMEC AND MISSISSIPPI RIVER SURFACE WATER RESULTS -
TO HUMAN HEALTH AWQC SCREENING LEVELS -
TOTAL (UNFILTERED) SAMPLE RESULTS (a)
AMEREN MISSOURI MERAMEC ENERGY CENTER
ST. LOUIS COUNTY, MISSOURI

Constituent	CAS	Units	USEPA	Meramec River Upstream					Meramec River Adjacent					Meramec River Downstream				
			AWQC (b)	M2-MEC-7S	M2-MEC-8D	M2-MEC-8S	M2-MEC-9D	M2-MEC-9S	M2-MEC-4S	M2-MEC-5D	M2-MEC-5S	M2-MEC-6D	M2-MEC-6S	M2-MEC-1S	M2-MEC-2D	M2-MEC-2S	M2-MEC-3D	M2-MEC-3S
Antimony*	7440-36-0	mg/L	0.64															
Arsenic	7440-38-2	mg/L	0.00014 (c)	0.00061 J	0.00064 J	0.00061 J	0.00063 J	0.00064 J	0.00062 J	0.00061 J	0.00058 J	0.00064 J	0.00069 J	0.00069 J	0.00066 J	0.00061 J	0.00059 J	0.00069 J
Barium	7440-39-3	mg/L	NA	0.134	0.139	0.133	0.14	0.133	0.135	0.14	0.135	0.139	0.136	0.135	0.141	0.137	0.137	0.135
Beryllium	7440-41-7	mg/L	NA	0.00017 J	0.00017 J													
Boron	7440-42-8	mg/L	NA						0.0151 J					0.0142 J	0.0151 J	0.0143 J	0.0139 J	0.0139 J
Cadmium	7440-43-9	mg/L	NA															
Calcium	7440-70-2	mg/L	NA	28.6	28.8	28.3	29.1	28.3	28.8	28.9	28.9	28.7	29	28.6	28.9	29.3	28.3	28.5
Chloride	16887-00-6	mg/L	NA	6.4	6.5	6.5	6.5	6.5	6.4	6.4	6.5	6.5	6.4	6.5	6.4	6.7	6.4	6.3
Chromium	7440-47-3	mg/L	NA															
Cobalt	7440-48-4	mg/L	NA															
Fluoride	16984-48-8	mg/L	NA	0.074 J	0.12 J	0.12 J	0.12 J	0.12 J	0.12 J	0.12 J	0.12 J	0.12 J	0.12 J	0.12 J	0.12 J	0.12 J	0.12 J	0.11 J
Lead	7439-92-1	mg/L	NA	0.0081 J	0.0092 J	0.0077 J	0.0086 J	0.005 J	0.0071 J	0.0094 J	0.0057 J	0.0114	0.0054 J	0.0065 J	0.0097 J	0.0062 J	0.0096 J	0.0067 J
Lithium	7439-93-2	mg/L	NA															
Mercury*	7439-97-6	mg/L	NA															
Molybdenum	7439-98-7	mg/L	NA															
Selenium	7782-49-2	mg/L	4.2															
Sulfate	14808-79-8	mg/L	NA	12.2	13.3	13.1	15.4	13.1	13	12.9	12.9	13	12.8	13.2	12.9	13	12.9	12.9
Thallium*	7440-28-0	mg/L	0.00047															
Total Hardness as CaCO3	471-34-1	mg/L	NA	135	135	133	137	133	135	136	136	135	136	136	137	138	134	135
Total Dissolved Solids	TDS	mg/L	NA	163	165	166	160	134	162	163	169	163	179	260	177	172	177	173

Notes:
Blank cells - Non-detect value.
* - Constituent was not detected in any samples.
AWQC - Ambient Water Quality Criteria.
CAS - Chemical Abstracts Service.
J - Estimated value.
mg/L - milligrams per liter.
NA - Not Available.
USEPA - United States Environmental Protection Agency.
 Detected Concentration > AWQC.

- (a) - Surface water samples collected in May 2018.
- (b) - USEPA National Recommended Water Quality Criteria.
USEPA Office of Water and Office of Science and Technology.
<http://water.epa.gov/scitech/swguidance/standards/criteria/current/index.cfm>
USEPA AWQC Human Health for the Consumption of Organism Only
apply to total concentrations.
- (c) - Value applies to inorganic form of arsenic only.

TABLE 6a
COMPARISON OF MAY 2018 MERAMEC AND MISSISSIPPI RIVER SURFACE WATER RESULTS -
TO HUMAN HEALTH AWQC SCREENING LEVELS -
TOTAL (UNFILTERED) SAMPLE RESULTS (a)
AMEREN MISSOURI MERAMEC ENERGY CENTER
ST. LOUIS COUNTY, MISSOURI

Constituent	CAS	Units	USEPA	Mississippi River Upstream					Mississippi River Adjacent										
			AWQC (b)	M2-MIS-10S	M2-MIS-11D	M2-MIS-11S	M2-MIS-12D	M2-MIS-12S	M2-MIS-4S	M2-MIS-5D	M2-MIS-5S	M2-MIS-6D	M2-MIS-6S	M2-MIS-7S	M2-MIS-8D	M2-MIS-8S	M2-MIS-9D	M2-MIS-9S	
Antimony*	7440-36-0	mg/L	0.64																
Arsenic	7440-38-2	mg/L	0.00014 (c)	0.0034	0.0034	0.0031	0.0023	0.0024	0.0034	0.0029	0.003	0.0021	0.0022	0.0033	0.0031	0.0034	0.002	0.0021	
Barium	7440-39-3	mg/L	NA	0.139	0.146	0.136	0.106	0.118	0.136	0.122	0.131	0.105	0.0973	0.137	0.144	0.14	0.0934	0.1	
Beryllium	7440-41-7	mg/L	NA	0.00017 J		0.0002 J								0.00018 J					
Boron	7440-42-8	mg/L	NA	0.0659 J	0.058 J	0.0522 J	0.0368 J	0.0408 J	0.0656 J	0.0503 J	0.0531 J	0.0341 J	0.0347 J	0.0651 J	0.0561 J	0.0576 J	0.0345 J	0.0338 J	
Cadmium	7440-43-9	mg/L	NA																
Calcium	7440-70-2	mg/L	NA	61.1	61.7	57.2	51.8	54	61	56.4	58.4	50.2	50.4	62.5	58.9	60.1	48.3	49.6	
Chloride	16887-00-6	mg/L	NA	24.5	24.6	24.6	28.4	28.3	23.2	24.1	24	28.8	29	23.2	23.6	23.6	30.4	29.6	
Chromium	7440-47-3	mg/L	NA	0.0044 J	0.0056	0.0047 J	0.0043 J	0.0045 J	0.0044 J	0.0029 J	0.0045 J	0.0043 J	0.003 J	0.0035 J	0.0053	0.0039 J	0.0028 J	0.004 J	
Cobalt	7440-48-4	mg/L	NA	0.0018 J	0.0022 J	0.0019 J	0.0021 J	0.0022 J	0.002 J	0.0016 J	0.0019 J	0.0015 J	0.0015 J	0.0017 J	0.0025 J	0.002 J	0.0014 J	0.0015 J	
Fluoride	16984-48-8	mg/L	NA	0.35	0.32	0.32	0.25	0.26	0.29 J	0.24	0.25	0.19 J	0.18 J	0.3	0.27	0.27	0.18 J	0.17 J	
Lead	7439-92-1	mg/L	NA	0.0063 J	0.0087 J	0.0067 J	0.0069 J	0.0068 J	0.0052 J	0.0048 J	0.0071 J	0.0071 J	0.0065 J	0.006 J	0.0061 J	0.005 J	0.004 J	0.0059 J	
Lithium	7439-93-2	mg/L	NA	0.026	0.0232	0.0202	0.0095 J	0.012	0.0252	0.0176	0.0189	0.0092 J	0.0096 J	0.028	0.0229	0.0227	0.0068 J	0.0076 J	
Mercury*	7439-97-6	mg/L	NA																
Molybdenum	7439-98-7	mg/L	NA	0.002 J	0.0023 J	0.0017 J	0.0012 J	0.0013 J	0.002 J	0.0014 J	0.0016 J	0.0013 J	0.00097 J	0.0023 J	0.0016 J	0.0018 J	0.0013 J	0.0012 J	
Selenium	7782-49-2	mg/L	4.2				0.0068 J												
Sulfate	14808-79-8	mg/L	NA	132	107	105	53.9	54.5	127	85.1	90.3	44.9	44.5	128	105	105	39.7	42.4	
Thallium*	7440-28-0	mg/L	0.00047																
Total Hardness as CaCO3	471-34-1	mg/L	NA	250	253	235	214	222	253	232	239	206	207	256	242	246	200	205	
Total Dissolved Solids	TDS	mg/L	NA	440	392	389	347	426	446	400	379	319	330	442	469	401	298	225	

Notes:
 Blank cells - Non-detect value.
 * - Constituent was not detected in any samples.
 AWQC - Ambient Water Quality Criteria.
 CAS - Chemical Abstracts Service.
 J - Estimated value.
 mg/L - milligrams per liter.
 NA - Not Available.
 USEPA - United States Environmental Protection Agency.

Detected Concentration > AWQC.

- (a) - Surface water samples collected in May 2018.
- (b) - USEPA National Recommended Water Quality Criteria.
 USEPA Office of Water and Office of Science and Technology.
<http://water.epa.gov/scitech/swguidance/standards/criteria/current/index.cfm>
 USEPA AWQC Human Health for the Consumption of Organism Only
 apply to total concentrations.
- (c) - Value applies to inorganic form of arsenic only.

TABLE 6a
COMPARISON OF MAY 2018 MERAMEC AND MISSISSIPPI RIVER SURFACE WATER RESULTS -
TO HUMAN HEALTH AWQC SCREENING LEVELS -
TOTAL (UNFILTERED) SAMPLE RESULTS (a)
AMEREN MISSOURI MERAMEC ENERGY CENTER
ST. LOUIS COUNTY, MISSOURI

Constituent	CAS	Units	USEPA	Mississippi River Downstream				
			AWQC (b)	M2-MIS-1S	M2-MIS-2D	M2-MIS-2S	M2-MIS-3D	M2-MIS-3S
Antimony*	7440-36-0	mg/L	0.64					
Arsenic	7440-38-2	mg/L	0.00014 (c)	0.0022	0.0031	0.0032	0.0025	0.0026
Barium	7440-39-3	mg/L	NA	0.142	0.139	0.138	0.111	0.11
Beryllium	7440-41-7	mg/L	NA		0.00029 J		0.00022 J	0.00018 J
Boron	7440-42-8	mg/L	NA	0.0413 J	0.0623 J	0.0642 J	0.0407 J	0.044 J
Cadmium	7440-43-9	mg/L	NA	0.00065 J		0.00045 J		
Calcium	7440-70-2	mg/L	NA	50.7	61.9	62	53	53.4
Chloride	16887-00-6	mg/L	NA	16.2	23.3	23.4	26	25.6
Chromium	7440-47-3	mg/L	NA	0.0021 J	0.0041 J	0.005	0.0035 J	0.0036 J
Cobalt	7440-48-4	mg/L	NA	0.0011 J	0.0024 J	0.0021 J	0.002 J	0.0022 J
Fluoride	16984-48-8	mg/L	NA	0.18 J	0.26	0.26	0.2	0.21
Lead	7439-92-1	mg/L	NA	0.0049 J	0.0059 J	0.006 J	0.0068 J	0.0062 J
Lithium	7439-93-2	mg/L	NA	0.0155	0.022	0.0252	0.0119	0.0137
Mercury*	7439-97-6	mg/L	NA					
Molybdenum	7439-98-7	mg/L	NA	0.0012 J	0.0021 J	0.0023 J	0.0015 J	0.0015 J
Selenium	7782-49-2	mg/L	4.2					
Sulfate	14808-79-8	mg/L	NA	73.2	109	104	63.4	66.7
Thallium*	7440-28-0	mg/L	0.00047					
Total Hardness as CaCO3	471-34-1	mg/L	NA	215	254	254	214	219
Total Dissolved Solids	TDS	mg/L	NA	303	423	404	351	348

Notes:

Blank cells - Non-detect value.

* - Constituent was not detected in any samples.

AWQC - Ambient Water Quality Criteria.

CAS - Chemical Abstracts Service.

J - Estimated value.

mg/L - milligrams per liter.

NA - Not Available.

USEPA - United States Environmental Protection Agency.

Detected Concentration > AWQC.

(a) - Surface water samples collected in May 2018.

(b) - USEPA National Recommended Water Quality Criteria.

USEPA Office of Water and Office of Science and Technology.

<http://water.epa.gov/scitech/swguidance/standards/criteria/current/index.cfm>

USEPA AWQC Human Health for the Consumption of Organism Only

apply to total concentrations.

(c) - Value applies to inorganic form of arsenic only.

TABLE 6b
COMPARISON OF MAY 2018 MERAMEC AND MISSISSIPPI RIVER SURFACE WATER RESULTS -
TO HUMAN HEALTH AWQC SCREENING LEVELS -
DISSOLVED (FILTERED) SAMPLE RESULTS (a)
AMEREN MISSOURI MERAMEC ENERGY CENTER
ST. LOUIS COUNTY, MISSOURI

Constituent	CAS	Units	USEPA	Meramec River Upstream					Meramec River Adjacent					Meramec River Downstream				
			AWQC (b)	M2-MEC-7S	M2-MEC-8D	M2-MEC-8S	M2-MEC-9D	M2-MEC-9S	M2-MEC-4S	M2-MEC-5D	M2-MEC-5S	M2-MEC-6D	M2-MEC-6S	M2-MEC-1S	M2-MEC-2D	M2-MEC-2S	M2-MEC-3D	M2-MEC-3S
Antimony*	7440-36-0	mg/L	0.64															
Arsenic	7440-38-2	mg/L	0.00014 (c)	0.00058 J	0.00058 J	0.00065 J	0.00059 J	0.00059 J	0.00061 J	0.00056 J	0.00066 J	0.00056 J	0.00064 J	0.00063 J	0.00062 J	0.0006 J	0.00061 J	0.00059 J
Barium	7440-39-3	mg/L	NA	0.13	0.127	0.128	0.127	0.128	0.127	0.128	0.13	0.129	0.128	0.127	0.127	0.128	0.129	0.13
Beryllium	7440-41-7	mg/L	NA															
Boron	7440-42-8	mg/L	NA															
Cadmium	7440-43-9	mg/L	NA															
Calcium	7440-70-2	mg/L	NA	28.4	28.4	28.2	28.2	28.5	28.3	28.3	28.7	28.6	28.4	28.1	28.2	28.4	28.5	28.8
Chromium*	7440-47-3	mg/L	NA															
Cobalt*	7440-48-4	mg/L	NA															
Lead	7439-92-1	mg/L	NA															
Lithium	7439-93-2	mg/L	NA															
Mercury*	7439-97-6	mg/L	NA															
Molybdenum	7439-98-7	mg/L	NA															
Selenium	7782-49-2	mg/L	4.2															
Thallium	7440-28-0	mg/L	0.00047															

Notes:
 Blank cells - Non-detect value.
 * - Constituent was not detected in any samples.
 AWQC - Ambient Water Quality Criteria.
 CAS - Chemical Abstracts Service.
 J - Estimated value.
 mg/L - milligrams per liter.
 NA - Not Available.
 USEPA - United States Environmental Protection Agency.

Detected Concentration > AWQC.

- (a) - Surface water samples collected in May 2018.
- (b) - USEPA National Recommended Water Quality Criteria.
 USEPA Office of Water and Office of Science and Technology.
<http://water.epa.gov/scitech/swguidance/standards/criteria/current/index.cfm>
 USEPA AWQC Human Health for the Consumption of Organism Only
 apply to total concentrations.
- (c) - Value applies to inorganic form of arsenic only.

TABLE 6b
COMPARISON OF MAY 2018 MERAMEC AND MISSISSIPPI RIVER SURFACE WATER RESULTS -
TO HUMAN HEALTH AWQC SCREENING LEVELS -
DISSOLVED (FILTERED) SAMPLE RESULTS (a)
AMEREN MISSOURI MERAMEC ENERGY CENTER
ST. LOUIS COUNTY, MISSOURI

Constituent	CAS	Units	USEPA	Mississippi River Upstream					Mississippi River Adjacent									
			AWQC (b)	M2-MIS-10S	M2-MIS-11D	M2-MIS-11S	M2-MIS-12D	M2-MIS-12S	M2-MIS-4S	M2-MIS-5D	M2-MIS-5S	M2-MIS-6D	M2-MIS-6S	M2-MIS-7S	M2-MIS-8D	M2-MIS-8S	M2-MIS-9D	M2-MIS-9S
Antimony*	7440-36-0	mg/L	0.64															
Arsenic	7440-38-2	mg/L	0.00014 (c)	0.0023	0.0021	0.0022	0.0015	0.0016	0.002 J	0.0521	0.052	0.0014	0.0015	0.0024	0.0023	0.0021	0.0014	0.0014
Barium	7440-39-3	mg/L	NA	0.0969	0.0829	0.0856	0.066	0.0727	0.0981	0.0823	0.0848	0.0634	0.0698	0.096	0.0899	0.0906	0.065	0.0665
Beryllium	7440-41-7	mg/L	NA															
Boron	7440-42-8	mg/L	NA	0.0648 J	0.0502 J	0.0538 J	0.0343 J	0.0369 J	0.068 J	0.0501 J	0.0514 J	0.0328 J	0.0346 J	0.0675 J	0.0578 J	0.059 J	0.0336 J	0.0331 J
Cadmium	7440-43-9	mg/L	NA													0.00046 J		
Calcium	7440-70-2	mg/L	NA	62.8	57.7	60.1	49.5	52.6	61.5	53.6	55	51.8	52.7	64.7	59.4	60.8	50.6	52.2
Chromium*	7440-47-3	mg/L	NA															
Cobalt*	7440-48-4	mg/L	NA															
Lead	7439-92-1	mg/L	NA		0.003 J				0.0042 J									
Lithium	7439-93-2	mg/L	NA	0.0246	0.016	0.0172	0.0079 J	0.011	0.0269	0.0156	0.0192	0.0046 J	0.0074 J	0.0255	0.0213	0.0219	0.0054 J	
Mercury*	7439-97-6	mg/L	NA															
Molybdenum	7439-98-7	mg/L	NA	0.002 J	0.0017 J	0.002 J	0.0014 J	0.0018 J	0.0022 J	0.0016 J	0.0019 J	0.0015 J	0.0014 J	0.0024 J	0.0017 J	0.0021 J	0.0012 J	0.0015 J
Selenium	7782-49-2	mg/L	4.2															
Thallium	7440-28-0	mg/L	0.00047							0.0506	0.0512							

Notes:
 Blank cells - Non-detect value.
 * - Constituent was not detected in any samples.
 AWQC - Ambient Water Quality Criteria.
 CAS - Chemical Abstracts Service.
 J - Estimated value.
 mg/L - milligrams per liter.
 NA - Not Available.
 USEPA - United States Environmental Protection Agency.

 Detected Concentration > AWQC.

- (a) - Surface water samples collected in May 2018.
- (b) - USEPA National Recommended Water Quality Criteria.
 USEPA Office of Water and Office of Science and Technology.
<http://water.epa.gov/scitech/swguidance/standards/criteria/current/index.cfm>
 USEPA AWQC Human Health for the Consumption of Organism Only
 apply to total concentrations.
- (c) - Value applies to inorganic form of arsenic only.

TABLE 6b
COMPARISON OF MAY 2018 MERAMEC AND MISSISSIPPI RIVER SURFACE WATER RESULTS -
TO HUMAN HEALTH AWQC SCREENING LEVELS -
DISSOLVED (FILTERED) SAMPLE RESULTS (a)
AMEREN MISSOURI MERAMEC ENERGY CENTER
ST. LOUIS COUNTY, MISSOURI

Constituent	CAS	Units	USEPA	Mississippi River Downstream				
			AWQC (b)	M2-MIS-1S	M2-MIS-2D	M2-MIS-2S	M2-MIS-3D	M2-MIS-3S
Antimony*	7440-36-0	mg/L	0.64					
Arsenic	7440-38-2	mg/L	0.00014 (c)	0.0018	0.0025	0.0023	0.0021	0.0019
Barium	7440-39-3	mg/L	NA	0.109	0.0917	0.0941	0.0732	0.0798
Beryllium	7440-41-7	mg/L	NA	0.00018 J				
Boron	7440-42-8	mg/L	NA	0.0408 J	0.0666 J	0.0573 J	0.0435 J	0.0479 J
Cadmium	7440-43-9	mg/L	NA					
Calcium	7440-70-2	mg/L	NA	48.5	58.5	61.8	50.8	54
Chromium*	7440-47-3	mg/L	NA					
Cobalt*	7440-48-4	mg/L	NA					
Lead	7439-92-1	mg/L	NA		0.0034 J		0.0035 J	0.004 J
Lithium	7439-93-2	mg/L	NA	0.0136	0.0207	0.0231	0.0106	0.0131
Mercury*	7439-97-6	mg/L	NA					
Molybdenum	7439-98-7	mg/L	NA	0.0015 J	0.0024 J	0.0017 J	0.0017 J	0.0021 J
Selenium	7782-49-2	mg/L	4.2					
Thallium	7440-28-0	mg/L	0.00047					

Notes:

Blank cells - Non-detect value.

* - Constituent was not detected in any samples.

AWQC - Ambient Water Quality Criteria.

CAS - Chemical Abstracts Service.

J - Estimated value.

mg/L - milligrams per liter.

NA - Not Available.

USEPA - United States Environmental Protection Agency.

Detected Concentration > AWQC.

(a) - Surface water samples collected in May 2018.

(b) - USEPA National Recommended Water Quality Criteria.

USEPA Office of Water and Office of Science and Technology.

<http://water.epa.gov/scitech/swguidance/standards/criteria/current/index.cfm>

USEPA AWQC Human Health for the Consumption of Organism Only apply to total concentrations.

(c) - Value applies to inorganic form of arsenic only.

TABLE 6c
COMPARISON OF SEPTEMBER 2017 MERAMEC AND MISSISSIPPI RIVER SURFACE WATER RESULTS -
TO HUMAN HEALTH AWQC SCREENING LEVELS - TOTAL (UNFILTERED) SAMPLE RESULTS (a)
AMEREN MISSOURI MERAMEC ENERGY CENTER
ST. LOUIS COUNTY, MISSOURI

Constituent	CAS	Units	USEPA AWQC (b)	Meramec River												
				River Upstream				River Adjacent				River Downstream				
				M-MEC-7S	M-MEC-8S	M-MEC-9D	M-MEC-9S	M-MEC-4S	M-MEC-5S	M-MEC-6D	M-MEC-6S	M-MEC-1S	M-MEC-2D	M-MEC-2S	M-MEC-3D	M-MEC-3S
Antimony*	7440-36-0	mg/L	0.64			0.0038										
Arsenic	7440-38-2	mg/L	0.00014 (c)	0.0018	0.0014	0.0013	0.0012	0.0018	0.0016	0.0014	0.0013	0.0016	0.0014	0.0015	0.0014	0.0015
Barium	7440-39-3	mg/L	NA	0.186	0.18	0.193	0.186	0.193	0.19	0.194	0.18	0.19	0.195	0.191	0.188	0.19
Beryllium*	7440-41-7	mg/L	NA													
Boron	7440-42-8	mg/L	NA	0.0305	0.0256	0.0248	0.0257	0.0749	0.0609	0.0289	0.0282	0.0364	0.0305	0.0312	0.0336	0.0306
Cadmium*	7440-43-9	mg/L	NA													
Calcium	7440-70-2	mg/L	NA	44.1	43.1	43.9	42.9	44.4	44.6	44.1	42.9	44	44.9	44	43.1	43.7
Chloride	16887-00-6	mg/L	NA	20.6	19.8	19.9	20	20.3	20.4	19.6	19.8	19.6	19.8	19.9	19.5	20
Chromium	7440-47-3	mg/L	NA	0.0013		0.0018		0.0014	0.00092	0.0011	0.0012	0.0018	0.0015		0.0014	0.0009
Cobalt	7440-48-4	mg/L	NA			0.00073		0.00085								
Fluoride	16984-48-8	mg/L	NA	0.18	0.17	0.17	0.17	0.18	0.18	0.18	0.18	0.17	0.18	0.18	0.18	0.18
Lead	7439-92-1	mg/L	NA	0.0172	0.0112	0.0205	0.0196	0.0175	0.0139	0.018	0.0121	0.014	0.0142	0.0146	0.0155	0.0143
Lithium	7439-93-2	mg/L	NA				0.0042					0.0035				0.0035
Mercury*	7439-97-6	mg/L	NA													
Molybdenum	7439-98-7	mg/L	NA					0.0016						0.0014		
Selenium	7782-49-2	mg/L	4.2													
Sulfate	14808-79-8	mg/L	NA	24.3	23.4	23.1	23.1	26.7	26.6	23.2	23.2	24.5	23.1	23.9	23.3	23.3
Thallium*	7440-28-0	mg/L	0.00047									0.000073		0.000075		
Total Hardness as CaCO3	HARDNESS	mg/L	NA	212	211	214	209	212	214	213	209	214	219	213	209	213
Total Dissolved Solids	TDS	mg/L	NA	242	240	229	248	254	250	227	247	245	249	238	224	245

Notes:
 Blank cells - Non-detect value.
 * Constituent was not detected in any samples.
 -- - Constituent not included in this analysis.
 AWQC - Ambient Water Quality Criteria.
 CAS - Chemical Abstracts Service.
 mg/L - milligrams per liter.
 NA - Not Available.
 USEPA - United States Environmental Protection Agency.
 Detected Concentration > AWQC.

- (a) - Surface water samples collected in September 2017.
- (b) - USEPA National Recommended Water Quality Criteria. USEPA Office of Water and Office of Science and Technology. Accessed November 2014.
<http://water.epa.gov/scitech/swguidance/standards/criteria/current/index.cfm>
 USEPA AWQC Human Health for the Consumption of Organism Only apply to total concentrations.
- (c) - Value applies to inorganic form of arsenic only.

TABLE 6c
COMPARISON OF SEPTEMBER 2017 MERAMEC AND MISSISSIPPI RIVER SURFACE WATER RESULTS -
TO HUMAN HEALTH AWQC SCREENING LEVELS - TOTAL (UNFILTERED) SAMPLE RESULTS (a)
AMEREN MISSOURI MERAMEC ENERGY CENTER
ST. LOUIS COUNTY, MISSOURI

Constituent	CAS	Units	USEPA AWQC (b)	Mississippi River																			
				River Upstream					River Adjacent										River Downstream				
				M-MIS-10S	M-MIS-11D	M-MIS-11S	M-MIS-12D	M-MIS-12S	M-MIS-4S	M-MIS-5D	M-MIS-5S	M-MIS-6D	M-MIS-6S	M-MIS-7S	M-MIS-8D	M-MIS-8S	M-MIS-9D	M-MIS-9S	M-MIS-1S	M-MIS-2D	M-MIS-2S	M-MIS-3D	M-MIS-3S
Antimony*	7440-36-0	mg/L	0.64															0.0035					
Arsenic	7440-38-2	mg/L	0.00014 (c)	0.003	0.0028	0.003	0.0024	0.0022	0.0032	0.0028	0.0027	0.0024	0.0023	0.0035	0.0029	0.0027	0.0022	0.0022	0.0028	0.003	0.003	0.0024	0.0026
Barium	7440-39-3	mg/L	NA	0.102	0.0987	0.103	0.081	0.0807	0.106	0.0976	0.0967	0.081	0.0825	0.124	0.0999	0.0978	0.0783	0.078	0.133	0.106	0.103	0.0859	0.11
Beryllium*	7440-41-7	mg/L	NA																				
Boron	7440-42-8	mg/L	NA	0.0953	0.0822	0.0858	0.0547	0.0573	0.0943	0.0803	0.0755	0.0593	0.0587	0.0981	0.0842	0.0846	0.0548	0.0535	0.0801	0.0902	0.0888	0.0665	0.0674
Cadmium*	7440-43-9	mg/L	NA																				
Calcium	7440-70-2	mg/L	NA	57	56	56.8	52.6	52.4	57.9	55.8	52.4	51.5	52.1	59.5	56.6	55.1	50.7	51.1	59.4	57.1	57.5	52	52.9
Chloride	16887-00-6	mg/L	NA	24.9	24.6	24.7	25.4	25.7	25	24.6	24.7	25.7	25.9	25.1	24.7	24.9	26	26	24	24.7	24.8	24.9	
Chromium	7440-47-3	mg/L	NA	0.00072	0.0018	0.0015	0.0013	0.0014	0.0013	0.0014	0.002	0.0013	0.0016	0.0018	0.0015	0.0012	0.0012	0.00093	0.0016		0.0016	0.0012	0.002
Cobalt	7440-48-4	mg/L	NA																				
Fluoride	16984-48-8	mg/L	NA	0.37	0.35	0.35	0.27	0.28	0.37	0.32	0.33	0.27	0.27	0.37	0.34	0.34	0.26	0.26	0.32	0.35	0.34	0.3	0.31
Lead	7439-92-1	mg/L	NA	0.0028			0.0035	0.0026	0.0037	0.0035			0.0028	0.0043	0.0032	0.0034		0.0033	0.0056	0.0033	0.0027		0.0029
Lithium	7439-93-2	mg/L	NA	0.0321	0.0288	0.0284	0.0169	0.012	0.032	0.0277	0.0215	0.0172	0.0158	0.0331	0.0255	0.0267	0.0123	0.0113	0.0266	0.0323	0.0302	0.0193	0.021
Mercury*	7439-97-6	mg/L	NA																				
Molybdenum	7439-98-7	mg/L	NA	0.0029	0.0026	0.0025	0.002	0.002	0.0026	0.0024	0.0024	0.0026	0.0027	0.0032	0.0024	0.0023	0.0022	0.0021	0.0029	0.0027	0.0028	0.0024	0.0025
Selenium	7782-49-2	mg/L	4.2						0.005			0.004											
Sulfate	14808-79-8	mg/L	NA	140	130	129	71	69.8	140	111	110	61.8	63.2	140	120	123	57.2	57.6	109	130	123	87.9	88.4
Thallium*	7440-28-0	mg/L	0.00047											0.00016							0.000062		
Total Hardness as CaCO3	HARDNESS	mg/L	NA	236	233	235	230	230	238	234	221	226	227	245	237	229	223	224	243	235	240	224	226
Total Dissolved Solids	TDS	mg/L	NA	398	391	384	300	309	393	374	357	290	303	408	389	373	288	277	355	393	390	332	328

Notes:

Blank cells - Non-detect value.

* Constituent was not detected in any samples.

-- - Constituent not included in this analysis.

AWQC - Ambient Water Quality Criteria.

CAS - Chemical Abstracts Service.

mg/L - milligrams per liter.

NA - Not Available.

USEPA - United States Environmental Protection Agency.

Detected Concentration > AWQC.

(a) - Surface water samples collected in September 2017.

(b) - USEPA National Recommended Water Quality Criteria. USEPA Office of Water and Office of Science and Technology. Accessed November 2014.

<http://water.epa.gov/scitech/swguidance/standards/criteria/current/index.cfm>

USEPA AWQC Human Health for the Consumption of Organism Only apply to total concentrations.

(c) - Value applies to inorganic form of arsenic only.

TABLE 6d
COMPARISON OF SEPTEMBER 2017 MERAMEC AND MISSISSIPPI RIVER SURFACE WATER RESULTS -
TO HUMAN HEALTH AWQC SCREENING LEVELS - DISSOLVED (FILTERED) SAMPLE RESULTS (a)
AMEREN MISSOURI MERAMEC ENERGY CENTER
ST. LOUIS COUNTY, MISSOURI


Constituent	CAS	Units	USEPA AWQC (b)	Meramec River												
				River Upstream				River Adjacent				River Downstream				
				M-MEC-7S	M-MEC-8S	M-MEC-9D	M-MEC-9S	M-MEC-4S	M-MEC-5S	M-MEC-6D	M-MEC-6S	M-MEC-1S	M-MEC-2D	M-MEC-2S	M-MEC-3D	M-MEC-3S
Antimony*	7440-36-0	mg/L	0.64													
Arsenic	7440-38-2	mg/L	0.00014 (c)	0.0016	0.0013	0.0011	0.0011	0.0014	0.0013	0.0012	0.0011	0.0013	0.0012	0.0011	0.0011	0.0012
Barium	7440-39-3	mg/L	NA	0.167	0.166	0.176	0.172	0.18	0.177	0.177	0.173	0.171	0.172	0.174	0.18	0.176
Beryllium*	7440-41-7	mg/L	NA													
Boron	7440-42-8	mg/L	NA	0.0281	0.0266	0.0263	0.025	0.0625	0.0596	0.0282	0.027	0.0359	0.0285	0.0341	0.0314	0.0289
Cadmium*	7440-43-9	mg/L	NA													
Calcium	7440-70-2	mg/L	NA	41.2	40.2	41.9	41.2	43.2	42.8	42.1	41.2	41.1	41	41.3	41.7	41.9
Chromium	7440-47-3	mg/L	NA													
Cobalt	7440-48-4	mg/L	NA									0.00073		0.00074		
Lead	7439-92-1	mg/L	NA													
Lithium	7439-93-2	mg/L	NA													
Mercury*	7439-97-6	mg/L	NA													
Molybdenum	7439-98-7	mg/L	NA						0.0013							
Selenium	7782-49-2	mg/L	4.2													
Thallium*	7440-28-0	mg/L	0.00047									0.000057				0.00005

Notes:
 Blank cells - Non-detect value.
 * Constituent was not detected in any samples.
 -- - Constituent not included in this analysis.
 AWQC - Ambient Water Quality Criteria.
 CAS - Chemical Abstracts Service.
 mg/L - milligrams per liter.
 NA - Not Available.
 USEPA - United States Environmental Protection Agency.
 Detected Concentration > AWQC.

(a) - Surface water samples collected in September 2017.
 (b) - USEPA National Recommended Water Quality Criteria. USEPA Office of Water and Office of Science and Technology. Accessed November 2014.
<http://water.epa.gov/scitech/swguidance/standards/criteria/current/index.cfm>
 USEPA AWQC Human Health for the Consumption of Organism Only apply to total concentrations.
 (c) - Value applies to inorganic form of arsenic only.

TABLE 6d
COMPARISON OF SEPTEMBER 2017 MERAMEC AND MISSISSIPPI RIVER SURFACE WATER RESULTS -
TO HUMAN HEALTH AWQC SCREENING LEVELS - DISSOLVED (FILTERED) SAMPLE RESULTS (a)
AMEREN MISSOURI MERAMEC ENERGY CENTER
ST. LOUIS COUNTY, MISSOURI

Constituent	CAS	Units	USEPA AWQC (b)	Mississippi River																			
				River Upstream					River Adjacent									River Downstream					
				M-MIS-10S	M-MIS-11D	M-MIS-11S	M-MIS-12D	M-MIS-12S	M-MIS-4S	M-MIS-5D	M-MIS-5S	M-MIS-6D	M-MIS-6S	M-MIS-7S	M-MIS-8D	M-MIS-8S	M-MIS-9D	M-MIS-9S	M-MIS-1S	M-MIS-2D	M-MIS-2S	M-MIS-3D	M-MIS-3S
Antimony*	7440-36-0	mg/L	0.64																				
Arsenic	7440-38-2	mg/L	0.00014 (c)	0.0028	0.0026	0.0025	0.0019	0.0019	0.0028	0.0024	0.0024	0.0019	0.002	0.0027	0.0024	0.0025	0.0018	0.0021	0.0024	0.0025	0.0024	0.0021	0.0021
Barium	7440-39-3	mg/L	NA	0.0965	0.0887	0.0899	0.066	0.0656	0.0936	0.0826	0.0845	0.0687	0.0688	0.0949	0.0844	0.0861	0.0645	0.0674	0.112	0.0874	0.0872	0.073	0.0746
Beryllium*	7440-41-7	mg/L	NA								0.0014												
Boron	7440-42-8	mg/L	NA	0.0979	0.0859	0.0862	0.0542	0.0566	0.0946	0.0771	0.0812	0.0593	0.057	0.0943	0.0806	0.0836	0.0515	0.0579	0.0804	0.0873	0.082	0.0627	0.0672
Cadmium*	7440-43-9	mg/L	NA																				
Calcium	7440-70-2	mg/L	NA	58.1	56	56	51	50.2	57.2	54.1	53.8	51.4	52.9	57.2	54.3	54.5	50.2	51.2	52	55.5	51	51.9	52.5
Chromium	7440-47-3	mg/L	NA	0.00079	0.00074		0.00076		0.00093	0.00096				0.00075				0.0011					0.00099
Cobalt	7440-48-4	mg/L	NA																				
Lead	7439-92-1	mg/L	NA	0.0026	0.0027		0.0024			0.0027						0.0025						0.003	
Lithium	7439-93-2	mg/L	NA	0.0306	0.0241	0.032	0.0132	0.0144	0.0289	0.023	0.0316	0.0176	0.0155	0.0335	0.0287	0.032	0.0135	0.0166	0.0264	0.0263	0.0278	0.019	0.0207
Mercury*	7439-97-6	mg/L	NA																				
Molybdenum	7439-98-7	mg/L	NA	0.0032	0.0025	0.0027	0.0025	0.0018	0.0029	0.0025	0.0031	0.0026	0.0026	0.0028	0.0026	0.0027	0.0017	0.0022	0.0023	0.0034	0.0024	0.0027	0.0022
Selenium	7782-49-2	mg/L	4.2	0.0036									0.0051						0.0043		0.0039		
Thallium*	7440-28-0	mg/L	0.00047																		0.000053		

Notes:
 Blank cells - Non-detect value.
 * Constituent was not detected in any samples.
 -- - Constituent not included in this analysis.
 AWQC - Ambient Water Quality Criteria.
 CAS - Chemical Abstracts Service.
 mg/L - milligrams per liter.
 NA - Not Available.
 USEPA - United States Environmental Protection Agency.
 Detected Concentration > AWQC.

- (a) - Surface water samples collected in September 2017.
- (b) - USEPA National Recommended Water Quality Criteria. USEPA Office of Water and Office of Science and Technology. Accessed November 2014.
<http://water.epa.gov/scitech/swguidance/standards/criteria/current/index.cfm>
 USEPA AWQC Human Health for the Consumption of Organism Only apply to total concentrations.
- (c) - Value applies to inorganic form of arsenic only.

TABLE 7a
COMPARISON OF MAY 2018 MERAMEC AND MISSISSIPPI RIVER SURFACE WATER RESULTS -
TO ECOLOGICAL SCREENING LEVELS - TOTAL (UNFILTERED) SAMPLE RESULTS (a)
AMEREN MISSOURI MERAMEC ENERGY CENTER
ST. LOUIS COUNTY, MISSOURI

Constituent	CAS	Units	Federal Water Quality Criteria		Meramec River Upstream					Meramec River Adjacent					Meramec River Downstream				
			USEPA Aquatic Life AWQC Freshwater Acute (b)	USEPA Aquatic Life AWQC Freshwater Chronic (b)	M2-MEC-7S	M2-MEC-8D	M2-MEC-8S	M2-MEC-9D	M2-MEC-9S	M2-MEC-4S	M2-MEC-5D	M2-MEC-5S	M2-MEC-6D	M2-MEC-6S	M2-MEC-1S	M2-MEC-2D	M2-MEC-2S	M2-MEC-3D	M2-MEC-3S
			Antimony*	7440-36-0	mg/L	NA	NA												
Arsenic	7440-38-2	mg/L	0.34	0.15	0.00061 J	0.00064 J	0.00061 J	0.00063 J	0.00064 J	0.00062 J	0.00061 J	0.00058 J	0.00064 J	0.00069 J	0.00066 J	0.00061 J	0.00059 J	0.00069 J	
Barium	7440-39-3	mg/L	NA	NA	0.134	0.139	0.133	0.14	0.133	0.135	0.14	0.135	0.139	0.136	0.135	0.141	0.137	0.137	
Beryllium	7440-41-7	mg/L	NA	NA	0.00017 J	0.00017 J													
Boron	7440-42-8	mg/L	NA	NA						0.0151 J					0.0142 J	0.0151 J	0.0143 J	0.0139 J	
Cadmium	7440-43-9	mg/L	0.0036 (d)	0.0013 (d)															
Calcium	7440-70-2	mg/L	NA	NA	28.6	28.8	28.3	29.1	28.3	28.8	28.9	28.9	28.7	29	28.6	28.9	29.3	28.3	
Chloride	16887-00-6	mg/L	860	230	6.4	6.5	6.5	6.5	6.5	6.4	6.4	6.5	6.5	6.4	6.5	6.4	6.7	6.4	
Chromium	7440-47-3	mg/L	3.1 (c,d)	0.15 (c,d)															
Cobalt	7440-48-4	mg/L	NA	NA														0.00089 J	
Fluoride	16984-48-8	mg/L	NA	NA	0.074 J	0.12 J	0.12 J	0.12 J	0.12 J	0.12 J	0.12 J	0.12 J	0.12 J	0.12 J	0.12 J	0.12 J	0.12 J	0.11 J	
Lead	7439-92-1	mg/L	0.19 (d)	0.0073 (d)	0.0081 J	0.0092 J	0.0077 J	0.0086 J	0.005 J	0.0071 J	0.0094 J	0.0057 J	0.0114	0.0054 J	0.0065 J	0.0097 J	0.0062 J	0.0096 J	
Lithium	7439-93-2	mg/L	NA	NA															
Mercury*	7439-97-6	mg/L	0.0016	0.00091															
Molybdenum	7439-98-7	mg/L	NA	NA															
Selenium	7782-49-2	mg/L	NA	3.1															
Sulfate	14808-79-8	mg/L	NA	NA	12.2	13.3	13.1	15.4	13.1	13	12.9	12.9	13	12.8	13.2	12.9	13	12.9	
Thallium*	7440-28-0	mg/L	NA	NA															
Total Hardness as CaCO3	471-34-1	mg/L	NA	NA	135	135	133	137	133	135	136	136	135	136	136	137	138	134	
Total Dissolved Solids	TDS	mg/L	NA	NA	163	165	166	160	134	162	163	169	163	179	260	177	172	177	

Notes:
Blank cells - Non-detect value. J - Estimated value.
* Constituent was not detected in any samples. mg/L - milligrams per liter.
AWQC - USEPA Ambient Water Quality Criteria. NA - Not Available.
CAS - Chemical Abstracts Service. USEPA - United States Environmental Protection Agency.

Detected Concentration> USEPA Aquatic Life AWQC Chronic.
Detected Concentration> USEPA Aquatic Life AWQC Acute and Chronic.

- (a) - Surface water samples collected in May 2018.
- (b) - USEPA National Recommended Water Quality Criteria. USEPA Office of Water and Office of Science and Technology. <http://water.epa.gov/scitech/swguidance/standards/criteria/current/index.cfm>
Total values provided. Values adjusted for site-specific hardness - see note (d).
USEPA provides AWQC for both total and dissolved results.
- (c) - Value for trivalent chromium used.
- (d) - Hardness dependent value for total metals. Site-specific total recoverable mean hardness value for Meramec River and Mississippi River of 192 mg/L as CaCO3 used.

TABLE 7a
COMPARISON OF MAY 2018 MERAMEC AND MISSISSIPPI RIVER SURFACE WATER RESULTS -
TO ECOLOGICAL SCREENING LEVELS - TOTAL (UNFILTERED) SAMPLE RESULTS (a)
AMEREN MISSOURI MERAMEC ENERGY CENTER
ST. LOUIS COUNTY, MISSOURI

Constituent	CAS	Units	Federal Water Quality Criteria		Mississippi River Upstream					Mississippi River Adjacent									
			USEPA Aquatic Life AWQC Freshwater Acute (b)	USEPA Aquatic Life AWQC Freshwater Chronic (b)	M2-MIS-10S	M2-MIS-11D	M2-MIS-11S	M2-MIS-12D	M2-MIS-12S	M2-MIS-4S	M2-MIS-5D	M2-MIS-5S	M2-MIS-6D	M2-MIS-6S	M2-MIS-7S	M2-MIS-8D	M2-MIS-8S	M2-MIS-9D	M2-MIS-9S
Antimony*	7440-36-0	mg/L	NA	NA															
Arsenic	7440-38-2	mg/L	0.34	0.15	0.0034	0.0034	0.0031	0.0023	0.0024	0.0034	0.0029	0.003	0.0021	0.0022	0.0033	0.0031	0.0034	0.002	0.0021
Barium	7440-39-3	mg/L	NA	NA	0.139	0.146	0.136	0.106	0.118	0.136	0.122	0.131	0.105	0.0973	0.137	0.144	0.14	0.0934	0.1
Beryllium	7440-41-7	mg/L	NA	NA	0.00017 J		0.0002 J							0.00018 J					
Boron	7440-42-8	mg/L	NA	NA	0.0659 J	0.058 J	0.0522 J	0.0368 J	0.0408 J	0.0656 J	0.0503 J	0.0531 J	0.0341 J	0.0347 J	0.0651 J	0.0561 J	0.0576 J	0.0345 J	0.0338 J
Cadmium	7440-43-9	mg/L	0.0036 (d)	0.0013 (d)															
Calcium	7440-70-2	mg/L	NA	NA	61.1	61.7	57.2	51.8	54	61	56.4	58.4	50.2	50.4	62.5	58.9	60.1	48.3	49.6
Chloride	16887-00-6	mg/L	860	230	24.5	24.6	24.6	28.4	28.3	23.2	24.1	24	28.8	29	23.2	23.6	23.6	30.4	29.6
Chromium	7440-47-3	mg/L	3.1 (c,d)	0.15 (c,d)	0.0044 J	0.0056	0.0047 J	0.0043 J	0.0045 J	0.0044 J	0.0029 J	0.0045 J	0.0043 J	0.003 J	0.0035 J	0.0053	0.0039 J	0.0028 J	0.004 J
Cobalt	7440-48-4	mg/L	NA	NA	0.0018 J	0.0022 J	0.0019 J	0.0021 J	0.0022 J	0.002 J	0.0016 J	0.0019 J	0.0015 J	0.0015 J	0.0017 J	0.0025 J	0.002 J	0.0014 J	0.0015 J
Fluoride	16984-48-8	mg/L	NA	NA	0.35	0.32	0.32	0.25	0.26	0.29 J	0.24	0.25	0.19 J	0.18 J	0.3	0.27	0.27	0.18 J	0.17 J
Lead	7439-92-1	mg/L	0.19 (d)	0.0073 (d)	0.0063 J	0.0087 J	0.0067 J	0.0069 J	0.0068 J	0.0052 J	0.0048 J	0.0071 J	0.0071 J	0.0065 J	0.006 J	0.0061 J	0.005 J	0.004 J	0.0059 J
Lithium	7439-93-2	mg/L	NA	NA	0.026	0.0232	0.0202	0.0095 J	0.012	0.0252	0.0176	0.0189	0.0092 J	0.0096 J	0.028	0.0229	0.0227	0.0068 J	0.0076 J
Mercury*	7439-97-6	mg/L	0.0016	0.00091															
Molybdenum	7439-98-7	mg/L	NA	NA	0.002 J	0.0023 J	0.0017 J	0.0012 J	0.0013 J	0.002 J	0.0014 J	0.0016 J	0.0013 J	0.00097 J	0.0023 J	0.0016 J	0.0018 J	0.0013 J	0.0012 J
Selenium	7782-49-2	mg/L	NA	3.1															
Sulfate	14808-79-8	mg/L	NA	NA	132	107	105	53.9	54.5	127	85.1	90.3	44.9	44.5	128	105	105	39.7	42.4
Thallium*	7440-28-0	mg/L	NA	NA															
Total Hardness as CaCO3	471-34-1	mg/L	NA	NA	250	253	235	214	222	253	232	239	206	207	256	242	246	200	205
Total Dissolved Solids	TDS	mg/L	NA	NA	440	392	389	347	426	446	400	379	319	330	442	469	401	298	225

Notes:

- Blank cells - Non-detect value. J - Estimated value.
- * Constituent was not detected in any samples. mg/L - milligrams per liter.
- AWQC - USEPA Ambient Water Quality Criteria. NA - Not Available.
- CAS - Chemical Abstracts Service. USEPA - United States Environmental Protection Agency.

Detected Concentration> USEPA Aquatic Life AWQC Chronic.
 Detected Concentration> USEPA Aquatic Life AWQC Acute and Chronic.

- (a) - Surface water samples collected in May 2018.
- (b) - USEPA National Recommended Water Quality Criteria. USEPA Office of Water and Office of Science and Technology. <http://water.epa.gov/scitech/swguidance/standards/criteria/current/index.cfm>
Total values provided. Values adjusted for site-specific hardness - see note (d).
USEPA provides AWQC for both total and dissolved results.
- (c) - Value for trivalent chromium used.
- (d) - Hardness dependent value for total metals. Site-specific total recoverable mean hardness value for Meramec River and Mississippi River of 192 mg/L as CaCO3 used.

TABLE 7a
COMPARISON OF MAY 2018 MERAMEC AND MISSISSIPPI RIVER SURFACE WATER RESULTS -
TO ECOLOGICAL SCREENING LEVELS - TOTAL (UNFILTERED) SAMPLE RESULTS (a)
AMEREN MISSOURI MERAMEC ENERGY CENTER
ST. LOUIS COUNTY, MISSOURI

Constituent	CAS	Units	Federal Water Quality Criteria		Mississippi River Downstream				
			USEPA Aquatic Life AWQC Freshwater Acute (b)	USEPA Aquatic Life AWQC Freshwater Chronic (b)	M2-MIS-1S	M2-MIS-2D	M2-MIS-2S	M2-MIS-3D	M2-MIS-3S
Antimony*	7440-36-0	mg/L	NA	NA					
Arsenic	7440-38-2	mg/L	0.34	0.15	0.0022	0.0031	0.0032	0.0025	0.0026
Barium	7440-39-3	mg/L	NA	NA	0.142	0.139	0.138	0.111	0.11
Beryllium	7440-41-7	mg/L	NA	NA		0.00029 J		0.00022 J	0.00018 J
Boron	7440-42-8	mg/L	NA	NA	0.0413 J	0.0623 J	0.0642 J	0.0407 J	0.044 J
Cadmium	7440-43-9	mg/L	0.0036 (d)	0.0013 (d)	0.00065 J		0.00045 J		
Calcium	7440-70-2	mg/L	NA	NA	50.7	61.9	62	53	53.4
Chloride	16887-00-6	mg/L	860	230	16.2	23.3	23.4	26	25.6
Chromium	7440-47-3	mg/L	3.1 (c,d)	0.15 (c,d)	0.0021 J	0.0041 J	0.005	0.0035 J	0.0036 J
Cobalt	7440-48-4	mg/L	NA	NA	0.0011 J	0.0024 J	0.0021 J	0.002 J	0.0022 J
Fluoride	16984-48-8	mg/L	NA	NA	0.18 J	0.26	0.26	0.2	0.21
Lead	7439-92-1	mg/L	0.19 (d)	0.0073 (d)	0.0049 J	0.0059 J	0.006 J	0.0068 J	0.0062 J
Lithium	7439-93-2	mg/L	NA	NA	0.0155	0.022	0.0252	0.0119	0.0137
Mercury*	7439-97-6	mg/L	0.0016	0.00091					
Molybdenum	7439-98-7	mg/L	NA	NA	0.0012 J	0.0021 J	0.0023 J	0.0015 J	0.0015 J
Selenium	7782-49-2	mg/L	NA	3.1					
Sulfate	14808-79-8	mg/L	NA	NA	73.2	109	104	63.4	66.7
Thallium*	7440-28-0	mg/L	NA	NA					
Total Hardness as CaCO3	471-34-1	mg/L	NA	NA	215	254	254	214	219
Total Dissolved Solids	TDS	mg/L	NA	NA	303	423	404	351	348

Notes:

- Blank cells - Non-detect value.
- J - Estimated value.
- * Constituent was not detected in any samples.
- mg/L - milligrams per liter.
- AWQC - USEPA Ambient Water Quality Criteria.
- NA - Not Available.
- CAS - Chemical Abstracts Service.
- USEPA - United States Environmental Protection Agency.

Detected Concentration> USEPA Aquatic Life AWQC Chronic.
 Detected Concentration> USEPA Aquatic Life AWQC Acute and Chronic.

- (a) - Surface water samples collected in May 2018.
- (b) - USEPA National Recommended Water Quality Criteria. USEPA Office of Water and Office of Science and Technology. <http://water.epa.gov/scitech/swguidance/standards/criteria/current/index.cfm>
 Total values provided. Values adjusted for site-specific hardness - see note (d).
 USEPA provides AWQC for both total and dissolved results.
- (c) - Value for trivalent chromium used.
- (d) - Hardness dependent value for total metals. Site-specific total recoverable mean hardness value for Meramec River and Mississippi River of 192 mg/L as CaCO3 used.

TABLE 7b
COMPARISON OF MAY 2018 MERAMEC AND MISSISSIPPI RIVER SURFACE WATER RESULTS -
TO ECOLOGICAL SCREENING LEVELS - DISSOLVED (FILTERED) SAMPLE RESULTS (a)
AMEREN MISSOURI MERAMEC ENERGY CENTER
ST. LOUIS COUNTY, MISSOURI

Constituent	CAS	Units	Federal Water Quality Criteria		Meramec River Upstream					Meramec River Adjacent					Meramec River Downstream				
			USEPA Aquatic Life AWQC Freshwater Acute (b)	USEPA Aquatic Life AWQC Freshwater Chronic (b)	M2-MEC-7S	M2-MEC-8D	M2-MEC-8S	M2-MEC-9D	M2-MEC-9S	M2-MEC-4S	M2-MEC-5D	M2-MEC-5S	M2-MEC-6D	M2-MEC-6S	M2-MEC-1S	M2-MEC-2D	M2-MEC-2S	M2-MEC-3D	M2-MEC-3S
Antimony*	7440-36-0	mg/L	NA	NA															
Arsenic	7440-38-2	mg/L	0.34	0.15	0.00058 J	0.00058 J	0.00065 J	0.00059 J	0.00059 J	0.00061 J	0.00056 J	0.00066 J	0.00056 J	0.00064 J	0.00063 J	0.00062 J	0.0006 J	0.00061 J	0.00059 J
Barium	7440-39-3	mg/L	NA	NA	0.13	0.127	0.128	0.127	0.128	0.127	0.128	0.13	0.129	0.128	0.127	0.127	0.128	0.129	0.13
Beryllium	7440-41-7	mg/L	NA	NA						0.00018 J	0.00018 J	0.00019 J							
Boron	7440-42-8	mg/L	NA	NA									0.0129 J		0.0129 J				
Cadmium	7440-43-9	mg/L	0.0033 (d)	0.0012 (d)															
Calcium	7440-70-2	mg/L	NA	NA	28.4	28.4	28.2	28.2	28.5	28.3	28.3	28.7	28.6	28.4	28.1	28.2	28.4	28.5	28.8
Chromium*	7440-47-3	mg/L	0.97 (c,d)	0.13 (c,d)															
Cobalt*	7440-48-4	mg/L	NA	NA															
Lead	7439-92-1	mg/L	0.13 (d)	0.0051 (d)															
Lithium	7439-93-2	mg/L	NA	NA															
Mercury*	7439-97-6	mg/L	0.0014	0.00077															
Molybdenum	7439-98-7	mg/L	NA	NA															
Selenium	7782-49-2	mg/L	NA	NA															
Thallium	7440-28-0	mg/L	NA	NA															

Notes:
 Blank cells - Non-detect value. J - Estimated value.
 * Constituent was not detected in any samples. mg/L - milligrams per liter.
 AWQC - USEPA Ambient Water Quality Criteria. NA - Not Available.
 CAS - Chemical Abstracts Service. USEPA - United States Environmental Protection Agency.

Detected Concentration> USEPA Aquatic Life AWQC Chronic.
 Detected Concentration> USEPA Aquatic Life AWQC Acute and Chronic.

- (a) - Surface water samples collected in May 2018.
- (b) - USEPA National Recommended Water Quality Criteria. USEPA Office of Water and Office of Science and Technology. <http://water.epa.gov/scitech/swguidance/standards/criteria/current/index.cfm>
 Total values provided. Values adjusted for site-specific hardness - see note (d).
 USEPA provides AWQC for both total and dissolved results.
- (c) - Value for trivalent chromium used.
- (d) - Hardness dependent value for total metals. Site-specific total recoverable mean hardness value for Meramec River and Mississippi River of 192 mg/L as CaCO3 used.

TABLE 7b

COMPARISON OF MAY 2018 MERAMEC AND MISSISSIPPI RIVER SURFACE WATER RESULTS -
 TO ECOLOGICAL SCREENING LEVELS - DISSOLVED (FILTERED) SAMPLE RESULTS (a)
 AMEREN MISSOURI MERAMEC ENERGY CENTER
 ST. LOUIS COUNTY, MISSOURI

Constituent	CAS	Units	Federal Water Quality Criteria		Mississippi River Upstream					Mississippi River Adjacent									
			USEPA Aquatic Life AWQC Freshwater Acute (b)	USEPA Aquatic Life AWQC Freshwater Chronic (b)	M2-MIS-10S	M2-MIS-11D	M2-MIS-11S	M2-MIS-12D	M2-MIS-12S	M2-MIS-4S	M2-MIS-5D	M2-MIS-5S	M2-MIS-6D	M2-MIS-6S	M2-MIS-7S	M2-MIS-8D	M2-MIS-8S	M2-MIS-9D	M2-MIS-9S
Antimony*	7440-36-0	mg/L	NA	NA															
Arsenic	7440-38-2	mg/L	0.34	0.15	0.0023	0.0021	0.0022	0.0015	0.0016	0.002 J	0.0521	0.052	0.0014	0.0015	0.0024	0.0023	0.0021	0.0014	0.0014
Barium	7440-39-3	mg/L	NA	NA	0.0969	0.0829	0.0856	0.066	0.0727	0.0981	0.0823	0.0848	0.0634	0.0698	0.096	0.0899	0.0906	0.065	0.0665
Beryllium	7440-41-7	mg/L	NA	NA															
Boron	7440-42-8	mg/L	NA	NA	0.0648 J	0.0502 J	0.0538 J	0.0343 J	0.0369 J	0.068 J	0.0501 J	0.0514 J	0.0328 J	0.0346 J	0.0675 J	0.0578 J	0.059 J	0.0336 J	0.0331 J
Cadmium	7440-43-9	mg/L	0.0033 (d)	0.0012 (d)													0.00046 J	0.0046 J	0.0046 J
Calcium	7440-70-2	mg/L	NA	NA	62.8	57.7	60.1	49.5	52.6	61.5	53.6	55	51.8	52.7	64.7	59.4	60.8	50.6	52.2
Chromium*	7440-47-3	mg/L	0.97 (c,d)	0.13 (c,d)															
Cobalt*	7440-48-4	mg/L	NA	NA															
Lead	7439-92-1	mg/L	0.13 (d)	0.0051 (d)		0.003 J				0.0042 J									
Lithium	7439-93-2	mg/L	NA	NA	0.0246	0.016	0.0172	0.0079 J	0.011	0.0269	0.0156	0.0192	0.0046 J	0.0074 J	0.0255	0.0213	0.0219	0.0054 J	
Mercury*	7439-97-6	mg/L	0.0014	0.00077															
Molybdenum	7439-98-7	mg/L	NA	NA	0.002 J	0.0017 J	0.002 J	0.0014 J	0.0018 J	0.0022 J	0.0016 J	0.0019 J	0.0015 J	0.0014 J	0.0024 J	0.0017 J	0.0021 J	0.0012 J	0.0015 J
Selenium	7782-49-2	mg/L	NA	NA															
Thallium	7440-28-0	mg/L	NA	NA							0.0506	0.0512							

Notes:
 Blank cells - Non-detect value. J - Estimated value.
 * Constituent was not detected in any samples. mg/L - milligrams per liter.
 AWQC - USEPA Ambient Water Quality Criteria. NA - Not Available.
 CAS - Chemical Abstracts Service. USEPA - United States Environmental Protection Agency.

Detected Concentration> USEPA Aquatic Life AWQC Chronic.
 Detected Concentration> USEPA Aquatic Life AWQC Acute and Chronic.

- (a) - Surface water samples collected in May 2018.
- (b) - USEPA National Recommended Water Quality Criteria. USEPA Office of Water and Office of Science and Technology. <http://water.epa.gov/scitech/swguidance/standards/criteria/current/index.cfm>
 Total values provided. Values adjusted for site-specific hardness - see note (d).
 USEPA provides AWQC for both total and dissolved results.
- (c) - Value for trivalent chromium used.
- (d) - Hardness dependent value for total metals. Site-specific total recoverable mean hardness value for Meramec River and Mississippi River of 192 mg/L as CaCO3 used.

TABLE 7b
COMPARISON OF MAY 2018 MERAMEC AND MISSISSIPPI RIVER SURFACE WATER RESULTS -
TO ECOLOGICAL SCREENING LEVELS - DISSOLVED (FILTERED) SAMPLE RESULTS (a)
AMEREN MISSOURI MERAMEC ENERGY CENTER
ST. LOUIS COUNTY, MISSOURI

Constituent	CAS	Units	Federal Water Quality Criteria		Mississippi River Downstream				
			USEPA Aquatic Life AWQC Freshwater Acute (b)	USEPA Aquatic Life AWQC Freshwater Chronic (b)	M2-MIS-1S	M2-MIS-2D	M2-MIS-2S	M2-MIS-3D	M2-MIS-3S
Antimony*	7440-36-0	mg/L	NA	NA					
Arsenic	7440-38-2	mg/L	0.34	0.15	0.0018	0.0025	0.0023	0.0021	0.0019
Barium	7440-39-3	mg/L	NA	NA	0.109	0.0917	0.0941	0.0732	0.0798
Beryllium	7440-41-7	mg/L	NA	NA	0.00018 J				
Boron	7440-42-8	mg/L	NA	NA	0.0408 J	0.0666 J	0.0573 J	0.0435 J	0.0479 J
Cadmium	7440-43-9	mg/L	0.0033 (d)	0.0012 (d)					
Calcium	7440-70-2	mg/L	NA	NA	48.5	58.5	61.8	50.8	54
Chromium*	7440-47-3	mg/L	0.97 (c,d)	0.13 (c,d)					
Cobalt*	7440-48-4	mg/L	NA	NA					
Lead	7439-92-1	mg/L	0.13 (d)	0.0051 (d)		0.0034 J		0.0035 J	0.004 J
Lithium	7439-93-2	mg/L	NA	NA	0.0136	0.0207	0.0231	0.0106	0.0131
Mercury*	7439-97-6	mg/L	0.0014	0.00077					
Molybdenum	7439-98-7	mg/L	NA	NA	0.0015 J	0.0024 J	0.0017 J	0.0017 J	0.0021 J
Selenium	7782-49-2	mg/L	NA	NA					
Thallium	7440-28-0	mg/L	NA	NA					

Notes:
 Blank cells - Non-detect value. J - Estimated value.
 * Constituent was not detected in any samples. mg/L - milligrams per liter.
 AWQC - USEPA Ambient Water Quality Criteria. NA - Not Available.
 CAS - Chemical Abstracts Service. USEPA - United States Environmental Protection Agency.

Detected Concentration> USEPA Aquatic Life AWQC Chronic.
 Detected Concentration> USEPA Aquatic Life AWQC Acute and Chronic.

- (a) - Surface water samples collected in May 2018.
- (b) - USEPA National Recommended Water Quality Criteria. USEPA Office of Water and Office of Science and Technology.
<http://water.epa.gov/scitech/swguidance/standards/criteria/current/index.cfm>
 Total values provided. Values adjusted for site-specific hardness - see note (d).
 USEPA provides AWQC for both total and dissolved results.
- (c) - Value for trivalent chromium used.
- (d) - Hardness dependent value for total metals. Site-specific total recoverable mean hardness value for Meramec River and Mississippi River of 192 mg/L as CaCO3 used.

TABLE 7c
 COMPARISON OF SEPTEMBER 2017 MERAMEC AND MISSISSIPPI RIVER SURFACE WATER RESULTS
 TO ECOLOGICAL SCREENING LEVELS - TOTAL (UNFILTERED) SAMPLE RESULTS (a)
 AMEREN MISSOURI MERAMEC ENERGY CENTER
 ST. LOUIS COUNTY, MISSOURI

Constituent	CAS	Units	Federal Water Quality Criteria		Meramec River														
			USEPA Aquatic Life AWQC Freshwater Acute (b)	USEPA Aquatic Life AWQC Freshwater Chronic (b)	River Upstream				River Adjacent				River Downstream						
					M-MEC-7S	M-MEC-8S	M-MEC-9D	M-MEC-9S	M-MEC-4S	M-MEC-5S	M-MEC-6D	M-MEC-6S	M-MEC-1S	M-MEC-2D	M-MEC-2S	M-MEC-3D	M-MEC-3S		
Antimony	7440-36-0	mg/L	NA	NA				0.0038											
Arsenic	7440-38-2	mg/L	0.34	0.15	0.0018	0.0014	0.0013	0.0012	0.0018	0.0016	0.0014	0.0013	0.0016	0.0014	0.0015	0.0014	0.0015	0.0014	0.0015
Barium	7440-39-3	mg/L	NA	NA	0.186	0.18	0.193	0.186	0.193	0.19	0.194	0.18	0.19	0.195	0.191	0.188	0.19		
Beryllium*	7440-41-7	mg/L	NA	NA															
Boron	7440-42-8	mg/L	NA	NA	0.0305	0.0256	0.0248	0.0257	0.0749	0.0609	0.0289	0.0282	0.0364	0.0305	0.0312	0.0336	0.0306		
Cadmium*	7440-43-9	mg/L	0.0042 (d)	0.0015 (d)															
Calcium	7440-70-2	mg/L	NA	NA	44.1	43.1	43.9	42.9	44.4	44.6	44.1	42.9	44	44.9	44	43.1	43.7		
Chloride	16887-00-6	mg/L	860	230	20.6	19.8	19.9	20	20.3	20.4	19.6	19.8	19.6	19.8	19.9	19.5	20		
Chromium	7440-47-3	mg/L	3.5 (c,d)	0.17 (c,d)	0.0013		0.0018		0.0014	0.00092	0.0011	0.0012	0.0018	0.0015		0.0014	0.0009		
Cobalt	7440-48-4	mg/L	NA	NA			0.00073		0.00085										
Fluoride	16984-48-8	mg/L	NA	NA	0.18	0.17	0.17	0.17	0.18	0.18	0.18	0.18	0.17	0.18	0.18	0.18	0.18		
Lead	7439-92-1	mg/L	0.23 (d)	0.0089 (d)	0.0172	0.0112	0.0205	0.0196	0.0175	0.0139	0.018	0.0121	0.014	0.0142	0.0146	0.0155	0.0143		
Lithium	7439-93-2	mg/L	NA	NA				0.0042		0.0057			0.0035				0.0035		
Mercury*	7439-97-6	mg/L	0.0016	0.0009															
Molybdenum	7439-98-7	mg/L	NA	NA						0.0016					0.0014				
Selenium	7782-49-2	mg/L	NA	3.1															
Sulfate	14808-79-8	mg/L	NA	NA	24.3	23.4	23.1	23.1	26.7	26.6	23.2	23.2	24.5	23.1	23.9	23.3	23.3		
Thallium	7440-28-0	mg/L	NA	NA									0.000073		0.000075				
Total Hardness as CaCO3	HARDNESS	mg/L	NA	NA	212	211	214	209	212	214	213	209	214	219	213	209	213		
Total Dissolved Solids	TDS	mg/L	NA	NA	242	240	229	248	254	250	227	247	245	249	238	224	245		

Notes:
 Blank cells - Non-detect value.
 * Constituent was not detected in any samples.
 --- Constituent not included in this analysis.
 AWQC - USEPA Ambient Water Quality Criteria.
 CAS - Chemical Abstracts Service.
 mg/L - milligrams per liter.
 NA - Not Available.
 USEPA - United States Environmental Protection Agency.

Detected Concentration > USEPA Aquatic Life AWQC Chronic.
 Detected Concentration > USEPA Aquatic Life AWQC Acute and Chronic.

- (a) - Surface water samples collected in September 2017.
- (b) - USEPA National Recommended Water Quality Criteria. USEPA Office of Water and Office of Science and Technology. <http://water.epa.gov/scitech/swguidance/standards/criteria/current/index.cfm>
 Total values provided. Values adjusted for site-specific hardness - see note (d).
 USEPA provides AWQC for both total and dissolved results.
- (c) - Value for trivalent chromium used.
- (d) - Hardness dependent value for total metals. Site-specific total recoverable mean hardness value for Meramec River and Mississippi River of 224 mg/L as CaCO3 used.

TABLE 7d
COMPARISON OF SEPTEMBER 2017 MERAMEC AND MISSISSIPPI RIVER SURFACE WATER RESULTS
TO ECOLOGICAL SCREENING LEVELS - DISSOLVED (FILTERED) SAMPLE RESULTS (a)
AMEREN MISSOURI MERAMEC ENERGY CENTER
ST. LOUIS COUNTY, MISSOURI

Constituent	CAS	Units	Federal Water Quality Criteria		Meramec River													
			USEPA Aquatic Life AWQC Freshwater Acute (b)	USEPA Aquatic Life AWQC Freshwater Chronic (b)	River Upstream				River Adjacent				River Downstream					
					M-MEC-7S	M-MEC-8S	M-MEC-9D	M-MEC-9S	M-MEC-4S	M-MEC-5S	M-MEC-6D	M-MEC-6S	M-MEC-1S	M-MEC-2D	M-MEC-2S	M-MEC-3D	M-MEC-3S	
Antimony*	7440-36-0	mg/L	NA	NA														
Arsenic	7440-38-2	mg/L	0.34	0.15	0.0016	0.0013	0.0011	0.0011	0.0014	0.0013	0.0012	0.0011	0.0013	0.0012	0.0011	0.0011	0.0012	0.0012
Barium	7440-39-3	mg/L	NA	NA	0.167	0.166	0.176	0.172	0.18	0.177	0.177	0.173	0.171	0.172	0.174	0.18	0.176	0.176
Beryllium*	7440-41-7	mg/L	NA	NA														
Boron	7440-42-8	mg/L	NA	NA	0.0281	0.0266	0.0263	0.025	0.0625	0.0596	0.0282	0.027	0.0359	0.0285	0.0341	0.0314	0.0289	0.0289
Cadmium*	7440-43-9	mg/L	0.0038 (d)	0.0013 (d)														
Calcium	7440-70-2	mg/L	NA	NA	41.2	40.2	41.9	41.2	43.2	42.8	42.1	41.2	41.1	41	41.3	41.7	41.9	41.9
Chromium	7440-47-3	mg/L	1.1 (c,d)	0.14 (c,d)														
Cobalt	7440-48-4	mg/L	NA	NA									0.00073		0.00074			
Lead	7439-92-1	mg/L	0.15 (d)	0.0060 (d)														
Lithium	7439-93-2	mg/L	NA	NA														
Mercury*	7439-97-6	mg/L	0.0014	0.00077						0.0013								
Molybdenum	7439-98-7	mg/L	NA	NA														
Selenium	7782-49-2	mg/L	NA	NA														
Thallium	7440-28-0	mg/L	NA	NA									0.000057					0.00005

Notes:
 Blank cells - Non-detect value.
 * Constituent was not detected in any samples.
 -- - Constituent not included in this analysis.
 AWQC - USEPA Ambient Water Quality Criteria.
 CAS - Chemical Abstracts Service.
 mg/L - milligrams per liter.
 NA - Not Available.
 USEPA - United States Environmental Protection Agency.

Detected Concentration> USEPA Aquatic Life AWQC Chronic.
 Detected Concentration> USEPA Aquatic Life AWQC Acute and Chronic.

- (a) - Surface water samples collected in September 2017.
- (b) - USEPA National Recommended Water Quality Criteria. USEPA Office of Water and Office of Science and Technology.
<http://water.epa.gov/scitech/swguidance/standards/criteria/current/index.cfm>
 Total values provided. Values adjusted for site-specific hardness - see note (d).
 USEPA provides AWQC for both total and dissolved results.
- (c) - Value for trivalent chromium used.
- (d) - Hardness dependent value for total metals. Site-specific total recoverable mean hardness value for Meramec River and Mississippi River of 224 mg/L as CaCO3 used.

TABLE 7d
COMPARISON OF SEPTEMBER 2017 MERAMEC AND MISSISSIPPI RIVER SURFACE WATER RESULTS
TO ECOLOGICAL SCREENING LEVELS - DISSOLVED (FILTERED) SAMPLE RESULTS (a)
AMEREN MISSOURI MERAMEC ENERGY CENTER
ST. LOUIS COUNTY, MISSOURI

Constituent	CAS	Units	Federal Water Quality Criteria		Mississippi River																								
			USEPA Aquatic Life AWQC Freshwater Acute (b)	USEPA Aquatic Life AWQC Freshwater Chronic (b)	River Upstream					River Adjacent									River Downstream										
					M-MIS-10S	M-MIS-11D	M-MIS-11S	M-MIS-12D	M-MIS-12S	M-MIS-4S	M-MIS-5D	M-MIS-5S	M-MIS-6D	M-MIS-6S	M-MIS-7S	M-MIS-8D	M-MIS-8S	M-MIS-9D	M-MIS-9S	M-MIS-1S	M-MIS-2D	M-MIS-2S	M-MIS-3D	M-MIS-3S					
Antimony*	7440-36-0	mg/L	NA	NA																									
Arsenic	7440-38-2	mg/L	0.34	0.15	0.0028	0.0026	0.0025	0.0019	0.0019	0.0028	0.0024	0.0024	0.0019	0.002	0.0027	0.0024	0.0025	0.0018	0.0021	0.0024	0.0025	0.0024	0.0025	0.0024	0.0025	0.0024	0.0021	0.0021	
Barium	7440-39-3	mg/L	NA	NA	0.0965	0.0887	0.0899	0.066	0.0656	0.0936	0.0826	0.0845	0.0687	0.0688	0.0949	0.0844	0.0861	0.0645	0.0674	0.112	0.0874	0.0872	0.0872	0.073	0.0746				
Beryllium*	7440-41-7	mg/L	NA	NA																									
Boron	7440-42-8	mg/L	NA	NA	0.0979	0.0859	0.0862	0.0542	0.0566	0.0946	0.0771	0.0812	0.0593	0.057	0.0943	0.0806	0.0836	0.0515	0.0579	0.0804	0.0873	0.082	0.0627	0.0672					
Cadmium*	7440-43-9	mg/L	0.0038 (d)	0.0013 (d)																									
Calcium	7440-70-2	mg/L	NA	NA	58.1	56	56	51	50.2	57.2	54.1	53.8	51.4	52.9	57.2	54.3	54.5	50.2	51.2	52	55.5	51	51.9	52.5	0.00099				
Chromium	7440-47-3	mg/L	1.1 (c,d)	0.14 (c,d)	0.00079	0.00074		0.00076		0.00093	0.00096				0.00075														
Cobalt	7440-48-4	mg/L	NA	NA																									
Lead	7439-92-1	mg/L	0.15 (d)	0.0060 (d)	0.0026	0.0027		0.0024		0.0027	0.0027																		
Lithium	7439-93-2	mg/L	NA	NA	0.0306	0.0241	0.032	0.0132	0.0144	0.0289	0.023	0.0316	0.0176	0.0155	0.0335	0.0287	0.032	0.0135	0.0166	0.0264	0.0263	0.0278	0.019	0.0207					
Mercury*	7439-97-6	mg/L	0.0014	0.00077																									
Molybdenum	7439-98-7	mg/L	NA	NA	0.0032	0.0025	0.0027	0.0025	0.0018	0.0029	0.0025	0.0031	0.0026	0.0026	0.0028	0.0026	0.0027	0.0017	0.0022	0.0023	0.0034	0.0024	0.0027	0.0022					
Selenium	7782-49-2	mg/L	NA	NA	0.0036									0.0051						0.0043		0.0039	0.00053						
Thallium	7440-28-0	mg/L	NA	NA																									

Notes:
Blank cells - Non-detect value.
* Constituent was not detected in any samples.
-- - Constituent not included in this analysis.
AWQC - USEPA Ambient Water Quality Criteria.
CAS - Chemical Abstracts Service.
mg/L - milligrams per liter.
NA - Not Available.
USEPA - United States Environmental Protection Agency.

Detected Concentration > USEPA Aquatic Life AWQC Chronic.
Detected Concentration > USEPA Aquatic Life AWQC Acute and Chronic.

- (a) - Surface water samples collected in September 2017.
- (b) - USEPA National Recommended Water Quality Criteria. USEPA Office of Water and Office of Science and Technology.
<http://water.epa.gov/scitech/swguidance/standards/criteria/current/index.cfm>
Total values provided. Values adjusted for site-specific hardness - see note (d).
USEPA provides AWQC for both total and dissolved results.
- (c) - Value for trivalent chromium used.
- (d) - Hardness dependent value for total metals. Site-specific total recoverable mean hardness value for Meramec River and Mississippi River of 224 mg/L as CaCO3 used.

TABLE 8a
COMPARISON OF MAY 2018 UNNAMED CREEK/DRAINAGE SURFACE WATER RESULTS -
TO HUMAN HEALTH DRINKING WATER SCREENING LEVELS - TOTAL (UNFILTERED) SAMPLE RESULTS (a)
AMEREN MISSOURI MERAMEC ENERGY CENTER
ST. LOUIS COUNTY, MISSOURI

Constituent	CAS	Units	Federal Water Quality Screening Levels			Selected Drinking Water Screening Level (h)	Unnamed Creek / Drainage		
			USEPA MCLs (b)	USEPA SMCLs (b)	USEPA Tapwater RSLs (c)		M2-C-1	M2-C-2	M2-C-3
Antimony*	7440-36-0	mg/L	0.006	NA	0.0078	0.006			
Arsenic	7440-38-2	mg/L	0.01	NA	0.000052	0.01	0.0016	0.0035	0.0019
Barium	7440-39-3	mg/L	2	NA	3.8	2	0.0918	0.182	0.151
Beryllium	7440-41-7	mg/L	0.004	NA	0.025	0.004		0.00021 J	
Boron	7440-42-8	mg/L	NA	NA	4	4	0.0246 J	0.789	0.257
Cadmium*	7440-43-9	mg/L	0.005	NA	0.0092	0.005			
Calcium	7440-70-2	mg/L	NA	NA	NA	NA	78.8	48.5	38.5
Chloride	16887-00-6	mg/L	NA	250	NA	250	146	30.2	20.6
Chromium	7440-47-3	mg/L	0.1 (e)	NA	22 (f)	0.1	0.0023 J	0.0064	
Cobalt	7440-48-4	mg/L	NA	NA	0.006	0.006	0.0014 J		0.0012 J
Fluoride	16984-48-8	mg/L	4	2	0.8	4	0.56	0.71	0.33
Lead	7439-92-1	mg/L	0.015 (g)	NA	0.015	0.015		0.0037 J	
Lithium	7439-93-2	mg/L	NA	NA	0.04	0.04		0.0266	0.0095 J
Mercury*	7439-97-6	mg/L	0.002	NA	0.0057 (d)	0.002			
Molybdenum	7439-98-7	mg/L	NA	NA	0.1	0.1	0.0052 J	0.0249	0.0079 J
Selenium*	7782-49-2	mg/L	0.05	NA	0.1	0.05			
Sulfate	14808-79-8	mg/L	NA	250	NA	250	58.5	140	77.3
Thallium*	7440-28-0	mg/L	0.002	NA	0.0002	0.002			
Total Hardness as CaCO3	471-34-1	mg/L	NA	NA	NA	NA	265	206	174
Total Dissolved Solids	TDS	mg/L	NA	500	NA	500	570	374	283

Notes:

Blank cells - Non-detect value.

* - Constituent was not detected in any samples.

CAS - Chemical Abstracts Service.

J - Estimated value.

MCL - Maximum Contaminant Level.

mg/L - milligrams per liter.

NA - Not Available.

RSL - Regional Screening Level.

SMCL - Secondary Maximum Contaminant Level.

USEPA - United States Environmental Protection Agency.

Detected Concentration > Selected Drinking Water Screening Level.

(a) - Surface water samples collected in May 2018.

(b) - USEPA 2018 Edition of the Drinking Water Standards and Health Advisories. Spring 2018.

<http://water.epa.gov/drink/contaminants/index.cfm>

(c) - USEPA Regional Screening Levels (November 2018). Values for tapwater.

http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/Generic_Tables/index.htm

(d) - RSL for Mercuric Chloride used for Mercury.

(e) - The drinking water standard or MCL for chromium is based on total chromium.

(f) - Value for trivalent chromium used. USEPA provides a screening level for hexavalent chromium that is not a drinking water standard, the basis of which has been questioned by USEPA's Science Advisory Board.

(g) - The Action Level presented is recommended in the USEPA Drinking Water Standards.

(h) - Selected Drinking Water Screening Level uses the following hierarchy:

Federal USEPA MCL for Drinking Water.

Federal USEPA SMCL for Drinking Water.

Federal November 2018 USEPA Tapwater RSL.

TABLE 8b
COMPARISON OF MAY 2018 UNNAMED CREEK/DRAINAGE SURFACE WATER RESULTS -
TO HUMAN HEALTH DRINKING WATER SCREENING LEVELS - DISSOLVED (FILTERED) SAMPLE RESULTS (a)
AMEREN MISSOURI MERAMEC ENERGY CENTER
ST. LOUIS COUNTY, MISSOURI

Constituent	CAS	Units	Federal Water Quality Screening Levels			Selected Drinking Water Screening Level (h)	Unnamed Creek / Drainage		
			USEPA MCLs (b)	USEPA SMCLs (b)	USEPA Tapwater RSLs (c)		M2-C-1	M2-C-2	M2-C-3
Antimony*	7440-36-0	mg/L	0.006	NA	0.0078	0.006			
Arsenic	7440-38-2	mg/L	0.01	NA	0.000052	0.01	0.0013	0.0031	0.0016
Barium	7440-39-3	mg/L	2	NA	3.8	2	0.0788	0.165	0.137
Beryllium*	7440-41-7	mg/L	0.004	NA	0.025	0.004			
Boron	7440-42-8	mg/L	NA	NA	4	4		0.964	0.246
Cadmium*	7440-43-9	mg/L	0.005	NA	0.0092	0.005			
Calcium	7440-70-2	mg/L	NA	NA	NA	NA	82.6	53.4	42.6
Chromium	7440-47-3	mg/L	0.1 (e)	NA	22 (f)	0.1		0.0069	
Cobalt*	7440-48-4	mg/L	NA	NA	0.006	0.006			
Lead*	7439-92-1	mg/L	0.015 (g)	NA	0.015	0.015			
Lithium*	7439-93-2	mg/L	NA	NA	0.04	0.04			
Mercury*	7439-97-6	mg/L	0.002	NA	0.0057 (d)	0.002			
Molybdenum	7439-98-7	mg/L	NA	NA	0.1	0.1	0.0052 J	0.0313	0.0077 J
Selenium	7782-49-2	mg/L	0.05	NA	0.1	0.05		0.0124 J	
Thallium*	7440-28-0	mg/L	0.002	NA	0.0002	0.002			

Notes:

Blank cells - Non-detect value.

* - Constituent was not detected in any samples.

CAS - Chemical Abstracts Service.

J - Estimated value.

MCL - Maximum Contaminant Level.

mg/L - milligrams per liter.

NA - Not Available.

RSL - Regional Screening Level.

SMCL - Secondary Maximum Contaminant Level.

USEPA - United States Environmental Protection Agency.

 Detected Concentration > Selected Drinking Water Screening Level.

(a) - Surface water samples collected in May 2018.

(b) - USEPA 2018 Edition of the Drinking Water Standards and Health Advisories. Spring 2018.

<http://water.epa.gov/drink/contaminants/index.cfm>

(c) - USEPA Regional Screening Levels (November 2018). Values for tapwater.

http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/Generic_Tables/index.htm

(d) - RSL for Mercuric Chloride used for Mercury.

(e) - The drinking water standard or MCL for chromium is based on total chromium.

(f) - Value for trivalent chromium used. USEPA provides a screening level for hexavalent chromium that is not a drinking water standard, the basis of which has been questioned by USEPA's Science Advisory Board.

(g) - The Action Level presented is recommended in the USEPA Drinking Water Standards.

(h) - Selected Drinking Water Screening Level uses the following hierarchy:

Federal USEPA MCL for Drinking Water.

Federal USEPA SMCL for Drinking Water.

Federal November 2018 USEPA Tapwater RSL.

TABLE 8c
COMPARISON OF SEPTEMBER 2017 UNNAMED CREEK/DRAINAGE SURFACE WATER RESULTS -
TO HUMAN HEALTH DRINKING WATER SCREENING LEVELS - TOTAL (UNFILTERED) SAMPLE RESULTS (a)
AMEREN MISSOURI MERAMEC ENERGY CENTER
ST. LOUIS COUNTY, MISSOURI

Constituent	CAS	Units	Federal Water Quality Screening Levels			Selected Drinking Water Screening Level (h)	Creek / Drainage		
			USEPA MCLs (b)	USEPA SMCLs (b)	USEPA Tapwater RSLs (c)		M-C-1	M-C-2	M-C-3
Antimony*	7440-36-0	mg/L	0.006	NA	0.0078	0.006			
Arsenic	7440-38-2	mg/L	0.01	NA	0.000052	0.01	0.00077	0.0022	0.0025
Barium	7440-39-3	mg/L	2	NA	3.8	2	0.0734	0.107	0.122
Beryllium*	7440-41-7	mg/L	0.004	NA	0.025	0.004			
Boron	7440-42-8	mg/L	NA	NA	4	4	0.03	0.366	0.358
Cadmium*	7440-43-9	mg/L	0.005	NA	0.0092	0.005			
Calcium	7440-70-2	mg/L	NA	NA	NA	NA	78.5	69.7	69.4
Chloride	16887-00-6	mg/L	NA	250	NA	250	54.8	44	44.1
Chromium	7440-47-3	mg/L	0.1 (e)	NA	22 (f)	0.1	0.0011	0.0011	
Cobalt	7440-48-4	mg/L	NA	NA	0.006	0.006			
Fluoride	16984-48-8	mg/L	4	2	0.8	4	0.63	0.56	0.56
Lead	7439-92-1	mg/L	0.015 (g)	NA	0.015	0.015		0.0035	
Lithium	7439-93-2	mg/L	NA	NA	0.04	0.04	0.0039	0.014	0.0132
Mercury*	7439-97-6	mg/L	0.002	NA	0.0057 (d)	0.002			
Molybdenum	7439-98-7	mg/L	NA	NA	0.1	0.1	0.0067	0.0119	0.0115
Selenium	7782-49-2	mg/L	0.05	NA	0.1	0.05			
Sulfate	14808-79-8	mg/L	NA	250	NA	250	49.1	97.6	97.8
Thallium*	7440-28-0	mg/L	0.002	NA	0.0002	0.002		0.000042	0.000092
Total Hardness as CaCO3	HARDNESS	mg/L	NA	NA	NA	NA	263	252	253
Total Dissolved Solids	TDS	mg/L	NA	500	NA	500	386	414	407

Notes:

Blank cells - Non-detect value.

* - Constituent was not detected in any samples.

CAS - Chemical Abstracts Service.

J - Estimated value.

MCL - Maximum Contaminant Level.

mg/L - milligrams per liter.

NA - Not Available.

RSL - Regional Screening Level.

SMCL - Secondary Maximum Contaminant Level.

USEPA - United States Environmental Protection Agency.

 Detected Concentration > Selected Drinking Water Screening Level.

(a) - Surface water samples collected in September 2017.

(b) - USEPA 2018 Edition of the Drinking Water Standards and Health Advisories. Spring 2018.
<http://water.epa.gov/drink/contaminants/index.cfm>

(c) - USEPA Regional Screening Levels (November 2018). Values for tapwater.
http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/Generic_Tables/index.htm

(d) - RSL for Mercuric Chloride used for Mercury.

(e) - The drinking water standard or MCL for chromium is based on total chromium.

(f) - Value for trivalent chromium used. USEPA provides a screening level for hexavalent chromium that is not a drinking water standard, the basis of which has been questioned by USEPA's Science Advisory Board.

(g) - The Action Level presented is recommended in the USEPA Drinking Water Standards.

(h) - Selected Drinking Water Screening Level uses the following hierarchy:

Federal USEPA MCL for Drinking Water.

Federal USEPA SMCL for Drinking Water.

Federal November 2018 USEPA Tapwater RSL.

TABLE 8d
COMPARISON OF SEPTEMBER 2017 UNNAMED CREEK/DRAINAGE SURFACE WATER RESULTS -
TO HUMAN HEALTH DRINKING WATER SCREENING LEVELS - DISSOLVED (FILTERED) SAMPLE RESULTS (a)
AMEREN MISSOURI MERAMEC ENERGY CENTER
ST. LOUIS COUNTY, MISSOURI

Constituent	CAS	Units	Federal Water Quality Screening Levels			Selected Drinking Water Screening Level (h)	Creek / Drainage		
			USEPA MCLs (b)	USEPA SMCLs (b)	USEPA Tapwater RSLs (c)		M-C-1	M-C-2	M-C-3
Antimony*	7440-36-0	mg/L	0.006	NA	0.0078	0.006			
Arsenic	7440-38-2	mg/L	0.01	NA	0.000052	0.01	0.00084	0.0023	0.0024
Barium	7440-39-3	mg/L	2	NA	3.8	2	0.0712	0.105	0.123
Beryllium*	7440-41-7	mg/L	0.004	NA	0.025	0.004			
Boron	7440-42-8	mg/L	NA	NA	4	4	0.0308	0.389	0.392
Cadmium*	7440-43-9	mg/L	0.005	NA	0.0092	0.005			
Calcium	7440-70-2	mg/L	NA	NA	NA	NA	78.8	69.5	70.7
Chromium	7440-47-3	mg/L	0.1 (e)	NA	22 (f)	0.1		0.00095	0.00085
Cobalt	7440-48-4	mg/L	NA	NA	0.006	0.006			
Lead	7439-92-1	mg/L	0.015 (g)	NA	0.015	0.015			
Lithium	7439-93-2	mg/L	NA	NA	0.04	0.04	0.0047	0.0147	0.0152
Mercury*	7439-97-6	mg/L	0.002	NA	0.0057 (d)	0.002			
Molybdenum	7439-98-7	mg/L	NA	NA	0.1	0.1	0.0066	0.0132	0.0128
Selenium	7782-49-2	mg/L	0.05	NA	0.1	0.05			
Thallium	7440-28-0	mg/L	0.002	NA	0.0002	0.002	0.000053	0.000041	0.000085

Notes:

Blank cells - Non-detect value.

* - Constituent was not detected in any samples.

CAS - Chemical Abstracts Service.

J - Estimated value.

MCL - Maximum Contaminant Level.

mg/L - milligrams per liter.

NA - Not Available.

RSL - Regional Screening Level.

SMCL - Secondary Maximum Contaminant Level.

USEPA - United States Environmental Protection Agency.

Detected Concentration > Selected Drinking Water Screening Level.

(a) - Surface water samples collected in September 2017.

(b) - USEPA 2018 Edition of the Drinking Water Standards and Health Advisories. Spring 2018.
<http://water.epa.gov/drink/contaminants/index.cfm>

(c) - USEPA Regional Screening Levels (November 2018). Values for tapwater.
http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/Generic_Tables/index.htm

(d) - RSL for Mercuric Chloride used for Mercury.

(e) - The drinking water standard or MCL for chromium is based on total chromium.

(f) - Value for trivalent chromium used. USEPA provides a screening level for hexavalent chromium that is not a drinking water standard, the basis of which has been questioned by USEPA's Science Advisory Board.

(g) - The Action Level presented is recommended in the USEPA Drinking Water Standards.

(h) - Selected Drinking Water Screening Level uses the following hierarchy:

Federal USEPA MCL for Drinking Water.

Federal USEPA SMCL for Drinking Water.

Federal November 2018 USEPA Tapwater RSL.

TABLE 9a
COMPARISON OF MAY 2018 UNNAMED CREEK/DRAINAGE SURFACE WATER RESULTS -
TO HUMAN HEALTH AWQC SCREENING LEVELS -
TOTAL (UNFILTERED) SAMPLE RESULTS (a)
AMEREN MISSOURI MERAMEC ENERGY CENTER
ST. LOUIS COUNTY, MISSOURI

Constituent	CAS	Units	USEPA	Unnamed Creek / Drainage		
			AWQC (b)	M2-C-1	M2-C-2	M2-C-3
Antimony*	7440-36-0	mg/L	0.64			
Arsenic	7440-38-2	mg/L	0.00014 (c)	0.0016	0.0035	0.0019
Barium	7440-39-3	mg/L	NA	0.0918	0.182	0.151
Beryllium	7440-41-7	mg/L	NA		0.00021 J	
Boron	7440-42-8	mg/L	NA	0.0246 J	0.789	0.257
Cadmium*	7440-43-9	mg/L	NA			
Calcium	7440-70-2	mg/L	NA	78.8	48.5	38.5
Chloride	16887-00-6	mg/L	NA	146	30.2	20.6
Chromium	7440-47-3	mg/L	NA	0.0023 J	0.0064	
Cobalt	7440-48-4	mg/L	NA	0.0014 J		0.0012 J
Fluoride	16984-48-8	mg/L	NA	0.56	0.71	0.33
Lead	7439-92-1	mg/L	NA		0.0037 J	
Lithium	7439-93-2	mg/L	NA		0.0266	0.0095 J
Mercury*	7439-97-6	mg/L	NA			
Molybdenum	7439-98-7	mg/L	NA	0.0052 J	0.0249	0.0079 J
Selenium*	7782-49-2	mg/L	4.2			
Sulfate	14808-79-8	mg/L	NA	58.5	140	77.3
Thallium*	7440-28-0	mg/L	0.00047			
Total Hardness as CaCO3	471-34-1	mg/L	NA	265	206	174
Total Dissolved Solids	TDS	mg/L	NA	570	374	283

Notes:

Blank cells - Non-detect value.

* - Constituent was not detected in any samples.

AWQC - Ambient Water Quality Criteria.

CAS - Chemical Abstracts Service.

J - Estimated value.

mg/L - milligrams per liter.

NA - Not Available.

USEPA - United States Environmental Protection Agency.

Detected Concentration > AWQC.

(a) - Surface water samples collected in May 2018.

(b) - USEPA National Recommended Water Quality Criteria.

USEPA Office of Water and Office of Science and Technology.

<http://water.epa.gov/scitech/swguidance/standards/criteria/current/index.cfm>

USEPA AWQC Human Health for the Consumption of Organism Only

apply to total concentrations.

(c) - Value applies to inorganic form of arsenic only.

TABLE 9b
COMPARISON OF MAY 2018 UNNAMED CREEK/DRAINAGE SURFACE WATER RESULTS -
TO HUMAN HEALTH AWQC SCREENING LEVELS - DISSOLVED (FILTERED) SAMPLE RESULTS (a)
AMEREN MISSOURI MERAMEC ENERGY CENTER
ST. LOUIS COUNTY, MISSOURI

Constituent	CAS	Units	USEPA	Unnamed Creek / Drainage		
			AWQC (b)	M2-C-1	M2-C-2	M2-C-3
Antimony*	7440-36-0	mg/L	0.64			
Arsenic	7440-38-2	mg/L	0.00014 (c)	0.0013	0.0031	0.0016
Barium	7440-39-3	mg/L	NA	0.0788	0.165	0.137
Beryllium	7440-41-7	mg/L	NA			
Boron	7440-42-8	mg/L	NA		0.964	0.246
Cadmium	7440-43-9	mg/L	NA			
Calcium	7440-70-2	mg/L	NA	82.6	53.4	42.6
Chromium*	7440-47-3	mg/L	NA		0.0069	
Cobalt*	7440-48-4	mg/L	NA			
Lead	7439-92-1	mg/L	NA			
Lithium	7439-93-2	mg/L	NA			
Mercury*	7439-97-6	mg/L	NA			
Molybdenum	7439-98-7	mg/L	NA	0.0052 J	0.0313	0.0077 J
Selenium	7782-49-2	mg/L	4.2		0.0124 J	
Thallium	7440-28-0	mg/L	0.00047			

Notes:

Blank cells - Non-detect value.

* - Constituent was not detected in any samples.

AWQC - Ambient Water Quality Criteria.

CAS - Chemical Abstracts Service.

J - Estimated value.

mg/L - milligrams per liter.

NA - Not Available.

USEPA - United States Environmental Protection Agency.

Detected Concentration > AWQC.

(a) - Surface water samples collected in May 2018.

(b) - USEPA National Recommended Water Quality Criteria.

USEPA Office of Water and Office of Science and Technology.

<http://water.epa.gov/scitech/swguidance/standards/criteria/current/index.cfm>

USEPA AWQC Human Health for the Consumption of Organism Only

apply to total concentrations.

(c) - Value applies to inorganic form of arsenic only.

TABLE 9c
COMPARISON OF SEPTEMBER 2017 UNNAMED CREEK/DRAINAGE SURFACE WATER RESULTS -
TO HUMAN HEALTH AWQC SCREENING LEVELS - TOTAL (UNFILTERED) SAMPLE RESULTS (a)
AMEREN MISSOURI MERAMEC ENERGY CENTER
ST. LOUIS COUNTY, MISSOURI

Constituent	CAS	Units	USEPA	Creek / Drainage		
			AWQC (b)	M-C-1	M-C-2	M-C-3
Antimony*	7440-36-0	mg/L	0.64			
Arsenic	7440-38-2	mg/L	0.00014 (c)	0.00077	0.0022	0.0025
Barium	7440-39-3	mg/L	NA	0.0734	0.107	0.122
Beryllium*	7440-41-7	mg/L	NA			
Boron	7440-42-8	mg/L	NA	0.03	0.366	0.358
Cadmium*	7440-43-9	mg/L	NA			
Calcium	7440-70-2	mg/L	NA	78.5	69.7	69.4
Chloride	16887-00-6	mg/L	NA	54.8	44	44.1
Chromium	7440-47-3	mg/L	NA	0.0011	0.0011	
Cobalt	7440-48-4	mg/L	NA			
Fluoride	16984-48-8	mg/L	NA	0.63	0.56	0.56
Lead	7439-92-1	mg/L	NA		0.0035	
Lithium	7439-93-2	mg/L	NA	0.0039	0.014	0.0132
Mercury*	7439-97-6	mg/L	NA			
Molybdenum	7439-98-7	mg/L	NA	0.0067	0.0119	0.0115
Selenium	7782-49-2	mg/L	4.2			
Sulfate	14808-79-8	mg/L	NA	49.1	97.6	97.8
Thallium*	7440-28-0	mg/L	0.00047		0.000042	0.000092
Total Hardness as CaCO3	HARDNESS	mg/L	NA	263	252	253
Total Dissolved Solids	TDS	mg/L	NA	386	414	407

Notes:

Blank cells - Non-detect value.

* Constituent was not detected in any samples.

mg/L - milligrams per liter.

-- - Constituent not included in this analysis.

NA - Not Available.

AWQC - Ambient Water Quality Criteria.

USEPA - United States Environmental Protection Agency.

CAS - Chemical Abstracts Service.

 Detected Concentration > AWQC.

(a) - Surface water samples collected in September 2017.

(b) - USEPA National Recommended Water Quality Criteria. USEPA Office of Water and Office of Science and Technology. Accessed November 2014.

<http://water.epa.gov/scitech/swguidance/standards/criteria/current/index.cfm>

USEPA AWQC Human Health for the Consumption of Organism Only apply to total concentrations.

(c) - Value applies to inorganic form of arsenic only.

TABLE 9d
COMPARISON OF SEPTEMBER 2017 UNNAMED CREEK/DRAINAGE SURFACE WATER RESULTS -
TO HUMAN HEALTH AWQC SCREENING LEVELS - DISSOLVED (FILTERED) SAMPLE RESULTS (a)
AMEREN MISSOURI MERAMEC ENERGY CENTER
ST. LOUIS COUNTY, MISSOURI

Constituent	CAS	Units	USEPA	Creek / Drainage		
			AWQC (b)	M-C-1	M-C-2	M-C-3
Antimony*	7440-36-0	mg/L	0.64			
Arsenic	7440-38-2	mg/L	0.00014 (c)	0.00084	0.0023	0.0024
Barium	7440-39-3	mg/L	NA	0.0712	0.105	0.123
Beryllium*	7440-41-7	mg/L	NA			
Boron	7440-42-8	mg/L	NA	0.0308	0.389	0.392
Cadmium*	7440-43-9	mg/L	NA			
Calcium	7440-70-2	mg/L	NA	78.8	69.5	70.7
Chromium	7440-47-3	mg/L	NA		0.00095	0.00085
Cobalt	7440-48-4	mg/L	NA			
Lead	7439-92-1	mg/L	NA			
Lithium	7439-93-2	mg/L	NA	0.0047	0.0147	0.0152
Mercury*	7439-97-6	mg/L	NA			
Molybdenum	7439-98-7	mg/L	NA	0.0066	0.0132	0.0128
Selenium	7782-49-2	mg/L	4.2			
Thallium*	7440-28-0	mg/L	0.00047	0.000053	0.000041	0.000085

Notes:

Blank cells - Non-detect value.

* Constituent was not detected in any samples.

-- - Constituent not included in this analysis.

AWQC - Ambient Water Quality Criteria.

CAS - Chemical Abstracts Service.

mg/L - milligrams per liter.

NA - Not Available.

USEPA - United States Environmental Protection Agency.

Detected Concentration > AWQC.

(a) - Surface water samples collected in September 2017.

(b) - USEPA National Recommended Water Quality Criteria. USEPA Office of Water and Office of Science and Technology. Accessed November 2014.

<http://water.epa.gov/scitech/swguidance/standards/criteria/current/index.cfm>

USEPA AWQC Human Health for the Consumption of Organism Only apply to total concentrations.

(c) - Value applies to inorganic form of arsenic only.

TABLE 10a
COMPARISON OF MAY 2018 UNNAMED CREEK/DRAINAGE SURFACE WATER RESULTS -
TO ECOLOGICAL SCREENING LEVELS - TOTAL (UNFILTERED) SAMPLE RESULTS (a)
AMEREN MISSOURI MERAMEC ENERGY CENTER
ST. LOUIS COUNTY, MISSOURI

Constituent	CAS	Units	Federal Water Quality Criteria		Unnamed Creek / Drainage		
			Aquatic Life AWQC Freshwater Acute (b)	USEPA Aquatic Life AWQC Freshwater Chronic (b)	M2-C-1	M2-C-2	M2-C-3
Antimony*	7440-36-0	mg/L	NA	NA			
Arsenic	7440-38-2	mg/L	0.34	0.15	0.0016	0.0035	0.0019
Barium	7440-39-3	mg/L	NA	NA	0.0918	0.182	0.151
Beryllium	7440-41-7	mg/L	NA	NA		0.00021 J	
Boron	7440-42-8	mg/L	NA	NA	0.0246 J	0.789	0.257
Cadmium*	7440-43-9	mg/L	0.0040 (d)	0.0015 (d)			
Calcium	7440-70-2	mg/L	NA	NA	78.8	48.5	38.5
Chloride	16887-00-6	mg/L	860	230	146	30.2	20.6
Chromium	7440-47-3	mg/L	3.4 (c,d)	0.16 (c,d)	0.0023 J	0.0064	
Cobalt	7440-48-4	mg/L	NA	NA	0.0014 J		0.0012 J
Fluoride	16984-48-8	mg/L	NA	NA	0.56	0.71	0.33
Lead	7439-92-1	mg/L	0.22 (d)	0.0084 (d)		0.0037 J	
Lithium	7439-93-2	mg/L	NA	NA		0.0266	0.0095 J
Mercury*	7439-97-6	mg/L	0.0016	0.00091			
Molybdenum	7439-98-7	mg/L	NA	NA	0.0052 J	0.0249	0.0079 J
Selenium*	7782-49-2	mg/L	NA	3.1			
Sulfate	14808-79-8	mg/L	NA	NA	58.5	140	77.3
Thallium*	7440-28-0	mg/L	NA	NA			
Total Hardness as CaCO3	471-34-1	mg/L	NA	NA	265	206	174
Total Dissolved Solids	TDS	mg/L	NA	NA	570	374	283

Notes:

Blank cells - Non-detect value.

J - Estimated value.

* Constituent was not detected in any samples.

mg/L - milligrams per liter.

AWQC - USEPA Ambient Water Quality Criteria.

NA - Not Available.

CAS - Chemical Abstracts Service.

USEPA - United States Environmental Protection Agency.

Detected Concentration> USEPA Aquatic Life AWQC Chronic.

Detected Concentration> USEPA Aquatic Life AWQC Acute and Chronic.

(a) - Surface water samples collected in May 2018.

(b) - USEPA National Recommended Water Quality Criteria. USEPA Office of Water and Office of Science and Technology.

<http://water.epa.gov/scitech/swguidance/standards/criteria/current/index.cfm>

Total values provided. Values adjusted for site-specific hardness - see note (d).

USEPA provides AWQC for both total and dissolved results.

(c) - Value for trivalent chromium used.

(d) - Hardness dependent value for total metals. Site-specific total recoverable mean hardness value for Unnamed Creek/Drainage of 215 mg/L as CaCO3 used.

TABLE 10b
COMPARISON OF MAY 2018 UNNAMED CREEK/DRAINAGE SURFACE WATER RESULTS -
TO ECOLOGICAL SCREENING LEVELS - DISSOLVED (FILTERED) SAMPLE RESULTS (a)
AMEREN MISSOURI MERAMEC ENERGY CENTER
ST. LOUIS COUNTY, MISSOURI

Constituent	CAS	Units	Federal Water Quality Criteria		Unnamed Creek / Drainage		
			Aquatic Life AWQC Freshwater Acute (b)	USEPA Aquatic Life AWQC Freshwater Chronic (b)	M2-C-1	M2-C-2	M2-C-3
Antimony*	7440-36-0	mg/L	NA	NA			
Arsenic	7440-38-2	mg/L	0.34	0.15	0.0013	0.0031	0.0016
Barium	7440-39-3	mg/L	NA	NA	0.0788	0.165	0.137
Beryllium	7440-41-7	mg/L	NA	NA			
Boron	7440-42-8	mg/L	NA	NA		0.964	0.246
Cadmium	7440-43-9	mg/L	0.0037 (d)	0.0013 (d)			
Calcium	7440-70-2	mg/L	NA	NA	82.6	53.4	42.6
Chromium*	7440-47-3	mg/L	1.1 (c,d)	0.14 (c,d)		0.0069	
Cobalt*	7440-48-4	mg/L	NA	NA			
Lead	7439-92-1	mg/L	0.15 (d)	0.0057 (d)			
Lithium	7439-93-2	mg/L	NA	NA			
Mercury*	7439-97-6	mg/L	0.0014	0.00077			
Molybdenum	7439-98-7	mg/L	NA	NA	0.0052 J	0.0313	0.0077 J
Selenium	7782-49-2	mg/L	NA	NA		0.0124 J	
Thallium	7440-28-0	mg/L	NA	NA			

Notes:

Blank cells - Non-detect value.

* Constituent was not detected in any samples.

-- - Constituent not included in this analysis.

AWQC - USEPA Ambient Water Quality Criteria.

CAS - Chemical Abstracts Service.


J - Estimated value.

mg/L - milligrams per liter.

NA - Not Available.

USEPA - United States Environmental Protection Agency.

 Detected Concentration > USEPA Aquatic Life AWQC Chronic.

 Detected Concentration > USEPA Aquatic Life AWQC Acute and Chronic.

(a) - Surface water samples collected in May 2018.

(b) - USEPA National Recommended Water Quality Criteria. USEPA Office of Water and Office of Science and Technology.

<http://water.epa.gov/scitech/swguidance/standards/criteria/current/index.cfm>

Total values provided. Values adjusted for site-specific hardness - see note (d).

USEPA provides AWQC for both total and dissolved results.

(c) - Value for trivalent chromium used.

(d) - Hardness dependent value for total metals adjusted for dissolved fraction. Site-specific total recoverable mean hardness value for Unnamed Creek/Drainage of 215 mg/L as CaCO₃ used.

**TABLE 10c
COMPARISON OF SEPTEMBER 2017 UNNAMED CREEK/DRAINAGE SURFACE WATER RESULTS -
TO ECOLOGICAL SCREENING LEVELS - TOTAL (UNFILTERED) SAMPLE RESULTS (a) AMEREN
MISSOURI MERAMEC ENERGY CENTER
ST. LOUIS COUNTY, MISSOURI**

Constituent	CAS	Units	Federal Water Quality Criteria		Creek / Drainage		
			USEPA Aquatic Life AWQC Freshwater Acute (b)	USEPA Aquatic Life AWQC Freshwater Chronic (b)	M-C-1	M-C-2	M-C-3
Antimony	7440-36-0	mg/L	NA	NA			
Arsenic	7440-38-2	mg/L	0.34	0.15	0.00077	0.0022	0.0025
Barium	7440-39-3	mg/L	NA	NA	0.0734	0.107	0.122
Beryllium*	7440-41-7	mg/L	NA	NA			
Boron	7440-42-8	mg/L	NA	NA	0.03	0.366	0.358
Cadmium*	7440-43-9	mg/L	0.0048 (d)	0.0017 (d)			
Calcium	7440-70-2	mg/L	NA	NA	78.5	69.7	69.4
Chromium	7440-47-3	mg/L	3.9 (c,d)	0.19 (c,d)	0.0011	0.0011	
Cobalt	7440-48-4	mg/L	NA	NA			
Fluoride	16984-48-8	mg/L	NA	NA	0.63	0.56	0.56
Lead	7439-92-1	mg/L	0.27 (d)	0.011 (d)		0.0035	
Lithium	7439-93-2	mg/L	NA	NA	0.0039	0.014	0.0132
Mercury*	7439-97-6	mg/L	0.0016	0.00091			
Molybdenum	7439-98-7	mg/L	NA	NA	0.0067	0.0119	0.0115
Selenium	7782-49-2	mg/L	NA	3.1			
Sulfate	14808-79-8	mg/L	NA	NA	49.1	97.6	97.8
Thallium	7440-28-0	mg/L	NA	NA		0.000042	0.000092
Total Hardness as CaCO3	HARDNESS	mg/L	NA	NA	263	252	253
Total Dissolved Solids	TDS	mg/L	NA	NA	386	414	407

Notes:

Blank cells - Non-detect value.

* Constituent was not detected in any samples.

mg/L - milligrams per liter.

-- - Constituent not included in this analysis.



NA - Not Available.

AWQC - USEPA Ambient Water Quality Criteria.

ND - Not Detected.

CAS - Chemical Abstracts Service.

USEPA - United States Environmental Protection Agency.

 Detected Concentration> USEPA Aquatic Life AWQC Chronic.
 Detected Concentration> USEPA Aquatic Life AWQC Acute and Chronic.

(a) - Surface water samples collected in September 2017.

(b) - USEPA National Recommended Water Quality Criteria. USEPA Office of Water and Office of Science and Technology.

<http://water.epa.gov/scitech/swguidance/standards/criteria/current/index.cfm>

Total values provided. Values adjusted for site-specific hardness - see note (d).

USEPA provides AWQC for both total and dissolved results.

(c) - Value for trivalent chromium used.

(d) - Hardness dependent value for total metals. Site-specific total recoverable mean hardness value for Unnamed Creek/Drainage of 256mg/L as CaCO3 used.

TABLE 10d
COMPARISON OF SEPTEMBER 2017 UNNAMED CREEK/DRAINAGE SURFACE WATER RESULTS -
TO ECOLOGICAL SCREENING LEVELS - DISSOLVED (FILTERED) SAMPLE RESULTS (a)
AMEREN MISSOURI MERAMEC ENERGY CENTER
ST. LOUIS COUNTY, MISSOURI

Constituent	CAS	Units	Federal Water Quality Criteria		Creek / Drainage		
			USEPA Aquatic Life AWQC Freshwater Acute (b)	USEPA Aquatic Life AWQC Freshwater Chronic (b)	M-C-1	M-C-2	M-C-3
Antimony*	7440-36-0	mg/L	NA	NA			
Arsenic	7440-38-2	mg/L	0.34	0.15	0.00084	0.0023	0.0024
Barium	7440-39-3	mg/L	NA	NA	0.0712	0.105	0.123
Beryllium*	7440-41-7	mg/L	NA	NA			
Boron	7440-42-8	mg/L	NA	NA	0.0308	0.389	0.392
Cadmium*	7440-43-9	mg/L	0.0043 (d)	0.0015 (d)			
Calcium	7440-70-2	mg/L	NA	NA	78.8	69.5	70.7
Chromium	7440-47-3	mg/L	1.2 (c,d)	0.16 (c,d)		0.00095	0.00085
Cobalt	7440-48-4	mg/L	NA	NA			
Lead	7439-92-1	mg/L	0.18 (d)	0.0069 (d)			
Lithium	7439-93-2	mg/L	NA	NA	0.0047	0.0147	0.0152
Mercury*	7439-97-6	mg/L	0.0014	0.00077			
Molybdenum	7439-98-7	mg/L	NA	NA	0.0066	0.0132	0.0128
Selenium	7782-49-2	mg/L	NA	NA			
Thallium	7440-28-0	mg/L	NA	NA	0.000053	0.000041	0.000085

Notes:

Blank cells - Non-detect value.

* Constituent was not detected in any samples.

-- - Constituent not included in this analysis.

AWQC - USEPA Ambient Water Quality Criteria.

CAS - Chemical Abstracts Service.

J - Estimated value.

mg/L - milligrams per liter.

NA - Not Available.

U - Constituent was not detected.

USEPA - United States Environmental Protection Agency.

Detected Concentration> USEPA Aquatic Life AWQC Chronic.

Detected Concentration> USEPA Aquatic Life AWQC Acute and Chronic.

(a) - Surface water samples collected in September 2017.

(b) - USEPA National Recommended Water Quality Criteria. USEPA Office of Water and Office of Science and Technology.

<http://water.epa.gov/scitech/swguidance/standards/criteria/current/index.cfm>

Total values provided. Values adjusted for site-specific hardness - see note (d).

USEPA provides AWQC for both total and dissolved results.

(c) - Value for trivalent chromium used.

(d) - Hardness dependent value for total metals adjusted for dissolved fraction. Site-specific total recoverable mean hardness value for Unnamed Creek/Drainage of 256 mg/L as CaCO₃ used.

APPENDIX B

What You Need to Know About Lithium

WHAT YOU NEED TO KNOW ABOUT LITHIUM

Lithium is present in at least one groundwater sample from two monitoring wells at the Ameren Meramec Energy Center (MEC) in Missouri above the screening level used by the U.S. Environmental Protection Agency (USEPA) under the Coal Combustion Residuals (CCR) Rule. The purpose of this fact sheet is to provide information on lithium so that data can be considered in context. There is no public exposure to groundwater at the Meramec Energy Center and concentration levels of lithium in adjacent surface waters of the Mississippi River and the Missouri River are all well below health-based regulatory standards. In fact, for lithium to pose a risk to surface water, concentration levels would need to be more than **24,000 times higher** than the level observed at Meramec.

LITHIUM IS NATURALLY OCCURRING

Lithium is naturally occurring in soils and water. Based on a literature review, Aral and Vecchio-Sadus (2008) reported that typical background lithium concentrations are between 0.001 and 0.01 mg/L (milligrams of lithium per liter of water) in surface waters, approximately 0.17 mg/L in seawater, and around 0.003 mg/L in rivers. Some natural mineral waters may contain up to 100 mg/L of lithium (Schrauzer, 2002). Lithium is also present in soil between 3 and 350 mg/kg (milligrams of lithium per kilogram of soil) and in the earth's crust between 20 and 60 mg/kg (Aral and Vecchio-Sadus, 2008). Lithium is typically found in sediment at concentrations of approximately 56 mg/kg. United States Geological Survey (USGS, 2013) estimates the average concentration of lithium in soil in the U.S. is 21 mg/kg.

Lithium is not routinely evaluated in groundwater samples as it is not a typical constituent of concern and the concentrations are often below instrument detection limits. The USGS conducted the first comprehensive analysis of trace-element concentrations in groundwater that were evaluated from samples collected between 1992 and 2003 from aquifers across the U.S. (USGS, 2011). Lithium was one of the trace elements evaluated in the study and samples from drinking-water wells in dry regions had greater concentrations than other areas. The study found that the maximum concentration of lithium in the analysis of 936 groundwater samples was 1.2 mg/L with a 90th percentile concentration of 0.054 mg/L and a median concentration of 0.006 mg/L (USGS, 2011).

Lithium is Present in Our Diet

Primary dietary sources of lithium are grains and vegetables, dairy products and meat. Estimates for daily dietary intake of lithium have been reported from different sources and varies amongst different countries. Ranges have included 0.0168 to 0.105 mg lithium/day with other authors estimating daily intake from food and tap water ranging from 2.31 to 5.6 mg lithium/day (USEPA, 2008). Schrauzer (2002) reports the daily estimate to be from 0.65 to 3.1 mg lithium/day for a 70 kg (154 lb) adult. The

U.S. Food and Drug Administration has not established a recommended daily value for lithium; however, a provisional recommended daily allowance (RDA) has been proposed to be 1 mg lithium/day for a 70 kg adult based on the lithium intake data in different countries (Schrauzer, 2002).

The USEPA provisional toxicity value (2008; see below) is roughly equivalent to an intake of 0.14 mg lithium/day for a 70 kg (154 lb) adult (i.e., USEPA would suggest that a safe intake of lithium is at or below this level). However, many of the estimated daily exposures and the recommended daily allowances for lithium from the diet and tapwater are above the USEPA level, and there have been no reported findings that these lithium exposures have resulted in any toxicological effects; this suggests that the current USEPA level overestimates potential risks associated with lithium exposures.

Lithium is Used Medicinally

Lithium is used medicinally in the U.S. and globally as the leading treatment for bipolar disease. Adult daily dosages are approximately 900 mg lithium/day or higher, and recommended doses for children are approximately 600 mg lithium/day. These intakes are much higher than the USEPA provisional level.

USEPA'S ORAL TOXICITY VALUE FOR LITHIUM

There are limited studies on lithium of the type upon which to base a toxicity value to use in human health risk assessment. USEPA has derived a provisional toxicity value (i.e., the value does not have the normal level of review or confidence compared to final toxicity values published by USEPA) that equates to a drinking water screening level of 0.04 mg/L, and a general intake of 0.14 mg/day for an adult. As noted above, this level is below many estimates of daily intake in humans presented above, and well below the typical therapeutic doses presented above.

DRINKING WATER SCREENING LEVELS FOR LITHIUM

Using this toxicity value, the USEPA regional screening level (RSL) for lithium for tapwater (drinking water) is 0.04 mg/L (USEPA, 2018b). This is also the screening level identified by USEPA for the CCR Rule (USEPA, 2018a). Surface water samples taken by Ameren of the Mississippi and Meramec Rivers near the MEC and evaluated for lithium were all below the drinking water screening level. Lithium was rarely detected in the Meramec River; lithium concentrations detected in the Mississippi River were similar upstream and downstream indicating that MEC is not the source of lithium in the Mississippi River.

OTHER LITHIUM TOXICITY EVALUATIONS

In 1990, Schrauzer et al. published data for 27 Texas counties showing that incidence rates of suicide, homicide, and rape were significantly higher in counties whose drinking water contained little or no lithium compared to counties with water lithium levels ranging from 0.7 – 0.17 mg/L. The authors suggested that continuous exposure to low dose lithium may have a generally beneficial effect on human behavior. Since that publication, additional studies investigating the anti-suicidal effects of lithium as a trace element in drinking water have been conducted throughout the world.

A review of these studies published recently by Liaugaudaite (2016) found that 7 of the 9 studies reported an association between low levels of lithium and suicide rates suggesting that lithium levels in drinking water could reduce the suicide risk in the general population. The mean lithium levels in the

drinking water from these 7 studies ranged from 0.0007 to 0.219 mg/L, which is around less than a thousandth of the minimum daily dose of lithium given for bipolar disorders and depression.

For example, Ohgami et al. (2009) examined lithium levels in tap water in 18 municipalities of Oita prefecture in Japan and found that the levels ranged from 0.0007 to 0.059 mg/L. The standardized mortality ratio of suicide across the municipalities was significantly and negatively associated with lithium levels in males as well as females (Ohgami et al, 2009).

Additional studies conducted in Japan, Austria, Texas, Greece, and Austria corroborate these results finding that higher lithium levels in the drinking water were associated with lower suicide rates. One negative study has been reported in England. However, the evidence that has been accumulating over the years, especially in the last 5-10 years, that small doses of lithium can have beneficial effects has even recently been the topic of an opinion editorial piece in the New York Times by a psychiatrist and faculty member at Weill Cornell Medical College who cites the different studies and questions why more research is not being conducted to evaluate this trend in the literature that shows lithium at low levels in drinking water could have an impact on suicide levels, violent acts and even dementia (Fels, 2014). She concludes that for the public health issue of suicide prevention alone, studies should be conducted with lithium to determine if it should be considered an essential trace element nutrient which would then allow its addition to vitamins, foods, etc. which could result in beneficial clinical, societal, and behavioral outcomes.

These data suggest that long term exposure to low levels of lithium in drinking water, which can range from 0.0007 to 0.219 mg/L may actually have beneficial effects in humans. The tap water screening level of 0.04 mg/L used by USEPA in the CCR Rule is well below the high end of this range. Therefore, lithium levels could be as high as 0.219 mg/L without adverse effect, well above the maximum concentration level observed at Meramec of 0.164 mg/L.

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APPENDIX C

What You Need to Know About Molybdenum

WHAT YOU NEED TO KNOW ABOUT MOLYBDENUM

Molybdenum is the one constituent that is present in at least one groundwater sample at each of the four Ameren energy centers in Missouri above the screening level used by the U.S. Environmental Protection Agency (USEPA) under the Coal Combustion Residuals (CCR) Rule. The purpose of this fact sheet is to provide information on molybdenum so that data can be considered in context. There is no public exposure to groundwater at the Ameren energy centers and concentration levels of molybdenum in adjacent surface waters are all well below health-based regulatory standards.

SOURCES OF INFORMATION ON MOLYBDENUM

Molybdenum had been evaluated by regulatory and health agencies in the U.S. As discussed below, molybdenum is an essential nutrient for humans, and the Institute of Medicine of the U.S. National Academy of Sciences (NAS) has provided recommended daily allowances and tolerable upper limits to be used as guidelines for vitamins and supplements and other exposures (NAS, 2001).

The Agency for Toxic Substances and Disease Registry (ATSDR) is a federal public health agency within the U.S. Department of Health and Human Services. The ATSDR Toxicological Profile for Molybdenum (ATSDR, 2017) provides a comprehensive summary and interpretation of available toxicological and epidemiological information on molybdenum and provides information on the naturally occurring levels in our environment and in our diet.

The U.S. Environmental Protection Agency (USEPA) published an oral toxicity value for molybdenum in 1992 (USEPA, 1992); this value serves as the basis for the tapwater screening level for molybdenum of 0.1 milligrams per liter (mg/L) or 100 micrograms per liter (ug/L) that was included in the Phase 1 Part update to the CCR Rule (USEPA, 2018a).

MOLYBDENUM IS NATURALLY OCCURRING AND AN ESSENTIAL NUTRIENT FOR PLANTS AND HUMANS

Molybdenum is a naturally occurring trace element that can be found extensively in nature. Biologically, molybdenum plays an important role as a micronutrient in plants and animals, including humans.

Molybdenum in Our Natural Environment

Molybdenum naturally accumulates in poorly drained soils and soils with high organic content (for example, peat bogs and wetlands). It is also present at high concentrations in “black shales,” which are shale deposits with high organic content. The U.S. Geological Survey (USGS, 2013) reports that the average concentration in U.S. soils is approximately 1 milligram per kilogram of soil (mg/kg). USGS (2011) estimates the median concentration of molybdenum in groundwater is 0.001 milligrams per liter (mg/L), with most concentrations below 0.008 mg/L.

Molybdenum in Our Diet

Molybdenum is considered an essential nutrient or trace element for living beings. It is required in several mammalian enzyme systems and is present in most adult multi-vitamins. A deficiency syndrome has only been seen in people with a genetic defect that prevents the synthesis of a specific enzyme for which molybdenum is a cofactor. The deficiency leads to severe neurological damage and early death.

Because it is present in soils, it is also present in our diet. Food derived from above ground plants, such as legumes, leafy vegetables, and cauliflower generally has a relatively higher concentration of molybdenum in comparison to food from tubers or animals. Beans, cereal grains, leafy vegetables, legumes, liver, and milk are reported as the richest sources of molybdenum in the average diet (ATSDR, 2017). The amount of molybdenum in plants varies according to the amount in the soil. The National Academy of Sciences (NAS) has estimated that the average dietary intakes of molybdenum by adult men and women are 0.109 and 0.076 milligrams per day (mg/day), respectively. A study of the dietary intake of adult residents in Denver, Colorado reported a mean molybdenum ingestion rate of 180 µg/day (range 120–240 µg/day) (ATSDR, 2017).

Molybdenum for Health

How Much Do You Need - Daily Allowance:

The Institute of Medicine of the NAS sets dietary intake values for essential nutrients. The recommended dietary allowance (RDA) for a nutrient is “the average daily dietary nutrient intake level sufficient to meet the nutrient requirement of nearly all (97 to 98 percent) health individuals” (NAS, 2001). The RDA for molybdenum for adults set by the NAS in 2001 is 0.045 milligram per day (mg/day) and is based on the amount of molybdenum needed to achieve a steady healthy balance in the body for the majority of the population.

How Much is Too Much - Upper Limits:

In addition to the RDA, the NAS also defines a Tolerable Upper Intake Level (UL) for essential nutrients. The UL is “the highest average daily nutrient intake level that is likely to pose no risk of adverse health effects to almost all individuals in the general population.” Thus, the RDA is a level that is considered to be sufficient for the health of the general population, while intake can be as high as the UL and pose no adverse health effects.

The UL for molybdenum set by the NAS is 2 mg/day. This level is based on an evaluation of the potential toxicity of molybdenum at high levels of intake. The most sensitive effect in the literature is associated with reproductive outcomes in rats, and the study was used to develop an oral toxicity value for humans of 0.03 milligrams of molybdenum ingested per day per kilogram of body weight (mg/kg-day). This value is used with an average adult body weight of 68-70 kg (154 lbs) to set the UL¹.

¹ The oral toxicity value identifies a level of intake in terms of milligrams of constituent per kilogram of body weight per day (mg/kg-day) that is considered to be safe for daily exposure for a lifetime. The oral toxicity value is used to calculate a safe drinking water level as follows: if the oral toxicity value is 0.03 mg/kg-day, and a 70 kg adult that consumes 2 liters of water per day, then the safe drinking water level = (0.03 mg/kg-day) x (70 kg) ÷ (2 liters water/day) = 1.05 milligrams per liter (mg/L).

USEPA'S ORAL TOXICITY VALUE FOR MOLYBDENUM

USEPA developed a lower oral toxicity value for molybdenum of 0.005 mg/kg-day (USEPA, 1992) based on a 1962 study of a small population (52 exposure subjects) in Armenia that had a high level of molybdenum in their diet. This population had high levels of uric acid and experienced gout. The findings from the Armenian study have not been replicated, and other regulatory bodies such as the NAS and ATSDR have rejected the study due to its many deficiencies. [It is likely that the observance of gout in the Armenian population had some other cause.]

The NAS concluded that there were “serious methodological difficulties with the [Armenian] study” and noted that no other studies in humans or animals have replicated this effect. The NAS toxicity value is 0.03 mg/kg-day, six-fold higher than the USEPA value. Based on the NAS toxicity value and USEPA assumptions (for body weight and drinking water intake) results in a calculated safe drinking water level of 0.6 mg/L or 600 ug/L.

ATSDR noted the study of the Armenian population was not considered suitable for derivation of a chronic-duration oral toxicity value for molybdenum due to deficiencies in the control group size and composition, and a lack of controlling for confounders, such as diet and alcohol, that could affect the results. ATSDR developed an oral toxicity value of 0.008 mg/kg-day, using the same study reproductive outcomes in rats as the NAS, but applying different assumptions, most notably a 3-fold higher uncertainty factor. Based on the ATSDR toxicity value and USEPA assumptions (for body weight and drinking water intake) results in a calculated safe drinking water level of 0.16 mg/L or 160 ug/L.

MOLYBDENUM UNDER THE CCR RULE

When the CCR Rule was published in 2015, groundwater standards were provided only for those Appendix IV constituents that have primary drinking water standards published by the USEPA under the Safe Drinking Water Act – values known as MCLs or maximum contaminant levels. Molybdenum does not have an MCL². In a subsequent 2018 CCR rule-making, USEPA designated a health-based groundwater protection standard for molybdenum of 0.1 mg/L or 100 ug/L. That is the value used to evaluate groundwater at the Ameren facilities. This level is very conservative and could be much higher and still protective of human health, as described above. [Note that in its March 3, 2019 report the Environmental Integrity Project used a screening level for molybdenum of 0.04 mg/L (or 40 ug/L), which is not the level USEPA has required in the CCR Rule.]

However, based on the USEPA toxicity value, the drinking water levels USEPA has developed for molybdenum are:

² USEPA is in the process of gathering information on the occurrence of molybdenum in public drinking water systems. The decision to develop an MCL (which is a multi-year process) is based on occurrence in public drinking water systems, the severity of adverse health effects, whether the constituent is present in public drinking water systems at levels of public health concern, and whether regulation would provide a meaningful opportunity for health risk reduction. No decision has yet been made as to whether molybdenum will be a candidate for the development of a drinking standard. Note that when USEPA included molybdenum for public water supply testing, it cited USEPA 1992, ATSDR 2017, and NAS 2001 as toxicity references. No mention was made of the differences in toxicity studies used or the values developed.

- 0.1 mg/L – The USEPA tapwater value in its Regional Screening Level (RSL) table and the value identified by USEPA for the CCR Rule (USEPA, 2018b). This is the value USEPA uses in the CCR Rule (USEPA, 2018a).
- 0.2 mg/L – The USEPA Office of Water value for the Drinking Water Equivalent Level (DWEL), which is a *lifetime exposure* concentration protective of adverse, non-cancer health effects, that assumes all of the exposure to a constituent is from drinking water (USEPA, 2018c).
- 0.04 mg/L – The USEPA Office of Water value for the Health Advisory Level (HA), which is based on the DWEL, but using a default assumption that only 20% of intake can come from water (USEPA, 2018c).

Therefore, drinking water concentrations of molybdenum up to 0.2 mg/L to are expected to be **without** adverse health effects. Based on the NAS review, daily exposure to drinking water concentrations of molybdenum up to 0.6 mg/L would be **without** adverse health effects.

WHAT THIS MEANS FOR THE AMEREN ENERGY CENTERS

This information from the NAS has been used to evaluate the levels of molybdenum in groundwater at the Ameren Energy Centers and in nearby surface waters. A total of 930 groundwater and surface water samples were collected from the four energy centers. The concentration levels in approximately 866 samples were below the screening level based on the National Academy of Science Tolerable Upper Intake Level (UL), while 241 are above the GWPS established by USEPA in the CCR Rule.

	Labadie	Meramec	Rush Island	Sioux
Groundwater				
Number of Samples	208	88	77	244
Molybdenum greater than CCR GWPS of 0.1 mg/L (a)	81	35	38	77
Molybdenum greater than NAS standard of 0.6 mg/L (b)	3	1	11	49
Surface Water				
Number of Samples	67	74	50	80
Molybdenum greater than 0.1 mg/L (a)	0	0	0	0

Notes:

mg/L - milligrams per liter.

(a) - Drinking water-based groundwater protection standard specified in the Coal Combustion Residuals Rule.

(b) - Alternative health-protective drinking water screening level based on the National Academy of Sciences review of molybdenum.

The groundwater results were collected from monitoring wells placed as close as practical to the ash basins’ boundaries and provide near-source groundwater monitoring results. The groundwater downgradient of each of the Ameren ash basins is not used as a source of drinking water. Deep bedrock groundwater used as drinking water in the vicinity of Labadie and in the vicinity of Rush Island was sampled and demonstrated no impacts from CCR.

Surface water adjacent to each of the energy centers was sampled and all results for molybdenum in surface water are well below the USEPA drinking water screening level of 0.1 mg/L.

Thus, although there are some results for molybdenum in groundwater that are above the USEPA drinking water screening level, the groundwater at these facilities is not used as a source of drinking water, and molybdenum is not present in any of the adjacent water bodies above the drinking water screening level. These results confirm that molybdenum does not pose a risk to human health or the environment at any of the Ameren facilities.

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APPENDIX D

Extraction and Transportation Assessment

ADDENDUM

Meramec, Labadie and Sioux Ash Pond Closure: Extraction and Transportation Assessment

Lochmueller Group applied the methodology from the Extraction and Transportation Study for the Rush Island Energy Center to develop high-level estimates of the costs and timeframes associated with hypothetical CCR excavation processes at the Labadie, Sioux and Meramec Energy Centers. Specifically, the formula used to estimate daily productivity (i.e. number of trucks hauling excavated material offsite) was adapted for use at Labadie, Sioux and Meramec along with site-specific considerations.

Estimates from the Rush Island Study assumed a maximum of 192 truck loads per day over an 8-hour work day (24 per hour), with 155 to 193 days of annual operation. Once loaded, trucks would make multiple roundtrips to the closest available commercial landfill. Such estimates assume that the excavation, staging, and loading process is capable of accommodating a steady stream of trucks loading **every 2.5 minutes** and that such material can be quickly unloaded at the receiving commercial landfill without significant delay. While such productivity rates are undoubtedly optimistic, the resulting estimates nevertheless are useful in capturing the enormity of such projects and are sufficient at a planning-level.

It is important to note that the existing onsite utility waste landfills (UWLs) at Labadie and Sioux were designed and permitted to manage production needs of the energy centers through each facility's retirement date. To facilitate permanent storage, excavated CCR material would need to be transported offsite to a commercial landfill or Ameren Missouri would need to permit and construct new onsite landfills. Given the absence of an existing utility waste landfill at Meramec, onsite disposal options were considered for the Labadie and Sioux locations only.

Each facility presents unique challenges that are likely to impact cost estimates and closure times beyond the scope of this assessment. For example, the regulatory process for construction of an onsite landfill would require multiple levels of approval, including environmental permits, zoning or land use authorization, and potentially a certificate of issuance from the Missouri Public Service Commission. Opposition to such projects may further delay the regulatory approval process such that it would be years *before* construction could commence.¹

¹ Efforts to permit and construct the Labadie UWL commenced in 2008 with the completion of Preliminary Site Investigation (PSI). The landfill was placed in service in 2016 after years of opposition from environmental groups and litigation. *See* *Petition for Writ of Certiorari [to invalidate county landfill ordinance] Franklin County Circ. Ct., 11/23/11, Case # 11AB-C286; Appeal to Franklin County Board of Adjustment, #14-00002, Filed 1/8/14 (of Land Use Administrator 10/10/13 and 12/10/13 Decisions), Denied by BZA 6/24/14; Appealed to Circ. Ct. by Writ of Certiorari, Cause # 14AB-CC00155, 7/24/14; Intervention and Motion to Dismiss in PSC Case EA 2012-0281, Ameren Application to PSC for CCN to operate landfill (PSC overruled Motion to Dismiss on 4/17/13); Administrative Hearing Commission Petition for Review [of MDNR Solid Waste Disposal Construction Permit], Filed 1-30-15, #15-0136, dismissed by AHC 3/5/15. *See also* *Campbell v. County Commission of Franklin County, 453 S.W.3d 762 (Mo. banc 2015).**

May 13, 2019

Page 2

Based on experience, it would be virtually impossible to sustain productivity at the planning level rate over extended, multi-year timeframe due to a variety of unpredictable factors. Excavation activities could be limited or precluded for several days following weather events. Other potential disruptions could include:

- loading equipment failure
- site restrictions that limit the number of excavation equipment
- traffic congestion on travel route
- truck breakdown
- staffing
- weather conditions
- commercial landfill available capacity in Illinois and Missouri
- landfill unloading equipment failure

In addition, site specific conditions can impact productivity. For example, an elementary school is located along Fine Road between the Meramec Energy Center and Telegraph Road. To accommodate local safety concerns, the hauling company would likely limit trips during the beginning and end of the school day, thereby limiting effective hauling hours to 5-6 per day during the school year.

Route 94 east of the Sioux Energy Center travels beneath multiple narrow, low-clearance railroad overpasses in the West Alton area. An entirely new roadway by-passing West Alton would avoid the railroad entirely, but would require regulatory approvals, land acquisition, and potentially eminent domain. Assumptions were adjusted to account for these impacts, but it is not possible to foresee every challenge and quantify every impact likely to surface.

Scenarios:

The following summarizes the assessment of five scenarios for CCR removal for the Meramec, Labadie and the Sioux Energy Centers. The assessment utilized the same methodology, assumptions, and unit costing information as for Rush Island. The volume of ash, hauling distances, and the anticipated infrastructure upgrades were adjusted for each site.

For each scenario, the total volume of excavated ash, total cost of removal, and closure duration are summarized. The reported volume of ash incorporates a swell factor. The closure duration is measured from the time the decision is made to close the ponds (i.e. removal from service) until such time that the CCR material is fully removed. It was assumed that 5 years of preparation time would be needed in advance of starting an offsite removal operation, whereas an onsite removal operation would require 10 years of preparation time to account for the regulatory process to secure approvals for construction of new onsite landfills.

The five scenarios are as follows:

1. Labadie Bottom Ash and Fly Ash Pond CCR Removal to an Offsite Landfill
2. Labadie Bottom Ash and Fly Ash Pond CCR Removal to an Onsite Landfill

3. Sioux Bottom Ash and Fly Ash Pond CCR Removal to an Offsite Landfill
4. Sioux Bottom Ash and Fly Ash Pond CCR Removal to an Onsite Landfill
5. Meramec Bottom Ash and Fly Ash Pond CCR Removal to an Offsite Landfill

Scenario 1: Offsite CCR Removal for Labadie

This scenario assumes offsite removal for the Labadie ash pond sites and includes the following:

- Pre-CCR removal preparation (5 years, included on a prorated basis in the Closure Duration for each pond);
- Stabilization, loading, and pond restoration;
- Seasonal impacts from wet and winter weather conditions impeding productivity;
- Hauling to an offsite landfill in Missouri;
- Landfill placement; and
- Loading and transportation infrastructure.

Labadie Energy Center	Estimated Ash Volume (CY) ²	Estimated Total Removal Cost	Closure Duration (Years)
	17,325,126	\$2,440 M – \$2,930 M	35 plus years

Scenario 2: Onsite CCR Removal for Labadie

This scenario assumes onsite disposal the Labadie ash pond sites and includes the following:

- Pre-CCR removal preparation (10 years, included on a prorated basis in the Closure Duration for each pond);
- Stabilization, loading, and pond restoration;
- Hauling to an onsite landfill located near the existing ponds;
- Seasonal impacts from wet and winter weather conditions impeding productivity;
- Landfill placement; and
- Loading infrastructure.

Labadie Energy Center	Estimated Ash Volume (CY)	Estimated Total Removal Cost	Closure Duration (Years)
	17,325,126	\$1,270 M - \$1,520 M	40 plus years

²Estimated volumes do not include any dry amendment materials.

Scenario 3: Offsite CCR Removal for Sioux

This scenario assumes offsite removal for the Sioux ash pond sites and includes the following:

- Pre-CCR removal preparation (5 years, included on a prorated basis in the Closure Duration for each pond);
- Stabilization, loading, and pond restoration;
- Hauling to an offsite landfill in Illinois³;
- Seasonal impacts from wet and winter weather conditions impeding productivity;
- Landfill placement; and
- Loading and transportation infrastructure.

Sioux Energy Center	Estimated Ash Volume (CY)	Estimated Total Removal Cost	Closure Duration (Years)
	6,079,808	\$890 M - \$1,060 M	15 plus years

Scenario 4: Onsite CCR Removal for Sioux

This scenario assumes onsite disposal the Sioux ash pond sites and includes the following:

- Pre-CCR removal preparation (10 years, included on a prorated basis in the Closure Duration for each pond);
- Stabilization, loading, and pond restoration;
- Hauling to an onsite landfill located near the existing ponds;
- Seasonal impacts from wet and winter weather conditions impeding productivity;
- Landfill placement; and
- Loading infrastructure.

Sioux Energy Center	Estimated Ash Volume (CY)	Estimated Total Removal Cost	Closure Duration (Years)
	6,079,808	\$470 M - \$570 M	20 plus years

Scenario 5: Onsite CCR Removal for Meramec

This scenario assumes offsite removal for the Meramec ash pond sites and includes the following:

- Pre-CCR removal preparation (5 years, included on a prorated basis in the Closure Duration for each pond);

³ Lochmueller did not review local siting requirements but many Illinois counties contain such restrictions.

May 13, 2019

Page 5

- Stabilization, loading, and pond restoration;
- Hauling to an offsite landfill in Illinois;
- Seasonal impacts from wet and winter weather conditions impeding productivity;
- Site specific constraints with transportation access and associated limitations;
- Landfill placement; and
- Loading and transportation infrastructure.

Meramec Energy Center	Estimated Ash Volume (CY)	Estimated Total Removal Cost	Closure Duration (Years)
	5,194,923	\$740 M - \$890 M	20 plus years

APRIL 29, 2019

EXTRACTION & TRANSPORTATION STUDY: Rush Island Ash Pond Closure Assessment

Rush Island Site
Jefferson County, Missouri

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Table of Contents

Introduction	2
Extraction & Stabilization.....	3
Description of Method.....	3
Dry Extraction:	3
Partially Wet Extraction:	3
Fully Submerged Extraction:	3
Site Restoration:.....	4
Extraction and Stabilization Impacts.....	5
Safety	5
Accidents.....	5
Exposure.....	5
Environment.....	5
Floodplain	5
River Embankment.....	5
Emissions.....	5
Fugitive Ash Particulate	5
Capital Projects	5
Onsite Access Roads.....	5
Geotube Staging Areas.....	6
Water Treatment Facilities	6
Loading Areas.....	6
Restoration of Former Ash Ponds.....	6
Transportation & Disposal	7
Modal Options (Truck, Rail, Barge)	7
Truck Hauling	7
Landfill Options	8
Transportation Route.....	9
Transportation Impacts.....	10
Traffic Flow.....	10
Safety & Environment.....	11
Pavement	11
Conclusion.....	12

Introduction

Lochmueller Group completed the following planning-level assessment of the costs and logistics associated with extracting, stabilizing, and transporting coal combustion residuals (CCR) from the existing ash pond system at the Rush Island Power Generation Center to existing offsite, commercially available landfill facilities. The Rush Island site is located along the Mississippi River in Jefferson County, Missouri approximately nine (9) miles southeast of Festus, Missouri. The purpose of this assessment is to describe the methods, determine the impacts, and quantify the order-of-magnitude costs associated with removing and transporting all CCR from its current disposal location at the Rush Island site to a private landfill for permanent storage.

Extraction & Stabilization

Description of Method

Extraction and stabilization of the CCR material from the CCR unit at Rush Island Energy Center is complicated due to its depth and location. In addition, the CCR unit contains both Class C and F fly ash that complicates excavation methods. CCR material from the unit would need to be excavated at depths of up to 100 feet, dewatered, dried and conditioned, before being and loaded into trucks and transported offsite.

Removal of the CCR material would require multiple phases including dry extraction, partially wet extraction and fully submerged extraction. The various phases are described below:

Dry Extraction:

This phase includes the handling and removal of the existing CCR material from the current surface elevation down to the groundwater elevation (approximately 18' below the ground surface (BGS) elevation) (Geotechnical Investigation and Report, prepared by CEC and dated December 20, 2011). Generally, it is assumed that this material can be direct loaded and transported without additional drying or conditioning procedures (moisture content between approximately 25% and 35%). The work associated with this phase includes the extraction, on-site transportation to Staging/Loading Areas, storage, and loading onto transportation for off-site removal. Standard earth-moving equipment and procedures would be utilized including dozers, loaders, and excavators. In general, dozers would be used to excavate and move the CCR material into piles and loaders would be used to load the CCR material into the waiting trucks for transport off-site. Excavators would be used in a support role to dig in areas where dozers are not efficient. Sub-areas of the pond area would need to be established to facilitate extraction operations. The general size of these sub-areas, laterally and vertically, will be determined based on on-site conditions as the operation progresses and the CCR material is removed.

Partially Wet Extraction:

This phase includes the handling and removal of the existing CCR material from the groundwater elevation to a point in which hydraulic excavation is feasible (18' below ground surface to 28' below ground surface). This material is assumed to be in acceptable condition for loading and transportation with no additional drying and conditioning after the dewatering procedure described below is completed.

Dewatering of this material would involve excavation of channels to promote material drying prior to excavation and transportation. Water would be diverted from excavated depressions utilizing pumps and piping systems to transport the water away from the material excavation area. After sufficient dewatering and drying time, the CCR materials would be removed using the same means as described for dry excavation.

Fully Submerged Extraction:

CCR materials located further down in the pond (28' below ground surface to 100' below ground surface) may be saturated and would require drying and conditioning prior to off-site transport. Such materials would need to be extracted via hydraulic dredging methods. The complexities and potential costs associated with such dredging efforts are significantly higher per unit volume than the "Dry Extraction" and "Partially Wet Extraction" phases. In fact, successful pond closures at the depths

required for the Rush Island site could were not discovered. Removal operations for CCR ponds with depths up to 50 feet were found.

This method employs equipment that removes the CCR material directly from the bottom of the CCR unit and pumps the “slurry” through a piping system to “geotubes” located in nearby drying areas. Geotubes are a geotextile filtration “bag” manufactured by sewing together multiple sheets of geotextiles using polyester or polypropylene. As the dredged water enters the geotubes, the geotextile captures the CCR materials as the water drains. Chemical addition during the pumping and piping operation using coagulants and flocculants will be necessary to aid in the dewatering process. The specific makeup of CCR materials are site specific. Therefore, selection of the most effective and efficient coagulants and flocculants will require bench testing. Maintenance of the dredging equipment, piping system, drying areas, settling ponds, and temporary roads will be necessary to facilitate the operation.

Significantly large drying areas will be required to accommodate the multi-week week drying procedure. After dewatering is complete, the geotubes are opened and the CCR material is loaded onto transportation for off-site removal. The transportation of material for off-site removal was the assumed limiting factor for the overall CCR disposal process flow based on the analysis performed in this study. However, extended, unforeseen weather conditions can contribute to additional lost working time due to icy conditions, mechanical system freeze-ups, or flooding.

Site Restoration:

This phase includes the final restoration of the site. This would include removal of all temporary access roads and residual ash in project area. Backfilling would likely need to occur for at least some volume of the remaining pond in conjunction with excavation activities to minimize infiltration from the Mississippi River. The closest source of backfill material would be sand dredged from the Mississippi River. Stabilization of the site with vegetative practices would be required for erosion control. The river banks and the remaining embankment along the river would require additional analysis and appropriate stabilization, but may include a combination of vegetation, large rocks or manufactured concrete products.

Extraction and Stabilization Impacts

Safety

Accidents

Workforce safety during the operation is a significant risk factor. With several unit processes operating with heavy machinery, proper safety planning is important. Accidents can be minimized during operations, but the planning and implementation of a safety plan will have significant costs associated with the effort.

Exposure

There is not only immediate physical injury risks, but there is also exposure risk to the people working on the site. Proper safety equipment will be necessary to limit exposure to potentially harmful substances in the CCR material removal process such as flocculants and coagulant used for the dewatering process.

Environment

Floodplain

The project area is currently shown within the 100 year floodplain for both the current and pending FIRM maps. The potential for the area to experience flooding during excavation activities creates additional risk to the extraction and stabilization operations.

River Embankment

The existing ash ponds are adjacent to the Mississippi River. There is a strip of land that separates these surface water bodies and serves as an embankment that separates the pond from the river. Proper excavation techniques and monitoring will need to be employed to ensure the land between the two surface water bodies remains stable during excavation and dredging activities. After dredging activities are complete, the embankment will require analysis to confirm stability. Removal of the embankment and/or significant re-stabilization may be necessary for the restoration of the site.

Emissions

The heavy equipment used during the extraction and stabilization phase of the project includes dozers, loaders, excavators, hydraulic dredges, and onsite hauling trucks. These types of equipment typically utilize diesel fuel and would generate emissions during operations. These emissions are in addition to the emissions discussed in the transportation impacts section of this assessment.

Fugitive Ash Particulate

As the CCR material is being extracted and stabilized, fugitive ash particulate will be created and would need to be managed through an ash management plan.

Capital Projects

Onsite Access Roads

The onsite access road utilized for the offsite hauling trucks is discussed in the transportation section of this assessment. The construction of temporary on-site hauling roads will be required throughout the extraction and stabilization process. These haul roads will need to be modified frequently in order to provide efficient transportation of the CCR to the stabilization and loading areas and to maintain dust control.

Geotube Staging Areas

Geotube staging areas will need to be constructed within the project area that are relatively flat to allow for proper dewatering of the CCR. These staging areas will be temporary and will need to be moved throughout the closure process as CCR is removed during different phases of the operation. Filtrate from the geotubes would be directed back to the settling ponds for treatment.

Water Treatment Facilities

The existing ponds could be utilized throughout the CCR removal process for settling any remaining solids from the filtrate from the drying process. There may be a need for the construction of new settling ponds toward the end of the process to fully remove CCR from the existing ponds. The filtrate will likely contain suspended solids and some form of treatment or settling may need to be evaluated depending on the final characteristics of the filtrate.

Loading Areas

Once the CCR is stabilized, the material may require some additional layout and loading area to ensure the material is dry enough for offsite hauling and ultimate placement in a landfill. The loading areas will need to be constructed as appropriate for the CCR removal areas that are active. The loading areas will require the construction of scales for measuring the weight of trucks and truck washing facilities to wash down tires of residual ash material.

Restoration of Former Ash Ponds

The post-CCR-removal condition of the ponds will be dependent on the final planned use of the area. Some options may include backfilling, removing embankment, creating or restoring habitat, etc. Achieving the desired future use may include utilizing the soil material that would remain between the pond and the river to backfill some of the remaining pond area. Sand backfill material could also be dredged from the Mississippi river for additional backfill material. Overall stabilization of the site would be required and would include vegetative, natural rock, and manufactured products to meet regulatory requirements.

Transportation & Disposal

This section addresses the transportation of CCR material from the site and its permanent disposal at a private landfill.

Modal Options (Truck, Rail, Barge)

The Rush Island site is located along the Mississippi River. Additionally, a BNSF rail line runs adjacent to the site. Therefore, the ability to haul CCR by barge and rail from Rush Island may be possible. However, significant infrastructure improvements would be required at the Rush Island site to provide ash loading capabilities for these modes.

The preferred landfill locations are all located within 80 miles of Rush Island. None of the sites have direct water access. Therefore, any CCR transported by barge from Rush Island would need to be transferred from barge to truck to reach the landfill destinations. The inefficiency of this transfer would render barge transportation considerably more costly than truck hauling. Moreover, most of the landfill sites are located further inland (east or west) from Rush Island such that north-south travel along the Mississippi River would not be beneficial.

With regards to rail, none of the preferred landfill sites have direct rail access. Several sites are located adjacent to rail corridors but spurs would need to be constructed to facilitate direct landfill access and allow for the temporary storage and unloading of rail cars. Additionally, three of the four preferred landfill sites are located in Illinois, which would require trains to travel through the congested St. Louis rail network to cross the Mississippi River. Rail is most efficient when transporting bulk materials over long distances. Given the relatively short travel distance to each landfill site, rail would not be cost-competitive with truck hauling.

This assessment assumed truck hauling to be the most cost-effective and feasible mode of transport. All subsequent analyses reflect truck hauling.

Truck Hauling

To determine a timeframe for extraction and removal of all CCR from its current, impounded location, the following was assumed:

- Truck hauling via 40-foot end load dump trucks loaded via conventional equipment – each trailer has a payload capacity of 25 tons based on a typical 80,000 lb. gross loaded maximum;
- 8-hour daily operation and a range of 155 to 193 days of annual operation (accounting for weekends, holidays, and time lost due to weather and imperfect execution);
- Loading operations on the Rush Island site occur adjacent to the impoundment and on the south portion of the site; and
- A maximum daily haul rate of 5,000 tons.

The resulting transportation haul assumptions are summarized in **Table 1**.

Table 1: Transportation Haul Summary

Total Tons of CCR Removed	Annual Tons of CCR Removed	Closure Duration*
21.6 million	742,772 to 928,465	28-34 Years

*Measured from the decision to begin extraction until fully removed

To accommodate the volume of truck traffic identified in **Table 1**, roadways internal to the Rush Island site would need to be improved. Specifically, a heavy-duty concrete roadway would need to be constructed along the western perimeter of the site extending from Big Hollow Road south to the ash pond area. Multiple at-grade railroad crossings with the site's rail spur would be required.

In the vicinity of the pond area, staging would need to be provided to accommodate several trucks in queue for multiple loading stations. Hence, a large loading station would need to be constructed. Once loaded, trucks would need to proceed to a washout area and scaled to verify the truck is loaded properly. A quick route back to the loading pad from the scale area would be needed for any overweight trucks.

Landfill Options

Four preferred landfills were identified as potential destinations for the CCR removed from the Rush Island site as shown in **Table 2**. Landfill disposal costs supplied by Ameren are similar across the four locations. With costs paid to the landfill being essentially equal, transportation costs would drive the landfill location decision. Assumed haul rates per ton to each landfill location were also supplied by Ameren. The lowest cost haul rate would be to the Progressive Waste site in Richwoods, which is also significantly closer to Rush Island than the other sites. Therefore, this assessment prioritized CCR disposal at the Progressive Waste landfill.

Table 2: Preferred Landfill Locations

Landfill Site	Address	Distance to Site (mi)	Travel Time to Site (min)
Progressive Waste	12581 State Hwy H, Richwoods, MO	34.7	44
Republic Services	4601 Cahokia Road, Roxana, IL	67.3	67
Waste Management	10400 Hillstown Road, Marissa, IL	73.4	82
Perry Ridge	6305 Sacred Heart Road, DuQuoin, IL	79.8	97

Capacity calculations were performed to determine the total space available for CCR disposal in aggregate. The annual disposal amount currently received by the landfill was assumed to remain constant over time and the incremental annual disposal amount due to the Rush Island CCR was added. Based on the capacity of the Progressive Waste site, at the combined disposal volume, it was estimated that the Progressive Waste landfill would become full upon receiving approximately 80 percent of the total CCR from Rush Island.

It was also assumed that the Progressive Waste site could feasibly accept the maximum daily load of trucks (192) and that Progressive Waste would be willing to receive the maximum amount of CCR possible and dedicate the necessary space on site for monofill construction to isolate the CCR material from other waste on site.

Given these assumptions, the calculations indicate that a second landfill site with available capacity would need to receive the final 20 percent of Rush Island CCR material once Progressive Waste reaches capacity. However, for purposes of the subsequent routing and transportation evaluations, it was assumed that the entire Rush Island CCR volume would be disposed at Progressive Waste.

Transportation Route

Many factors were considered when establishing a preferred route suitable for the removal of the CCR from the Rush Island site to the Progressive Waste landfill, including roadway functional classification and the available connectivity between the two sites using the existing roadway network. The selected route is approximately 36.5 miles long and utilizes the following roadways:

- Begin at the Rush Island site on Big Hollow Road
- Johnson Road west
- Danby Road west
- Highway 61 south
- Highway TT west
- Interstate 55 north
- Highway 67 south
- MO-110 west
- MO-21 south
- Highway H west
- End off Highway H at Progressive Waste

This route prioritizes roadways with the highest functional classifications along a reasonably direct line of travel. While a shorter route may be possible, it would rely upon roadways less suitable for truck traffic and therefore was not considered. The selected route emphasizes major numbered state routes, with the exception of leaving the Rush Island site (via Big Hollow Road, Johnson Road, and Danby Road) and accessing Progressive Waste (via Highway H).

The egress route from the Rush Island site utilizes Johnson Road and Danby Road instead of remaining on Big Hollow Road to Drury Road. Johnson Road/Danby Road is the designated route for truck traffic in and out of the Rush Island site. This route also promotes use of the half diamond interchange on Interstate 55 at Route TT, which was constructed approximately 10 years ago for purposes of serving truck traffic to/from the nearby Holcim Cement Plant.

Transportation Impacts

The following transportation impacts would be anticipated as a result of the hauling operation.

Traffic Flow

The selected route between Rush Island and Progressive Waste was evaluated in terms of its ability to accommodate the additional truck traffic, including both loaded and unloaded trucks. Overall, the truck volume distributed over the course of the day would not be expected to generate significant traffic flow impacts. The route emphasizes major roadways, which would be capable of handling the additional traffic. In fact, no improvements were assumed for Interstate 55 or Highway 67.

That said, the following transportation improvements would be recommended to mitigate anticipated impacts of the additional truck traffic at select locations:

- Big Hollow Road, Johnson Road, and Danby Road, which connect the Rush Island site with Highway 61, are not suitable for the volume of truck traffic anticipated. These roadways typically have 11-foot lanes and no shoulders. The horizontal and vertical geometry is substandard in places. The existing asphalt pavement would not likely withstand the effects of heavy truck traffic. It is recommended that this corridor be upgraded to provide an appropriate truck route between Rush Island and Highway 61. The assumed improvements consist of heavy-duty concrete pavement and alignment corrections along the existing roadway.
- The intersection of Danby Road with Highway 61 should be improved to include a dedicated northbound right-turn lane on Highway 61 and enlarged right-turn radius. This turn lane would serve trucks en route to Rush Island from Interstate 55. This intersection would be expected to remain unsignalized.
- The intersection of Route TT with Highway 61 should be improved to include a dedicated southbound right-turn lane on Highway 61 and enlarged right-turn radius. This turn lane would serve trucks en route to Progressive Waste. This intersection would be expected to remain unsignalized.
- The intersection of Highway 21 and Highway 110 was recently realigned and upgraded to current standards, so it should be well-equipped to serve truck turning maneuvers. However, the intersection remains unsignalized. Installation of a signal would be recommended in order to safely and efficiently serve trucks turning from westbound Highway 110 to southbound Highway 21 en route to Progressive Waste.
- The intersection of Highway 21 with Route H is signalized and currently includes a dedicated southbound right-turn lane and dedicated eastbound left-turn lane to serve truck turning movements along the selected route. It is recommended that the eastbound left-turn lane be extended to provide additional storage capacity. The existing turn lane is approximately 75 feet in length, which would accommodate only a single truck and possibly one additional vehicle.
- Route H is a low-volume and narrow two-lane highway with lane widths of approximately 10 feet, low shoulders, and substandard alignment in select areas. While upgrades to this corridor would be beneficial, given the length of the route, significant upgrades for purposes of the hauling operation would likely be deemed cost prohibitive.

Safety & Environment

The safety implications of the truck hauling operation were evaluated using information provided in the Highway Safety Manual (HSM), published by the American Association of State Highway and Transportation Officials (AASHTO). The HSM relates traffic volumes and roadway character to crash expectancy. Changes in volumes would then cause an increase or decrease in the crash expectancy. It is anticipated that the additional truck traffic would result in an increase of 6 crashes total on an annual basis along the entirety of the haul route, as follows:

- Net increase of 2 Severe (Fatal or Injury) Crashes per year
- Net increase of 4 PDO (Property Damage Only) Crashes per year

Additional environmental costs would also be incurred as a result of the hauling operation.¹ In total, transportation safety and environmental costs are estimated to be approximately \$490 million to \$611 million over the duration of the hauling operation. These costs would not be borne directly by Ameren but instead would be incurred by the general population.

Pavement

The additional truck volume would depreciate the pavement design life and accelerate pavement deterioration along the selected route. To compensate for the increased wear, pavement mill and overlay were assumed at 5-year increments along all segments of the route, with the exception of Interstate 55 (which as an interstate should be built to withstand truck traffic) and the upgraded access route to the Rush Island site (which would be reconstructed with heavy duty concrete).

¹ According to the Environmental Protection Agency's (EPA) publication on National Average In-Use Emissions from Heavy-Duty Trucks, semi-tractor trailer rigs are responsible for emitting 12.5 grams of pollutants per mile into the air. The economic cost attributable to truck emissions using EPA's methodology was estimated to be \$434M. This accounts for increased healthcare costs, lost productivity, welfare costs, environmental remediation, etc.

Conclusion

Lochmueller Group completed the preceding planning-level assessment of the methods and impacts associated with extracting, stabilizing, and transporting CCR from the existing Rush Island Power Generation Center. The purpose of this assessment was to determine the impacts and quantify the order-of-magnitude costs associated with completely removing all CCR from the Rush Island site and transporting it to a private landfill for permanent storage. The information contained herein is provided at a planning-level.

This study assumed that 12,725,000 cubic yards of coal combustion residuals would ultimately need to be removed from the Rush Island site. This would equate to approximately 21,650,000 tons of material to transport. This transport weight was calculated by multiplying the in place cubic yards by a swell factor to account for the uncompacted volume after excavation. The weight of the uncompacted unit volume was established from geotechnical testing data that provided the pounds per cubic foot and the percent moisture content. Based on a range of operating days per calendar year, it would take from 28 to 34 years to extract all material from the site.

Restoration of the site would include backfilling and stabilization with vegetative and structural practices. Restoration costs could be significant in that the resulting 70 – 100 foot depression may need to be backfilled via a dredging operation within the Mississippi River.

The total cost to extract, stabilize, transport, and dispose of the CCR material is summarized below in 2019 dollars. The total cost to Ameren could range from \$1.9 to \$2.1 Billion, depending upon the total period of removal operations. This includes transportation infrastructure upgrades both internal and external to the Rush Island site as discussed.

Extraction of CCR and Transport to Offsite Landfill	
Ameren Project Costs	
Extraction, Stabilization, Loading, and Restoration	\$773-891 Million
Hauling	\$372-375 Million
Landfill Placement Costs	\$691-757 Million
Transportation Infrastructure (on and off-site)	\$66-77 Million
Project Cost Total	\$1.9-\$2.1 Billion

Costs in 2019 Dollars

APPENDIX B

Laboratory Analytical Data

December 10, 2018

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

RE: Project: AMEREN MEC N&E, 153-1406.0004C
Pace Project No.: 60287289

Dear Mark Haddock:

Enclosed are the analytical results for sample(s) received by the laboratory between November 20, 2018 and November 21, 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



REPORT OF LABORATORY ANALYSIS

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CERTIFICATIONS

Project: AMEREN MEC N&E, 153-1406.0004C

Pace Project No.: 60287289

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

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SAMPLE SUMMARY

Project: AMEREN MEC N&E, 153-1406.0004C

Pace Project No.: 60287289

Lab ID	Sample ID	Matrix	Date Collected	Date Received
60287289001	M-TP-2	Water	11/19/18 11:35	11/20/18 04:15
60287289002	M-NE-FB-1	Water	11/19/18 11:30	11/20/18 04:15
60287289003	M-TP-1	Water	11/20/18 13:05	11/21/18 03:30
60287289004	M-NE-DUP-1	Water	11/20/18 13:05	11/21/18 03:30

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SAMPLE ANALYTE COUNT

Project: AMEREN MEC N&E, 153-1406.0004C

Pace Project No.: 60287289

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
60287289001	M-TP-2	EPA 200.7	EMR	13	PASI-K
		EPA 200.8	JDH	6	PASI-K
		EPA 7470	JDE	1	PASI-K
		SM 2320B	RLG	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
		60287289002	M-NE-FB-1	EPA 200.7	EMR, JGP
EPA 200.8	JDH			6	PASI-K
EPA 7470	JDE			1	PASI-K
SM 2320B	RLG			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
60287289003	M-TP-1			EPA 200.7	EMR, JGP
		EPA 200.8	JDH	6	PASI-K
		EPA 7470	JDE	1	PASI-K
		SM 2320B	RMT	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
		60287289004	M-NE-DUP-1	EPA 200.7	EMR, JGP
EPA 200.8	JDH			6	PASI-K
EPA 7470	JDE			1	PASI-K
SM 2320B	RMT			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

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: AMEREN MEC N&E, 153-1406.0004C

Pace Project No.: 60287289

Sample: M-TP-2 **Lab ID:** 60287289001 Collected: 11/19/18 11:35 Received: 11/20/18 04:15 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							
Barium	58.8	ug/L	5.0	1.5	1	12/03/18 16:08	12/04/18 18:11	7440-39-3	
Beryllium	<0.16	ug/L	1.0	0.16	1	12/03/18 16:08	12/04/18 18:11	7440-41-7	
Boron	2550	ug/L	100	12.5	1	12/03/18 16:08	12/04/18 18:11	7440-42-8	
Calcium	217000	ug/L	200	53.5	1	12/03/18 16:08	12/04/18 18:11	7440-70-2	M1
Cobalt	<0.87	ug/L	5.0	0.87	1	12/03/18 16:08	12/04/18 18:11	7440-48-4	
Iron	15900	ug/L	50.0	6.1	1	12/03/18 16:08	12/04/18 18:11	7439-89-6	
Lead	<3.0	ug/L	10.0	3.0	1	12/03/18 16:08	12/04/18 18:11	7439-92-1	
Lithium	42.7	ug/L	10.0	4.6	1	12/03/18 16:08	12/04/18 18:11	7439-93-2	
Magnesium	56200	ug/L	50.0	14.0	1	12/03/18 16:08	12/04/18 18:11	7439-95-4	
Manganese	578	ug/L	5.0	0.73	1	12/03/18 16:08	12/04/18 18:11	7439-96-5	
Molybdenum	6.2J	ug/L	20.0	0.90	1	12/03/18 16:08	12/04/18 18:11	7439-98-7	
Potassium	7890	ug/L	500	79.3	1	12/03/18 16:08	12/04/18 18:11	7440-09-7	
Sodium	167000	ug/L	500	157	1	12/03/18 16:08	12/04/18 18:11	7440-23-5	M1
200.8 MET ICPMS		Analytical Method: EPA 200.8 Preparation Method: EPA 200.8							
Antimony	<0.078	ug/L	1.0	0.078	1	12/03/18 15:40	12/04/18 12:55	7440-36-0	
Arsenic	3.8	ug/L	1.0	0.065	1	12/03/18 15:40	12/04/18 12:55	7440-38-2	
Cadmium	<0.033	ug/L	0.50	0.033	1	12/03/18 15:40	12/04/18 12:55	7440-43-9	
Chromium	0.17J	ug/L	1.0	0.078	1	12/03/18 15:40	12/04/18 12:55	7440-47-3	
Selenium	<0.085	ug/L	1.0	0.085	1	12/03/18 15:40	12/04/18 12:55	7782-49-2	
Thallium	<0.099	ug/L	1.0	0.099	1	12/03/18 15:40	12/04/18 12:55	7440-28-0	
7470 Mercury		Analytical Method: EPA 7470 Preparation Method: EPA 7470							
Mercury	<0.090	ug/L	0.20	0.090	1	12/04/18 14:50	12/05/18 11:09	7439-97-6	
2320B Alkalinity		Analytical Method: SM 2320B							
Alkalinity, Total as CaCO3	403	mg/L	20.0	4.9	1		11/29/18 16:04		
2540C Total Dissolved Solids		Analytical Method: SM 2540C							
Total Dissolved Solids	1450	mg/L	5.0	5.0	1		11/21/18 14:48		
Iron, Ferric (Calculation)		Analytical Method: SM 3500-Fe B#4							
Iron, Ferric	13.8	mg/L	0.050		1		12/06/18 16:38	7439-89-6	
Iron, Ferrous		Analytical Method: SM 3500-Fe B#4							
Iron, Ferrous	2.1	mg/L	0.20	0.012	1		11/21/18 12:10		H6
300.0 IC Anions 28 Days		Analytical Method: EPA 300.0							
Chloride	242	mg/L	50.0	14.5	50		12/10/18 11:43	16887-00-6	
Fluoride	0.36	mg/L	0.20	0.19	1		12/09/18 23:02	16984-48-8	
Sulfate	475	mg/L	50.0	12.0	50		12/10/18 11:43	14808-79-8	
365.4 Total Phosphorus		Analytical Method: EPA 365.4							
Phosphorus	0.68	mg/L	0.10	0.050	1		11/26/18 14:14	7723-14-0	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: AMEREN MEC N&E, 153-1406.0004C

Pace Project No.: 60287289

Sample: M-NE-FB-1 **Lab ID: 60287289002** Collected: 11/19/18 11:30 Received: 11/20/18 04:15 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							
Barium	<1.5	ug/L	5.0	1.5	1	12/04/18 12:45	12/05/18 13:59	7440-39-3	
Beryllium	0.25J	ug/L	1.0	0.16	1	12/04/18 12:45	12/05/18 13:59	7440-41-7	
Boron	12.5J	ug/L	100	12.5	1	12/04/18 12:45	12/05/18 13:59	7440-42-8	
Calcium	<53.5	ug/L	200	53.5	1	12/04/18 12:45	12/05/18 13:59	7440-70-2	
Cobalt	<0.87	ug/L	5.0	0.87	1	12/04/18 12:45	12/05/18 13:59	7440-48-4	
Iron	<6.1	ug/L	50.0	6.1	1	12/04/18 12:45	12/05/18 13:59	7439-89-6	
Lead	<3.0	ug/L	10.0	3.0	1	12/04/18 12:45	12/05/18 13:59	7439-92-1	
Lithium	<4.6	ug/L	10.0	4.6	1	12/04/18 12:45	12/05/18 14:54	7439-93-2	
Magnesium	<14.0	ug/L	50.0	14.0	1	12/04/18 12:45	12/05/18 13:59	7439-95-4	
Manganese	<0.73	ug/L	5.0	0.73	1	12/04/18 12:45	12/05/18 13:59	7439-96-5	
Molybdenum	<0.90	ug/L	20.0	0.90	1	12/04/18 12:45	12/05/18 13:59	7439-98-7	
Potassium	<79.3	ug/L	500	79.3	1	12/04/18 12:45	12/05/18 13:59	7440-09-7	
Sodium	<157	ug/L	500	157	1	12/04/18 12:45	12/05/18 13:59	7440-23-5	
200.8 MET ICPMS		Analytical Method: EPA 200.8 Preparation Method: EPA 200.8							
Antimony	<0.078	ug/L	1.0	0.078	1	12/03/18 15:40	12/04/18 13:03	7440-36-0	
Arsenic	<0.065	ug/L	1.0	0.065	1	12/03/18 15:40	12/04/18 13:03	7440-38-2	
Cadmium	0.065J	ug/L	0.50	0.033	1	12/03/18 15:40	12/04/18 13:03	7440-43-9	
Chromium	0.16J	ug/L	1.0	0.078	1	12/03/18 15:40	12/04/18 13:03	7440-47-3	
Selenium	<0.085	ug/L	1.0	0.085	1	12/03/18 15:40	12/04/18 13:03	7782-49-2	
Thallium	<0.099	ug/L	1.0	0.099	1	12/03/18 15:40	12/04/18 13:03	7440-28-0	
7470 Mercury		Analytical Method: EPA 7470 Preparation Method: EPA 7470							
Mercury	<0.090	ug/L	0.20	0.090	1	12/04/18 14:50	12/05/18 11:16	7439-97-6	
2320B Alkalinity		Analytical Method: SM 2320B							
Alkalinity, Total as CaCO3	<4.9	mg/L	20.0	4.9	1		11/29/18 16:13		
2540C Total Dissolved Solids		Analytical Method: SM 2540C							
Total Dissolved Solids	6.0	mg/L	5.0	5.0	1		11/21/18 14:48		
Iron, Ferric (Calculation)		Analytical Method: SM 3500-Fe B#4							
Iron, Ferric	0.0J	mg/L	0.050		1		12/06/18 16:38	7439-89-6	
Iron, Ferrous		Analytical Method: SM 3500-Fe B#4							
Iron, Ferrous	<0.012	mg/L	0.20	0.012	1		11/21/18 12:09		H6
300.0 IC Anions 28 Days		Analytical Method: EPA 300.0							
Chloride	0.43J	mg/L	1.0	0.29	1		12/10/18 00:38	16887-00-6	B
Fluoride	<0.19	mg/L	0.20	0.19	1		12/10/18 00:38	16984-48-8	
Sulfate	<0.24	mg/L	1.0	0.24	1		12/10/18 00:38	14808-79-8	
365.4 Total Phosphorus		Analytical Method: EPA 365.4							
Phosphorus	<0.050	mg/L	0.10	0.050	1		11/26/18 14:19	7723-14-0	

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ANALYTICAL RESULTS

Project: AMEREN MEC N&E, 153-1406.0004C

Pace Project No.: 60287289

Sample: M-TP-1 **Lab ID:** 60287289003 Collected: 11/20/18 13:05 Received: 11/21/18 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							
Barium	386	ug/L	5.0	1.5	1	12/04/18 12:45	12/05/18 13:46	7440-39-3	
Beryllium	<0.16	ug/L	1.0	0.16	1	12/04/18 12:45	12/05/18 13:46	7440-41-7	
Boron	640	ug/L	100	12.5	1	12/04/18 12:45	12/05/18 13:46	7440-42-8	
Calcium	77100	ug/L	200	53.5	1	12/04/18 12:45	12/05/18 13:46	7440-70-2	
Cobalt	<0.87	ug/L	5.0	0.87	1	12/04/18 12:45	12/05/18 13:46	7440-48-4	
Iron	8420	ug/L	50.0	6.1	1	12/04/18 12:45	12/05/18 13:46	7439-89-6	
Lead	4.1J	ug/L	10.0	3.0	1	12/04/18 12:45	12/05/18 13:46	7439-92-1	
Lithium	17.2	ug/L	10.0	4.6	1	12/04/18 12:45	12/05/18 14:41	7439-93-2	
Magnesium	31300	ug/L	50.0	14.0	1	12/04/18 12:45	12/05/18 13:46	7439-95-4	
Manganese	110	ug/L	5.0	0.73	1	12/04/18 12:45	12/05/18 13:46	7439-96-5	
Molybdenum	3.1J	ug/L	20.0	0.90	1	12/04/18 12:45	12/05/18 13:46	7439-98-7	
Potassium	3160	ug/L	500	79.3	1	12/04/18 12:45	12/05/18 13:46	7440-09-7	
Sodium	44900	ug/L	500	157	1	12/04/18 12:45	12/05/18 13:46	7440-23-5	
200.8 MET ICPMS		Analytical Method: EPA 200.8 Preparation Method: EPA 200.8							
Antimony	<0.078	ug/L	1.0	0.078	1	12/05/18 10:24	12/05/18 15:55	7440-36-0	
Arsenic	1.9	ug/L	1.0	0.065	1	12/05/18 10:24	12/05/18 15:55	7440-38-2	
Cadmium	0.039J	ug/L	0.50	0.033	1	12/05/18 10:24	12/05/18 15:55	7440-43-9	
Chromium	0.17J	ug/L	1.0	0.078	1	12/05/18 10:24	12/05/18 15:55	7440-47-3	
Selenium	<0.085	ug/L	1.0	0.085	1	12/05/18 10:24	12/05/18 15:55	7782-49-2	
Thallium	<0.099	ug/L	1.0	0.099	1	12/05/18 10:24	12/05/18 15:55	7440-28-0	
7470 Mercury		Analytical Method: EPA 7470 Preparation Method: EPA 7470							
Mercury	<0.090	ug/L	0.20	0.090	1	12/04/18 14:50	12/05/18 11:21	7439-97-6	
2320B Alkalinity		Analytical Method: SM 2320B							
Alkalinity, Total as CaCO3	387	mg/L	20.0	4.9	1		12/03/18 16:40		
2540C Total Dissolved Solids		Analytical Method: SM 2540C							
Total Dissolved Solids	404	mg/L	5.0	5.0	1		11/26/18 09:09		
Iron, Ferric (Calculation)		Analytical Method: SM 3500-Fe B#4							
Iron, Ferric	6.5	mg/L	0.050		1		12/06/18 16:38	7439-89-6	
Iron, Ferrous		Analytical Method: SM 3500-Fe B#4							
Iron, Ferrous	1.9	mg/L	0.20	0.012	1		11/21/18 15:54		H6
300.0 IC Anions 28 Days		Analytical Method: EPA 300.0							
Chloride	21.3	mg/L	2.0	0.58	2		12/07/18 15:24	16887-00-6	
Fluoride	0.30	mg/L	0.20	0.19	1		12/07/18 15:10	16984-48-8	
Sulfate	<0.24	mg/L	1.0	0.24	1		12/07/18 15:10	14808-79-8	
365.4 Total Phosphorus		Analytical Method: EPA 365.4							
Phosphorus	0.58	mg/L	0.10	0.050	1		11/28/18 11:48	7723-14-0	

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ANALYTICAL RESULTS

Project: AMEREN MEC N&E, 153-1406.0004C

Pace Project No.: 60287289

Sample: M-NE-DUP-1 **Lab ID: 60287289004** Collected: 11/20/18 13:05 Received: 11/21/18 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							
Barium	383	ug/L	5.0	1.5	1	12/04/18 12:45	12/05/18 13:52	7440-39-3	
Beryllium	<0.16	ug/L	1.0	0.16	1	12/04/18 12:45	12/05/18 13:52	7440-41-7	
Boron	625	ug/L	100	12.5	1	12/04/18 12:45	12/05/18 13:52	7440-42-8	
Calcium	76100	ug/L	200	53.5	1	12/04/18 12:45	12/05/18 13:52	7440-70-2	
Cobalt	<0.87	ug/L	5.0	0.87	1	12/04/18 12:45	12/05/18 13:52	7440-48-4	
Iron	8380	ug/L	50.0	6.1	1	12/04/18 12:45	12/05/18 13:52	7439-89-6	
Lead	<3.0	ug/L	10.0	3.0	1	12/04/18 12:45	12/05/18 13:52	7439-92-1	
Lithium	16.1	ug/L	10.0	4.6	1	12/04/18 12:45	12/05/18 14:47	7439-93-2	
Magnesium	31600	ug/L	50.0	14.0	1	12/04/18 12:45	12/05/18 13:52	7439-95-4	
Manganese	109	ug/L	5.0	0.73	1	12/04/18 12:45	12/05/18 13:52	7439-96-5	
Molybdenum	3.9J	ug/L	20.0	0.90	1	12/04/18 12:45	12/05/18 13:52	7439-98-7	
Potassium	3210	ug/L	500	79.3	1	12/04/18 12:45	12/05/18 13:52	7440-09-7	
Sodium	44400	ug/L	500	157	1	12/04/18 12:45	12/05/18 13:52	7440-23-5	
200.8 MET ICPMS		Analytical Method: EPA 200.8 Preparation Method: EPA 200.8							
Antimony	<0.078	ug/L	1.0	0.078	1	12/05/18 10:24	12/05/18 15:57	7440-36-0	
Arsenic	1.8	ug/L	1.0	0.065	1	12/05/18 10:24	12/05/18 15:57	7440-38-2	
Cadmium	<0.033	ug/L	0.50	0.033	1	12/05/18 10:24	12/05/18 15:57	7440-43-9	
Chromium	0.11J	ug/L	1.0	0.078	1	12/05/18 10:24	12/05/18 15:57	7440-47-3	
Selenium	<0.085	ug/L	1.0	0.085	1	12/05/18 10:24	12/05/18 15:57	7782-49-2	
Thallium	<0.099	ug/L	1.0	0.099	1	12/05/18 10:24	12/05/18 15:57	7440-28-0	
7470 Mercury		Analytical Method: EPA 7470 Preparation Method: EPA 7470							
Mercury	<0.090	ug/L	0.20	0.090	1	12/04/18 14:50	12/05/18 11:23	7439-97-6	
2320B Alkalinity		Analytical Method: SM 2320B							
Alkalinity, Total as CaCO3	387	mg/L	20.0	4.9	1		12/03/18 16:45		
2540C Total Dissolved Solids		Analytical Method: SM 2540C							
Total Dissolved Solids	388	mg/L	5.0	5.0	1		11/26/18 09:09		
Iron, Ferric (Calculation)		Analytical Method: SM 3500-Fe B#4							
Iron, Ferric	8.0	mg/L	0.050		1		12/06/18 16:38	7439-89-6	
Iron, Ferrous		Analytical Method: SM 3500-Fe B#4							
Iron, Ferrous	0.40	mg/L	0.20	0.012	1		11/21/18 15:55		H6
300.0 IC Anions 28 Days		Analytical Method: EPA 300.0							
Chloride	21.3	mg/L	5.0	1.4	5		12/07/18 15:52	16887-00-6	
Fluoride	0.31	mg/L	0.20	0.19	1		12/07/18 15:38	16984-48-8	
Sulfate	<0.24	mg/L	1.0	0.24	1		12/07/18 15:38	14808-79-8	
365.4 Total Phosphorus		Analytical Method: EPA 365.4							
Phosphorus	0.61	mg/L	0.10	0.050	1		11/28/18 11:50	7723-14-0	

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QUALITY CONTROL DATA

Project: AMEREN MEC N&E, 153-1406.0004C

Pace Project No.: 60287289

QC Batch: 558279 Analysis Method: EPA 7470
 QC Batch Method: EPA 7470 Analysis Description: 7470 Mercury
 Associated Lab Samples: 60287289001, 60287289002, 60287289003, 60287289004

METHOD BLANK: 2290334 Matrix: Water
 Associated Lab Samples: 60287289001, 60287289002, 60287289003, 60287289004

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Mercury	ug/L	<0.090	0.20	0.090	12/05/18 10:53	

LABORATORY CONTROL SAMPLE: 2290335

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury	ug/L	5	4.9	98	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2290336 2290337

Parameter	Units	60287288010 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mercury	ug/L	<0.090	5	5	4.8	4.8	95	96	75-125	1	20	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2290338 2290339

Parameter	Units	60287289001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mercury	ug/L	<0.090	5	5	4.9	4.9	97	98	75-125	0	20	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: AMEREN MEC N&E, 153-1406.0004C

Pace Project No.: 60287289

QC Batch: 558137 Analysis Method: EPA 200.7
QC Batch Method: EPA 200.7 Analysis Description: 200.7 Metals, Total
Associated Lab Samples: 60287289001

METHOD BLANK: 2289783 Matrix: Water
Associated Lab Samples: 60287289001

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Barium	ug/L	<1.5	5.0	1.5	12/04/18 17:22	
Beryllium	ug/L	<0.16	1.0	0.16	12/04/18 17:22	
Boron	ug/L	<12.5	100	12.5	12/04/18 17:22	
Calcium	ug/L	54.6J	200	53.5	12/04/18 17:22	
Cobalt	ug/L	<0.87	5.0	0.87	12/04/18 17:22	
Iron	ug/L	<6.1	50.0	6.1	12/04/18 17:22	
Lead	ug/L	<3.0	10.0	3.0	12/04/18 17:22	
Lithium	ug/L	<4.6	10.0	4.6	12/04/18 17:22	
Magnesium	ug/L	<14.0	50.0	14.0	12/04/18 17:22	
Manganese	ug/L	<0.73	5.0	0.73	12/04/18 17:22	
Molybdenum	ug/L	<0.90	20.0	0.90	12/04/18 17:22	
Potassium	ug/L	<79.3	500	79.3	12/04/18 17:22	
Sodium	ug/L	<157	500	157	12/04/18 17:22	

LABORATORY CONTROL SAMPLE: 2289784

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Barium	ug/L	1000	951	95	85-115	
Beryllium	ug/L	1000	951	95	85-115	
Boron	ug/L	1000	952	95	85-115	
Calcium	ug/L	10000	9540	95	85-115	
Cobalt	ug/L	1000	990	99	85-115	
Iron	ug/L	10000	9260	93	85-115	
Lead	ug/L	1000	961	96	85-115	
Lithium	ug/L	1000	940	94	85-115	
Magnesium	ug/L	10000	9620	96	85-115	
Manganese	ug/L	1000	961	96	85-115	
Molybdenum	ug/L	1000	976	98	85-115	
Potassium	ug/L	10000	9540	95	85-115	
Sodium	ug/L	10000	9810	98	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2289785 2289786

Parameter	Units	MS		MSD		MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
		Spike Conc.	Result	Spike Conc.	Result						
Barium	ug/L	147	1000	1000	1120	98	94	70-130	3	20	
Beryllium	ug/L	<0.16	1000	1000	974	97	95	70-130	3	20	
Boron	ug/L	1980	1000	1000	2990	101	88	70-130	5	20	

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QUALITY CONTROL DATA

Project: AMEREN MEC N&E, 153-1406.0004C

Pace Project No.: 60287289

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2289785												2289786			
Parameter	Units	60287288010 Result	MS	MSD	MS	MSD	MS	MSD	% Rec	Max	Qual				
			Spike Conc.	Spike Conc.	Result	Result	% Rec	% Rec	Limits	RPD					
Calcium	ug/L	190000	10000	10000	203000	194000	132	43	70-130	4	20	M1			
Cobalt	ug/L	<0.87	1000	1000	973	946	97	95	70-130	3	20				
Iron	ug/L	16300	10000	10000	25800	24800	96	85	70-130	4	20				
Lead	ug/L	<3.0	1000	1000	944	918	94	92	70-130	3	20				
Lithium	ug/L	36.0	1000	1000	1010	976	98	94	70-130	4	20				
Magnesium	ug/L	47700	10000	10000	57900	55200	102	75	70-130	5	20				
Manganese	ug/L	704	1000	1000	1680	1610	97	91	70-130	4	20				
Molybdenum	ug/L	4.3J	1000	1000	1010	974	100	97	70-130	3	20				
Potassium	ug/L	7780	10000	10000	17800	17100	100	94	70-130	4	20				
Sodium	ug/L	49000	10000	10000	59800	57400	109	85	70-130	4	20				

MATRIX SPIKE SAMPLE: 2289787									
Parameter	Units	60287289001	Spike	MS	MS	% Rec	Qualifiers		
		Result	Conc.	Result	% Rec	Limits			
Barium	ug/L	58.8	1000	1020	97	70-130			
Beryllium	ug/L	<0.16	1000	963	96	70-130			
Boron	ug/L	2550	1000	3510	96	70-130			
Calcium	ug/L	217000	10000	222000	44	70-130	M1		
Cobalt	ug/L	<0.87	1000	965	96	70-130			
Iron	ug/L	15900	10000	24800	89	70-130			
Lead	ug/L	<3.0	1000	932	93	70-130			
Lithium	ug/L	42.7	1000	1000	96	70-130			
Magnesium	ug/L	56200	10000	65000	88	70-130			
Manganese	ug/L	578	1000	1530	95	70-130			
Molybdenum	ug/L	6.2J	1000	1000	100	70-130			
Potassium	ug/L	7890	10000	17700	98	70-130			
Sodium	ug/L	167000	10000	173000	62	70-130	M1		

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QUALITY CONTROL DATA

Project: AMEREN MEC N&E, 153-1406.0004C

Pace Project No.: 60287289

QC Batch: 558212 Analysis Method: EPA 200.7
 QC Batch Method: EPA 200.7 Analysis Description: 200.7 Metals, Total
 Associated Lab Samples: 60287289002, 60287289003, 60287289004

METHOD BLANK: 2290148 Matrix: Water

Associated Lab Samples: 60287289002, 60287289003, 60287289004

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Barium	ug/L	<1.5	5.0	1.5	12/05/18 13:33	
Beryllium	ug/L	<0.16	1.0	0.16	12/05/18 13:33	
Boron	ug/L	<12.5	100	12.5	12/05/18 13:33	
Calcium	ug/L	<53.5	200	53.5	12/05/18 13:33	
Cobalt	ug/L	0.98J	5.0	0.87	12/05/18 13:33	
Iron	ug/L	<6.1	50.0	6.1	12/05/18 13:33	
Lead	ug/L	<3.0	10.0	3.0	12/05/18 13:33	
Lithium	ug/L	<4.6	10.0	4.6	12/05/18 14:28	
Magnesium	ug/L	<14.0	50.0	14.0	12/05/18 13:33	
Manganese	ug/L	<0.73	5.0	0.73	12/05/18 13:33	
Molybdenum	ug/L	<0.90	20.0	0.90	12/05/18 13:33	
Potassium	ug/L	<79.3	500	79.3	12/05/18 13:33	
Sodium	ug/L	<157	500	157	12/05/18 13:33	

LABORATORY CONTROL SAMPLE: 2290149

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Barium	ug/L	1000	1010	101	85-115	
Beryllium	ug/L	1000	1010	101	85-115	
Boron	ug/L	1000	985	98	85-115	
Calcium	ug/L	10000	10000	100	85-115	
Cobalt	ug/L	1000	1000	100	85-115	
Iron	ug/L	10000	9940	99	85-115	
Lead	ug/L	1000	974	97	85-115	
Lithium	ug/L	1000	919	92	85-115	
Magnesium	ug/L	10000	10000	100	85-115	
Manganese	ug/L	1000	996	100	85-115	
Molybdenum	ug/L	1000	1010	101	85-115	
Potassium	ug/L	10000	10100	101	85-115	
Sodium	ug/L	10000	10400	104	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2290150 2290151

Parameter	Units	MS		MSD		MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
		Spike Conc.	Result	Spike Conc.	Result						
Barium	ug/L	386	1000	1000	1380	1370	100	99	70-130	1	20
Beryllium	ug/L	<0.16	1000	1000	1040	1030	104	103	70-130	1	20
Boron	ug/L	640	1000	1000	1610	1640	97	100	70-130	1	20

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QUALITY CONTROL DATA

Project: AMEREN MEC N&E, 153-1406.0004C

Pace Project No.: 60287289

Parameter	Units	60287289003		2290150		2290151		% Rec	% Rec	% Rec	Limits	RPD	Max RPD	Qual
		Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec							
Calcium	ug/L	77100	10000	10000	86200	85000	91	80	70-130	1	20			
Cobalt	ug/L	<0.87	1000	1000	973	987	97	99	70-130	1	20			
Iron	ug/L	8420	10000	10000	17900	17700	95	93	70-130	1	20			
Lead	ug/L	4.1J	1000	1000	944	950	94	95	70-130	1	20			
Lithium	ug/L	17.2	1000	1000	923	911	91	89	70-130	1	20			
Magnesium	ug/L	31300	10000	10000	41200	41500	98	102	70-130	1	20			
Manganese	ug/L	110	1000	1000	1110	1120	100	101	70-130	1	20			
Molybdenum	ug/L	3.1J	1000	1000	1020	1030	101	103	70-130	1	20			
Potassium	ug/L	3160	10000	10000	13600	13500	105	103	70-130	1	20			
Sodium	ug/L	44900	10000	10000	54600	54300	98	94	70-130	1	20			

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QUALITY CONTROL DATA

Project: AMEREN MEC N&E, 153-1406.0004C
Pace Project No.: 60287289

QC Batch: 558139 Analysis Method: EPA 200.8
QC Batch Method: EPA 200.8 Analysis Description: 200.8 MET
Associated Lab Samples: 60287289001, 60287289002

METHOD BLANK: 2289794 Matrix: Water
Associated Lab Samples: 60287289001, 60287289002

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Antimony	ug/L	<0.078	1.0	0.078	12/04/18 12:25	
Arsenic	ug/L	<0.065	1.0	0.065	12/04/18 12:25	
Cadmium	ug/L	<0.033	0.50	0.033	12/04/18 12:25	
Chromium	ug/L	<0.078	1.0	0.078	12/04/18 12:25	
Selenium	ug/L	<0.085	1.0	0.085	12/04/18 12:25	
Thallium	ug/L	<0.099	1.0	0.099	12/04/18 12:25	

LABORATORY CONTROL SAMPLE: 2289795

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Antimony	ug/L	40	39.3	98	85-115	
Arsenic	ug/L	40	39.5	99	85-115	
Cadmium	ug/L	40	39.2	98	85-115	
Chromium	ug/L	40	39.8	99	85-115	
Selenium	ug/L	40	39.3	98	85-115	
Thallium	ug/L	40	37.8	94	85-115	

MATRIX SPIKE SAMPLE: 2289796

Parameter	Units	60287288010 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Antimony	ug/L	<0.078	40	39.8	100	70-130	
Arsenic	ug/L	11.7	40	51.8	100	70-130	
Cadmium	ug/L	<0.033	40	38.1	95	70-130	
Chromium	ug/L	0.23J	40	43.8	109	70-130	
Selenium	ug/L	<0.085	40	37.7	94	70-130	
Thallium	ug/L	<0.099	40	39.3	98	70-130	

MATRIX SPIKE SAMPLE: 2289797

Parameter	Units	60287289001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Antimony	ug/L	<0.078	40	39.4	99	70-130	
Arsenic	ug/L	3.8	40	43.6	99	70-130	
Cadmium	ug/L	<0.033	40	37.1	93	70-130	
Chromium	ug/L	0.17J	40	42.2	105	70-130	
Selenium	ug/L	<0.085	40	37.1	93	70-130	
Thallium	ug/L	<0.099	40	39.9	100	70-130	

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QUALITY CONTROL DATA

Project: AMEREN MEC N&E, 153-1406.0004C
Pace Project No.: 60287289

QC Batch: 558318 Analysis Method: EPA 200.8
QC Batch Method: EPA 200.8 Analysis Description: 200.8 MET
Associated Lab Samples: 60287289003, 60287289004

METHOD BLANK: 2290488 Matrix: Water
Associated Lab Samples: 60287289003, 60287289004

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Antimony	ug/L	<0.078	1.0	0.078	12/05/18 15:42	
Arsenic	ug/L	<0.065	1.0	0.065	12/05/18 15:42	
Cadmium	ug/L	<0.033	0.50	0.033	12/05/18 15:42	
Chromium	ug/L	<0.078	1.0	0.078	12/05/18 15:42	
Selenium	ug/L	<0.085	1.0	0.085	12/05/18 15:42	
Thallium	ug/L	<0.099	1.0	0.099	12/05/18 15:42	

LABORATORY CONTROL SAMPLE: 2290489

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Antimony	ug/L	40	38.7	97	85-115	
Arsenic	ug/L	40	37.9	95	85-115	
Cadmium	ug/L	40	38.4	96	85-115	
Chromium	ug/L	40	38.8	97	85-115	
Selenium	ug/L	40	38.2	95	85-115	
Thallium	ug/L	40	37.0	92	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2290490 2290491

Parameter	Units	60287167001 Result	MS		MSD		MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
			Spike Conc.	MS Result	Spike Conc.	MSD Result						
Antimony	ug/L	0.20J	40	38.1	40	38.3	95	95	70-130	1	20	
Arsenic	ug/L	1.0	40	38.5	40	38.3	94	93	70-130	1	20	
Cadmium	ug/L	0.38J	40	36.7	40	36.7	91	91	70-130	0	20	
Chromium	ug/L	<0.078	40	37.7	40	37.7	94	94	70-130	0	20	
Selenium	ug/L	0.12J	40	35.5	40	35.6	88	89	70-130	0	20	
Thallium	ug/L	<0.099	40	38.4	40	38.5	96	96	70-130	0	20	

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QUALITY CONTROL DATA

Project: AMEREN MEC N&E, 153-1406.0004C

Pace Project No.: 60287289

QC Batch: 557524

Analysis Method: SM 2320B

QC Batch Method: SM 2320B

Analysis Description: 2320B Alkalinity

Associated Lab Samples: 60287289001, 60287289002

METHOD BLANK: 2287246

Matrix: Water

Associated Lab Samples: 60287289001, 60287289002

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Alkalinity, Total as CaCO ₃	mg/L	<4.9	20.0	4.9	11/29/18 13:19	

LABORATORY CONTROL SAMPLE: 2287247

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity, Total as CaCO ₃	mg/L	500	501	100	90-110	

SAMPLE DUPLICATE: 2287252

Parameter	Units	60287288010 Result	Dup Result	RPD	Max RPD	Qualifiers
Alkalinity, Total as CaCO ₃	mg/L	525	543	3	10	

SAMPLE DUPLICATE: 2287253

Parameter	Units	60287289001 Result	Dup Result	RPD	Max RPD	Qualifiers
Alkalinity, Total as CaCO ₃	mg/L	403	406	1	10	

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QUALITY CONTROL DATA

Project: AMEREN MEC N&E, 153-1406.0004C

Pace Project No.: 60287289

QC Batch: 557603

Analysis Method: SM 2320B

QC Batch Method: SM 2320B

Analysis Description: 2320B Alkalinity

Associated Lab Samples: 60287289003, 60287289004

METHOD BLANK: 2287625

Matrix: Water

Associated Lab Samples: 60287289003, 60287289004

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Alkalinity, Total as CaCO ₃	mg/L	<4.9	20.0	4.9	12/03/18 16:29	

LABORATORY CONTROL SAMPLE: 2287626

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity, Total as CaCO ₃	mg/L	500	484	97	90-110	

SAMPLE DUPLICATE: 2287630

Parameter	Units	60287288017 Result	Dup Result	RPD	Max RPD	Qualifiers
Alkalinity, Total as CaCO ₃	mg/L	394	396	1	10	

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QUALITY CONTROL DATA

Project: AMEREN MEC N&E, 153-1406.0004C

Pace Project No.: 60287289

QC Batch: 556373

Analysis Method: SM 2540C

QC Batch Method: SM 2540C

Analysis Description: 2540C Total Dissolved Solids

Associated Lab Samples: 60287289001, 60287289002

METHOD BLANK: 2282777

Matrix: Water

Associated Lab Samples: 60287289001, 60287289002

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	<5.0	5.0	5.0	11/21/18 14:47	

LABORATORY CONTROL SAMPLE: 2282778

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Dissolved Solids	mg/L	1000	965	96	80-120	

SAMPLE DUPLICATE: 2282781

Parameter	Units	60287081003 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	505	510	1	10	

SAMPLE DUPLICATE: 2282799

Parameter	Units	60287289001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	1450	1450	0	10	

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QUALITY CONTROL DATA

Project: AMEREN MEC N&E, 153-1406.0004C

Pace Project No.: 60287289

QC Batch: 556732

Analysis Method: SM 2540C

QC Batch Method: SM 2540C

Analysis Description: 2540C Total Dissolved Solids

Associated Lab Samples: 60287289003, 60287289004

METHOD BLANK: 2284609

Matrix: Water

Associated Lab Samples: 60287289003, 60287289004

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	<5.0	5.0	5.0	11/26/18 09:06	

LABORATORY CONTROL SAMPLE: 2284610

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

SAMPLE DUPLICATE: 2284611

Parameter	Units	60287327002 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	1010	971	4	10	

SAMPLE DUPLICATE: 2284612

Parameter	Units	60287289004 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	388	404	4	10	

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QUALITY CONTROL DATA

Project: AMEREN MEC N&E, 153-1406.0004C

Pace Project No.: 60287289

QC Batch: 556509 Analysis Method: SM 3500-Fe B#4
 QC Batch Method: SM 3500-Fe B#4 Analysis Description: Iron, Ferrous
 Associated Lab Samples: 60287289001, 60287289002

METHOD BLANK: 2283283 Matrix: Water

Associated Lab Samples: 60287289001, 60287289002

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Iron, Ferrous	mg/L	<0.012	0.20	0.012	11/21/18 12:09	H6

LABORATORY CONTROL SAMPLE: 2283284

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

SAMPLE DUPLICATE: 2283286

Parameter	Units	60287289002 Result	Dup Result	RPD	Max RPD	Qualifiers
Iron, Ferrous	mg/L	<0.012	<0.012		20	H6

SAMPLE DUPLICATE: 2283287

Parameter	Units	60287289001 Result	Dup Result	RPD	Max RPD	Qualifiers
Iron, Ferrous	mg/L	2.1	2.1	2	20	H6

SAMPLE DUPLICATE: 2283288

Parameter	Units	60287288010 Result	Dup Result	RPD	Max RPD	Qualifiers
Iron, Ferrous	mg/L	2.4	2.5	4	20	H6

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 MEC N&E, 153-1406.0004C

Pace Project No.: 60287289

QC Batch: 556555 Analysis Method: SM 3500-Fe B#4

QC Batch Method: SM 3500-Fe B#4 Analysis Description: Iron, Ferrous

Associated Lab Samples: 60287289003, 60287289004

METHOD BLANK: 2283493 Matrix: Water

Associated Lab Samples: 60287289003, 60287289004

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Iron, Ferrous	mg/L	<0.012	0.20	0.012	11/21/18 15:26	H6

LABORATORY CONTROL SAMPLE: 2283494

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

SAMPLE DUPLICATE: 2283495

Parameter	Units	60287288006 Result	Dup Result	RPD	Max RPD	Qualifiers
Iron, Ferrous	mg/L	<0.012	<0.012		20	H6

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QUALITY CONTROL DATA

Project: AMEREN MEC N&E, 153-1406.0004C

Pace Project No.: 60287289

QC Batch: 558974

Analysis Method: EPA 300.0

QC Batch Method: EPA 300.0

Analysis Description: 300.0 IC Anions

Associated Lab Samples: 60287289003, 60287289004

METHOD BLANK: 2293702

Matrix: Water

Associated Lab Samples: 60287289003, 60287289004

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Chloride	mg/L	<0.29	1.0	0.29	12/07/18 13:53	
Fluoride	mg/L	<0.19	0.20	0.19	12/07/18 13:53	
Sulfate	mg/L	<0.24	1.0	0.24	12/07/18 13:53	

LABORATORY CONTROL SAMPLE: 2293703

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	5	4.5	90	90-110	
Fluoride	mg/L	2.5	2.4	94	90-110	
Sulfate	mg/L	5	4.8	96	90-110	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: AMEREN MEC N&E, 153-1406.0004C

Pace Project No.: 60287289

QC Batch: 559127

Analysis Method: EPA 300.0

QC Batch Method: EPA 300.0

Analysis Description: 300.0 IC Anions

Associated Lab Samples: 60287289001, 60287289002

METHOD BLANK: 2294915

Matrix: Water

Associated Lab Samples: 60287289001, 60287289002

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Chloride	mg/L	0.34J	1.0	0.29	12/09/18 15:07	
Fluoride	mg/L	<0.19	0.20	0.19	12/09/18 15:07	
Sulfate	mg/L	<0.24	1.0	0.24	12/09/18 15:07	

LABORATORY CONTROL SAMPLE: 2294916

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	5	4.6	92	90-110	
Fluoride	mg/L	2.5	2.4	97	90-110	
Sulfate	mg/L	5	4.8	95	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2294917 2294918

Parameter	Units	60287289001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Fluoride	mg/L	0.36	2.5	2.5	2.7	2.8	94	96	90-110	1	15	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: AMEREN MEC N&E, 153-1406.0004C

Pace Project No.: 60287289

QC Batch: 559201	Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0	Analysis Description: 300.0 IC Anions
Associated Lab Samples: 60287289001	

METHOD BLANK: 2295155 Matrix: Water
Associated Lab Samples: 60287289001

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Chloride	mg/L	<0.29	1.0	0.29	12/10/18 08:43	
Sulfate	mg/L	<0.24	1.0	0.24	12/10/18 08:43	

LABORATORY CONTROL SAMPLE: 2295156

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	5	4.8	96	90-110	
Sulfate	mg/L	5	5.1	103	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2295157 2295158

Parameter	Units	60287044033 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Sulfate	mg/L	10.6	5	5	12.7	14.4	44	76	90-110	12	15	M1

MATRIX SPIKE SAMPLE: 2295159

Parameter	Units	60287044038 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	88.2	250	461	149	90-110	M1
Sulfate	mg/L	29.0	250	698	267	90-110	M1

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: AMEREN MEC N&E, 153-1406.0004C

Pace Project No.: 60287289

QC Batch: 556707 Analysis Method: EPA 365.4
QC Batch Method: EPA 365.4 Analysis Description: 365.4 Phosphorus
Associated Lab Samples: 60287289001, 60287289002

METHOD BLANK: 2284390 Matrix: Water
Associated Lab Samples: 60287289001, 60287289002

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Phosphorus	mg/L	<0.050	0.10	0.050	11/26/18 13:42	

LABORATORY CONTROL SAMPLE: 2284391

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Phosphorus	mg/L	2	1.9	95	90-110	

MATRIX SPIKE SAMPLE: 2284393

Parameter	Units	60287288010 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Phosphorus	mg/L	0.69	2	2.5	91	90-110	

MATRIX SPIKE SAMPLE: 2284394

Parameter	Units	60287289001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Phosphorus	mg/L	0.68	2	2.5	91	90-110	

SAMPLE DUPLICATE: 2284392

Parameter	Units	60287443001 Result	Dup Result	RPD	Max RPD	Qualifiers
Phosphorus	mg/L	1.4	1.4	3	10	

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QUALITY CONTROL DATA

Project: AMEREN MEC N&E, 153-1406.0004C

Pace Project No.: 60287289

QC Batch: 557188 Analysis Method: EPA 365.4
QC Batch Method: EPA 365.4 Analysis Description: 365.4 Phosphorus
Associated Lab Samples: 60287289003, 60287289004

METHOD BLANK: 2285943 Matrix: Water

Associated Lab Samples: 60287289003, 60287289004

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Phosphorus	mg/L	<0.050	0.10	0.050	11/28/18 11:17	

LABORATORY CONTROL SAMPLE: 2285944

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

MATRIX SPIKE SAMPLE: 2285945

Parameter	Units	60285327001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Phosphorus	mg/L	8.8	2	15.6	341	90-110	M1

MATRIX SPIKE SAMPLE: 2285947

Parameter	Units	60287428005 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Phosphorus	mg/L	0.50	2	2.4	96	90-110	

SAMPLE DUPLICATE: 2285946

Parameter	Units	60287380002 Result	Dup Result	RPD	Max RPD	Qualifiers
Phosphorus	mg/L	9.2	9.7	6	10	

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REPORT OF LABORATORY ANALYSIS

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QUALIFIERS

Project: AMEREN MEC N&E, 153-1406.0004C

Pace Project No.: 60287289

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.

H6 Analysis initiated outside of the 15 minute EPA required holding time.

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

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: AMEREN MEC N&E, 153-1406.0004C

Pace Project No.: 60287289

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
60287289001	M-TP-2	EPA 200.7	558137	EPA 200.7	558173
60287289002	M-NE-FB-1	EPA 200.7	558212	EPA 200.7	558388
60287289003	M-TP-1	EPA 200.7	558212	EPA 200.7	558388
60287289004	M-NE-DUP-1	EPA 200.7	558212	EPA 200.7	558388
60287289001	M-TP-2	EPA 200.8	558139	EPA 200.8	558167
60287289002	M-NE-FB-1	EPA 200.8	558139	EPA 200.8	558167
60287289003	M-TP-1	EPA 200.8	558318	EPA 200.8	558523
60287289004	M-NE-DUP-1	EPA 200.8	558318	EPA 200.8	558523
60287289001	M-TP-2	EPA 7470	558279	EPA 7470	558376
60287289002	M-NE-FB-1	EPA 7470	558279	EPA 7470	558376
60287289003	M-TP-1	EPA 7470	558279	EPA 7470	558376
60287289004	M-NE-DUP-1	EPA 7470	558279	EPA 7470	558376
60287289001	M-TP-2	SM 2320B	557524		
60287289002	M-NE-FB-1	SM 2320B	557524		
60287289003	M-TP-1	SM 2320B	557603		
60287289004	M-NE-DUP-1	SM 2320B	557603		
60287289001	M-TP-2	SM 2540C	556373		
60287289002	M-NE-FB-1	SM 2540C	556373		
60287289003	M-TP-1	SM 2540C	556732		
60287289004	M-NE-DUP-1	SM 2540C	556732		
60287289001	M-TP-2	SM 3500-Fe B#4	558862		
60287289002	M-NE-FB-1	SM 3500-Fe B#4	558862		
60287289003	M-TP-1	SM 3500-Fe B#4	558862		
60287289004	M-NE-DUP-1	SM 3500-Fe B#4	558862		
60287289001	M-TP-2	SM 3500-Fe B#4	556509		
60287289002	M-NE-FB-1	SM 3500-Fe B#4	556509		
60287289003	M-TP-1	SM 3500-Fe B#4	556555		
60287289004	M-NE-DUP-1	SM 3500-Fe B#4	556555		
60287289001	M-TP-2	EPA 300.0	559127		
60287289001	M-TP-2	EPA 300.0	559201		
60287289002	M-NE-FB-1	EPA 300.0	559127		
60287289003	M-TP-1	EPA 300.0	558974		
60287289004	M-NE-DUP-1	EPA 300.0	558974		
60287289001	M-TP-2	EPA 365.4	556707		
60287289002	M-NE-FB-1	EPA 365.4	556707		
60287289003	M-TP-1	EPA 365.4	557188		
60287289004	M-NE-DUP-1	EPA 365.4	557188		

REPORT OF LABORATORY ANALYSIS

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Sample Condition Upon Receipt

WO#: 60287289



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: 30L Type of Ice: Wet Blue None

Cooler Temperature (°C): As-read 4.0 Corr. Factor 20.0 Corrected 4.0

Date and initials of person examining contents: 11/20

Temperature should be above freezing to 6°C

Chain of Custody present:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Chain of Custody relinquished:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Samples arrived within holding time:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Short Hold Time analyses (<72hr):	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<u>Fe²⁺</u>
Rush Turn Around Time requested:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	
Sufficient volume:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Correct containers used:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Pace containers used:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Containers intact:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Unpreserved 5035A / TX1005/1006 soils frozen in 48hrs?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Filtered volume received for dissolved tests?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Sample labels match COC: Date / time / ID / analyses	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Samples contain multiple phases? Matrix: <u>lvs</u>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	
Containers requiring pH preservation in compliance? (HNO ₃ , H ₂ SO ₄ , HCl<2; NaOH>9 Sulfide, NaOH>10 Cyanide) (Exceptions: VOA, Micro, O&G, KS TPH, OK-DRO)	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> 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)	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Potassium iodide test strip turns blue/purple? (Preserve)	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Trip Blank present:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Headspace in VOA vials (>6mm):	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Samples from USDA Regulated Area: State:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Additional labels attached to 5035A / TX1005 vials in the field?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> 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: Jamie Church Date: 11/20/18



Sample Condition Upon Receipt

WO# : 60287289



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 EPIC

Thermometer Used: T300 Type of Ice: Wet Blue None

Cooler Temperature (°C): As-read 0.8 Corr. Factor +0.2 Corrected 1.0

Date and initials of person examining contents: 11-21-18 JLS

Temperature should be above freezing to 6°C

Chain of Custody present:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Chain of Custody relinquished:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Samples arrived within holding time:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Short Hold Time analyses (<72hr):	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<u>Fe+2</u>
Rush Turn Around Time requested:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	
Sufficient volume:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Correct containers used:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Pace containers used:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Containers intact:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Unpreserved 5035A / TX1005/1006 soils frozen in 48hrs?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Filtered volume received for dissolved tests?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Sample labels match COC: Date / time / ID / analyses	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Samples contain multiple phases? Matrix: <u>WT</u>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	
Containers requiring pH preservation in compliance? (HNO ₃ , H ₂ SO ₄ , HCl<2; NaOH>9 Sulfide, NaOH>10 Cyanide) (Exceptions: VOA, Micro, O&G, KS TPH, OK-DRO)	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> 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)	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Potassium iodide test strip turns blue/purple? (Preserve)	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Trip Blank present:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Headspace in VOA vials (>6mm):	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Samples from USDA Regulated Area: State:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Additional labels attached to 5035A / TX1005 vials in the field?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> 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: Juan Chual Date: 11/21/18

CHAIN-OF-CUSTODY / Analytical Request Document

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

Section A Required Client Information:		Section B Required Project Information:		Section C Invoice Information:	
Company: Golder Associates		Report To: Mark Haddock (mhaddock@golder.com)		Attention:	
Address: 13515 Barrett Parkway Drive, Ste 260		Copy To: Jeffrey Ingram		Company Name:	
Ballwin, MO 63021		Purchase Order No.:		Address:	
Email To: mhaddock@golder.com		Project Name: Ameren Meramec Energy Center MEC N&E		REGULATORY AGENCY	
Phone: 636-724-9191 Fax: 636-724-9323		Project Number: 153-1406.0004C (COC #23)		<input type="checkbox"/> NPDES <input checked="" type="checkbox"/> GROUND WATER <input type="checkbox"/> DRINKING WATER <input type="checkbox"/> UST <input type="checkbox"/> RCRA <input type="checkbox"/> OTHER	
Requested Due Date/TAT: Standard		Pace Profile #: 9285		Site Location: MO	
Pace Project Manager: Jamie Church				STATE: MO	

ITEM #	Section D Required Client Information	Valid Matrix Codes		COLLECTED		SAMPLE TYPE (G=GRAB C=COMP)	MATRIX CODE (see valid codes to left)	# OF CONTAINERS	PRESERVATIVES	Requested Analysis Filtered (Y/N)											Pace Project No. / Lab I.D.						
		MATRIX	CODE	DATE	TIME					DATE	TIME	Analysis Test	Metals*	Mercury	Chloride/Fluoride/Sulfate	Alkalinity	TDS	Total Phosphorus	Ferrous Iron	Ferric Iron		Residual Chlorine (Y/N)					
1	M-TP-1	DRINKING WATER	DW	11/20/18	1305	G	WT	4	H2SO4	NaOH	HCl	HNO3	H2SO4													1427 9209	
2	M-TP-2	WASTE WATER	WW			G	WT																			28820U, DP35, DP3N 003	
3	M-NE-DUP-1	PRODUCT	P	11/20/18		G	WT	4																		20820U, DP35, DP3N 004	
4	M-NE-FB-1	LIQUID	L			G	WT																				
5		SOLID	S			G	WT																				
6		SOLID	S			G	WT																				
7		SOLID	S			G	WT																				
8		SOLID	S			G	WT																				
9		SOLID	S			G	WT																				
10		SOLID	S			G	WT																				
11		SOLID	S			G	WT																				
12		SOLID	S			G	WT																				

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS
Mark Haddock	11/20/18	1640	Jamie Church	11/20/18	1650	
Jamie Church	11/20/18	1700	J.C. Pace	11/20/18	0350	Y Y Y

TEMPERATURE RECORD

TEMP IN °C	RECEIVED ON	CUSTODY SEALED	COOLER (Y/N)	SAMPLES INTACT

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Eric Schneider

SIGNATURE of SAMPLER: *Eric Schneider*

DATE Signed (MM/DD/YYYY): 11/20/14

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 – MERAMEC ENERGY CENTER – NOVEMBER 2018 – N&E – DATA PACKAGE 60287289**

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).

QA LEVEL II - INORGANIC DATA EVALUATION CHECKLIST

Company Name: Golder Associates
 Project Name: Ameren - MEC - Nov 2018 - N+E
 Reviewer: T Goodwin

Project Manager: J Ingram
 Project Number: 1531406
 Validation Date: 1/7/19

Laboratory: Pace Analytical SDG #: 60287289
 Analytical Method (type and no.): Metals(200.7+200.8), H₂(7470), Alk(2320B), TDS(2540C), Fe(3500), Amions(300.0), P(365.4)
 Matrix: Air Soil/Sed. Water Waste
 Sample Names M-TP-2, M-NE-FB-1, M-TP-1, M-NE-DUP-1

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

Field Information	YES	NO	NA	COMMENTS
a) Sampling dates noted?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>11/19 - 11/20/18</u>
b) Sampling team indicated?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
c) Sample location noted?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
d) Sample depth indicated (Soils)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
e) Sample type indicated (grab/composite)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>Grab</u>
f) Field QC noted?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
g) Field parameters collected (note types)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>pH, Cond, Turb, Temp, DO, ORP, Flow, DTW</u>
h) Field Calibration within control limits?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
i) Notations of unacceptable field conditions/performance from field logs or field notes?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
j) Does the laboratory narrative indicate deficiencies?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Note Deficiencies: _____				

Chain-of-Custody (COC)	YES	NO	NA	COMMENTS
a) Was the COC properly completed?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
b) Was the COC signed by both field and laboratory personnel?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
c) Were samples received in good condition?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

General (reference QAPP or Method)	YES	NO	NA	COMMENTS
a) Were hold times met for sample pretreatment?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
b) Were hold times met for sample analysis?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<u>Fe²⁺</u>
c) Were the correct preservatives used?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
d) Was the correct method used?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
e) Were appropriate reporting limits achieved?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
f) Were any sample dilutions noted?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
g) Were any matrix problems noted?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

QA LEVEL II - INORGANIC DATA EVALUATION CHECKLIST

Blanks	YES	NO	NA	COMMENTS
a) Were analytes detected in the method blank(s)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<div style="font-family: monospace; font-size: 0.8em;"> { [9001] Cu (54.6), [9001-02] Cl⁻ (0.34) [9002-04] Co (0.98), FB+1: Be (0.25), B (12.5), Cd (0.065), Cr (0.16), TDS (60), Cl⁻ (0.34) </div>
b) Were analytes detected in the field blank(s)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
c) Were analytes detected in the equipment blank(s)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
d) Were analytes detected in the trip blank(s)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

Laboratory Control Sample (LCS)	YES	NO	NA	COMMENTS
a) Was a LCS analyzed once per SDG?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
b) Were the proper analytes included in the LCS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
c) Was the LCS accuracy criteria met?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____

Duplicates	YES	NO	NA	COMMENTS
a) Were field duplicates collected (note original and duplicate sample names)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<div style="font-family: monospace; font-size: 0.8em;"> Dup-1@ M-TR-1 FB-1@ M-TR-2 </div>
b) Were field dup. precision criteria met (note RPD)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
c) Were lab duplicates analyzed (note original and duplicate samples)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<div style="font-family: monospace; font-size: 0.8em;"> DLR-1: Pb (200), Mo (23), Cr (43), Fe³⁺ (21), Fe²⁺ (130) </div>
d) Were lab dup. precision criteria met (note RPD)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Blind Standards	YES	NO	NA	COMMENTS
a) Was a blind standard used (indicate name, analytes included and concentrations)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	_____
b) Was the %D within control limits?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	_____


Matrix Spike/Matrix Spike Duplicate (MS/MSD)	YES	NO	NA	COMMENTS
a) Was MS accuracy criteria met?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	_____
Recovery could not be calculated since sample contained high concentration of analyte?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	_____
b) Was MSD accuracy criteria met?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	_____
Recovery could not be calculated since sample contained high concentration of analyte?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	_____
c) Were MS/MSD precision criteria met?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____

Comments/Notes:

QA LEVEL II - INORGANIC DATA EVALUATION CHECKLIST

Data Qualification:

Sample Name	Constituent(s)	Result	Qualifier	Reason
M-TP-2	Chromium (Cr)	1.0	U	Detected in Field Blank (FB); MDL < Result < PQL
┆	Ferrous Iron (Fe ²⁺)	2.1	J	Analyzed outside EPA Hold time; Result > MDL
M-NE-FB-1	┆	0.012	UJ	┆ ; Result < MDL
┆	Chloride (Cl ⁻)	1.0	U	MB; MDL < Result < PQL
M-TP-1	Fe ²⁺	1.9	J	Hold time; Result > MDL
┆	Ferric Iron (Fe ³⁺)	6.5	J	RPD exceeded limit; Result > MDL
M-NE-DUP-1	┆	8.0	J	┆
┆	Lead (Pb)	3.0	UJ	┆ ; Result < MDL
<div style="position: absolute; top: 0; left: 0; bottom: 0; right: 0; border: 1px solid black; transform: rotate(45deg); opacity: 0.5;"></div>				

Signature: 

Date: 1/9/19

December 28, 2018

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

RE: Project: AMEREN MERAMEC MEC / MEC N&E
Pace Project No.: 60290697

Dear Mark Haddock:

Enclosed are the analytical results for sample(s) received by the laboratory between November 20, 2018 and November 21, 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
Eric Schneider, Golder Associates



REPORT OF LABORATORY ANALYSIS

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CERTIFICATIONS

Project: AMEREN MERAMEC MEC / MEC N&E

Pace Project No.: 60290697

Pennsylvania Certification IDs

1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601

ANAB DOD-ELAP Rad Accreditation #: L2417

Alabama Certification #: 41590

Arizona Certification #: AZ0734

Arkansas Certification

California Certification #: 04222CA

Colorado Certification #: PA01547

Connecticut Certification #: PH-0694

Delaware Certification

EPA Region 4 DW Rad

Florida/TNI Certification #: E87683

Georgia Certification #: C040

Guam Certification

Hawaii Certification

Idaho Certification

Illinois Certification

Indiana Certification

Iowa Certification #: 391

Kansas/TNI Certification #: E-10358

Kentucky Certification #: KY90133

KY WW Permit #: KY0098221

KY WW Permit #: KY0000221

Louisiana DHH/TNI Certification #: LA180012

Louisiana DEQ/TNI Certification #: 4086

Maine Certification #: 2017020

Maryland Certification #: 308

Massachusetts Certification #: M-PA1457

Michigan/PADEP Certification #: 9991

Missouri Certification #: 235

Montana Certification #: Cert0082

Nebraska Certification #: NE-OS-29-14

Nevada Certification #: PA014572018-1

New Hampshire/TNI Certification #: 297617

New Jersey/TNI Certification #: PA051

New Mexico Certification #: PA01457

New York/TNI Certification #: 10888

North Carolina Certification #: 42706

North Dakota Certification #: R-190

Ohio EPA Rad Approval: #41249

Oregon/TNI Certification #: PA200002-010

Pennsylvania/TNI Certification #: 65-00282

Puerto Rico Certification #: PA01457

Rhode Island Certification #: 65-00282

South Dakota Certification

Tennessee Certification #: 02867

Texas/TNI Certification #: T104704188-17-3

Utah/TNI Certification #: PA014572017-9

USDA Soil Permit #: P330-17-00091

Vermont Dept. of Health: ID# VT-0282

Virgin Island/PADEP Certification

Virginia/VELAP Certification #: 9526

Washington Certification #: C868

West Virginia DEP Certification #: 143

West Virginia DHHR Certification #: 9964C

Wisconsin Approve List for Rad

Wyoming Certification #: 8TMS-L

Kansas Certification IDs

9608 Loiret Boulevard, Lenexa, KS 66219

Arkansas Drinking Water

Missouri Certification Number: 10090

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

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SAMPLE SUMMARY

Project: AMEREN MERAMEC MEC / MEC N&E

Pace Project No.: 60290697

Lab ID	Sample ID	Matrix	Date Collected	Date Received
60287288010	M-AMW-2	Water	11/19/18 09:55	11/20/18 04:15
60287288015	M-AMW-2 MS	Water	11/19/18 09:55	11/20/18 04:15
60287288016	M-AMW-2 MSD	Water	11/19/18 09:55	11/20/18 04:15
60287288018	M-AMW-1	Water	11/20/18 12:10	11/21/18 03:30

REPORT OF LABORATORY ANALYSIS

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SAMPLE ANALYTE COUNT

Project: AMEREN MERAMEC MEC / MEC N&E

Pace Project No.: 60290697

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
60287288010	M-AMW-2	EPA 200.7	EMR	13	PASI-K
		EPA 200.8	JDH	6	PASI-K
		EPA 7470	JDE	1	PASI-K
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	JLW	1	PASI-PA
		SM 2320B	RLG	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
60287288015	M-AMW-2 MS	EPA 365.4	BLA	1	PASI-K
		EPA 903.1	MK1	1	PASI-PA
60287288016	M-AMW-2 MSD	EPA 904.0	JLW	1	PASI-PA
		EPA 903.1	MK1	1	PASI-PA
60287288018	M-AMW-1	EPA 904.0	JLW	1	PASI-PA
		EPA 200.7	EMR, JGP	13	PASI-K
		EPA 200.8	JDH	6	PASI-K
		EPA 7470	JDE	1	PASI-K
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
		SM 2320B	RMT	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

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: AMEREN MERAMEC MEC / MEC N&E

Pace Project No.: 60290697

Sample: M-AMW-2 Lab ID: 60287288010 Collected: 11/19/18 09:55 Received: 11/20/18 04:15 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									
Barium	147	ug/L	5.0	1.5	1	12/03/18 16:08	12/04/18 17:51	7440-39-3	
Beryllium	<0.16	ug/L	1.0	0.16	1	12/03/18 16:08	12/04/18 17:51	7440-41-7	
Boron	1980	ug/L	100	12.5	1	12/03/18 16:08	12/04/18 17:51	7440-42-8	
Calcium	190000	ug/L	200	53.5	1	12/03/18 16:08	12/04/18 17:51	7440-70-2	M1
Cobalt	<0.87	ug/L	5.0	0.87	1	12/03/18 16:08	12/04/18 17:51	7440-48-4	
Iron	16300	ug/L	50.0	6.1	1	12/03/18 16:08	12/04/18 17:51	7439-89-6	
Lead	<3.0	ug/L	10.0	3.0	1	12/03/18 16:08	12/04/18 17:51	7439-92-1	
Lithium	36.0	ug/L	10.0	4.6	1	12/03/18 16:08	12/04/18 17:51	7439-93-2	
Magnesium	47700	ug/L	50.0	14.0	1	12/03/18 16:08	12/04/18 17:51	7439-95-4	
Manganese	704	ug/L	5.0	0.73	1	12/03/18 16:08	12/04/18 17:51	7439-96-5	
Molybdenum	4.3J	ug/L	20.0	0.90	1	12/03/18 16:08	12/04/18 17:51	7439-98-7	
Potassium	7780	ug/L	500	79.3	1	12/03/18 16:08	12/04/18 17:51	7440-09-7	
Sodium	49000	ug/L	500	157	1	12/03/18 16:08	12/04/18 17:51	7440-23-5	
200.8 MET ICPMS									
Analytical Method: EPA 200.8 Preparation Method: EPA 200.8									
Antimony	<0.078	ug/L	1.0	0.078	1	12/03/18 15:40	12/04/18 12:46	7440-36-0	
Arsenic	11.7	ug/L	1.0	0.065	1	12/03/18 15:40	12/04/18 12:46	7440-38-2	
Cadmium	<0.033	ug/L	0.50	0.033	1	12/03/18 15:40	12/04/18 12:46	7440-43-9	
Chromium	0.23J	ug/L	1.0	0.078	1	12/03/18 15:40	12/04/18 12:46	7440-47-3	
Selenium	<0.085	ug/L	1.0	0.085	1	12/03/18 15:40	12/04/18 12:46	7782-49-2	
Thallium	<0.099	ug/L	1.0	0.099	1	12/03/18 15:40	12/04/18 12:46	7440-28-0	
7470 Mercury									
Analytical Method: EPA 7470 Preparation Method: EPA 7470									
Mercury	<0.090	ug/L	0.20	0.090	1	12/04/18 14:50	12/05/18 11:02	7439-97-6	
2320B Alkalinity									
Analytical Method: SM 2320B									
Alkalinity, Total as CaCO3	525	mg/L	20.0	4.9	1		11/29/18 14:46		
2540C Total Dissolved Solids									
Analytical Method: SM 2540C									
Total Dissolved Solids	941	mg/L	5.0	5.0	1		11/26/18 09:06		
Iron, Ferric (Calculation)									
Analytical Method: SM 3500-Fe B#4									
Iron, Ferric	13.9	mg/L	0.050		1		12/06/18 16:38	7439-89-6	
Iron, Ferrous									
Analytical Method: SM 3500-Fe B#4									
Iron, Ferrous	2.4	mg/L	0.20	0.012	1		11/21/18 12:14		H6
300.0 IC Anions 28 Days									
Analytical Method: EPA 300.0									
Chloride	63.1	mg/L	20.0	5.8	20		12/12/18 21:22	16887-00-6	B
Fluoride	0.30	mg/L	0.20	0.19	1		12/12/18 20:50	16984-48-8	M1
Sulfate	200	mg/L	20.0	4.8	20		12/12/18 21:22	14808-79-8	
365.4 Total Phosphorus									
Analytical Method: EPA 365.4									
Phosphorus	0.69	mg/L	0.10	0.050	1		11/26/18 14:07	7723-14-0	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: AMEREN MERAMEC MEC / MEC N&E

Pace Project No.: 60290697

Sample: M-AMW-1 **Lab ID: 60287288018** Collected: 11/20/18 12:10 Received: 11/21/18 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							
Barium	325	ug/L	5.0	1.5	1	12/04/18 12:45	12/05/18 14:03	7440-39-3	
Beryllium	<0.16	ug/L	1.0	0.16	1	12/04/18 12:45	12/05/18 14:03	7440-41-7	
Boron	7690	ug/L	100	12.5	1	12/04/18 12:45	12/05/18 14:03	7440-42-8	
Calcium	170000	ug/L	200	53.5	1	12/04/18 12:45	12/05/18 14:03	7440-70-2	
Cobalt	<0.87	ug/L	5.0	0.87	1	12/04/18 12:45	12/05/18 14:03	7440-48-4	
Iron	19400	ug/L	50.0	6.1	1	12/04/18 12:45	12/05/18 14:03	7439-89-6	
Lead	<3.0	ug/L	10.0	3.0	1	12/04/18 12:45	12/05/18 14:03	7439-92-1	
Lithium	16.4	ug/L	10.0	4.6	1	12/04/18 12:45	12/05/18 14:58	7439-93-2	
Magnesium	56900	ug/L	50.0	14.0	1	12/04/18 12:45	12/05/18 14:03	7439-95-4	
Manganese	513	ug/L	5.0	0.73	1	12/04/18 12:45	12/05/18 14:03	7439-96-5	
Molybdenum	39.1	ug/L	20.0	0.90	1	12/04/18 12:45	12/05/18 14:03	7439-98-7	
Potassium	5340	ug/L	500	79.3	1	12/04/18 12:45	12/05/18 14:03	7440-09-7	
Sodium	45400	ug/L	500	157	1	12/04/18 12:45	12/05/18 14:03	7440-23-5	
200.8 MET ICPMS		Analytical Method: EPA 200.8 Preparation Method: EPA 200.8							
Antimony	<0.078	ug/L	1.0	0.078	1	12/05/18 10:24	12/05/18 16:03	7440-36-0	
Arsenic	18.0	ug/L	1.0	0.065	1	12/05/18 10:24	12/05/18 16:03	7440-38-2	
Cadmium	<0.033	ug/L	0.50	0.033	1	12/05/18 10:24	12/05/18 16:03	7440-43-9	
Chromium	0.19J	ug/L	1.0	0.078	1	12/05/18 10:24	12/05/18 16:03	7440-47-3	
Selenium	<0.085	ug/L	1.0	0.085	1	12/05/18 10:24	12/05/18 16:03	7782-49-2	
Thallium	<0.099	ug/L	1.0	0.099	1	12/05/18 10:24	12/05/18 16:03	7440-28-0	
7470 Mercury		Analytical Method: EPA 7470 Preparation Method: EPA 7470							
Mercury	<0.090	ug/L	0.20	0.090	1	12/04/18 14:50	12/05/18 11:30	7439-97-6	
2320B Alkalinity		Analytical Method: SM 2320B							
Alkalinity, Total as CaCO3	365	mg/L	20.0	4.9	1		12/03/18 17:02		
2540C Total Dissolved Solids		Analytical Method: SM 2540C							
Total Dissolved Solids	319	mg/L	5.0	5.0	1		11/26/18 09:09		
Iron, Ferric (Calculation)		Analytical Method: SM 3500-Fe B#4							
Iron, Ferric	14.7	mg/L	0.050		1		12/14/18 09:15	7439-89-6	
Iron, Ferrous		Analytical Method: SM 3500-Fe B#4							
Iron, Ferrous	4.7	mg/L	0.20	0.012	1		11/21/18 15:43		H6
300.0 IC Anions 28 Days		Analytical Method: EPA 300.0							
Chloride	38.4	mg/L	5.0	1.4	5		12/13/18 21:30	16887-00-6	
Fluoride	0.19J	mg/L	0.20	0.19	1		12/13/18 21:15	16984-48-8	
Sulfate	344	mg/L	50.0	12.0	50		12/14/18 12:41	14808-79-8	
365.4 Total Phosphorus		Analytical Method: EPA 365.4							
Phosphorus	1.1	mg/L	0.10	0.050	1		11/28/18 11:52	7723-14-0	

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC MEC / MEC N&E
Pace Project No.: 60290697

QC Batch: 558279 Analysis Method: EPA 7470
QC Batch Method: EPA 7470 Analysis Description: 7470 Mercury
Associated Lab Samples: 60287288010, 60287288018

METHOD BLANK: 2290334 Matrix: Water
Associated Lab Samples: 60287288010, 60287288018

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Mercury	ug/L	<0.090	0.20	0.090	12/05/18 10:53	

LABORATORY CONTROL SAMPLE: 2290335

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury	ug/L	5	4.9	98	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2290336 2290337

Parameter	Units	60287288010 Result	MS	MSD	MS	MSD	MS	MSD	% Rec	Max		Qual
			Spike Conc.	Spike Conc.	Result	Result	% Rec	% Rec	Limits	RPD	RPD	
Mercury	ug/L	<0.090	5	5	4.8	4.8	95	96	75-125	1	20	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2290338 2290339

Parameter	Units	60287289001 Result	MS	MSD	MS	MSD	MS	MSD	% Rec	Max		Qual
			Spike Conc.	Spike Conc.	Result	Result	% Rec	% Rec	Limits	RPD	RPD	
Mercury	ug/L	<0.090	5	5	4.9	4.9	97	98	75-125	0	20	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC MEC / MEC N&E
Pace Project No.: 60290697

QC Batch: 558137 Analysis Method: EPA 200.7
QC Batch Method: EPA 200.7 Analysis Description: 200.7 Metals, Total
Associated Lab Samples: 60287288010

METHOD BLANK: 2289783 Matrix: Water
Associated Lab Samples: 60287288010

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Barium	ug/L	<1.5	5.0	1.5	12/04/18 17:22	
Beryllium	ug/L	<0.16	1.0	0.16	12/04/18 17:22	
Boron	ug/L	<12.5	100	12.5	12/04/18 17:22	
Calcium	ug/L	54.6J	200	53.5	12/04/18 17:22	
Cobalt	ug/L	<0.87	5.0	0.87	12/04/18 17:22	
Iron	ug/L	<6.1	50.0	6.1	12/04/18 17:22	
Lead	ug/L	<3.0	10.0	3.0	12/04/18 17:22	
Lithium	ug/L	<4.6	10.0	4.6	12/04/18 17:22	
Magnesium	ug/L	<14.0	50.0	14.0	12/04/18 17:22	
Manganese	ug/L	<0.73	5.0	0.73	12/04/18 17:22	
Molybdenum	ug/L	<0.90	20.0	0.90	12/04/18 17:22	
Potassium	ug/L	<79.3	500	79.3	12/04/18 17:22	
Sodium	ug/L	<157	500	157	12/04/18 17:22	

LABORATORY CONTROL SAMPLE: 2289784

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Barium	ug/L	1000	951	95	85-115	
Beryllium	ug/L	1000	951	95	85-115	
Boron	ug/L	1000	952	95	85-115	
Calcium	ug/L	10000	9540	95	85-115	
Cobalt	ug/L	1000	990	99	85-115	
Iron	ug/L	10000	9260	93	85-115	
Lead	ug/L	1000	961	96	85-115	
Lithium	ug/L	1000	940	94	85-115	
Magnesium	ug/L	10000	9620	96	85-115	
Manganese	ug/L	1000	961	96	85-115	
Molybdenum	ug/L	1000	976	98	85-115	
Potassium	ug/L	10000	9540	95	85-115	
Sodium	ug/L	10000	9810	98	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2289785 2289786

Parameter	Units	MS		MSD		MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
		Spike Conc.	Result	Spike Conc.	Result						
Barium	ug/L	147	1000	1000	1120	98	94	70-130	3	20	
Beryllium	ug/L	<0.16	1000	1000	974	97	95	70-130	3	20	
Boron	ug/L	1980	1000	1000	2990	101	88	70-130	5	20	

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC MEC / MEC N&E

Pace Project No.: 60290697

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2289785												2289786	
Parameter	Units	60287288010 Result	MS	MSD	MS	MSD	MS	MSD	% Rec	Max	Qual		
			Spike Conc.	Spike Conc.	Result	Result	% Rec	% Rec	Limits	RPD			
Calcium	ug/L	190000	10000	10000	203000	194000	132	43	70-130	4	20	M1	
Cobalt	ug/L	<0.87	1000	1000	973	946	97	95	70-130	3	20		
Iron	ug/L	16300	10000	10000	25800	24800	96	85	70-130	4	20		
Lead	ug/L	<3.0	1000	1000	944	918	94	92	70-130	3	20		
Lithium	ug/L	36.0	1000	1000	1010	976	98	94	70-130	4	20		
Magnesium	ug/L	47700	10000	10000	57900	55200	102	75	70-130	5	20		
Manganese	ug/L	704	1000	1000	1680	1610	97	91	70-130	4	20		
Molybdenum	ug/L	4.3J	1000	1000	1010	974	100	97	70-130	3	20		
Potassium	ug/L	7780	10000	10000	17800	17100	100	94	70-130	4	20		
Sodium	ug/L	49000	10000	10000	59800	57400	109	85	70-130	4	20		

MATRIX SPIKE SAMPLE: 2289787									
Parameter	Units	60287289001	Spike	MS	MS	% Rec	Qualifiers		
		Result	Conc.	Result	% Rec	Limits			
Barium	ug/L	58.8	1000	1020	97	70-130			
Beryllium	ug/L	<0.16	1000	963	96	70-130			
Boron	ug/L	2550	1000	3510	96	70-130			
Calcium	ug/L	217000	10000	222000	44	70-130	M1		
Cobalt	ug/L	<0.87	1000	965	96	70-130			
Iron	ug/L	15900	10000	24800	89	70-130			
Lead	ug/L	<3.0	1000	932	93	70-130			
Lithium	ug/L	42.7	1000	1000	96	70-130			
Magnesium	ug/L	56200	10000	65000	88	70-130			
Manganese	ug/L	578	1000	1530	95	70-130			
Molybdenum	ug/L	6.2J	1000	1000	100	70-130			
Potassium	ug/L	7890	10000	17700	98	70-130			
Sodium	ug/L	167000	10000	173000	62	70-130	M1		

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC MEC / MEC N&E
Pace Project No.: 60290697

QC Batch: 558212 Analysis Method: EPA 200.7
QC Batch Method: EPA 200.7 Analysis Description: 200.7 Metals, Total
Associated Lab Samples: 60287288018

METHOD BLANK: 2290148 Matrix: Water
Associated Lab Samples: 60287288018

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Barium	ug/L	<1.5	5.0	1.5	12/05/18 13:33	
Beryllium	ug/L	<0.16	1.0	0.16	12/05/18 13:33	
Boron	ug/L	<12.5	100	12.5	12/05/18 13:33	
Calcium	ug/L	<53.5	200	53.5	12/05/18 13:33	
Cobalt	ug/L	0.98J	5.0	0.87	12/05/18 13:33	
Iron	ug/L	<6.1	50.0	6.1	12/05/18 13:33	
Lead	ug/L	<3.0	10.0	3.0	12/05/18 13:33	
Lithium	ug/L	<4.6	10.0	4.6	12/05/18 14:28	
Magnesium	ug/L	<14.0	50.0	14.0	12/05/18 13:33	
Manganese	ug/L	<0.73	5.0	0.73	12/05/18 13:33	
Molybdenum	ug/L	<0.90	20.0	0.90	12/05/18 13:33	
Potassium	ug/L	<79.3	500	79.3	12/05/18 13:33	
Sodium	ug/L	<157	500	157	12/05/18 13:33	

LABORATORY CONTROL SAMPLE: 2290149

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Barium	ug/L	1000	1010	101	85-115	
Beryllium	ug/L	1000	1010	101	85-115	
Boron	ug/L	1000	985	98	85-115	
Calcium	ug/L	10000	10000	100	85-115	
Cobalt	ug/L	1000	1000	100	85-115	
Iron	ug/L	10000	9940	99	85-115	
Lead	ug/L	1000	974	97	85-115	
Lithium	ug/L	1000	919	92	85-115	
Magnesium	ug/L	10000	10000	100	85-115	
Manganese	ug/L	1000	996	100	85-115	
Molybdenum	ug/L	1000	1010	101	85-115	
Potassium	ug/L	10000	10100	101	85-115	
Sodium	ug/L	10000	10400	104	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2290150 2290151

Parameter	Units	MS		MSD		MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
		Spike Conc.	Result	Spike Conc.	Result						
Barium	ug/L	386	1000	1000	1380	100	99	70-130	1	20	
Beryllium	ug/L	<0.16	1000	1000	1040	104	103	70-130	1	20	
Boron	ug/L	640	1000	1000	1610	97	100	70-130	1	20	

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC MEC / MEC N&E

Pace Project No.: 60290697

Parameter	Units	60287289003		2290150		2290151		% Rec	% Rec	% Rec	Limits	RPD	Max RPD	Qual
		Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec							
Calcium	ug/L	77100	10000	10000	86200	85000	91	80	70-130	1	20			
Cobalt	ug/L	<0.87	1000	1000	973	987	97	99	70-130	1	20			
Iron	ug/L	8420	10000	10000	17900	17700	95	93	70-130	1	20			
Lead	ug/L	4.1J	1000	1000	944	950	94	95	70-130	1	20			
Lithium	ug/L	17.2	1000	1000	923	911	91	89	70-130	1	20			
Magnesium	ug/L	31300	10000	10000	41200	41500	98	102	70-130	1	20			
Manganese	ug/L	110	1000	1000	1110	1120	100	101	70-130	1	20			
Molybdenum	ug/L	3.1J	1000	1000	1020	1030	101	103	70-130	1	20			
Potassium	ug/L	3160	10000	10000	13600	13500	105	103	70-130	1	20			
Sodium	ug/L	44900	10000	10000	54600	54300	98	94	70-130	1	20			

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC MEC / MEC N&E

Pace Project No.: 60290697

QC Batch:	558139	Analysis Method:	EPA 200.8
QC Batch Method:	EPA 200.8	Analysis Description:	200.8 MET
Associated Lab Samples:	60287288010		

METHOD BLANK: 2289794 Matrix: Water

Associated Lab Samples: 60287288010

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Antimony	ug/L	<0.078	1.0	0.078	12/04/18 12:25	
Arsenic	ug/L	<0.065	1.0	0.065	12/04/18 12:25	
Cadmium	ug/L	<0.033	0.50	0.033	12/04/18 12:25	
Chromium	ug/L	<0.078	1.0	0.078	12/04/18 12:25	
Selenium	ug/L	<0.085	1.0	0.085	12/04/18 12:25	
Thallium	ug/L	<0.099	1.0	0.099	12/04/18 12:25	

LABORATORY CONTROL SAMPLE: 2289795

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Antimony	ug/L	40	39.3	98	85-115	
Arsenic	ug/L	40	39.5	99	85-115	
Cadmium	ug/L	40	39.2	98	85-115	
Chromium	ug/L	40	39.8	99	85-115	
Selenium	ug/L	40	39.3	98	85-115	
Thallium	ug/L	40	37.8	94	85-115	

MATRIX SPIKE SAMPLE: 2289796

Parameter	Units	60287288010 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Antimony	ug/L	<0.078	40	39.8	100	70-130	
Arsenic	ug/L	11.7	40	51.8	100	70-130	
Cadmium	ug/L	<0.033	40	38.1	95	70-130	
Chromium	ug/L	0.23J	40	43.8	109	70-130	
Selenium	ug/L	<0.085	40	37.7	94	70-130	
Thallium	ug/L	<0.099	40	39.3	98	70-130	

MATRIX SPIKE SAMPLE: 2289797

Parameter	Units	60287289001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Antimony	ug/L	<0.078	40	39.4	99	70-130	
Arsenic	ug/L	3.8	40	43.6	99	70-130	
Cadmium	ug/L	<0.033	40	37.1	93	70-130	
Chromium	ug/L	0.17J	40	42.2	105	70-130	
Selenium	ug/L	<0.085	40	37.1	93	70-130	
Thallium	ug/L	<0.099	40	39.9	100	70-130	

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC MEC / MEC N&E

Pace Project No.: 60290697

QC Batch: 558318 Analysis Method: EPA 200.8
 QC Batch Method: EPA 200.8 Analysis Description: 200.8 MET
 Associated Lab Samples: 60287288018

METHOD BLANK: 2290488 Matrix: Water

Associated Lab Samples: 60287288018

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Antimony	ug/L	<0.078	1.0	0.078	12/05/18 15:42	
Arsenic	ug/L	<0.065	1.0	0.065	12/05/18 15:42	
Cadmium	ug/L	<0.033	0.50	0.033	12/05/18 15:42	
Chromium	ug/L	<0.078	1.0	0.078	12/05/18 15:42	
Selenium	ug/L	<0.085	1.0	0.085	12/05/18 15:42	
Thallium	ug/L	<0.099	1.0	0.099	12/05/18 15:42	

LABORATORY CONTROL SAMPLE: 2290489

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Antimony	ug/L	40	38.7	97	85-115	
Arsenic	ug/L	40	37.9	95	85-115	
Cadmium	ug/L	40	38.4	96	85-115	
Chromium	ug/L	40	38.8	97	85-115	
Selenium	ug/L	40	38.2	95	85-115	
Thallium	ug/L	40	37.0	92	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2290490 2290491

Parameter	Units	MS		MSD		MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
		60287167001 Result	Spike Conc.	Spike Conc.	Result						
Antimony	ug/L	0.20J	40	40	38.1	38.3	95	95	70-130	1	20
Arsenic	ug/L	1.0	40	40	38.5	38.3	94	93	70-130	1	20
Cadmium	ug/L	0.38J	40	40	36.7	36.7	91	91	70-130	0	20
Chromium	ug/L	<0.078	40	40	37.7	37.7	94	94	70-130	0	20
Selenium	ug/L	0.12J	40	40	35.5	35.6	88	89	70-130	0	20
Thallium	ug/L	<0.099	40	40	38.4	38.5	96	96	70-130	0	20

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC MEC / MEC N&E

Pace Project No.: 60290697

QC Batch: 557524

Analysis Method: SM 2320B

QC Batch Method: SM 2320B

Analysis Description: 2320B Alkalinity

Associated Lab Samples: 60287288010

METHOD BLANK: 2287246

Matrix: Water

Associated Lab Samples: 60287288010

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Alkalinity, Total as CaCO ₃	mg/L	<4.9	20.0	4.9	11/29/18 13:19	

LABORATORY CONTROL SAMPLE: 2287247

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity, Total as CaCO ₃	mg/L	500	501	100	90-110	

SAMPLE DUPLICATE: 2287252

Parameter	Units	60287288010 Result	Dup Result	RPD	Max RPD	Qualifiers
Alkalinity, Total as CaCO ₃	mg/L	525	543	3	10	

SAMPLE DUPLICATE: 2287253

Parameter	Units	60287289001 Result	Dup Result	RPD	Max RPD	Qualifiers
Alkalinity, Total as CaCO ₃	mg/L	403	406	1	10	

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC MEC / MEC N&E

Pace Project No.: 60290697

QC Batch: 557603

Analysis Method: SM 2320B

QC Batch Method: SM 2320B

Analysis Description: 2320B Alkalinity

Associated Lab Samples: 60287288018

METHOD BLANK: 2287625

Matrix: Water

Associated Lab Samples: 60287288018

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Alkalinity, Total as CaCO ₃	mg/L	<4.9	20.0	4.9	12/03/18 16:29	

LABORATORY CONTROL SAMPLE: 2287626

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity, Total as CaCO ₃	mg/L	500	484	97	90-110	

SAMPLE DUPLICATE: 2287630

Parameter	Units	60287288017 Result	Dup Result	RPD	Max RPD	Qualifiers
Alkalinity, Total as CaCO ₃	mg/L	394	396	1	10	

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC MEC / MEC N&E

Pace Project No.: 60290697

QC Batch:	556629	Analysis Method:	SM 2540C
QC Batch Method:	SM 2540C	Analysis Description:	2540C Total Dissolved Solids
Associated Lab Samples:	60287288010		

METHOD BLANK: 2283821 Matrix: Water
Associated Lab Samples: 60287288010

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	<5.0	5.0	5.0	11/26/18 09:06	

LABORATORY CONTROL SAMPLE: 2283822

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Dissolved Solids	mg/L	1000	966	97	80-120	

SAMPLE DUPLICATE: 2283824

Parameter	Units	60287297001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	864	843	2	10	

SAMPLE DUPLICATE: 2283825

Parameter	Units	60287288010 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	941	947	1	10	

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC MEC / MEC N&E

Pace Project No.: 60290697

QC Batch: 556732

Analysis Method: SM 2540C

QC Batch Method: SM 2540C

Analysis Description: 2540C Total Dissolved Solids

Associated Lab Samples: 60287288018

METHOD BLANK: 2284609

Matrix: Water

Associated Lab Samples: 60287288018

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	<5.0	5.0	5.0	11/26/18 09:06	

LABORATORY CONTROL SAMPLE: 2284610

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

SAMPLE DUPLICATE: 2284611

Parameter	Units	60287327002 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	1010	971	4	10	

SAMPLE DUPLICATE: 2284612

Parameter	Units	60287289004 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	388	404	4	10	

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC MEC / MEC N&E

Pace Project No.: 60290697

QC Batch: 556509	Analysis Method: SM 3500-Fe B#4
QC Batch Method: SM 3500-Fe B#4	Analysis Description: Iron, Ferrous
Associated Lab Samples: 60287288010	

METHOD BLANK: 2283283 Matrix: Water
Associated Lab Samples: 60287288010

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Iron, Ferrous	mg/L	<0.012	0.20	0.012	11/21/18 12:09	H6

LABORATORY CONTROL SAMPLE: 2283284

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

SAMPLE DUPLICATE: 2283286

Parameter	Units	60287289002 Result	Dup Result	RPD	Max RPD	Qualifiers
Iron, Ferrous	mg/L	<0.012	<0.012		20	H6

SAMPLE DUPLICATE: 2283287

Parameter	Units	60287289001 Result	Dup Result	RPD	Max RPD	Qualifiers
Iron, Ferrous	mg/L	2.1	2.1	2	20	H6

SAMPLE DUPLICATE: 2283288

Parameter	Units	60287288010 Result	Dup Result	RPD	Max RPD	Qualifiers
Iron, Ferrous	mg/L	2.4	2.5	4	20	H6

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC MEC / MEC N&E

Pace Project No.: 60290697

QC Batch: 556555 Analysis Method: SM 3500-Fe B#4

QC Batch Method: SM 3500-Fe B#4 Analysis Description: Iron, Ferrous

Associated Lab Samples: 60287288018

METHOD BLANK: 2283493 Matrix: Water

Associated Lab Samples: 60287288018

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Iron, Ferrous	mg/L	<0.012	0.20	0.012	11/21/18 15:26	H6

LABORATORY CONTROL SAMPLE: 2283494

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

SAMPLE DUPLICATE: 2283495

Parameter	Units	60287288006 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 MERAMEC MEC / MEC N&E

Pace Project No.: 60290697

QC Batch:	559762	Analysis Method:	EPA 300.0
QC Batch Method:	EPA 300.0	Analysis Description:	300.0 IC Anions
Associated Lab Samples:	60287288010		

METHOD BLANK: 2297044 Matrix: Water

Associated Lab Samples: 60287288010

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Chloride	mg/L	0.33J	1.0	0.29	12/12/18 14:28	
Fluoride	mg/L	<0.19	0.20	0.19	12/12/18 14:28	
Sulfate	mg/L	<0.24	1.0	0.24	12/12/18 14:28	

LABORATORY CONTROL SAMPLE: 2297045

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	10	9.9	99	90-110	
Fluoride	mg/L	5	4.7	94	90-110	
Sulfate	mg/L	10	9.6	96	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2297046 2297047

Parameter	Units	60287946001		MS		MSD		MS		MSD		% Rec Limits	Max RPD	Qual
		Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec						
Chloride	mg/L	155	250	250	387	409	93	102	90-110	6	15			
Fluoride	mg/L	ND	125	125	116	123	93	99	90-110	6	15			
Sulfate	mg/L	60.7	250	250	294	300	93	96	90-110	2	15			

MATRIX SPIKE SAMPLE: 2297048

Parameter	Units	60287288010 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	63.1	100	158	95	90-110	
Fluoride	mg/L	0.30	2.5	5.1	193	90-110 M1	
Sulfate	mg/L	200	100	299	99	90-110	

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC MEC / MEC N&E

Pace Project No.: 60290697

QC Batch: 559950

Analysis Method: EPA 300.0

QC Batch Method: EPA 300.0

Analysis Description: 300.0 IC Anions

Associated Lab Samples: 60287288018

METHOD BLANK: 2297959

Matrix: Water

Associated Lab Samples: 60287288018

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Chloride	mg/L	<0.29	1.0	0.29	12/13/18 13:45	
Fluoride	mg/L	<0.19	0.20	0.19	12/13/18 13:45	

LABORATORY CONTROL SAMPLE: 2297960

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

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC MEC / MEC N&E

Pace Project No.: 60290697

QC Batch: 560175

Analysis Method: EPA 300.0

QC Batch Method: EPA 300.0

Analysis Description: 300.0 IC Anions

Associated Lab Samples: 60287288018

METHOD BLANK: 2299101

Matrix: Water

Associated Lab Samples: 60287288018

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Sulfate	mg/L	<0.24	1.0	0.24	12/14/18 09:35	

LABORATORY CONTROL SAMPLE: 2299102

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: 2299103 2299104

Parameter	Units	60287288003		2299104		MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
		MS Result	MSD Spike Conc.	MS Result	MSD Spike Conc.						
Sulfate	mg/L	483	250	748	250	106	106	90-110	0	15	

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC MEC / MEC N&E
Pace Project No.: 60290697

QC Batch: 556707 Analysis Method: EPA 365.4
QC Batch Method: EPA 365.4 Analysis Description: 365.4 Phosphorus
Associated Lab Samples: 60287288010

METHOD BLANK: 2284390 Matrix: Water
Associated Lab Samples: 60287288010

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Phosphorus	mg/L	<0.050	0.10	0.050	11/26/18 13:42	

LABORATORY CONTROL SAMPLE: 2284391

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Phosphorus	mg/L	2	1.9	95	90-110	

MATRIX SPIKE SAMPLE: 2284393

Parameter	Units	60287288010 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Phosphorus	mg/L	0.69	2	2.5	91	90-110	

MATRIX SPIKE SAMPLE: 2284394

Parameter	Units	60287289001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Phosphorus	mg/L	0.68	2	2.5	91	90-110	

SAMPLE DUPLICATE: 2284392

Parameter	Units	60287443001 Result	Dup Result	RPD	Max RPD	Qualifiers
Phosphorus	mg/L	1.4	1.4	3	10	

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC MEC / MEC N&E

Pace Project No.: 60290697

QC Batch: 557188 Analysis Method: EPA 365.4
 QC Batch Method: EPA 365.4 Analysis Description: 365.4 Phosphorus
 Associated Lab Samples: 60287288018

METHOD BLANK: 2285943 Matrix: Water

Associated Lab Samples: 60287288018

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Phosphorus	mg/L	<0.050	0.10	0.050	11/28/18 11:17	

LABORATORY CONTROL SAMPLE: 2285944

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

MATRIX SPIKE SAMPLE: 2285945

Parameter	Units	60285327001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Phosphorus	mg/L	8.8	2	15.6	341	90-110	M1

MATRIX SPIKE SAMPLE: 2285947

Parameter	Units	60287428005 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Phosphorus	mg/L	0.50	2	2.4	96	90-110	

SAMPLE DUPLICATE: 2285946

Parameter	Units	60287380002 Result	Dup Result	RPD	Max RPD	Qualifiers
Phosphorus	mg/L	9.2	9.7	6	10	

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ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: AMEREN MERAMEC MEC / MEC N&E

Pace Project No.: 60290697

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	0.693 ± 0.515 (0.678) C:NA T:92%	pCi/L	12/13/18 12:03	13982-63-3	
Radium-228	EPA 904.0	0.795 ± 0.387 (0.648) C:78% T:84%	pCi/L	12/12/18 16:26	15262-20-1	

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ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: AMEREN MERAMEC MEC / MEC N&E

Pace Project No.: 60290697

Sample: M-AMW-2 MS **Lab ID: 60287288015** Collected: 11/19/18 09:55 Received: 11/20/18 04:15 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	89.18 %REC ± NA (NA) C:NA T:NA	pCi/L	12/13/18 12:17	13982-63-3	
Radium-228	EPA 904.0	89.69 %REC ± NA (NA) C:NA T:NA	pCi/L	12/12/18 16:26	15262-20-1	

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ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: AMEREN MERAMEC MEC / MEC N&E

Pace Project No.: 60290697

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	86.36 %REC 3.22 RPD ± NA (NA) C:NA T:NA	pCi/L	12/13/18 12:17	13982-63-3	
Radium-228	EPA 904.0	102.86 %REC 13.68 RPD ± NA (NA) C:NA T:NA	pCi/L	12/12/18 16:26	15262-20-1	

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ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: AMEREN MERAMEC MEC / MEC N&E

Pace Project No.: 60290697

Sample: M-AMW-1 **Lab ID: 60287288018** Collected: 11/20/18 12:10 Received: 11/21/18 03:30 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	0.297 ± 0.351 (0.552) C:NA T:90%	pCi/L	12/13/18 22:24	13982-63-3	
Radium-228	EPA 904.0	0.741 ± 0.379 (0.658) C:78% T:85%	pCi/L	12/13/18 12:52	15262-20-1	

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL - RADIOCHEMISTRY

Project: AMEREN MERAMEC MEC / MEC N&E

Pace Project No.: 60290697

QC Batch: 321904 Analysis Method: EPA 903.1

QC Batch Method: EPA 903.1 Analysis Description: 903.1 Radium-226

Associated Lab Samples: 60287288010, 60287288015, 60287288016

METHOD BLANK: 1569446 Matrix: Water

Associated Lab Samples: 60287288010, 60287288015, 60287288016

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-226	0.545 ± 0.433 (0.563) C:NA T:94%	pCi/L	12/13/18 11:24	

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QUALITY CONTROL - RADIOCHEMISTRY

Project: AMEREN MERAMEC MEC / MEC N&E

Pace Project No.: 60290697

QC Batch: 322725

Analysis Method: EPA 904.0

QC Batch Method: EPA 904.0

Analysis Description: 904.0 Radium 228

Associated Lab Samples: 60287288018

METHOD BLANK: 1572958

Matrix: Water

Associated Lab Samples: 60287288018

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-228	0.839 ± 0.342 (0.501) C:77% T:85%	pCi/L	12/13/18 12:52	

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QUALITY CONTROL - RADIOCHEMISTRY

Project: AMEREN MERAMEC MEC / MEC N&E

Pace Project No.: 60290697

QC Batch: 321906 Analysis Method: EPA 904.0

QC Batch Method: EPA 904.0 Analysis Description: 904.0 Radium 228

Associated Lab Samples: 60287288010, 60287288015, 60287288016

METHOD BLANK: 1569449 Matrix: Water

Associated Lab Samples: 60287288010, 60287288015, 60287288016

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-228	0.660 ± 0.402 (0.736) C:82% T:72%	pCi/L	12/12/18 16:25	

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QUALITY CONTROL - RADIOCHEMISTRY

Project: AMEREN MERAMEC MEC / MEC N&E

Pace Project No.: 60290697

QC Batch:	322681	Analysis Method:	EPA 903.1
QC Batch Method:	EPA 903.1	Analysis Description:	903.1 Radium-226
Associated Lab Samples:	60287288018		

METHOD BLANK:	1572864	Matrix:	Water
Associated Lab Samples:	60287288018		

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-226	0.200 ± 0.433 (0.799) C:NA T:83%	pCi/L	12/13/18 21:55	

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QUALIFIERS

Project: AMEREN MERAMEC MEC / MEC N&E

Pace Project No.: 60290697

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.

Act - Activity

Unc - Uncertainty: SDWA = 1.96 sigma count uncertainty, all other matrices = Expanded Uncertainty (95% confidence interval).

Gamma Spec = Expanded Uncertainty (95.4% Confidence Interval)

(MDC) - Minimum Detectable Concentration

Trac - Tracer Recovery (%)

Carr - Carrier Recovery (%)

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

PASI-PA Pace Analytical Services - Greensburg

ANALYTE QUALIFIERS

B Analyte was detected in the associated method blank.

H6 Analysis initiated outside of the 15 minute EPA required holding time.

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

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: AMEREN MERAMEC MEC / MEC N&E

Pace Project No.: 60290697

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
60287288010	M-AMW-2	EPA 200.7	558137	EPA 200.7	558173
60287288018	M-AMW-1	EPA 200.7	558212	EPA 200.7	558388
60287288010	M-AMW-2	EPA 200.8	558139	EPA 200.8	558167
60287288018	M-AMW-1	EPA 200.8	558318	EPA 200.8	558523
60287288010	M-AMW-2	EPA 7470	558279	EPA 7470	558376
60287288018	M-AMW-1	EPA 7470	558279	EPA 7470	558376
60287288010	M-AMW-2	EPA 903.1	321904		
60287288015	M-AMW-2 MS	EPA 903.1	321904		
60287288016	M-AMW-2 MSD	EPA 903.1	321904		
60287288018	M-AMW-1	EPA 903.1	322681		
60287288010	M-AMW-2	EPA 904.0	321906		
60287288015	M-AMW-2 MS	EPA 904.0	321906		
60287288016	M-AMW-2 MSD	EPA 904.0	321906		
60287288018	M-AMW-1	EPA 904.0	322725		
60287288010	M-AMW-2	SM 2320B	557524		
60287288018	M-AMW-1	SM 2320B	557603		
60287288010	M-AMW-2	SM 2540C	556629		
60287288018	M-AMW-1	SM 2540C	556732		
60287288010	M-AMW-2	SM 3500-Fe B#4	558862		
60287288018	M-AMW-1	SM 3500-Fe B#4	560161		
60287288010	M-AMW-2	SM 3500-Fe B#4	556509		
60287288018	M-AMW-1	SM 3500-Fe B#4	556555		
60287288010	M-AMW-2	EPA 300.0	559762		
60287288018	M-AMW-1	EPA 300.0	559950		
60287288018	M-AMW-1	EPA 300.0	560175		
60287288010	M-AMW-2	EPA 365.4	556707		
60287288018	M-AMW-1	EPA 365.4	557188		

REPORT OF LABORATORY ANALYSIS

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Sample Condition Upon Receipt

WO#: 60287288



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 4.0 3.7 3.6 Corr. Factor 10.0 Corrected 4.0 3.7 3.6
3.0 2.7

Date and initials of person examining contents: JLS
JLS/20

Temperature should be above freezing to 6°C

Chain of Custody present:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Chain of Custody relinquished:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Samples arrived within holding time:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Short Hold Time analyses (<72hr):	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<u>Fe²⁺</u>
Rush Turn Around Time requested:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	
Sufficient volume:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Correct containers used:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Pace containers used:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Containers intact:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Unpreserved 5035A / TX1005/1006 soils frozen in 48hrs?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Filtered volume received for dissolved tests?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Sample labels match COC: Date / time / ID / analyses	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Samples contain multiple phases? Matrix: <u>WT</u>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	
Containers requiring pH preservation in compliance? (HNO ₃ , H ₂ SO ₄ , HCl<2; NaOH>9 Sulfide, NaOH>10 Cyanide) (Exceptions: VOA, Micro, O&G, KS TPH, OK-DRO)	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> 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)	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Potassium iodide test strip turns blue/purple? (Preserve)	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Trip Blank present:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Headspace in VOA vials (>6mm):	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Samples from USDA Regulated Area: State:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Additional labels attached to 5035A / TX1005 vials in the field?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> 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: Juan Chirib Date: 11/20/18



CHAIN-OF-CUSTODY / Analytical Request Document

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

Section A Required Client Information		Section B Required Project Information		Section C Invoice Information	
Company: Golder Associates		Report To: 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: mhaddock@golder.com		Purchase Order No.:		Pace Quote Reference:	
Phone: 636-724-9191		Project Name: Ameren Meramec Energy Center-MEC		Pace Project Manager: Jamie Church	
Requested Due Date/TAT: Standard		Project Number: 153-1406.0004B (COC #21)		Pace Profile #: 9285	

REGULATORY AGENCY	
<input type="checkbox"/> NPDES	<input checked="" type="checkbox"/> GROUND WATER
<input type="checkbox"/> UST	<input type="checkbox"/> RCRA
<input type="checkbox"/>	<input type="checkbox"/> DRINKING WATER
<input type="checkbox"/>	<input type="checkbox"/> OTHER
Site Location	STATE: MO

ITEM #	Section D Required Client Information	Valid Matrix Codes MATRIX CODES DW WT DRINKING WATER WW WT WASTE WATER P PRODUCT SL SOIL/SOLID CL OIL WP AR OT TS	MATRIX CODE (see Valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED		PRESERVATIVES	Analysis Test ↑ Y/N	Requested Analysis Filtered (Y/N)						Pace Project No./ Lab I.D.		
					DATE	TIME			COMPOSITE START	COMPOSITE END/GRAB	DATE	TIME	CHLORIDE/FLUORIDE/SULFATE	TDS		RADIUM 226	RADIUM 228
1			M-MW-1	WT G													
2			M-MW-2	WT G		11/19/18	1025										
3			M-MW-3	WT G			1245										
4			M-MW-4	WT G			1425										
5			M-MW-5	WT G			1530										
6			M-MW-6	WT G			1235										
7			M-MW-7	WT G			1325										
8			M-MW-8	WT G			1500										
9			M-BMW-1	WT G			1525										
10			M-BMW-2	WT G			1120										
11			M-AMW-1	WT G													
12			M-AMW-2	WT G		11/19/18	0955										MS/MSD @ AMW-2
ADDITIONAL COMMENTS																	
*EPA 200.7: B, Ca, Ba, Li, Mo																	
*EPA 200.8: As, Cr																	

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS
<i>bolton</i>	11/19/18	1410				

SAMPLER NAME AND SIGNATURE	
PRINT Name of SAMPLER: Eric Schmidt	DATE Signed (MM/DD/YYYY): 11/19/18
SIGNATURE of SAMPLER: <i>[Signature]</i>	
Temp in °C	
Received on Ice (Y/N)	
Custody Sealed Cooler (Y/N)	
Samples Intact (Y/N)	

CHAIN-OF-CUSTODY / Analytical Request Document

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



Section A Required Client Information:		Section B Required Project Information:		Section C Invoice Information:	
Company: Golder Associates		Report To: Mark Haddock (mhaddock@golder.com)		Attention:	
Address: 13515 Barrett Parkway Drive, Ste 260 Ballwin, MO 63021		Copy To: Jeffrey Ingram		Company Name:	
Email To: mhaddock@golder.com		Purchase Order No.:		Address:	
Phone: 636-724-0191		Project Name: Ameren Meramec Energy Center-MEC		Place Quote Reference:	
Requested Due Date/TAT: Standard		Project Number: 153-1406.0004B (COC #21)		Place Project Manager: Jamie Church	

ITEM #	Valid Matrix Codes MATRIX CODE DRINKING WATER DW WASTE WATER WW WATER P PRODUCT SOLID SL GAS GAS G LIQUID LIQ OTHER OT TE	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		# OF CONTAINERS	PRESERVATIVES		Requested Analysis Filtered (Y/N)	Pace Project No. / Lab I.D.
					DATE	TIME		DATE	TIME		
1		M-DUP-1	WT	G	11/10	---	6	H2SO4 HNO3 HCl NaOH Na2S2O8 Methanol Other	Y		
2		M-DUP-2	WT	G	---	---	---	---	Y		
3		M-FB-1	WT	G	1240	---	---	---	Y		
4		M-FB-2	WT	G	1430	---	---	---	Y		
5			WT	G					Y		
6			WT	G					Y		
7			WT	G					Y		
8			WT	G					Y		
9			WT	G					Y		
10			WT	G					Y		
11			WT	G					Y		
12			WT	G					Y		

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS
EPA 200.7 B, Ca, Ba, Li, Mo EPA 200.8 As, Cr	<i>bolder/golder</i>	11/9/18	1810				Temp in °C
							Received on
							Ice (Y/N)
							Custody Sealed (Y/N)
							Samples Intact (Y/N)

SAMPLER NAME AND SIGNATURE	
PRINT Name of SAMPLER: Eric Schwede	DATE Signed (MM/DD/YYYY): 11/9/18
SIGNATURE of SAMPLER: <i>Eric Schwede</i>	



Sample Condition Upon Receipt

WO#: 60287288



Client Name: Golder Associates

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

Tracking #: _____ Pace Shipping Label Used? Yes No

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

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

Thermometer Used: T300 Type of Ice: Wet Blue None

Cooler Temperature (°C): As-read 0.8 Corr. Factor 40.2 Corrected 1.0

Date and initials of person examining contents: 11-21-18 DL5

Temperature should be above freezing to 6°C

Chain of Custody present:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Chain of Custody relinquished:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Samples arrived within holding time:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Short Hold Time analyses (<72hr):	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<u>Fe+2</u>
Rush Turn Around Time requested:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	
Sufficient volume:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Correct containers used:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Pace containers used:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Containers intact:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Unpreserved 5035A / TX1005/1006 soils frozen in 48hrs?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Filtered volume received for dissolved tests?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Sample labels match COC: Date / time / ID / analyses	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Samples contain multiple phases? Matrix: <u>WT</u>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	
Containers requiring pH preservation in compliance? (HNO ₃ , H ₂ SO ₄ , HCl<2; NaOH>9 Sulfide, NaOH>10 Cyanide) (Exceptions: VOA, Micro, O&G, KS TPH, OK-DRO)	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> 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)	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Potassium iodide test strip turns blue/purple? (Preserve)	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Trip Blank present:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Headspace in VOA vials (>6mm):	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Samples from USDA Regulated Area: State:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Additional labels attached to 5035A / TX1005 vials in the field?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> 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: Jamie Cheek 11/21/18

Date: _____

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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 280 Ballwin, MO 63021	Copy To:	Jeffrey Ingram	Company Name:	
Email To:	mhaddock@golder.com	Purchase Order No.:		Address:	
Phone:	636-724-9191	Project Name:	Ameren Meramec Energy Center-MEC	Preservatives:	
Requested Due Date/TAT:	Standard	Project Number:	153-1406.0004B (COC #21)	Reference:	
				Pace Project Manager:	Jamie Church
				Pace Profile #:	9285
				Site Location STATE:	MO
			REGULATORY AGENCY		
			<input type="checkbox"/> NPDES <input checked="" type="checkbox"/> GROUND WATER <input type="checkbox"/> DRINKING WATER <input type="checkbox"/> UST <input type="checkbox"/> RCRA <input type="checkbox"/> OTHER		

ITEM #	Valid Matrix Codes MATRIX CODE DRINKING WATER DW WASTE WATER WW PRODUCT P SOIL/SOLID SL OIL OL WF AR OT TS	COLLECTED		SAMPLE TYPE (G=GRAB C=COMP)	MATRIX CODE (see valid codes to left)	# OF CONTAINERS	Preservatives NaOH Na2S2O3 HCl HNO3 H2SO4 Unpreserved	Analysis Test Metals* Chloride/Fluoride/Sulfate TDS Radium 226 Radium 228	Requested Analysis Filtered (Y/N)	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
		COMPOSITE START DATE	COMPOSITE END/GRAB DATE								
1	M-MW-1		11/20/18 1505	G	WT	6 2 1 3		✓	Y	✓	262728
2	M-MW-2			G	WT						262728
3	M-MW-3			G	WT						262728
4	M-MW-4			G	WT						262728
5	M-MW-5			G	WT						262728
6	M-MW-6			G	WT						262728
7	M-MW-7			G	WT						262728
8	M-MW-8			G	WT						262728
9	M-BMW-1			G	WT						262728
10	M-BMW-2			G	WT						262728
11	M-AMW-1		11/20/18 1210	G	WT	6 2 1 3		✓	Y	✓	262728
12	M-AMW-2			G	WT						262728

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION		ACCEPTED BY / AFFILIATION		SAMPLE CONDITIONS			
	DATE	TIME	DATE	TIME	Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)
62181818	11/20/18	1640	Jamie Church	11/20/18	1640			
Jamie Church	11/20/18	1700	Jamie Church	11-20-18	0530	1.0	Y	Y

SAMPLER NAME AND SIGNATURE
 PRINT Name of SAMPLER: Eric Schneider
 SIGNATURE of SAMPLER: [Signature]
 DATE Signed (MM/DD/YY): 11/20/18

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 Ballwin, MO 63021	Copy To:	Jeffrey Ingram	Company Name:	
Email To:	mhaddock@golder.com	Purchase Order No.:		Address:	
Phone:	636-724-9191 Fax: 636-724-9323	Project Name:	Ameren Meramec Energy Center-MEC N&E	Pace Quote Reference:	
Requested Due Date/TAT:	Standard	Project Number:	153-1406.0004C (COC #22)	Pace Project Manager:	Jamie Church
				Pace Profile #:	9285

ITEM #	Valid Matrix Codes MATRIX CODE DRINKING WATER DIV WATER WT WASTE WATER WW PRODUCT P SOIL/SOLID SL OIL OL MWP MP AIR AR OT OT TS TS	COLLECTED		SAMPLE TYPE (G=GRAB C=COMP)	MATRIX CODE (see valid codes to left)	SAMPLE TEMP AT COLLECTION		# OF CONTAINERS	Preservatives	Requested Analysis Filtered (Y/N)	Pace Project No./ Lab I.D.
		COMPOSITE START	COMPOSITE END/GRAB			DATE	TIME				
1	M-MW-1			G	WT	11/20/18	1505	6	HNO ₃ H ₂ SO ₄ Unpreserved	Y	
2	M-MW-2			G	WT						
3	M-MW-3			G	WT						
4	M-MW-4			G	WT						
5	M-MW-5			G	WT						
6	M-MW-6			G	WT						
7	M-MW-7			G	WT						
8	M-MW-8			G	WT						
9	M-BMW-1			G	WT						
10	M-BMW-2			G	WT						
11	M-AMW-1			G	WT	11/20/18	1142 1200	6	HNO ₃ H ₂ SO ₄ Unpreserved	Y	
12	M-AMW-2			G	WT						
ADDITIONAL COMMENTS											
Mark Haddock / Golder Jeffrey Ingram / PACE 11/20/18 1640 11/20/18 1306 11/20/18 1640 11/20/18 0530 1.0											

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

MEMORANDUM**DATE** January 8, 2019**Project No.** 1531406**TO** Project File
Golder Associates**CC****FROM** Tommy Goodwin**EMAIL** tgoodwin@golder.com**DATA VALIDATION SUMMARY: AMEREN – MERAMEC ENERGY CENTER – NOVEMBER 2018 – CCR – DATA PACKAGE 60290697**

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).

QA LEVEL II - INORGANIC DATA EVALUATION CHECKLIST

Company Name: Golder Associates
 Project Name: Ameren - MEC - Nov 2018 - CCR
 Reviewer: T Goodwin

Project Manager: J Ingram
 Project Number: 1531406
 Validation Date: 1/8/19

Laboratory: Pace Analytical

SDG #: 60290697

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)

Matrix: Air Soil/Sed. Water Waste

Sample Names M-AMW-1, M-AMW-2, M-AMW-2 MS, M-AMW-2 MS

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?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>11/19 + 11/20/18</u>
b) Sampling team indicated?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
c) Sample location noted?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
d) Sample depth indicated (Soils)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
e) Sample type indicated (grab/composite)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>Grab</u>
f) Field QC noted?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
g) Field parameters collected (note types)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>pH, Cond, Turb, Temp, DO, ORP, Q, DTW</u>
h) Field Calibration within control limits?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
i) Notations of unacceptable field conditions/performances from field logs or field notes?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
j) Does the laboratory narrative indicate deficiencies?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

Note Deficiencies: _____

Chain-of-Custody (COC)	YES	NO	NA	COMMENTS
a) Was the COC properly completed?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
b) Was the COC signed by both field and laboratory personnel?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
c) Were samples received in good condition?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

General (reference QAPP or Method)	YES	NO	NA	COMMENTS
a) Were hold times met for sample pretreatment?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
b) Were hold times met for sample analysis?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<u>Fe²⁺</u>
c) Were the correct preservatives used?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
d) Was the correct method used?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
e) Were appropriate reporting limits achieved?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
f) Were any sample dilutions noted?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
g) Were any matrix problems noted?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

QA LEVEL II - INORGANIC DATA EVALUATION CHECKLIST

Blanks	YES	NO	NA	COMMENTS
a) Were analytes detected in the method blank(s)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>[010] Ca(54.6), Cl⁻(0.33)</u>
b) Were analytes detected in the field blank(s)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<u>[015] Co(0.93), Ra-228(0.939)</u>
c) Were analytes detected in the equipment blank(s)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	_____
d) Were analytes detected in the trip blank(s)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	_____

Laboratory Control Sample (LCS)	YES	NO	NA	COMMENTS
a) Was a LCS analyzed once per SDG?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
b) Were the proper analytes included in the LCS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
c) Was the LCS accuracy criteria met?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____

Duplicates	YES	NO	NA	COMMENTS
a) Were field duplicates collected (note original and duplicate sample names)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<u>Dup-1@ N/A</u>
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<u>FB-1@ N/A</u>
b) Were field dup. precision criteria met (note RPD)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	_____
c) Were lab duplicates analyzed (note original and duplicate samples)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
d) Were lab dup. precision criteria met (note RPD)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____

Blind Standards	YES	NO	NA	COMMENTS
a) Was a blind standard used (indicate name, analytes included and concentrations)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	_____
b) Was the %D within control limits?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	_____

Matrix Spike/Matrix Spike Duplicate (MS/MSD)	YES	NO	NA	COMMENTS
a) Was MS accuracy criteria met?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<u>Ca, Na, F, P</u>
Recovery could not be calculated since sample contained high concentration of analyte?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	_____
b) Was MSD accuracy criteria met?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<u>Ca</u>
Recovery could not be calculated since sample contained high concentration of analyte?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	_____
c) Were MS/MSD precision criteria met?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____

Comments/Notes:

QA LEVEL II - INORGANIC DATA EVALUATION CHECKLIST

Data Qualification:

Sample Name	Constituent(s)	Result	Qualifier	Reason
M-AMW-1	Radium-228 (Ra-228)	0.741	J	Detected in MB; MDC < Result < 10 x Blank
┆	Ferrous Ion (Fe ²⁺)	4.7	J	Analyzed outside EPA hold time
M-AMW-1	┆	2.4	J	┆

Signature: Tommy Good Jr

Date: 1/8/19

February 05, 2019

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

RE: Project: AMEREN MERAMEC ENERGY CENTER
Pace Project No.: 60292767

Dear Mark Haddock:

Enclosed are the analytical results for sample(s) received by the laboratory on January 25, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

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

Sincerely,



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

Enclosures

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



REPORT OF LABORATORY ANALYSIS

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CERTIFICATIONS

Project: AMEREN MERAMEC ENERGY CENTER

Pace Project No.: 60292767

Kansas Certification IDs

9608 Loiret Boulevard, Lenexa, KS 66219

Arkansas Drinking Water

Missouri Certification Number: 10090

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

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SAMPLE SUMMARY

Project: AMEREN MERAMEC ENERGY CENTER
Pace Project No.: 60292767

Lab ID	Sample ID	Matrix	Date Collected	Date Received
60292767001	M-MW-5	Water	01/24/19 14:35	01/25/19 04:25

REPORT OF LABORATORY ANALYSIS

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SAMPLE ANALYTE COUNT

Project: AMEREN MERAMEC ENERGY CENTER

Pace Project No.: 60292767

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
60292767001	M-MW-5	EPA 200.8	CTR	1	PASI-K

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: AMEREN MERAMEC ENERGY CENTER

Pace Project No.: 60292767

Sample: M-MW-5 **Lab ID: 60292767001** Collected: 01/24/19 14:35 Received: 01/25/19 04:25 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.8 MET ICPMS									
Analytical Method: EPA 200.8 Preparation Method: EPA 200.8									
Arsenic	19.7	ug/L	1.0	0.065	1	01/28/19 11:44	02/05/19 10:53	7440-38-2	

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC ENERGY CENTER

Pace Project No.: 60292767

QC Batch: 566437	Analysis Method: EPA 200.8
QC Batch Method: EPA 200.8	Analysis Description: 200.8 MET
Associated Lab Samples: 60292767001	

METHOD BLANK: 2323731 Matrix: Water
Associated Lab Samples: 60292767001

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Arsenic	ug/L	<0.065	1.0	0.065	02/05/19 10:42	

LABORATORY CONTROL SAMPLE: 2323732

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Arsenic	ug/L	40	40.9	102	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2323733 2323734

Parameter	Units	60292531003		2323734		MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
		MS Result	MS Spike Conc.	MS Result	MSD Spike Conc.						
Arsenic	ug/L	1.7	40	37.3	40	89	88	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

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QUALIFIERS

Project: AMEREN MERAMEC ENERGY CENTER

Pace Project No.: 60292767

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

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: AMEREN MERAMEC ENERGY CENTER

Pace Project No.: 60292767

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
60292767001	M-MW-5	EPA 200.8	566437	EPA 200.8	566543

REPORT OF LABORATORY ANALYSIS

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Sample Condition Upon Receipt

JLS

WO#: 60292767



Client Name: GOLDER Assoc

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

Tracking #: NA 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 ZPLC

Thermometer Used: T-298 Type of Ice: Wet Blue None

Cooler Temperature (°C): As-read 3.6 Corr. Factor 0.0 Corrected 3.6

Date and initials of person LR examining contents: 012519

Temperature should be above freezing to 6°C

Chain of Custody present:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Chain of Custody relinquished:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Samples arrived within holding time:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Short Hold Time analyses (<72hr):	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	
Rush Turn Around Time requested:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	
Sufficient volume:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Correct containers used:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Pace containers used:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Containers intact:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Unpreserved 5035A / TX1005/1006 soils frozen in 48hrs?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Filtered volume received for dissolved tests?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Sample labels match COC: Date / time / ID / analyses	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Samples contain multiple phases? Matrix: <u>WT</u>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	
Containers requiring pH preservation in compliance? (HNO ₃ , H ₂ SO ₄ , HCl<2; NaOH>9 Sulfide, NaOH>10 Cyanide) (Exceptions: VOA, Micro, O&G, KS TPH, OK-DRO)	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> 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)	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Potassium iodide test strip turns blue/purple? (Preserve)	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Trip Blank present:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Headspace in VOA vials (>6mm):	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Samples from USDA Regulated Area: State: _____	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Additional labels attached to 5035A / TX1005 vials in the field?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> 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: Jamie Chubb Date: 1/25/19

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 Inc.
 Address: 13515 Barrett Parkway Dr., Ste 260
 Email To: mhaddock@golder.com
 Phone: 314-984-8800 Fax:
 Requested Due Date/TAT:

Section B
Required Project Information:
 Report To: Mark Haddock / Jeffrey Ingram
 Copy To: Eric Schneider / Ryan Feldmann
 Purchase Order No.:
 Project Name: Ameren Meramec Energy Center
 Project Number:

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: MO
 STATE:

ITEM #	Valid Matrix Codes MATRIX CODE DRINKING WATER DW WASTE WATER WW PRODUCT P SOLID S OIL OIL	COLLECTED		SAMPLE TYPE (G=GRAB C=COMP)	MATRIX CODE (see valid codes to left)	# OF CONTAINERS	PRESERVATIVES		Requested Analysis Filtered (Y/N)
		COMPOSITE START	COMPOSITE END/GRAB				Y/N	N	
1	M-MW-5	DATE: 1/24/19	TIME: 1435	WT CS	WT CS	1	H ₂ SO ₄ HNO ₃ HCl NaOH Na ₂ S ₂ O ₃ Methanol Other	Analysis Test 200.8 Arsenic	Residual Chlorine (Y/N)
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									

ADDITIONAL COMMENTS
 RELINQUISHED BY / AFFILIATION: [Signature] / Golder
 DATE: 1/24/19 1745
 ACCEPTED BY / AFFILIATION: L. Reddy / PACE
 DATE: 01/25/19 0425
 SAMPLE CONDITIONS: Y Y Y Y Y Y
 Temp in °C: 3.6
 Received on: []
 Custody Sealed: []
 Cooler (Y/N): []
 Samples Intact: []

SAMPLER NAME AND SIGNATURE
 PRINT Name of SAMPLER: Arden Adams
 SIGNATURE of SAMPLER: [Signature]
 DATE Signed (MM/DD/YY): 01/24/19



MEMORANDUM

DATE March 4, 2019

Project No. 1531406

TO Project File
Golder Associates

CC Amanda Derhake, Jeff Ingram

FROM Tommy Goodwin

EMAIL Tommy_Goodwin@golder.com

DATA VALIDATION SUMMARY, MERAMEC ENERGY CENTER– AMEREN GROUNDWATER – DATA PACKAGE 60292767

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

- None.

QA LEVEL II - INORGANIC DATA EVALUATION CHECKLIST

Company Name: Golder Associates
 Project Name: Ameren-Meramec-
 Reviewer: T Goodwin

Project Manager: J Ingram
 Project Number: 1531406.00048
 Validation Date: 3/4/19

Laboratory: Pace Analytical SDG #: 60292767
 Analytical Method (type and no.): Metals 200.7 & 200.8, Hg 7470, TDS 2540C, pH 4500H+, Anions 300.0, Rads 903.18 & 904.0
 Matrix: Air Soil/Sed. Water Waste
 Sample Names: M-MW-1, M-MW-2, M-MW-3, M-MW-4, M-MW-5, M-MW-6, M-MW-7, M-MW-8,
M-BMW-1, M-BMW-2, M-DUP-1, M-PB-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?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>1/28/19</u>
b) Sampling team indicated?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
c) Sample location noted?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
d) Sample depth indicated (Soils)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
e) Sample type indicated (grab/composite)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>Grab</u>
f) Field QC noted?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
g) Field parameters collected (note types)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>pH, Cond, Turb, Temp, DO, ORP, Flow, DTW</u>
h) Field Calibration within control limits?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
i) Notations of unacceptable field conditions/performance from field logs or field notes?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
j) Does the laboratory narrative indicate deficiencies?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Note Deficiencies: _____				

Chain-of-Custody (COC)	YES	NO	NA	COMMENTS
a) Was the COC properly completed?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
b) Was the COC signed by both field and laboratory personnel?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
c) Were samples received in good condition?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

General (reference QAPP or Method)	YES	NO	NA	COMMENTS
a) Were hold times met for sample pretreatment?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
b) Were hold times met for sample analysis?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
c) Were the correct preservatives used?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
d) Was the correct method used?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
e) Were appropriate reporting limits achieved?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
f) Were any sample dilutions noted?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
g) Were any matrix problems noted?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

QA LEVEL II - INORGANIC DATA EVALUATION CHECKLIST

Blanks	YES	NO	NA	COMMENTS
a) Were analytes detected in the method blank(s)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	_____
b) Were analytes detected in the field blank(s)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	_____
c) Were analytes detected in the equipment blank(s)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	_____
d) Were analytes detected in the trip blank(s)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	_____

Laboratory Control Sample (LCS)	YES	NO	NA	COMMENTS
a) Was a LCS analyzed once per SDG?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
b) Were the proper analytes included in the LCS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
c) Was the LCS accuracy criteria met?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____

Duplicates	YES	NO	NA	COMMENTS
a) Were field duplicates collected (note original and duplicate sample names)?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Dup-1@ <i>N/A</i> _____
b) Were field dup. precision criteria met (note RPD)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	FB-1@ <i>N/A</i> _____
c) Were lab duplicates analyzed (note original and duplicate samples)?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	_____
d) Were lab dup. precision criteria met (note RPD)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	_____

Blind Standards	YES	NO	NA	COMMENTS
a) Was a blind standard used (indicate name, analytes included and concentrations)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	_____
b) Was the %D within control limits?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	_____

Matrix Spike/Matrix Spike Duplicate (MS/MSD)	YES	NO	NA	COMMENTS
a) Was MS accuracy criteria met?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Recovery could not be calculated since sample contained high concentration of analyte?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	_____
b) Was MSD accuracy criteria met?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Recovery could not be calculated since sample contained high concentration of analyte?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	_____
c) Were MS/MSD precision criteria met?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____

Comments/Notes:

September 27, 2019

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

RE: Project: AMEREN MERAMEC ENERGY CTR
Pace Project No.: 60311915

Dear Jeffrey Ingram:

Enclosed are the analytical results for sample(s) received by the laboratory between August 14, 2019 and August 15, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

REV-1, 9/27/19: Missing 200.8 metals for MW-1 pulled in.

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

Sincerely,



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

Enclosures

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



REPORT OF LABORATORY ANALYSIS

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CERTIFICATIONS

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311915

Pennsylvania Certification IDs

1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601

ANAB DOD-ELAP Rad Accreditation #: L2417

Alabama Certification #: 41590

Arizona Certification #: AZ0734

Arkansas Certification

California Certification #: 04222CA

Colorado Certification #: PA01547

Connecticut Certification #: PH-0694

Delaware Certification

EPA Region 4 DW Rad

Florida/TNI Certification #: E87683

Georgia Certification #: C040

Florida: Cert E871149 SEKS WET

Guam Certification

Hawaii Certification

Idaho Certification

Illinois Certification

Indiana Certification

Iowa Certification #: 391

Kansas/TNI Certification #: E-10358

Kentucky Certification #: KY90133

KY WW Permit #: KY0098221

KY WW Permit #: KY0000221

Louisiana DHH/TNI Certification #: LA180012

Louisiana DEQ/TNI Certification #: 4086

Maine Certification #: 2017020

Maryland Certification #: 308

Massachusetts Certification #: M-PA1457

Michigan/PADEP Certification #: 9991

Missouri Certification #: 235

Montana Certification #: Cert0082

Nebraska Certification #: NE-OS-29-14

Nevada Certification #: PA014572018-1

New Hampshire/TNI Certification #: 297617

New Jersey/TNI Certification #: PA051

New Mexico Certification #: PA01457

New York/TNI Certification #: 10888

North Carolina Certification #: 42706

North Dakota Certification #: R-190

Ohio EPA Rad Approval: #41249

Oregon/TNI Certification #: PA200002-010

Pennsylvania/TNI Certification #: 65-00282

Puerto Rico Certification #: PA01457

Rhode Island Certification #: 65-00282

South Dakota Certification

Tennessee Certification #: 02867

Texas/TNI Certification #: T104704188-17-3

Utah/TNI Certification #: PA014572017-9

USDA Soil Permit #: P330-17-00091

Vermont Dept. of Health: ID# VT-0282

Virgin Island/PADEP Certification

Virginia/VELAP Certification #: 9526

Washington Certification #: C868

West Virginia DEP Certification #: 143

West Virginia DHHR Certification #: 9964C

Wisconsin Approve List for Rad

Wyoming Certification #: 8TMS-L

Kansas Certification IDs

9608 Loiret Boulevard, Lenexa, KS 66219

Missouri Inorganic Drinking Water Certification #: 10090

Arkansas Drinking Water

Arkansas Certification #: 19-016-0

Arkansas Drinking Water

Illinois Certification #: 004455

Iowa Certification #: 118

Kansas/NELAP Certification #: E-10116

Louisiana Certification #: 03055

Nevada Certification #: KS000212018-1

Oklahoma Certification #: 9205/9935

Florida: Cert E871149 SEKS WET

Texas Certification #: T104704407-18-11

Utah Certification #: KS000212018-8

Illinois Certification #: 004592

Kansas Field Laboratory Accreditation: # E-92587

Missouri SEKS Micro Certification: 10070

REPORT OF LABORATORY ANALYSIS

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SAMPLE SUMMARY

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311915

Lab ID	Sample ID	Matrix	Date Collected	Date Received
60311915001	M-MW-2	Water	08/12/19 11:15	08/14/19 02:55
60311915002	M-MW-3	Water	08/12/19 13:26	08/14/19 02:55
60311915003	M-MW-4	Water	08/12/19 15:59	08/14/19 02:55
60311915004	M-MW-5	Water	08/13/19 11:30	08/14/19 02:55
60311915005	M-MW-6	Water	08/13/19 15:55	08/14/19 02:55
60311915006	M-MW-7	Water	08/13/19 15:25	08/14/19 02:55
60311915007	M-MW-8	Water	08/13/19 14:00	08/14/19 02:55
60311915008	M-BMW-1	Water	08/13/19 10:50	08/14/19 02:55
60311915009	M-BMW-2	Water	08/13/19 09:55	08/14/19 02:55
60311915010	M-DUP-1	Water	08/12/19 08:00	08/14/19 02:55
60311915011	M-FB-1	Water	08/13/19 08:00	08/14/19 02:55
60312019001	M-MW-1	Water	08/14/19 11:37	08/15/19 02:55
60311915013	M-MW-1 MS	Water	08/14/19 11:37	08/15/19 02:55
60311915014	M-MW-1 MSD	Water	08/14/19 11:37	08/15/19 02:55

REPORT OF LABORATORY ANALYSIS

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SAMPLE ANALYTE COUNT

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311915

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
60311915001	M-MW-2	EPA 200.7	HKC	13	PASI-K
		EPA 200.8	JGP	6	PASI-K
		EPA 245.1	JLH	1	PASI-K
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
		SM 2320B	AJS2	1	PASI-K
		SM 2540C	LDF	1	PASI-K
		EPA 300.0	MGS	3	PASI-K
60311915002	M-MW-3	EPA 200.7	HKC	13	PASI-K
		EPA 200.8	JGP	6	PASI-K
		EPA 245.1	JLH	1	PASI-K
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
		SM 2320B	AJS2	1	PASI-K
		SM 2540C	LDF	1	PASI-K
		EPA 300.0	MGS	3	PASI-K
60311915003	M-MW-4	EPA 200.7	HKC	13	PASI-K
		EPA 200.8	JGP	6	PASI-K
		EPA 245.1	JLH	1	PASI-K
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
		SM 2320B	AJS2	1	PASI-K
		SM 2540C	LDF	1	PASI-K
		EPA 300.0	MGS	3	PASI-K
60311915004	M-MW-5	EPA 200.7	HKC	13	PASI-K
		EPA 200.8	JGP	6	PASI-K
		EPA 245.1	JLH	1	PASI-K
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
		SM 2320B	AJS2	1	PASI-K
		SM 2540C	LDF	1	PASI-K
		EPA 300.0	MGS	3	PASI-K
60311915005	M-MW-6	EPA 200.7	HKC	13	PASI-K
		EPA 200.8	JGP	6	PASI-K
		EPA 245.1	JLH	1	PASI-K
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA

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SAMPLE ANALYTE COUNT

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311915

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
60311915006	M-MW-7	SM 2320B	AJS2	1	PASI-K
		SM 2540C	LDF	1	PASI-K
		EPA 300.0	MGS	3	PASI-K
		EPA 200.7	HKC	13	PASI-K
		EPA 200.8	JGP	6	PASI-K
		EPA 245.1	JLH	1	PASI-K
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
60311915007	M-MW-8	SM 2320B	AJS2	1	PASI-K
		SM 2540C	LDF	1	PASI-K
		EPA 300.0	JDS	3	PASI-K
		EPA 200.7	HKC	13	PASI-K
		EPA 200.8	JGP	6	PASI-K
		EPA 245.1	JLH	1	PASI-K
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
60311915008	M-BMW-1	SM 2320B	AJS2	1	PASI-K
		SM 2540C	LDF	1	PASI-K
		EPA 300.0	JDS	3	PASI-K
		EPA 200.7	HKC	13	PASI-K
		EPA 200.8	JGP	6	PASI-K
		EPA 245.1	JLH	1	PASI-K
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
60311915009	M-BMW-2	SM 2320B	AJS2	1	PASI-K
		SM 2540C	LDF	1	PASI-K
		EPA 300.0	JDS	3	PASI-K
		EPA 200.7	HKC	13	PASI-K
		EPA 200.8	JGP	6	PASI-K
		EPA 245.1	JLH	1	PASI-K
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
60311915010	M-DUP-1	SM 2320B	AJS2	1	PASI-K
		SM 2540C	LDF	1	PASI-K
		EPA 300.0	JDS	3	PASI-K
		EPA 200.7	HKC	13	PASI-K
		EPA 200.8	JGP	6	PASI-K

REPORT OF LABORATORY ANALYSIS

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SAMPLE ANALYTE COUNT

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311915

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
		EPA 245.1	JLH	1	PASI-K
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
		SM 2320B	AJS2	1	PASI-K
		SM 2540C	LDF	1	PASI-K
		EPA 300.0	JDS	3	PASI-K
60311915011	M-FB-1	EPA 200.7	HKC	13	PASI-K
		EPA 200.8	JGP	6	PASI-K
		EPA 245.1	JLH	1	PASI-K
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
		SM 2320B	AJS2	1	PASI-K
		SM 2540C	LDF	1	PASI-K
		EPA 300.0	JDS	3	PASI-K
60312019001	M-MW-1	EPA 200.7	HKC	13	PASI-K
		EPA 200.8	JGP	6	PASI-K
		EPA 245.1	JLH	1	PASI-K
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
		SM 2320B	AJS2	1	PASI-K
		SM 2540C	LDF	1	PASI-K
		EPA 300.0	JDS	3	PASI-K
60311915013	M-MW-1 MS	EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
60311915014	M-MW-1 MSD	EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA

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ANALYTICAL RESULTS

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311915

Sample: M-MW-2 **Lab ID: 60311915001** Collected: 08/12/19 11:15 Received: 08/14/19 02:55 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.7 Metals, Total		Analytical Method: EPA 200.7 Preparation Method: EPA 200.7							
Barium	301	ug/L	5.0	1.4	1	08/16/19 14:00	08/19/19 18:30	7440-39-3	
Beryllium	<0.25	ug/L	1.0	0.25	1	08/16/19 14:00	08/19/19 18:30	7440-41-7	
Boron	4980	ug/L	100	10.7	1	08/16/19 14:00	08/19/19 18:30	7440-42-8	
Calcium	135000	ug/L	200	50.0	1	08/16/19 14:00	08/19/19 18:30	7440-70-2	
Cobalt	<0.84	ug/L	5.0	0.84	1	08/16/19 14:00	08/19/19 18:30	7440-48-4	
Iron	45100	ug/L	50.0	14.0	1	08/16/19 14:00	08/19/19 18:30	7439-89-6	
Lead	<3.4	ug/L	10.0	3.4	1	08/16/19 14:00	08/19/19 18:30	7439-92-1	
Lithium	<5.9	ug/L	10.0	5.9	1	08/16/19 14:00	08/19/19 18:30	7439-93-2	
Magnesium	40400	ug/L	50.0	13.0	1	08/16/19 14:00	08/19/19 18:30	7439-95-4	
Manganese	6110	ug/L	5.0	2.1	1	08/16/19 14:00	08/19/19 18:30	7439-96-5	
Molybdenum	<2.6	ug/L	20.0	2.6	1	08/16/19 14:00	08/19/19 18:30	7439-98-7	
Potassium	2340	ug/L	500	79.0	1	08/16/19 14:00	08/19/19 18:30	7440-09-7	
Sodium	40300	ug/L	500	144	1	08/16/19 14:00	08/19/19 18:30	7440-23-5	
200.8 MET ICPMS		Analytical Method: EPA 200.8 Preparation Method: EPA 200.8							
Antimony	<0.078	ug/L	1.0	0.078	1	08/16/19 14:15	08/19/19 16:00	7440-36-0	
Arsenic	1.5	ug/L	1.0	0.065	1	08/16/19 14:15	08/19/19 16:00	7440-38-2	
Cadmium	<0.033	ug/L	0.50	0.033	1	08/16/19 14:15	08/19/19 16:00	7440-43-9	
Chromium	0.32J	ug/L	1.0	0.078	1	08/16/19 14:15	08/19/19 16:00	7440-47-3	
Selenium	0.15J	ug/L	1.0	0.085	1	08/16/19 14:15	08/19/19 16:00	7782-49-2	
Thallium	<0.099	ug/L	1.0	0.099	1	08/16/19 14:15	08/19/19 16:00	7440-28-0	
245.1 Mercury		Analytical Method: EPA 245.1 Preparation Method: EPA 245.1							
Mercury	<0.066	ug/L	0.20	0.066	1	08/20/19 15:57	08/21/19 11:21	7439-97-6	
2320B Alkalinity		Analytical Method: SM 2320B							
Alkalinity, Total as CaCO3	242	mg/L	20.0	6.5	1		08/26/19 11:33		
2540C Total Dissolved Solids		Analytical Method: SM 2540C							
Total Dissolved Solids	817	mg/L	10.0	10.0	1		08/19/19 10:18		
300.0 IC Anions 28 Days		Analytical Method: EPA 300.0							
Chloride	27.5	mg/L	2.0	0.44	2		08/27/19 04:08	16887-00-6	
Fluoride	0.15J	mg/L	0.20	0.085	1		08/27/19 03:24	16984-48-8	
Sulfate	324	mg/L	50.0	11.5	50		08/27/19 04:53	14808-79-8	

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ANALYTICAL RESULTS

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311915

Sample: M-MW-3 **Lab ID: 60311915002** Collected: 08/12/19 13:26 Received: 08/14/19 02:55 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.7 Metals, Total		Analytical Method: EPA 200.7 Preparation Method: EPA 200.7							
Barium	196	ug/L	5.0	1.4	1	08/16/19 14:00	08/19/19 18:38	7440-39-3	
Beryllium	<0.25	ug/L	1.0	0.25	1	08/16/19 14:00	08/19/19 18:38	7440-41-7	
Boron	9420	ug/L	100	10.7	1	08/16/19 14:00	08/19/19 18:38	7440-42-8	
Calcium	175000	ug/L	200	50.0	1	08/16/19 14:00	08/19/19 18:38	7440-70-2	
Cobalt	<0.84	ug/L	5.0	0.84	1	08/16/19 14:00	08/19/19 18:38	7440-48-4	
Iron	28500	ug/L	50.0	14.0	1	08/16/19 14:00	08/19/19 18:38	7439-89-6	
Lead	<3.4	ug/L	10.0	3.4	1	08/16/19 14:00	08/19/19 18:38	7439-92-1	
Lithium	<5.9	ug/L	10.0	5.9	1	08/16/19 14:00	08/19/19 18:38	7439-93-2	
Magnesium	47400	ug/L	50.0	13.0	1	08/16/19 14:00	08/19/19 18:38	7439-95-4	
Manganese	2100	ug/L	5.0	2.1	1	08/16/19 14:00	08/19/19 18:38	7439-96-5	
Molybdenum	7.5J	ug/L	20.0	2.6	1	08/16/19 14:00	08/19/19 18:38	7439-98-7	
Potassium	2750	ug/L	500	79.0	1	08/16/19 14:00	08/19/19 18:38	7440-09-7	
Sodium	33700	ug/L	500	144	1	08/16/19 14:00	08/19/19 18:38	7440-23-5	
200.8 MET ICPMS		Analytical Method: EPA 200.8 Preparation Method: EPA 200.8							
Antimony	<0.078	ug/L	1.0	0.078	1	08/16/19 14:15	08/19/19 16:02	7440-36-0	
Arsenic	7.5	ug/L	1.0	0.065	1	08/16/19 14:15	08/19/19 16:02	7440-38-2	
Cadmium	<0.033	ug/L	0.50	0.033	1	08/16/19 14:15	08/19/19 16:02	7440-43-9	
Chromium	0.11J	ug/L	1.0	0.078	1	08/16/19 14:15	08/19/19 16:02	7440-47-3	
Selenium	0.10J	ug/L	1.0	0.085	1	08/16/19 14:15	08/19/19 16:02	7782-49-2	
Thallium	<0.099	ug/L	1.0	0.099	1	08/16/19 14:15	08/19/19 16:02	7440-28-0	
245.1 Mercury		Analytical Method: EPA 245.1 Preparation Method: EPA 245.1							
Mercury	<0.066	ug/L	0.20	0.066	1	08/20/19 15:57	08/21/19 11:27	7439-97-6	
2320B Alkalinity		Analytical Method: SM 2320B							
Alkalinity, Total as CaCO3	311	mg/L	20.0	6.5	1		08/26/19 11:39		
2540C Total Dissolved Solids		Analytical Method: SM 2540C							
Total Dissolved Solids	968	mg/L	10.0	10.0	1		08/19/19 10:18		
300.0 IC Anions 28 Days		Analytical Method: EPA 300.0							
Chloride	22.0	mg/L	5.0	1.1	5		08/27/19 08:38	16887-00-6	
Fluoride	0.13J	mg/L	0.20	0.085	1		08/27/19 08:23	16984-48-8	
Sulfate	363	mg/L	50.0	11.5	50		08/27/19 08:52	14808-79-8	

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ANALYTICAL RESULTS

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311915

Sample: M-MW-4 **Lab ID: 60311915003** Collected: 08/12/19 15:59 Received: 08/14/19 02:55 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.7 Metals, Total		Analytical Method: EPA 200.7 Preparation Method: EPA 200.7							
Barium	168	ug/L	5.0	1.4	1	08/16/19 14:00	08/19/19 18:41	7440-39-3	
Beryllium	<0.25	ug/L	1.0	0.25	1	08/16/19 14:00	08/19/19 18:41	7440-41-7	
Boron	9120	ug/L	100	10.7	1	08/16/19 14:00	08/19/19 18:41	7440-42-8	
Calcium	181000	ug/L	200	50.0	1	08/16/19 14:00	08/19/19 18:41	7440-70-2	
Cobalt	<0.84	ug/L	5.0	0.84	1	08/16/19 14:00	08/19/19 18:41	7440-48-4	
Iron	24500	ug/L	50.0	14.0	1	08/16/19 14:00	08/19/19 18:41	7439-89-6	
Lead	<3.4	ug/L	10.0	3.4	1	08/16/19 14:00	08/19/19 18:41	7439-92-1	
Lithium	14.0	ug/L	10.0	5.9	1	08/16/19 14:00	08/19/19 18:41	7439-93-2	
Magnesium	49600	ug/L	50.0	13.0	1	08/16/19 14:00	08/19/19 18:41	7439-95-4	
Manganese	731	ug/L	5.0	2.1	1	08/16/19 14:00	08/19/19 18:41	7439-96-5	
Molybdenum	51.5	ug/L	20.0	2.6	1	08/16/19 14:00	08/19/19 18:41	7439-98-7	
Potassium	6060	ug/L	500	79.0	1	08/16/19 14:00	08/19/19 18:41	7440-09-7	
Sodium	45600	ug/L	500	144	1	08/16/19 14:00	08/19/19 18:41	7440-23-5	
200.8 MET ICPMS		Analytical Method: EPA 200.8 Preparation Method: EPA 200.8							
Antimony	<0.078	ug/L	1.0	0.078	1	08/16/19 14:15	08/19/19 16:04	7440-36-0	
Arsenic	13.9	ug/L	1.0	0.065	1	08/16/19 14:15	08/19/19 16:04	7440-38-2	
Cadmium	<0.033	ug/L	0.50	0.033	1	08/16/19 14:15	08/19/19 16:04	7440-43-9	
Chromium	<0.078	ug/L	1.0	0.078	1	08/16/19 14:15	08/19/19 16:04	7440-47-3	
Selenium	<0.085	ug/L	1.0	0.085	1	08/16/19 14:15	08/19/19 16:04	7782-49-2	
Thallium	<0.099	ug/L	1.0	0.099	1	08/16/19 14:15	08/19/19 16:04	7440-28-0	
245.1 Mercury		Analytical Method: EPA 245.1 Preparation Method: EPA 245.1							
Mercury	<0.066	ug/L	0.20	0.066	1	08/20/19 15:57	08/21/19 11:30	7439-97-6	
2320B Alkalinity		Analytical Method: SM 2320B							
Alkalinity, Total as CaCO3	242	mg/L	20.0	6.5	1		08/26/19 11:52		
2540C Total Dissolved Solids		Analytical Method: SM 2540C							
Total Dissolved Solids	1090	mg/L	10.0	10.0	1		08/19/19 10:18		
300.0 IC Anions 28 Days		Analytical Method: EPA 300.0							
Chloride	48.9	mg/L	5.0	1.1	5		08/27/19 09:22	16887-00-6	
Fluoride	0.18J	mg/L	0.20	0.085	1		08/27/19 09:07	16984-48-8	
Sulfate	465	mg/L	50.0	11.5	50		08/27/19 09:37	14808-79-8	

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ANALYTICAL RESULTS

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311915

Sample: M-MW-5 **Lab ID: 60311915004** Collected: 08/13/19 11:30 Received: 08/14/19 02:55 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.7 Metals, Total		Analytical Method: EPA 200.7 Preparation Method: EPA 200.7							
Barium	230	ug/L	5.0	1.4	1	08/16/19 14:00	08/19/19 18:43	7440-39-3	
Beryllium	<0.25	ug/L	1.0	0.25	1	08/16/19 14:00	08/19/19 18:43	7440-41-7	
Boron	6710	ug/L	100	10.7	1	08/16/19 14:00	08/19/19 18:43	7440-42-8	
Calcium	162000	ug/L	200	50.0	1	08/16/19 14:00	08/19/19 18:43	7440-70-2	
Cobalt	<0.84	ug/L	5.0	0.84	1	08/16/19 14:00	08/19/19 18:43	7440-48-4	
Iron	16100	ug/L	50.0	14.0	1	08/16/19 14:00	08/19/19 18:43	7439-89-6	
Lead	<3.4	ug/L	10.0	3.4	1	08/16/19 14:00	08/19/19 18:43	7439-92-1	
Lithium	12.2	ug/L	10.0	5.9	1	08/16/19 14:00	08/19/19 18:43	7439-93-2	
Magnesium	51300	ug/L	50.0	13.0	1	08/16/19 14:00	08/19/19 18:43	7439-95-4	
Manganese	409	ug/L	5.0	2.1	1	08/16/19 14:00	08/19/19 18:43	7439-96-5	
Molybdenum	96.3	ug/L	20.0	2.6	1	08/16/19 14:00	08/19/19 18:43	7439-98-7	
Potassium	5280	ug/L	500	79.0	1	08/16/19 14:00	08/19/19 18:43	7440-09-7	
Sodium	44000	ug/L	500	144	1	08/16/19 14:00	08/19/19 18:43	7440-23-5	
200.8 MET ICPMS		Analytical Method: EPA 200.8 Preparation Method: EPA 200.8							
Antimony	0.11J	ug/L	1.0	0.078	1	08/16/19 14:15	08/19/19 16:06	7440-36-0	
Arsenic	23.0	ug/L	1.0	0.065	1	08/16/19 14:15	08/19/19 16:06	7440-38-2	
Cadmium	0.048J	ug/L	0.50	0.033	1	08/16/19 14:15	08/19/19 16:06	7440-43-9	
Chromium	0.18J	ug/L	1.0	0.078	1	08/16/19 14:15	08/19/19 16:06	7440-47-3	
Selenium	<0.085	ug/L	1.0	0.085	1	08/16/19 14:15	08/19/19 16:06	7782-49-2	
Thallium	<0.099	ug/L	1.0	0.099	1	08/16/19 14:15	08/19/19 16:06	7440-28-0	
245.1 Mercury		Analytical Method: EPA 245.1 Preparation Method: EPA 245.1							
Mercury	<0.066	ug/L	0.20	0.066	1	08/20/19 15:57	08/21/19 11:37	7439-97-6	
2320B Alkalinity		Analytical Method: SM 2320B							
Alkalinity, Total as CaCO3	113	mg/L	20.0	6.5	1		08/26/19 12:26		
2540C Total Dissolved Solids		Analytical Method: SM 2540C							
Total Dissolved Solids	957	mg/L	10.0	10.0	1		08/19/19 10:20		
300.0 IC Anions 28 Days		Analytical Method: EPA 300.0							
Chloride	41.3	mg/L	5.0	1.1	5		08/27/19 10:07	16887-00-6	
Fluoride	0.24	mg/L	0.20	0.085	1		08/27/19 09:52	16984-48-8	
Sulfate	339	mg/L	50.0	11.5	50		08/27/19 10:51	14808-79-8	

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ANALYTICAL RESULTS

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311915

Sample: M-MW-6 **Lab ID: 60311915005** Collected: 08/13/19 15:55 Received: 08/14/19 02:55 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.7 Metals, Total		Analytical Method: EPA 200.7 Preparation Method: EPA 200.7							
Barium	44.1	ug/L	5.0	1.4	1	08/16/19 14:00	08/19/19 18:46	7440-39-3	
Beryllium	<0.25	ug/L	1.0	0.25	1	08/16/19 14:00	08/19/19 18:46	7440-41-7	
Boron	14500	ug/L	100	10.7	1	08/16/19 14:00	08/19/19 18:46	7440-42-8	
Calcium	320000	ug/L	200	50.0	1	08/16/19 14:00	08/19/19 18:46	7440-70-2	
Cobalt	5.4	ug/L	5.0	0.84	1	08/16/19 14:00	08/19/19 18:46	7440-48-4	
Iron	3940	ug/L	50.0	14.0	1	08/16/19 14:00	08/19/19 18:46	7439-89-6	
Lead	<3.4	ug/L	10.0	3.4	1	08/16/19 14:00	08/19/19 18:46	7439-92-1	
Lithium	122	ug/L	10.0	5.9	1	08/16/19 14:00	08/19/19 18:46	7439-93-2	
Magnesium	23700	ug/L	50.0	13.0	1	08/16/19 14:00	08/19/19 18:46	7439-95-4	
Manganese	1030	ug/L	5.0	2.1	1	08/16/19 14:00	08/19/19 18:46	7439-96-5	
Molybdenum	123	ug/L	20.0	2.6	1	08/16/19 14:00	08/19/19 18:46	7439-98-7	
Potassium	13200	ug/L	500	79.0	1	08/16/19 14:00	08/19/19 18:46	7440-09-7	
Sodium	23400	ug/L	500	144	1	08/16/19 14:00	08/19/19 18:46	7440-23-5	
200.8 MET ICPMS		Analytical Method: EPA 200.8 Preparation Method: EPA 200.8							
Antimony	<0.078	ug/L	1.0	0.078	1	08/16/19 14:15	08/19/19 16:08	7440-36-0	
Arsenic	2.6	ug/L	1.0	0.065	1	08/16/19 14:15	08/19/19 16:08	7440-38-2	
Cadmium	0.31J	ug/L	0.50	0.033	1	08/16/19 14:15	08/19/19 16:08	7440-43-9	
Chromium	<0.078	ug/L	1.0	0.078	1	08/16/19 14:15	08/19/19 16:08	7440-47-3	
Selenium	0.087J	ug/L	1.0	0.085	1	08/16/19 14:15	08/19/19 16:08	7782-49-2	
Thallium	<0.099	ug/L	1.0	0.099	1	08/16/19 14:15	08/19/19 16:08	7440-28-0	
245.1 Mercury		Analytical Method: EPA 245.1 Preparation Method: EPA 245.1							
Mercury	<0.066	ug/L	0.20	0.066	1	08/20/19 15:57	08/21/19 11:39	7439-97-6	
2320B Alkalinity		Analytical Method: SM 2320B							
Alkalinity, Total as CaCO3	331	mg/L	20.0	6.5	1		08/26/19 12:30		
2540C Total Dissolved Solids		Analytical Method: SM 2540C							
Total Dissolved Solids	1310	mg/L	13.3	13.3	1		08/19/19 10:20		
300.0 IC Anions 28 Days		Analytical Method: EPA 300.0							
Chloride	8.3	mg/L	2.0	0.44	2		08/27/19 11:21	16887-00-6	
Fluoride	0.24	mg/L	0.20	0.085	1		08/27/19 11:06	16984-48-8	
Sulfate	516	mg/L	50.0	11.5	50		08/27/19 11:36	14808-79-8	

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ANALYTICAL RESULTS

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311915

Sample: M-MW-7 **Lab ID: 60311915006** Collected: 08/13/19 15:25 Received: 08/14/19 02:55 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.7 Metals, Total		Analytical Method: EPA 200.7 Preparation Method: EPA 200.7							
Barium	37.0	ug/L	5.0	1.4	1	08/16/19 14:00	08/19/19 18:48	7440-39-3	
Beryllium	<0.25	ug/L	1.0	0.25	1	08/16/19 14:00	08/19/19 18:48	7440-41-7	
Boron	22700	ug/L	100	10.7	1	08/16/19 14:00	08/19/19 18:48	7440-42-8	
Calcium	354000	ug/L	200	50.0	1	08/16/19 14:00	08/19/19 18:48	7440-70-2	
Cobalt	<0.84	ug/L	5.0	0.84	1	08/16/19 14:00	08/19/19 18:48	7440-48-4	
Iron	<14.0	ug/L	50.0	14.0	1	08/16/19 14:00	08/19/19 18:48	7439-89-6	
Lead	<3.4	ug/L	10.0	3.4	1	08/16/19 14:00	08/19/19 18:48	7439-92-1	
Lithium	36.2	ug/L	10.0	5.9	1	08/16/19 14:00	08/19/19 18:48	7439-93-2	
Magnesium	26900	ug/L	50.0	13.0	1	08/16/19 14:00	08/19/19 18:48	7439-95-4	
Manganese	<2.1	ug/L	5.0	2.1	1	08/16/19 14:00	08/19/19 18:48	7439-96-5	
Molybdenum	463	ug/L	20.0	2.6	1	08/16/19 14:00	08/19/19 18:48	7439-98-7	
Potassium	18200	ug/L	500	79.0	1	08/16/19 14:00	08/19/19 18:48	7440-09-7	
Sodium	102000	ug/L	500	144	1	08/16/19 14:00	08/19/19 18:48	7440-23-5	
200.8 MET ICPMS		Analytical Method: EPA 200.8 Preparation Method: EPA 200.8							
Antimony	0.39J	ug/L	1.0	0.078	1	08/16/19 14:15	08/19/19 16:15	7440-36-0	
Arsenic	2.8	ug/L	1.0	0.065	1	08/16/19 14:15	08/19/19 16:15	7440-38-2	
Cadmium	0.36J	ug/L	0.50	0.033	1	08/16/19 14:15	08/19/19 16:15	7440-43-9	
Chromium	0.18J	ug/L	1.0	0.078	1	08/16/19 14:15	08/19/19 16:15	7440-47-3	
Selenium	8.6	ug/L	1.0	0.085	1	08/16/19 14:15	08/19/19 16:15	7782-49-2	
Thallium	<0.099	ug/L	1.0	0.099	1	08/16/19 14:15	08/19/19 16:15	7440-28-0	
245.1 Mercury		Analytical Method: EPA 245.1 Preparation Method: EPA 245.1							
Mercury	<0.066	ug/L	0.20	0.066	1	08/20/19 15:57	08/21/19 11:41	7439-97-6	
2320B Alkalinity		Analytical Method: SM 2320B							
Alkalinity, Total as CaCO3	426	mg/L	20.0	6.5	1		08/26/19 12:36		
2540C Total Dissolved Solids		Analytical Method: SM 2540C							
Total Dissolved Solids	1840	mg/L	13.3	13.3	1		08/19/19 10:20		
300.0 IC Anions 28 Days		Analytical Method: EPA 300.0							
Chloride	53.0	mg/L	10.0	2.2	10		08/27/19 11:41	16887-00-6	
Fluoride	0.82	mg/L	0.20	0.085	1		08/27/19 11:25	16984-48-8	
Sulfate	841	mg/L	100	23.0	100		08/27/19 12:28	14808-79-8	

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ANALYTICAL RESULTS

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311915

Sample: M-MW-8 **Lab ID: 60311915007** Collected: 08/13/19 14:00 Received: 08/14/19 02:55 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.7 Metals, Total		Analytical Method: EPA 200.7 Preparation Method: EPA 200.7							
Barium	102	ug/L	5.0	1.4	1	08/16/19 14:00	08/19/19 18:51	7440-39-3	
Beryllium	<0.25	ug/L	1.0	0.25	1	08/16/19 14:00	08/19/19 18:51	7440-41-7	
Boron	8880	ug/L	100	10.7	1	08/16/19 14:00	08/19/19 18:51	7440-42-8	
Calcium	197000	ug/L	200	50.0	1	08/16/19 14:00	08/19/19 18:51	7440-70-2	
Cobalt	<0.84	ug/L	5.0	0.84	1	08/16/19 14:00	08/19/19 18:51	7440-48-4	
Iron	8430	ug/L	50.0	14.0	1	08/16/19 14:00	08/19/19 18:51	7439-89-6	
Lead	<3.4	ug/L	10.0	3.4	1	08/16/19 14:00	08/19/19 18:51	7439-92-1	
Lithium	27.8	ug/L	10.0	5.9	1	08/16/19 14:00	08/19/19 18:51	7439-93-2	
Magnesium	41800	ug/L	50.0	13.0	1	08/16/19 14:00	08/19/19 18:51	7439-95-4	
Manganese	1550	ug/L	5.0	2.1	1	08/16/19 14:00	08/19/19 18:51	7439-96-5	
Molybdenum	186	ug/L	20.0	2.6	1	08/16/19 14:00	08/19/19 18:51	7439-98-7	
Potassium	7170	ug/L	500	79.0	1	08/16/19 14:00	08/19/19 18:51	7440-09-7	
Sodium	35600	ug/L	500	144	1	08/16/19 14:00	08/19/19 18:51	7440-23-5	
200.8 MET ICPMS		Analytical Method: EPA 200.8 Preparation Method: EPA 200.8							
Antimony	<0.078	ug/L	1.0	0.078	1	08/16/19 14:15	08/19/19 16:19	7440-36-0	
Arsenic	5.7	ug/L	1.0	0.065	1	08/16/19 14:15	08/19/19 16:19	7440-38-2	
Cadmium	0.099J	ug/L	0.50	0.033	1	08/16/19 14:15	08/19/19 16:19	7440-43-9	
Chromium	0.30J	ug/L	1.0	0.078	1	08/16/19 14:15	08/19/19 16:19	7440-47-3	
Selenium	0.11J	ug/L	1.0	0.085	1	08/16/19 14:15	08/19/19 16:19	7782-49-2	
Thallium	<0.099	ug/L	1.0	0.099	1	08/16/19 14:15	08/19/19 16:19	7440-28-0	
245.1 Mercury		Analytical Method: EPA 245.1 Preparation Method: EPA 245.1							
Mercury	<0.066	ug/L	0.20	0.066	1	08/20/19 15:57	08/21/19 11:43	7439-97-6	
2320B Alkalinity		Analytical Method: SM 2320B							
Alkalinity, Total as CaCO3	213	mg/L	20.0	6.5	1		08/26/19 12:41		
2540C Total Dissolved Solids		Analytical Method: SM 2540C							
Total Dissolved Solids	1060	mg/L	10.0	10.0	1		08/19/19 10:20		
300.0 IC Anions 28 Days		Analytical Method: EPA 300.0							
Chloride	30.9	mg/L	2.0	0.44	2		08/27/19 12:59	16887-00-6	
Fluoride	0.37	mg/L	0.20	0.085	1		08/27/19 12:44	16984-48-8	
Sulfate	462	mg/L	50.0	11.5	50		08/27/19 13:15	14808-79-8	

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ANALYTICAL RESULTS

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311915

Sample: M-BMW-1 **Lab ID: 60311915008** Collected: 08/13/19 10:50 Received: 08/14/19 02:55 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.7 Metals, Total		Analytical Method: EPA 200.7 Preparation Method: EPA 200.7							
Barium	210	ug/L	5.0	1.4	1	08/16/19 14:00	08/19/19 18:53	7440-39-3	
Beryllium	<0.25	ug/L	1.0	0.25	1	08/16/19 14:00	08/19/19 18:53	7440-41-7	
Boron	354	ug/L	100	10.7	1	08/16/19 14:00	08/19/19 18:53	7440-42-8	
Calcium	102000	ug/L	200	50.0	1	08/16/19 14:00	08/19/19 18:53	7440-70-2	
Cobalt	<0.84	ug/L	5.0	0.84	1	08/16/19 14:00	08/19/19 18:53	7440-48-4	
Iron	498	ug/L	50.0	14.0	1	08/16/19 14:00	08/19/19 18:53	7439-89-6	
Lead	<3.4	ug/L	10.0	3.4	1	08/16/19 14:00	08/19/19 18:53	7439-92-1	
Lithium	6.8J	ug/L	10.0	5.9	1	08/16/19 14:00	08/19/19 18:53	7439-93-2	
Magnesium	25600	ug/L	50.0	13.0	1	08/16/19 14:00	08/19/19 18:53	7439-95-4	
Manganese	994	ug/L	5.0	2.1	1	08/16/19 14:00	08/19/19 18:53	7439-96-5	
Molybdenum	3.7J	ug/L	20.0	2.6	1	08/16/19 14:00	08/19/19 18:53	7439-98-7	
Potassium	4890	ug/L	500	79.0	1	08/16/19 14:00	08/19/19 18:53	7440-09-7	
Sodium	60900	ug/L	500	144	1	08/16/19 14:00	08/19/19 18:53	7440-23-5	
200.8 MET ICPMS		Analytical Method: EPA 200.8 Preparation Method: EPA 200.8							
Antimony	0.23J	ug/L	1.0	0.078	1	08/16/19 14:15	08/19/19 16:21	7440-36-0	
Arsenic	2.1	ug/L	1.0	0.065	1	08/16/19 14:15	08/19/19 16:21	7440-38-2	
Cadmium	<0.033	ug/L	0.50	0.033	1	08/16/19 14:15	08/19/19 16:21	7440-43-9	
Chromium	0.086J	ug/L	1.0	0.078	1	08/16/19 14:15	08/19/19 16:21	7440-47-3	
Selenium	0.12J	ug/L	1.0	0.085	1	08/16/19 14:15	08/19/19 16:21	7782-49-2	
Thallium	<0.099	ug/L	1.0	0.099	1	08/16/19 14:15	08/19/19 16:21	7440-28-0	
245.1 Mercury		Analytical Method: EPA 245.1 Preparation Method: EPA 245.1							
Mercury	<0.066	ug/L	0.20	0.066	1	08/20/19 15:57	08/21/19 11:48	7439-97-6	
2320B Alkalinity		Analytical Method: SM 2320B							
Alkalinity, Total as CaCO3	298	mg/L	20.0	6.5	1		08/26/19 12:56		
2540C Total Dissolved Solids		Analytical Method: SM 2540C							
Total Dissolved Solids	620	mg/L	10.0	10.0	1		08/19/19 10:20		
300.0 IC Anions 28 Days		Analytical Method: EPA 300.0							
Chloride	96.2	mg/L	10.0	2.2	10		08/27/19 13:47	16887-00-6	
Fluoride	0.46	mg/L	0.20	0.085	1		08/27/19 13:31	16984-48-8	
Sulfate	53.0	mg/L	10.0	2.3	10		08/27/19 13:47	14808-79-8	

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ANALYTICAL RESULTS

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311915

Sample: M-BMW-2 **Lab ID: 60311915009** Collected: 08/13/19 09:55 Received: 08/14/19 02:55 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.7 Metals, Total		Analytical Method: EPA 200.7 Preparation Method: EPA 200.7							
Barium	502	ug/L	5.0	1.4	1	08/16/19 14:00	08/19/19 18:56	7440-39-3	
Beryllium	<0.25	ug/L	1.0	0.25	1	08/16/19 14:00	08/19/19 18:56	7440-41-7	
Boron	81.4J	ug/L	100	10.7	1	08/16/19 14:00	08/19/19 18:56	7440-42-8	
Calcium	104000	ug/L	200	50.0	1	08/16/19 14:00	08/19/19 18:56	7440-70-2	
Cobalt	<0.84	ug/L	5.0	0.84	1	08/16/19 14:00	08/19/19 18:56	7440-48-4	
Iron	13600	ug/L	50.0	14.0	1	08/16/19 14:00	08/19/19 18:56	7439-89-6	
Lead	<3.4	ug/L	10.0	3.4	1	08/16/19 14:00	08/19/19 18:56	7439-92-1	
Lithium	<5.9	ug/L	10.0	5.9	1	08/16/19 14:00	08/19/19 18:56	7439-93-2	
Magnesium	33600	ug/L	50.0	13.0	1	08/16/19 14:00	08/19/19 18:56	7439-95-4	
Manganese	3990	ug/L	5.0	2.1	1	08/16/19 14:00	08/19/19 18:56	7439-96-5	
Molybdenum	<2.6	ug/L	20.0	2.6	1	08/16/19 14:00	08/19/19 18:56	7439-98-7	
Potassium	1420	ug/L	500	79.0	1	08/16/19 14:00	08/19/19 18:56	7440-09-7	B
Sodium	19800	ug/L	500	144	1	08/16/19 14:00	08/19/19 18:56	7440-23-5	
200.8 MET ICPMS		Analytical Method: EPA 200.8 Preparation Method: EPA 200.8							
Antimony	<0.078	ug/L	1.0	0.078	1	08/16/19 14:15	08/19/19 16:22	7440-36-0	
Arsenic	0.86J	ug/L	1.0	0.065	1	08/16/19 14:15	08/19/19 16:22	7440-38-2	
Cadmium	<0.033	ug/L	0.50	0.033	1	08/16/19 14:15	08/19/19 16:22	7440-43-9	
Chromium	0.16J	ug/L	1.0	0.078	1	08/16/19 14:15	08/19/19 16:22	7440-47-3	
Selenium	<0.085	ug/L	1.0	0.085	1	08/16/19 14:15	08/19/19 16:22	7782-49-2	
Thallium	<0.099	ug/L	1.0	0.099	1	08/16/19 14:15	08/19/19 16:22	7440-28-0	
245.1 Mercury		Analytical Method: EPA 245.1 Preparation Method: EPA 245.1							
Mercury	<0.066	ug/L	0.20	0.066	1	08/20/19 15:57	08/21/19 11:50	7439-97-6	
2320B Alkalinity		Analytical Method: SM 2320B							
Alkalinity, Total as CaCO3	405	mg/L	20.0	6.5	1		08/26/19 13:01		
2540C Total Dissolved Solids		Analytical Method: SM 2540C							
Total Dissolved Solids	483	mg/L	10.0	10.0	1		08/19/19 10:20		
300.0 IC Anions 28 Days		Analytical Method: EPA 300.0							
Chloride	13.0	mg/L	1.0	0.22	1		08/27/19 14:19	16887-00-6	
Fluoride	0.29	mg/L	0.20	0.085	1		08/27/19 14:19	16984-48-8	
Sulfate	25.9	mg/L	2.0	0.46	2		08/27/19 14:35	14808-79-8	

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ANALYTICAL RESULTS

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311915

Sample: M-DUP-1 **Lab ID: 60311915010** Collected: 08/12/19 08:00 Received: 08/14/19 02:55 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.7 Metals, Total		Analytical Method: EPA 200.7 Preparation Method: EPA 200.7							
Barium	188	ug/L	5.0	1.4	1	08/16/19 14:00	08/19/19 18:58	7440-39-3	
Beryllium	<0.25	ug/L	1.0	0.25	1	08/16/19 14:00	08/19/19 18:58	7440-41-7	
Boron	9030	ug/L	100	10.7	1	08/16/19 14:00	08/19/19 18:58	7440-42-8	
Calcium	168000	ug/L	200	50.0	1	08/16/19 14:00	08/19/19 18:58	7440-70-2	M1
Cobalt	<0.84	ug/L	5.0	0.84	1	08/16/19 14:00	08/19/19 18:58	7440-48-4	
Iron	27200	ug/L	50.0	14.0	1	08/16/19 14:00	08/19/19 18:58	7439-89-6	
Lead	<3.4	ug/L	10.0	3.4	1	08/16/19 14:00	08/19/19 18:58	7439-92-1	
Lithium	<5.9	ug/L	10.0	5.9	1	08/16/19 14:00	08/19/19 18:58	7439-93-2	
Magnesium	45200	ug/L	50.0	13.0	1	08/16/19 14:00	08/19/19 18:58	7439-95-4	
Manganese	1990	ug/L	5.0	2.1	1	08/16/19 14:00	08/19/19 18:58	7439-96-5	
Molybdenum	6.7J	ug/L	20.0	2.6	1	08/16/19 14:00	08/19/19 18:58	7439-98-7	
Potassium	2720	ug/L	500	79.0	1	08/16/19 14:00	08/19/19 18:58	7440-09-7	
Sodium	32200	ug/L	500	144	1	08/16/19 14:00	08/19/19 18:58	7440-23-5	
200.8 MET ICPMS		Analytical Method: EPA 200.8 Preparation Method: EPA 200.8							
Antimony	<0.078	ug/L	1.0	0.078	1	08/16/19 14:15	08/19/19 16:24	7440-36-0	
Arsenic	7.5	ug/L	1.0	0.065	1	08/16/19 14:15	08/19/19 16:24	7440-38-2	
Cadmium	<0.033	ug/L	0.50	0.033	1	08/16/19 14:15	08/19/19 16:24	7440-43-9	
Chromium	0.17J	ug/L	1.0	0.078	1	08/16/19 14:15	08/19/19 16:24	7440-47-3	
Selenium	<0.085	ug/L	1.0	0.085	1	08/16/19 14:15	08/19/19 16:24	7782-49-2	
Thallium	<0.099	ug/L	1.0	0.099	1	08/16/19 14:15	08/19/19 16:24	7440-28-0	
245.1 Mercury		Analytical Method: EPA 245.1 Preparation Method: EPA 245.1							
Mercury	<0.066	ug/L	0.20	0.066	1	08/20/19 15:57	08/21/19 11:53	7439-97-6	
2320B Alkalinity		Analytical Method: SM 2320B							
Alkalinity, Total as CaCO3	324	mg/L	20.0	6.5	1		08/26/19 11:57		
2540C Total Dissolved Solids		Analytical Method: SM 2540C							
Total Dissolved Solids	681	mg/L	10.0	10.0	1		08/19/19 10:18		
300.0 IC Anions 28 Days		Analytical Method: EPA 300.0							
Chloride	0.74J	mg/L	1.0	0.22	1		08/27/19 15:54	16887-00-6	
Fluoride	<0.085	mg/L	0.20	0.085	1		08/27/19 15:54	16984-48-8	
Sulfate	3.3	mg/L	1.0	0.23	1		08/27/19 15:54	14808-79-8	

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ANALYTICAL RESULTS

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311915

Sample: M-FB-1 Lab ID: 60311915011 Collected: 08/13/19 08:00 Received: 08/14/19 02:55 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.7 Metals, Total		Analytical Method: EPA 200.7 Preparation Method: EPA 200.7							
Barium	<1.4	ug/L	5.0	1.4	1	08/16/19 14:00	08/19/19 19:08	7440-39-3	
Beryllium	<0.25	ug/L	1.0	0.25	1	08/16/19 14:00	08/19/19 19:08	7440-41-7	
Boron	13.0J	ug/L	100	10.7	1	08/16/19 14:00	08/19/19 19:08	7440-42-8	
Calcium	83.8J	ug/L	200	50.0	1	08/16/19 14:00	08/19/19 19:08	7440-70-2	B
Cobalt	<0.84	ug/L	5.0	0.84	1	08/16/19 14:00	08/19/19 19:08	7440-48-4	
Iron	<14.0	ug/L	50.0	14.0	1	08/16/19 14:00	08/19/19 19:08	7439-89-6	
Lead	<3.4	ug/L	10.0	3.4	1	08/16/19 14:00	08/19/19 19:08	7439-92-1	
Lithium	<5.9	ug/L	10.0	5.9	1	08/16/19 14:00	08/19/19 19:08	7439-93-2	
Magnesium	<13.0	ug/L	50.0	13.0	1	08/16/19 14:00	08/19/19 19:08	7439-95-4	
Manganese	<2.1	ug/L	5.0	2.1	1	08/16/19 14:00	08/19/19 19:08	7439-96-5	
Molybdenum	<2.6	ug/L	20.0	2.6	1	08/16/19 14:00	08/19/19 19:08	7439-98-7	
Potassium	94.0J	ug/L	500	79.0	1	08/16/19 14:00	08/19/19 19:08	7440-09-7	B
Sodium	<144	ug/L	500	144	1	08/16/19 14:00	08/19/19 19:08	7440-23-5	
200.8 MET ICPMS		Analytical Method: EPA 200.8 Preparation Method: EPA 200.8							
Antimony	<0.078	ug/L	1.0	0.078	1	08/16/19 14:15	08/19/19 16:13	7440-36-0	
Arsenic	<0.065	ug/L	1.0	0.065	1	08/16/19 14:15	08/19/19 16:13	7440-38-2	
Cadmium	<0.033	ug/L	0.50	0.033	1	08/16/19 14:15	08/19/19 16:13	7440-43-9	
Chromium	0.090J	ug/L	1.0	0.078	1	08/16/19 14:15	08/19/19 16:13	7440-47-3	
Selenium	<0.085	ug/L	1.0	0.085	1	08/16/19 14:15	08/19/19 16:13	7782-49-2	
Thallium	<0.099	ug/L	1.0	0.099	1	08/16/19 14:15	08/19/19 16:13	7440-28-0	
245.1 Mercury		Analytical Method: EPA 245.1 Preparation Method: EPA 245.1							
Mercury	<0.066	ug/L	0.20	0.066	1	08/20/19 15:57	08/21/19 11:55	7439-97-6	
2320B Alkalinity		Analytical Method: SM 2320B							
Alkalinity, Total as CaCO3	<6.5	mg/L	20.0	6.5	1		08/26/19 13:05		
2540C Total Dissolved Solids		Analytical Method: SM 2540C							
Total Dissolved Solids	9.0	mg/L	5.0	5.0	1		08/19/19 10:21		
300.0 IC Anions 28 Days		Analytical Method: EPA 300.0							
Chloride	0.43J	mg/L	1.0	0.22	1		08/27/19 16:10	16887-00-6	
Fluoride	<0.085	mg/L	0.20	0.085	1		08/27/19 16:10	16984-48-8	
Sulfate	<0.23	mg/L	1.0	0.23	1		08/27/19 16:10	14808-79-8	

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ANALYTICAL RESULTS

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311915

Sample: M-MW-1 **Lab ID: 60312019001** Collected: 08/14/19 11:37 Received: 08/15/19 02:55 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.7 Metals, Total		Analytical Method: EPA 200.7 Preparation Method: EPA 200.7							
Barium	341	ug/L	5.0	1.4	1	08/16/19 14:00	08/19/19 18:23	7440-39-3	
Beryllium	<0.25	ug/L	1.0	0.25	1	08/16/19 14:00	08/19/19 18:23	7440-41-7	
Boron	48.4J	ug/L	100	10.7	1	08/16/19 14:00	08/19/19 18:23	7440-42-8	
Calcium	131000	ug/L	200	50.0	1	08/16/19 14:00	08/19/19 18:23	7440-70-2	
Cobalt	<0.84	ug/L	5.0	0.84	1	08/16/19 14:00	08/19/19 18:23	7440-48-4	
Iron	14400	ug/L	50.0	14.0	1	08/16/19 14:00	08/19/19 18:23	7439-89-6	
Lead	<3.4	ug/L	10.0	3.4	1	08/16/19 14:00	08/19/19 18:23	7439-92-1	
Lithium	<5.9	ug/L	10.0	5.9	1	08/16/19 14:00	08/19/19 18:23	7439-93-2	
Magnesium	42700	ug/L	50.0	13.0	1	08/16/19 14:00	08/19/19 18:23	7439-95-4	
Manganese	1840	ug/L	5.0	2.1	1	08/16/19 14:00	08/19/19 18:23	7439-96-5	
Molybdenum	<2.6	ug/L	20.0	2.6	1	08/16/19 14:00	08/19/19 18:23	7439-98-7	
Potassium	1670	ug/L	500	79.0	1	08/16/19 14:00	08/19/19 18:23	7440-09-7	
Sodium	28400	ug/L	500	144	1	08/16/19 14:00	08/19/19 18:23	7440-23-5	
200.8 MET ICPMS		Analytical Method: EPA 200.8 Preparation Method: EPA 200.8							
Antimony	<0.078	ug/L	1.0	0.078	1	08/16/19 14:15	08/19/19 15:55	7440-36-0	
Arsenic	0.66J	ug/L	1.0	0.065	1	08/16/19 14:15	08/19/19 15:55	7440-38-2	
Cadmium	<0.033	ug/L	0.50	0.033	1	08/16/19 14:15	08/19/19 15:55	7440-43-9	
Chromium	0.22J	ug/L	1.0	0.078	1	08/16/19 14:15	08/19/19 15:55	7440-47-3	
Selenium	0.11J	ug/L	1.0	0.085	1	08/16/19 14:15	08/19/19 15:55	7782-49-2	
Thallium	<0.099	ug/L	1.0	0.099	1	08/16/19 14:15	08/19/19 15:55	7440-28-0	
245.1 Mercury		Analytical Method: EPA 245.1 Preparation Method: EPA 245.1							
Mercury	<0.066	ug/L	0.20	0.066	1	08/19/19 11:47	08/20/19 15:05	7439-97-6	
2320B Alkalinity		Analytical Method: SM 2320B							
Alkalinity, Total as CaCO3	390	mg/L	20.0	6.5	1		08/19/19 11:50		
2540C Total Dissolved Solids		Analytical Method: SM 2540C							
Total Dissolved Solids	696	mg/L	10.0	10.0	1		08/20/19 09:55		
300.0 IC Anions 28 Days		Analytical Method: EPA 300.0							
Chloride	44.2	mg/L	10.0	2.2	10		08/20/19 23:16	16887-00-6	
Fluoride	0.24	mg/L	0.20	0.085	1		08/20/19 21:52	16984-48-8	
Sulfate	106	mg/L	10.0	2.3	10		08/20/19 23:16	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC ENERGY CTR
Pace Project No.: 60311915

QC Batch: 604020 Analysis Method: EPA 245.1
QC Batch Method: EPA 245.1 Analysis Description: 245.1 Mercury
Associated Lab Samples: 60312019001

METHOD BLANK: 2469857 Matrix: Water
Associated Lab Samples: 60312019001

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Mercury	ug/L	<0.066	0.20	0.066	08/20/19 14:59	

LABORATORY CONTROL SAMPLE: 2469858

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury	ug/L	5	4.9	97	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2469859 2469860

Parameter	Units	60312019001		2469859		2469860		% Rec Limits	RPD	Max RPD	Qual	
		MS Result	MSD Spike Conc.	MS Result	MSD Spike Conc.	MS Result	MSD Spike Conc.					
Mercury	ug/L	<0.066	5	5	5	4.7	4.5	93	91	70-130	3	20

MATRIX SPIKE SAMPLE: 2469861

Parameter	Units	60311645005 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Mercury	ug/L	ND	5	4.9	98	70-130	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311915

QC Batch: 604387 Analysis Method: EPA 245.1
 QC Batch Method: EPA 245.1 Analysis Description: 245.1 Mercury
 Associated Lab Samples: 60311915001, 60311915002, 60311915003, 60311915004, 60311915005, 60311915006, 60311915007, 60311915008, 60311915009, 60311915010, 60311915011

METHOD BLANK: 2470996 Matrix: Water
 Associated Lab Samples: 60311915001, 60311915002, 60311915003, 60311915004, 60311915005, 60311915006, 60311915007, 60311915008, 60311915009, 60311915010, 60311915011

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Mercury	ug/L	<0.066	0.20	0.066	08/21/19 11:09	

LABORATORY CONTROL SAMPLE: 2470997

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury	ug/L	5	5.0	100	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2470998 2470999

Parameter	Units	60311814005 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mercury	ug/L	ND	5	5	5.1	5.0	102	100	70-130	1	20	

MATRIX SPIKE SAMPLE: 2471000

Parameter	Units	60311920002 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Mercury	ug/L	<0.066	5	5.1	103	70-130	

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311915

QC Batch: 603700 Analysis Method: EPA 200.7
 QC Batch Method: EPA 200.7 Analysis Description: 200.7 Metals, Total
 Associated Lab Samples: 60311915001, 60311915002, 60311915003, 60311915004, 60311915005, 60311915006, 60311915007, 60311915008, 60311915009, 60311915010, 60311915011, 60312019001

METHOD BLANK: 2468488 Matrix: Water
 Associated Lab Samples: 60311915001, 60311915002, 60311915003, 60311915004, 60311915005, 60311915006, 60311915007, 60311915008, 60311915009, 60311915010, 60311915011, 60312019001

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Barium	ug/L	<1.4	5.0	1.4	08/19/19 18:21	
Beryllium	ug/L	<0.25	1.0	0.25	08/19/19 18:21	
Boron	ug/L	<10.7	100	10.7	08/19/19 18:21	
Calcium	ug/L	60.6J	200	50.0	08/19/19 18:21	
Cobalt	ug/L	<0.84	5.0	0.84	08/19/19 18:21	
Iron	ug/L	<14.0	50.0	14.0	08/19/19 18:21	
Lead	ug/L	<3.4	10.0	3.4	08/19/19 18:21	
Lithium	ug/L	<5.9	10.0	5.9	08/19/19 18:21	
Magnesium	ug/L	18.7J	50.0	13.0	08/19/19 18:21	
Manganese	ug/L	<2.1	5.0	2.1	08/19/19 18:21	
Molybdenum	ug/L	<2.6	20.0	2.6	08/19/19 18:21	
Potassium	ug/L	160J	500	79.0	08/19/19 18:21	
Sodium	ug/L	448J	500	144	08/19/19 18:21	

LABORATORY CONTROL SAMPLE: 2468489

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Barium	ug/L	1000	978	98	85-115	
Beryllium	ug/L	1000	997	100	85-115	
Boron	ug/L	1000	945	95	85-115	
Calcium	ug/L	10000	9990	100	85-115	
Cobalt	ug/L	1000	1000	100	85-115	
Iron	ug/L	10000	9660	97	85-115	
Lead	ug/L	1000	1060	106	85-115	
Lithium	ug/L	1000	1010	101	85-115	
Magnesium	ug/L	10000	9590	96	85-115	
Manganese	ug/L	1000	975	98	85-115	
Molybdenum	ug/L	1000	983	98	85-115	
Potassium	ug/L	10000	10000	100	85-115	
Sodium	ug/L	10000	10400	104	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2468490 2468491

Parameter	Units	MS		MSD		MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
		60312019001	Result	Spike Conc.	Spike Conc.								
Barium	ug/L	341	1000	1000	1290	1320	95	98	70-130	2	20		
Beryllium	ug/L	<0.25	1000	1000	992	1010	99	101	70-130	2	20		

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311915

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2468490												2468491	
Parameter	Units	60312019001 Result	MS	MSD	MS	MSD	MS	MSD	% Rec	Max	Qual		
			Spike Conc.	Spike Conc.	Result	Result	% Rec	% Rec	Limits	RPD			
Boron	ug/L	48.4J	1000	1000	997	1010	95	96	70-130	1	20		
Calcium	ug/L	131000	10000	10000	139000	144000	81	129	70-130	3	20		
Cobalt	ug/L	<0.84	1000	1000	968	979	97	98	70-130	1	20		
Iron	ug/L	14400	10000	10000	23300	24000	89	96	70-130	3	20		
Lead	ug/L	<3.4	1000	1000	1020	1040	102	104	70-130	1	20		
Lithium	ug/L	<5.9	1000	1000	982	1000	98	100	70-130	2	20		
Magnesium	ug/L	42700	10000	10000	51200	53100	85	104	70-130	4	20		
Manganese	ug/L	1840	1000	1000	2760	2850	92	100	70-130	3	20		
Molybdenum	ug/L	<2.6	1000	1000	987	999	99	100	70-130	1	20		
Potassium	ug/L	1670	10000	10000	11300	11600	96	99	70-130	3	20		
Sodium	ug/L	28400	10000	10000	37500	38600	91	101	70-130	3	20		

MATRIX SPIKE SAMPLE: 2468492		60311915010	Spike	MS	MS	% Rec	Qualifiers
Parameter	Units	Result	Conc.	Result	% Rec	Limits	
Barium	ug/L	188	1000	1180	99	70-130	
Beryllium	ug/L	<0.25	1000	1020	101	70-130	
Boron	ug/L	9030	1000	10300	128	70-130	
Calcium	ug/L	168000	10000	183000	151	70-130	M1
Cobalt	ug/L	<0.84	1000	1010	101	70-130	
Iron	ug/L	27200	10000	37900	107	70-130	
Lead	ug/L	<3.4	1000	1060	106	70-130	
Lithium	ug/L	<5.9	1000	1020	102	70-130	
Magnesium	ug/L	45200	10000	56300	111	70-130	
Manganese	ug/L	1990	1000	3040	105	70-130	
Molybdenum	ug/L	6.7J	1000	1030	102	70-130	
Potassium	ug/L	2720	10000	12800	101	70-130	
Sodium	ug/L	32200	10000	43100	109	70-130	

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311915

QC Batch: 603726 Analysis Method: EPA 200.8
 QC Batch Method: EPA 200.8 Analysis Description: 200.8 MET
 Associated Lab Samples: 60311915001, 60311915002, 60311915003, 60311915004, 60311915005, 60311915006, 60311915007, 60311915008, 60311915009, 60311915010, 60311915011, 60312019001

METHOD BLANK: 2468551 Matrix: Water
 Associated Lab Samples: 60311915001, 60311915002, 60311915003, 60311915004, 60311915005, 60311915006, 60311915007, 60311915008, 60311915009, 60311915010, 60311915011, 60312019001

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Antimony	ug/L	<0.078	1.0	0.078	08/19/19 15:51	
Arsenic	ug/L	<0.065	1.0	0.065	08/19/19 15:51	
Cadmium	ug/L	<0.033	0.50	0.033	08/19/19 15:51	
Chromium	ug/L	<0.078	1.0	0.078	08/19/19 15:51	
Selenium	ug/L	<0.085	1.0	0.085	08/19/19 15:51	
Thallium	ug/L	<0.099	1.0	0.099	08/19/19 15:51	

LABORATORY CONTROL SAMPLE: 2468552

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Antimony	ug/L	40	41.4	103	85-115	
Arsenic	ug/L	40	40.0	100	85-115	
Cadmium	ug/L	40	41.2	103	85-115	
Chromium	ug/L	40	40.2	101	85-115	
Selenium	ug/L	40	41.0	102	85-115	
Thallium	ug/L	40	38.4	96	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2468553 2468554

Parameter	Units	MS		MSD		MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
		60312019001 Result	Spike Conc.	Spike Conc.	MS Result						
Antimony	ug/L	<0.078	40	40	41.1	40.0	103	100	70-130	3	20
Arsenic	ug/L	0.66J	40	40	40.5	39.7	100	98	70-130	2	20
Cadmium	ug/L	<0.033	40	40	39.1	38.2	98	96	70-130	2	20
Chromium	ug/L	0.22J	40	40	39.9	39.1	99	97	70-130	2	20
Selenium	ug/L	0.11J	40	40	38.6	38.5	96	96	70-130	0	20
Thallium	ug/L	<0.099	40	40	39.6	39.1	99	98	70-130	1	20

MATRIX SPIKE SAMPLE: 2468555

Parameter	Units	60311915006 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Antimony	ug/L	0.39J	40	40.0	99	70-130	
Arsenic	ug/L	2.8	40	44.0	103	70-130	
Cadmium	ug/L	0.36J	40	37.1	92	70-130	
Chromium	ug/L	0.18J	40	41.3	103	70-130	

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311915

MATRIX SPIKE SAMPLE:		2468555					
Parameter	Units	60311915006 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Selenium	ug/L	8.6	40	46.9	96	70-130	
Thallium	ug/L	<0.099	40	40.1	100	70-130	

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311915

QC Batch: 603916	Analysis Method: SM 2320B
QC Batch Method: SM 2320B	Analysis Description: 2320B Alkalinity
Associated Lab Samples: 60312019001	

METHOD BLANK: 2469612 Matrix: Water
Associated Lab Samples: 60312019001

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Alkalinity, Total as CaCO ₃	mg/L	<6.5	20.0	6.5	08/19/19 10:06	

LABORATORY CONTROL SAMPLE: 2469613

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity, Total as CaCO ₃	mg/L	500	487	97	90-110	

SAMPLE DUPLICATE: 2469766

Parameter	Units	60311993004 Result	Dup Result	RPD	Max RPD	Qualifiers
Alkalinity, Total as CaCO ₃	mg/L	386	387	0	10	

SAMPLE DUPLICATE: 2469767

Parameter	Units	60312019001 Result	Dup Result	RPD	Max RPD	Qualifiers
Alkalinity, Total as CaCO ₃	mg/L	390	412	6	10	

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC ENERGY CTR
Pace Project No.: 60311915

QC Batch: 605185 Analysis Method: SM 2320B
QC Batch Method: SM 2320B Analysis Description: 2320B Alkalinity
Associated Lab Samples: 60311915001, 60311915002, 60311915003, 60311915004, 60311915005, 60311915006, 60311915007, 60311915008, 60311915009, 60311915010, 60311915011

METHOD BLANK: 2473734 Matrix: Water
Associated Lab Samples: 60311915001, 60311915002, 60311915003, 60311915004, 60311915005, 60311915006, 60311915007, 60311915008, 60311915009, 60311915010, 60311915011

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Alkalinity, Total as CaCO3	mg/L	<6.5	20.0	6.5	08/26/19 10:49	

LABORATORY CONTROL SAMPLE: 2473735

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

SAMPLE DUPLICATE: 2473736

Parameter	Units	60311820012 Result	Dup Result	RPD	Max RPD	Qualifiers
Alkalinity, Total as CaCO3	mg/L	378	393	4	10	

SAMPLE DUPLICATE: 2473737

Parameter	Units	60311736004 Result	Dup Result	RPD	Max RPD	Qualifiers
Alkalinity, Total as CaCO3	mg/L	516	515	0	10	

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311915

QC Batch: 603928

Analysis Method: SM 2540C

QC Batch Method: SM 2540C

Analysis Description: 2540C Total Dissolved Solids

Associated Lab Samples: 60311915001, 60311915002, 60311915003, 60311915004, 60311915005, 60311915010

METHOD BLANK: 2469645

Matrix: Water

Associated Lab Samples: 60311915001, 60311915002, 60311915003, 60311915004, 60311915005, 60311915010

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	<5.0	5.0	5.0	08/19/19 10:17	

LABORATORY CONTROL SAMPLE: 2469646

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Dissolved Solids	mg/L	1000	1020	102	80-120	

SAMPLE DUPLICATE: 2469647

Parameter	Units	60311915001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	817	798	2	10	

SAMPLE DUPLICATE: 2469648

Parameter	Units	60311879003 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	499	523	5	10	

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311915

QC Batch: 603932

Analysis Method: SM 2540C

QC Batch Method: SM 2540C

Analysis Description: 2540C Total Dissolved Solids

Associated Lab Samples: 60311915006, 60311915007, 60311915008, 60311915009, 60311915011

METHOD BLANK: 2469663

Matrix: Water

Associated Lab Samples: 60311915006, 60311915007, 60311915008, 60311915009, 60311915011

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	<5.0	5.0	5.0	08/19/19 10:20	

LABORATORY CONTROL SAMPLE: 2469664

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

SAMPLE DUPLICATE: 2469665

Parameter	Units	60311920002 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	1630	1620	1	10	

SAMPLE DUPLICATE: 2469666

Parameter	Units	60312087006 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	2950	3460	16	10 D6	

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311915

QC Batch: 604219

Analysis Method: SM 2540C

QC Batch Method: SM 2540C

Analysis Description: 2540C Total Dissolved Solids

Associated Lab Samples: 60312019001

METHOD BLANK: 2470466

Matrix: Water

Associated Lab Samples: 60312019001

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	<5.0	5.0	5.0	08/20/19 09:55	

LABORATORY CONTROL SAMPLE: 2470467

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

SAMPLE DUPLICATE: 2470468

Parameter	Units	60312019001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	696	698	0	10	

SAMPLE DUPLICATE: 2470469

Parameter	Units	60312020006 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	<5.0	<5.0		10	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC ENERGY CTR
Pace Project No.: 60311915

QC Batch: 604358 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 60312019001

METHOD BLANK: 2470936 Matrix: Water
Associated Lab Samples: 60312019001

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Chloride	mg/L	<0.22	1.0	0.22	08/20/19 15:15	
Fluoride	mg/L	<0.085	0.20	0.085	08/20/19 15:15	
Sulfate	mg/L	<0.23	1.0	0.23	08/20/19 15:15	

LABORATORY CONTROL SAMPLE: 2470937

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	2.4	97	90-110	
Sulfate	mg/L	5	4.8	97	90-110	

MATRIX SPIKE SAMPLE: 2470938

Parameter	Units	60311700004 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	1700	1000	2670	97	80-120	
Fluoride	mg/L	98.0	500	599	100	80-120	
Sulfate	mg/L	ND	1000	1000	97	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2470939 2470940

Parameter	Units	60312019001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	44.2	50	50	94.5	92.2	100	96	80-120	2	15	
Fluoride	mg/L	0.24	2.5	2.5	2.6	2.7	95	98	80-120	2	15	
Sulfate	mg/L	106	50	50	161	156	109	98	80-120	3	15	

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311915

QC Batch: 605614

Analysis Method: EPA 300.0

QC Batch Method: EPA 300.0

Analysis Description: 300.0 IC Anions

Associated Lab Samples: 60311915001, 60311915002, 60311915003, 60311915004, 60311915005

METHOD BLANK: 2475662

Matrix: Water

Associated Lab Samples: 60311915001, 60311915002, 60311915003, 60311915004, 60311915005

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Chloride	mg/L	<0.22	1.0	0.22	08/27/19 02:54	
Fluoride	mg/L	<0.085	0.20	0.085	08/27/19 02:54	
Sulfate	mg/L	<0.23	1.0	0.23	08/27/19 02:54	

LABORATORY CONTROL SAMPLE: 2475663

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	5	4.7	95	90-110	
Fluoride	mg/L	2.5	2.5	100	90-110	
Sulfate	mg/L	5	5.2	104	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2475664 2475665

Parameter	Units	MS		MSD		MS		MSD		% Rec Limits	RPD	Max RPD	Qual
		60311915001 Result	Spike Conc.	Spike Conc.	Result	Result	% Rec	% Rec					
Chloride	mg/L	27.5	250	250	273	277	98	100	80-120	1	15		
Fluoride	mg/L	0.15J	2.5	2.5	2.7	2.7	104	104	80-120	0	15		
Sulfate	mg/L	324	250	250	564	568	96	98	80-120	1	15		

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC ENERGY CTR
Pace Project No.: 60311915

QC Batch: 605755 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 60311915006, 60311915007, 60311915008, 60311915009, 60311915010, 60311915011

METHOD BLANK: 2476001 Matrix: Water
Associated Lab Samples: 60311915006, 60311915007, 60311915008, 60311915009, 60311915010, 60311915011

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Chloride	mg/L	<0.22	1.0	0.22	08/27/19 10:51	
Fluoride	mg/L	<0.085	0.20	0.085	08/27/19 10:51	
Sulfate	mg/L	<0.23	1.0	0.23	08/27/19 10:51	

LABORATORY CONTROL SAMPLE: 2476002

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	5	4.6	92	90-110	
Fluoride	mg/L	2.5	2.3	93	90-110	
Sulfate	mg/L	5	5.1	103	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2476003 2476004

Parameter	Units	60311920002		MS		MSD		MS		MSD		% Rec Limits	RPD	Max RPD	Qual
		Result	Conc.	Spike Conc.	Conc.	Result	Result	% Rec	% Rec						
Chloride	mg/L	271	250	250	508	507	95	94	80-120	0	15				
Fluoride	mg/L	0.47	2.5	2.5	2.9	2.9	99	98	80-120	1	15				
Sulfate	mg/L	456	250	250	703	701	99	98	80-120	0	15				

MATRIX SPIKE SAMPLE: 2476005

Parameter	Units	60312114001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	ND	50	49.6	86	80-120	
Fluoride	mg/L	ND	25	24.6	98	80-120	
Sulfate	mg/L	166	50	214	95	80-120 E	

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ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311915

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	0.627 ± 0.546 (0.828) C:NA T:89%	pCi/L	09/06/19 15:49	13982-63-3	
Radium-228	EPA 904.0	0.0961 ± 0.405 (0.918) C:77% T:84%	pCi/L	09/04/19 14:38	15262-20-1	

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ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311915

Sample: M-MW-3 **Lab ID: 60311915002** Collected: 08/12/19 13:26 Received: 08/14/19 02:55 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	0.346 ± 0.260 (0.134) C:NA T:88%	pCi/L	09/06/19 15:49	13982-63-3	
Radium-228	EPA 904.0	0.746 ± 0.411 (0.739) C:79% T:90%	pCi/L	09/04/19 14:38	15262-20-1	

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ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311915

Sample: M-MW-4 **Lab ID: 60311915003** Collected: 08/12/19 15:59 Received: 08/14/19 02:55 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	0.640 ± 0.425 (0.496) C:NA T:89%	pCi/L	09/06/19 15:49	13982-63-3	
Radium-228	EPA 904.0	0.519 ± 0.422 (0.844) C:77% T:86%	pCi/L	09/04/19 14:34	15262-20-1	

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ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311915

Sample: M-MW-5 **Lab ID: 60311915004** Collected: 08/13/19 11:30 Received: 08/14/19 02:55 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	0.299 ± 0.403 (0.678) C:NA T:96%	pCi/L	09/06/19 15:49	13982-63-3	
Radium-228	EPA 904.0	1.30 ± 0.551 (0.894) C:77% T:80%	pCi/L	09/04/19 14:34	15262-20-1	

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ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311915

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	0.475 ± 0.315 (0.143) C:NA T:92%	pCi/L	09/06/19 16:02	13982-63-3	
Radium-228	EPA 904.0	-0.411 ± 0.348 (0.892) C:74% T:84%	pCi/L	09/04/19 14:35	15262-20-1	

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ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311915

Sample: M-MW-7 **Lab ID: 60311915006** Collected: 08/13/19 15:25 Received: 08/14/19 02:55 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	0.258 ± 0.337 (0.556) C:NA T:88%	pCi/L	09/06/19 16:02	13982-63-3	
Radium-228	EPA 904.0	0.366 ± 0.421 (0.885) C:72% T:88%	pCi/L	09/04/19 14:36	15262-20-1	

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ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311915

Sample: M-MW-8 **Lab ID: 60311915007** Collected: 08/13/19 14:00 Received: 08/14/19 02:55 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	0.373 ± 0.349 (0.495) C:NA T:84%	pCi/L	09/06/19 16:02	13982-63-3	
Radium-228	EPA 904.0	0.185 ± 0.321 (0.701) C:76% T:90%	pCi/L	09/04/19 14:36	15262-20-1	

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ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311915

Sample: M-BMW-1 **Lab ID: 60311915008** Collected: 08/13/19 10:50 Received: 08/14/19 02:55 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	0.838 ± 0.469 (0.487) C:NA T:88%	pCi/L	09/06/19 16:02	13982-63-3	
Radium-228	EPA 904.0	0.676 ± 0.426 (0.801) C:79% T:84%	pCi/L	09/04/19 14:36	15262-20-1	

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ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311915

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	1.10 ± 0.603 (0.738) C:NA T:92%	pCi/L	09/06/19 16:12	13982-63-3	
Radium-228	EPA 904.0	0.173 ± 0.361 (0.797) C:79% T:85%	pCi/L	09/04/19 14:37	15262-20-1	

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ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311915

Sample: M-DUP-1 **Lab ID: 60311915010** Collected: 08/12/19 08:00 Received: 08/14/19 02:55 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	0.307 ± 0.356 (0.574) C:NA T:97%	pCi/L	09/06/19 14:47	13982-63-3	
Radium-228	EPA 904.0	0.623 ± 0.466 (0.933) C:78% T:95%	pCi/L	09/05/19 11:24	15262-20-1	

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ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311915

Sample: M-FB-1 **Lab ID: 60311915011** Collected: 08/13/19 08:00 Received: 08/14/19 02:55 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	0.586 ± 0.412 (0.526) C:NA T:94%	pCi/L	09/06/19 14:47	13982-63-3	
Radium-228	EPA 904.0	0.282 ± 0.402 (0.864) C:78% T:83%	pCi/L	09/05/19 11:18	15262-20-1	

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ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311915

Sample: M-MW-1 **Lab ID: 60312019001** Collected: 08/14/19 11:37 Received: 08/15/19 02:55 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	0.374 ± 0.318 (0.447) C:NA T:88%	pCi/L	09/06/19 15:01	13982-63-3	
Radium-228	EPA 904.0	0.344 ± 0.438 (0.934) C:78% T:85%	pCi/L	09/05/19 11:19	15262-20-1	

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ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311915

Sample: M-MW-1 MS **Lab ID: 60311915013** Collected: 08/14/19 11:37 Received: 08/15/19 02:55 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	71.24 %REC ± NA (NA) C:NA T:NA	pCi/L	09/06/19 14:47	13982-63-3	
Radium-228	EPA 904.0	90.20 %REC ± NA (NA) C:NA T:NA	pCi/L	09/05/19 11:19	15262-20-1	

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ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311915

Sample: M-MW-1 MSD **Lab ID: 60311915014** Collected: 08/14/19 11:37 Received: 08/15/19 02:55 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	93.85 %REC 27.39 RPD ± NA (NA) C:NA T:NA	pCi/L	09/06/19 15:01	13982-63-3	
Radium-228	EPA 904.0	87.50 %REC 3.04 RPD ± NA (NA) C:NA T:NA	pCi/L	09/05/19 11:19	15262-20-1	

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QUALITY CONTROL - RADIOCHEMISTRY

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311915

QC Batch:	357798	Analysis Method:	EPA 903.1
QC Batch Method:	EPA 903.1	Analysis Description:	903.1 Radium-226
Associated Lab Samples:	60311915001, 60311915002, 60311915003, 60311915004, 60311915005, 60311915006, 60311915007, 60311915008, 60311915009		

METHOD BLANK:	1737463	Matrix:	Water
Associated Lab Samples:	60311915001, 60311915002, 60311915003, 60311915004, 60311915005, 60311915006, 60311915007, 60311915008, 60311915009		

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-226	0.497 ± 0.316 (0.382) C:NA T:100%	pCi/L	09/06/19 15:35	

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QUALITY CONTROL - RADIOCHEMISTRY

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311915

QC Batch: 357805 Analysis Method: EPA 903.1

QC Batch Method: EPA 903.1 Analysis Description: 903.1 Radium-226

Associated Lab Samples: 60311915010, 60311915011, 60311915013, 60311915014, 60312019001

METHOD BLANK: 1737479 Matrix: Water

Associated Lab Samples: 60311915010, 60311915011, 60311915013, 60311915014, 60312019001

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-226	0.445 ± 0.296 (0.345) C:NA T:100%	pCi/L	09/06/19 14:47	

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QUALITY CONTROL - RADIOCHEMISTRY

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311915

QC Batch: 357804 Analysis Method: EPA 904.0

QC Batch Method: EPA 904.0 Analysis Description: 904.0 Radium 228

Associated Lab Samples: 60311915010, 60311915011, 60311915013, 60311915014, 60312019001

METHOD BLANK: 1737478 Matrix: Water

Associated Lab Samples: 60311915010, 60311915011, 60311915013, 60311915014, 60312019001

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-228	-0.0593 ± 0.274 (0.666) C:80% T:77%	pCi/L	09/05/19 11:15	

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QUALITY CONTROL - RADIOCHEMISTRY

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311915

QC Batch: 357797

Analysis Method: EPA 904.0

QC Batch Method: EPA 904.0

Analysis Description: 904.0 Radium 228

Associated Lab Samples: 60311915001, 60311915002, 60311915003, 60311915004, 60311915005, 60311915006, 60311915007, 60311915008, 60311915009

METHOD BLANK: 1737457

Matrix: Water

Associated Lab Samples: 60311915001, 60311915002, 60311915003, 60311915004, 60311915005, 60311915006, 60311915007, 60311915008, 60311915009

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-228	0.550 ± 0.383 (0.736) C:76% T:81%	pCi/L	09/04/19 10:35	

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REPORT OF LABORATORY ANALYSIS

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QUALIFIERS

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311915

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.

Act - Activity

Unc - Uncertainty: SDWA = 1.96 sigma count uncertainty, all other matrices = Expanded Uncertainty (95% confidence interval).

Gamma Spec = Expanded Uncertainty (95.4% Confidence Interval)

(MDC) - Minimum Detectable Concentration

Trac - Tracer Recovery (%)

Carr - Carrier Recovery (%)

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

PASI-PA Pace Analytical Services - Greensburg

ANALYTE QUALIFIERS

B Analyte was detected in the associated method blank.

D6 The precision between the sample and sample duplicate exceeded laboratory control limits.

E Analyte concentration exceeded the calibration range. The reported result is estimated.

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

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311915

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
60311915001	M-MW-2	EPA 200.7	603700	EPA 200.7	603765
60311915002	M-MW-3	EPA 200.7	603700	EPA 200.7	603765
60311915003	M-MW-4	EPA 200.7	603700	EPA 200.7	603765
60311915004	M-MW-5	EPA 200.7	603700	EPA 200.7	603765
60311915005	M-MW-6	EPA 200.7	603700	EPA 200.7	603765
60311915006	M-MW-7	EPA 200.7	603700	EPA 200.7	603765
60311915007	M-MW-8	EPA 200.7	603700	EPA 200.7	603765
60311915008	M-BMW-1	EPA 200.7	603700	EPA 200.7	603765
60311915009	M-BMW-2	EPA 200.7	603700	EPA 200.7	603765
60311915010	M-DUP-1	EPA 200.7	603700	EPA 200.7	603765
60311915011	M-FB-1	EPA 200.7	603700	EPA 200.7	603765
60312019001	M-MW-1	EPA 200.7	603700	EPA 200.7	603765
60311915001	M-MW-2	EPA 200.8	603726	EPA 200.8	603773
60311915002	M-MW-3	EPA 200.8	603726	EPA 200.8	603773
60311915003	M-MW-4	EPA 200.8	603726	EPA 200.8	603773
60311915004	M-MW-5	EPA 200.8	603726	EPA 200.8	603773
60311915005	M-MW-6	EPA 200.8	603726	EPA 200.8	603773
60311915006	M-MW-7	EPA 200.8	603726	EPA 200.8	603773
60311915007	M-MW-8	EPA 200.8	603726	EPA 200.8	603773
60311915008	M-BMW-1	EPA 200.8	603726	EPA 200.8	603773
60311915009	M-BMW-2	EPA 200.8	603726	EPA 200.8	603773
60311915010	M-DUP-1	EPA 200.8	603726	EPA 200.8	603773
60311915011	M-FB-1	EPA 200.8	603726	EPA 200.8	603773
60312019001	M-MW-1	EPA 200.8	603726	EPA 200.8	603773
60311915001	M-MW-2	EPA 245.1	604387	EPA 245.1	604433
60311915002	M-MW-3	EPA 245.1	604387	EPA 245.1	604433
60311915003	M-MW-4	EPA 245.1	604387	EPA 245.1	604433
60311915004	M-MW-5	EPA 245.1	604387	EPA 245.1	604433
60311915005	M-MW-6	EPA 245.1	604387	EPA 245.1	604433
60311915006	M-MW-7	EPA 245.1	604387	EPA 245.1	604433
60311915007	M-MW-8	EPA 245.1	604387	EPA 245.1	604433
60311915008	M-BMW-1	EPA 245.1	604387	EPA 245.1	604433
60311915009	M-BMW-2	EPA 245.1	604387	EPA 245.1	604433
60311915010	M-DUP-1	EPA 245.1	604387	EPA 245.1	604433
60311915011	M-FB-1	EPA 245.1	604387	EPA 245.1	604433
60312019001	M-MW-1	EPA 245.1	604020	EPA 245.1	604051
60311915001	M-MW-2	EPA 903.1	357798		
60311915002	M-MW-3	EPA 903.1	357798		
60311915003	M-MW-4	EPA 903.1	357798		
60311915004	M-MW-5	EPA 903.1	357798		
60311915005	M-MW-6	EPA 903.1	357798		
60311915006	M-MW-7	EPA 903.1	357798		
60311915007	M-MW-8	EPA 903.1	357798		
60311915008	M-BMW-1	EPA 903.1	357798		
60311915009	M-BMW-2	EPA 903.1	357798		
60311915010	M-DUP-1	EPA 903.1	357805		

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311915

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
60311915011	M-FB-1	EPA 903.1	357805		
60312019001	M-MW-1	EPA 903.1	357805		
60311915013	M-MW-1 MS	EPA 903.1	357805		
60311915014	M-MW-1 MSD	EPA 903.1	357805		
60311915001	M-MW-2	EPA 904.0	357797		
60311915002	M-MW-3	EPA 904.0	357797		
60311915003	M-MW-4	EPA 904.0	357797		
60311915004	M-MW-5	EPA 904.0	357797		
60311915005	M-MW-6	EPA 904.0	357797		
60311915006	M-MW-7	EPA 904.0	357797		
60311915007	M-MW-8	EPA 904.0	357797		
60311915008	M-BMW-1	EPA 904.0	357797		
60311915009	M-BMW-2	EPA 904.0	357797		
60311915010	M-DUP-1	EPA 904.0	357804		
60311915011	M-FB-1	EPA 904.0	357804		
60312019001	M-MW-1	EPA 904.0	357804		
60311915013	M-MW-1 MS	EPA 904.0	357804		
60311915014	M-MW-1 MSD	EPA 904.0	357804		
60311915001	M-MW-2	SM 2320B	605185		
60311915002	M-MW-3	SM 2320B	605185		
60311915003	M-MW-4	SM 2320B	605185		
60311915004	M-MW-5	SM 2320B	605185		
60311915005	M-MW-6	SM 2320B	605185		
60311915006	M-MW-7	SM 2320B	605185		
60311915007	M-MW-8	SM 2320B	605185		
60311915008	M-BMW-1	SM 2320B	605185		
60311915009	M-BMW-2	SM 2320B	605185		
60311915010	M-DUP-1	SM 2320B	605185		
60311915011	M-FB-1	SM 2320B	605185		
60312019001	M-MW-1	SM 2320B	603916		
60311915001	M-MW-2	SM 2540C	603928		
60311915002	M-MW-3	SM 2540C	603928		
60311915003	M-MW-4	SM 2540C	603928		
60311915004	M-MW-5	SM 2540C	603928		
60311915005	M-MW-6	SM 2540C	603928		
60311915006	M-MW-7	SM 2540C	603932		
60311915007	M-MW-8	SM 2540C	603932		
60311915008	M-BMW-1	SM 2540C	603932		
60311915009	M-BMW-2	SM 2540C	603932		
60311915010	M-DUP-1	SM 2540C	603928		
60311915011	M-FB-1	SM 2540C	603932		
60312019001	M-MW-1	SM 2540C	604219		
60311915001	M-MW-2	EPA 300.0	605614		
60311915002	M-MW-3	EPA 300.0	605614		

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311915

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
60311915003	M-MW-4	EPA 300.0	605614		
60311915004	M-MW-5	EPA 300.0	605614		
60311915005	M-MW-6	EPA 300.0	605614		
60311915006	M-MW-7	EPA 300.0	605755		
60311915007	M-MW-8	EPA 300.0	605755		
60311915008	M-BMW-1	EPA 300.0	605755		
60311915009	M-BMW-2	EPA 300.0	605755		
60311915010	M-DUP-1	EPA 300.0	605755		
60311915011	M-FB-1	EPA 300.0	605755		
60312019001	M-MW-1	EPA 300.0	604358		

REPORT OF LABORATORY ANALYSIS

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Sample Condition Upon Receipt

WO#: 60311915



Client Name: Colder Assoc

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

Tracking #: _____ Pace Shipping Label Used? Yes No

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

Packing Material: Bubble Wrap Bubble Bags Foam None Other KEPIC

Thermometer Used: T-100 Type of Ice: Wet Blue None

Cooler Temperature (°C): As-read 19.5 Corr. Factor 0.0 Corrected 19.5 Date and initials of person examining contents: 8-15-19

Temperature should be above freezing to 6°C 2.7, 0.2, 18.8 2.7, 0.2, 18.8

Chain of Custody present:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Chain of Custody relinquished:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Samples arrived within holding time:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Short Hold Time analyses (<72hr):	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	
Rush Turn Around Time requested:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	
Sufficient volume:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Correct containers used:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Pace containers used:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Containers intact:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<u>All coolers without ICE</u>
Unpreserved 5035A / TX1005/1006 soils frozen in 48hrs?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	<u>have Radium samples</u>
Filtered volume received for dissolved tests?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Sample labels match COC: Date / time / ID / analyses	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Samples contain multiple phases? Matrix: <u>WT</u>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	
Containers requiring pH preservation in compliance? (HNO ₃ , H ₂ SO ₄ , HCl<2; NaOH>9 Sulfide, NaOH>10 Cyanide) (Exceptions: VOA, Micro, O&G, KS TPH, OK-DRO)	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> 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)	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Potassium iodide test strip turns blue/purple? (Preserve)	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Trip Blank present:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Headspace in VOA vials (>6mm):	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Samples from USDA Regulated Area: State:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Additional labels attached to 5035A / TX1005 vials in the field?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> 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: Jamie Church Date: 8/16/19

Project Manager Review: _____ Date: _____



Sample Condition Upon Receipt

WO# : 60312019
60312019

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 Nope Other

Thermometer Used: T-300 Type of Ice: Wet Blue None

Cooler Temperature (°C): As-read 1.9/0.7 Corr. Factor 0.0 Corrected 1.9/0.7/11.9

Date and initials of person examining contents:
PUG/15/19

Temperature should be above freezing to 6°C 11.9/14.6

Chain of Custody present:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Chain of Custody relinquished:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Samples arrived within holding time:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Short Hold Time analyses (<72hr):	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	<u>No Volume For Total Phosphorus</u>
Rush Turn Around Time requested:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	<u>Receive a empty BP3S with project.</u>
Sufficient volume:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Correct containers used:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Pace containers used:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Containers intact:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Unpreserved 5035A / TX1005/1006 soils frozen in 48hrs?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Filtered volume received for dissolved tests?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Sample labels match COC: Date / time / ID / analyses	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Samples contain multiple phases? Matrix: <u>WT</u>	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Containers requiring pH preservation in compliance? (HNO ₃ , H ₂ SO ₄ , HCl<2; NaOH>9 Sulfide, NaOH>10 Cyanide) (Exceptions: VOA, Micro, O&G, KS TPH, OK-DRO)	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> 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)	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Potassium iodide test strip turns blue/purple? (Preserve)	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Trip Blank present:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Headspace in VOA vials (>6mm):	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Samples from USDA Regulated Area: State:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Additional labels attached to 5035A / TX1005 vials in the field?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> 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: Jamie Church Date: 8/16/19

MEMORANDUM**DATE** October 1, 2019**Project No.** 1531406**TO** Project File
Golder Associates**CC** Amanda Derhake, Jeff Ingram**FROM** Tommy Goodwin**EMAIL** Tommy_Goodwin@golder.com**DATA VALIDATION SUMMARY, MERAMEC ENERGY CENTER – CCR – DATA PACKAGE 60311915R1**

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

- When a compound was detected in a sample result between the MDL and the PQL the results were recorded at the detection value and qualified as estimates (J).
- When a compound was detected in a blank (i.e. method, field) and the blank comparison criterion was not met, associated sample results were qualified as estimates (J) or non-detects (U).
- When a radionuclide was detected in a blank (i.e. method, field), and the sample results were greater than the MDC and less than ten times the blank results the results were recorded at the result value and qualified as estimates (J).
- When a field duplicate RPD exceeded 20%, associated samples were qualified as estimates (J).
- When MS/MSD recovery exceeded the QC limits, the associated sample result was qualified as an estimate (J).

QA LEVEL II - INORGANIC DATA EVALUATION CHECKLIST

Company Name: Golder Associates
 Project Name: Ameren - MEC - DM/AM
 Reviewer: T Goodwin

Project Manager: J Ingram
 Project Number: 1531406
 Validation Date: 10/1/2019

Laboratory: Pace Analytical - KS

SDG #: 60311915R1

Analytical Method (type and no.): EPA 200.7/200.8 (Metals); EPA 245.1 (Hg); EPA 903.1/904.0 (Rads); SM 2320B (Alk); SM 2540C (TDS); EPA 300.0 (Anions)

Matrix: Air Soil/Sed. Water Waste _____

Sample Names M-MW-1, M-MW-2, M-MW-3, M-MW-4, M-MW-5, M-MW-6, M-MW-7, M-MW-8, M-BMW-1, M-BMW-2, M-DUP-1, M-FB-1, M-MW-1 MS, M-MW-1 MSD

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?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>8/12-8/14/2019</u>
b) Sampling team indicated?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
c) Sample location noted?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
d) Sample depth indicated (Soils)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	_____
e) Sample type indicated (<u>grab</u> /composite)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
f) Field QC noted?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
g) Field parameters collected (note types)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>pH, Sp.Cond, ORP, Temp, DO, Turb</u>
h) Field Calibration within control limits?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
i) Notations of unacceptable field conditions/performance from field logs or field notes?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	_____
j) Does the laboratory narrative indicate deficiencies?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	_____
Note Deficiencies: _____				

Chain-of-Custody (COC)	YES	NO	NA	COMMENTS
a) Was the COC properly completed?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
b) Was the COC signed by both field and laboratory personnel?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
c) Were samples received in good condition?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____

General (reference QAPP or Method)	YES	NO	NA	COMMENTS
a) Were hold times met for sample pretreatment?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
b) Were hold times met for sample analysis?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
c) Were the correct preservatives used?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
d) Was the correct method used?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
e) Were appropriate reporting limits achieved?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
f) Were any sample dilutions noted?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>See Notes</u>
g) Were any matrix problems noted?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	_____

QA LEVEL II - INORGANIC DATA EVALUATION CHECKLIST

Blanks	YES	NO	NA	COMMENTS
a) Were analytes detected in the method blank(s)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	See Notes
b) Were analytes detected in the field blank(s)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	See Notes
c) Were analytes detected in the equipment blank(s)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
d) Were analytes detected in the trip blank(s)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

Laboratory Control Sample (LCS)	YES	NO	NA	COMMENTS
a) Was a LCS analyzed once per SDG?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
b) Were the proper analytes included in the LCS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
c) Was the LCS accuracy criteria met?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Duplicates	YES	NO	NA	COMMENTS
a) Were field duplicates collected (note original and duplicate sample names)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	DUP-1@M-MW-3
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	FB-1@M-MW-8
b) Were field dup. precision criteria met (note RPD)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	See Notes
c) Were lab duplicates analyzed (note original and duplicate samples)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-19001 (Alk, TDS); -15001 (TDS)
d) Were lab dup. precision criteria met (note RPD)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	See Notes

Blind Standards	YES	NO	NA	COMMENTS
a) Was a blind standard used (indicate name, analytes included and concentrations)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
b) Was the %D within control limits?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

Matrix Spike/Matrix Spike Duplicate (MS/MSD)	YES	NO	NA	COMMENTS
a) Was MS accuracy criteria met?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	See Notes
Recovery could not be calculated since sample contained high concentration of analyte?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
b) Was MSD accuracy criteria met?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Recovery could not be calculated since sample contained high concentration of analyte?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
c) Were MS/MSD precision criteria met?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Comments/Notes:

MB: -915001-11, -019001: Ca (60.6), Mg (18.7), K (160), Na (448); -915001-09: Ra-226 (0.497); -10-14, -19001: Ra-226 (0.445)

FB-1: B (13.0), Ca (83.8), K (94.0), Cr (0.090), TDS (9.0), Cl (0.43), Ra-226 (0.586)

DUP-1: Cr (43), Se (200), Cl (187), F (200), SO4 (196), TDS (35), Ra-226 (200), Ra-228 (200)

Max Lab Duplicate RPD: 6% (Limit 10%)

MS/MSD: -915010: Ca (MS-H)

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

QA LEVEL II - INORGANIC DATA EVALUATION CHECKLIST

Data Qualification:

Sample Name	Constituent(s)	Result	Qualifier	Reason
M-FB-1	Calcium (Ca)	200	U	Analyte Detected in Method Blank (MB); PQL>Result>MDL
"	Potassium (K)	500	U	"
M-MW-8	Chromium (Cr)	1.0	U	Analyte Detected in Field Blank (FB); PQL>Result>MDL
M-MW-3	Chloride (Cl)	-	J	Field Duplicate (FD) Exceeded RPD Limit; Result > MDL
"	Sulfate (SO4)	-	J	"
"	Total Dissolved Solids (TDS)	-	J	"
M-DUP-1	SO4	-	J	"
"	TDS	-	J	"
"	Cl	-	J	"
"	Ca	-	J	MS/MSD Exceeded Calibration Range
M-MW-3	Radium-226 (Ra-226)	-	J	Analyte Detected in MB; 10xMB>Result>MDC
M-MW-4	"	-	J	"
M-MW-6	"	-	J	"
M-BMW-1	"	-	J	"
M-BMW-2	"	-	J	"
M-FB-1	"	-	J	"
M-MW-3	Radium-228 (Ra-228)	-	J	FD Exceeded RPD Limit; Result > MDC

Signature: *Tommy J. Good*

Date: 10/1/2019

September 09, 2019

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

RE: Project: AMEREN MERAMEC ENERGY CTR
Pace Project No.: 60311920

Dear Jeffrey Ingram:

Enclosed are the analytical results for sample(s) received by the laboratory between August 14, 2019 and August 15, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

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

Sincerely,



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

Enclosures

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



REPORT OF LABORATORY ANALYSIS

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CERTIFICATIONS

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311920

Pennsylvania Certification IDs

1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601
ANAB DOD-ELAP Rad Accreditation #: L2417
Alabama Certification #: 41590
Arizona Certification #: AZ0734
Arkansas Certification
California Certification #: 04222CA
Colorado Certification #: PA01547
Connecticut Certification #: PH-0694
Delaware Certification
EPA Region 4 DW Rad
Florida/TNI Certification #: E87683
Georgia Certification #: C040
Florida: Cert E871149 SEKS WET
Guam Certification
Hawaii Certification
Idaho Certification
Illinois Certification
Indiana Certification
Iowa Certification #: 391
Kansas/TNI Certification #: E-10358
Kentucky Certification #: KY90133
KY WW Permit #: KY0098221
KY WW Permit #: KY0000221
Louisiana DHH/TNI Certification #: LA180012
Louisiana DEQ/TNI Certification #: 4086
Maine Certification #: 2017020
Maryland Certification #: 308
Massachusetts Certification #: M-PA1457
Michigan/PADEP Certification #: 9991

Missouri Certification #: 235
Montana Certification #: Cert0082
Nebraska Certification #: NE-OS-29-14
Nevada Certification #: PA014572018-1
New Hampshire/TNI Certification #: 297617
New Jersey/TNI Certification #: PA051
New Mexico Certification #: PA01457
New York/TNI Certification #: 10888
North Carolina Certification #: 42706
North Dakota Certification #: R-190
Ohio EPA Rad Approval: #41249
Oregon/TNI Certification #: PA200002-010
Pennsylvania/TNI Certification #: 65-00282
Puerto Rico Certification #: PA01457
Rhode Island Certification #: 65-00282
South Dakota Certification
Tennessee Certification #: 02867
Texas/TNI Certification #: T104704188-17-3
Utah/TNI Certification #: PA014572017-9
USDA Soil Permit #: P330-17-00091
Vermont Dept. of Health: ID# VT-0282
Virgin Island/PADEP Certification
Virginia/VELAP Certification #: 9526
Washington Certification #: C868
West Virginia DEP Certification #: 143
West Virginia DHHR Certification #: 9964C
Wisconsin Approve List for Rad
Wyoming Certification #: 8TMS-L

Kansas Certification IDs

9608 Loiret Boulevard, Lenexa, KS 66219
Missouri Inorganic Drinking Water Certification #: 10090
Arkansas Drinking Water
Arkansas Certification #: 19-016-0
Arkansas Drinking Water
Illinois Certification #: 004455
Iowa Certification #: 118
Kansas/NELAP Certification #: E-10116
Louisiana Certification #: 03055

Nevada Certification #: KS000212018-1
Oklahoma Certification #: 9205/9935
Florida: Cert E871149 SEKS WET
Texas Certification #: T104704407-18-11
Utah Certification #: KS000212018-8
Illinois Certification #: 004592
Kansas Field Laboratory Accreditation: # E-92587
Missouri SEKS Micro Certification: 10070

REPORT OF LABORATORY ANALYSIS

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SAMPLE SUMMARY

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311920

Lab ID	Sample ID	Matrix	Date Collected	Date Received
60311920001	M-MW-9	Water	08/13/19 13:14	08/14/19 02:55
60311920002	M-TP-2	Water	08/13/19 13:48	08/14/19 02:55
60311920003	M-NE-DUP-1	Water	08/13/19 08:00	08/14/19 02:55
60312020001	M-TP-1	Water	08/14/19 14:30	08/15/19 02:55
60312020002	MW-10	Water	08/14/19 09:32	08/15/19 02:55
60312020003	M-BMW-3	Water	08/14/19 11:05	08/15/19 02:55
60312020004	M-BMW-4	Water	08/14/19 10:02	08/15/19 02:55
60312020005	M-BMW-5	Water	08/14/19 09:00	08/15/19 02:55
60312020006	M-NE-FB-1	Water	08/14/19 10:06	08/15/19 02:55
60311920010	M-TP-2 MS	Water	08/13/19 13:48	08/14/19 02:55
60311920011	M-TP-2 MSD	Water	08/13/19 13:48	08/14/19 02:55

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SAMPLE ANALYTE COUNT

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311920

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
60311920001	M-MW-9	EPA 200.7	EMR	13	PASI-K
		EPA 200.8	JGP	6	PASI-K
		EPA 245.1	JLH	1	PASI-K
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
		SM 2320B	AJS2	1	PASI-K
		SM 2540C	LDF	1	PASI-K
		EPA 300.0	JDS	3	PASI-K
60311920002	M-TP-2	EPA 200.7	EMR	13	PASI-K
		EPA 200.8	JGP	6	PASI-K
		EPA 245.1	JLH	1	PASI-K
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
		SM 2320B	MJK	1	PASI-K
		SM 2540C	LDF	1	PASI-K
		EPA 300.0	JDS	3	PASI-K
60311920003	M-NE-DUP-1	EPA 200.7	EMR	13	PASI-K
		EPA 200.8	JGP	6	PASI-K
		EPA 245.1	JLH	1	PASI-K
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
		SM 2320B	MJK	1	PASI-K
		SM 2540C	LDF	1	PASI-K
		EPA 300.0	JDS	3	PASI-K
60312020001	M-TP-1	EPA 200.7	EMR	13	PASI-K
		EPA 200.8	JGP	6	PASI-K
		EPA 245.1	JLH	1	PASI-K
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
		SM 2320B	AJS2	1	PASI-K
		SM 2540C	LDF	1	PASI-K
		EPA 300.0	JDS	3	PASI-K
60312020002	MW-10	EPA 200.7	EMR	13	PASI-K
		EPA 200.8	JGP	6	PASI-K
		EPA 245.1	JLH	1	PASI-K
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA

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SAMPLE ANALYTE COUNT

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311920

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
60312020003	M-BMW-3	SM 2320B	AJS2	1	PASI-K
		SM 2540C	LDF	1	PASI-K
		EPA 300.0	JDS	3	PASI-K
		EPA 200.7	EMR	13	PASI-K
		EPA 200.8	JGP	6	PASI-K
		EPA 245.1	JLH	1	PASI-K
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
60312020004	M-BMW-4	SM 2320B	AJS2	1	PASI-K
		SM 2540C	LDF	1	PASI-K
		EPA 300.0	JDS	3	PASI-K
		EPA 200.7	EMR	13	PASI-K
		EPA 200.8	JGP	6	PASI-K
		EPA 245.1	JLH	1	PASI-K
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
60312020005	M-BMW-5	SM 2320B	AJS2	1	PASI-K
		SM 2540C	LDF	1	PASI-K
		EPA 300.0	JDS	3	PASI-K
		EPA 200.7	EMR	13	PASI-K
		EPA 200.8	JGP	6	PASI-K
		EPA 245.1	JLH	1	PASI-K
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
60312020006	M-NE-FB-1	SM 2320B	AJS2	1	PASI-K
		SM 2540C	LDF	1	PASI-K
		EPA 300.0	JDS	3	PASI-K
		EPA 200.7	EMR	13	PASI-K
		EPA 200.8	JGP	6	PASI-K
		EPA 245.1	JLH	1	PASI-K
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
60311920010	M-TP-2 MS	SM 2320B	AJS2	1	PASI-K
		SM 2540C	LDF	1	PASI-K
		EPA 300.0	JDS	3	PASI-K
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA

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SAMPLE ANALYTE COUNT

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311920

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
60311920011	M-TP-2 MSD	EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311920

Sample: M-MW-9 **Lab ID: 60311920001** Collected: 08/13/19 13:14 Received: 08/14/19 02:55 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.7 Metals, Total		Analytical Method: EPA 200.7 Preparation Method: EPA 200.7							
Barium	247	ug/L	5.0	1.4	1	08/19/19 09:27	08/20/19 19:37	7440-39-3	
Beryllium	<0.25	ug/L	1.0	0.25	1	08/19/19 09:27	08/20/19 19:37	7440-41-7	
Boron	5420	ug/L	100	10.7	1	08/19/19 09:27	08/20/19 19:37	7440-42-8	
Calcium	135000	ug/L	200	50.0	1	08/19/19 09:27	08/20/19 19:37	7440-70-2	
Cobalt	<0.84	ug/L	5.0	0.84	1	08/19/19 09:27	08/20/19 19:37	7440-48-4	
Iron	14800	ug/L	50.0	14.0	1	08/19/19 09:27	08/20/19 19:37	7439-89-6	
Lead	<3.4	ug/L	10.0	3.4	1	08/19/19 09:27	08/20/19 19:37	7439-92-1	
Lithium	13.8	ug/L	10.0	5.9	1	08/19/19 09:27	08/20/19 19:37	7439-93-2	
Magnesium	47400	ug/L	50.0	13.0	1	08/19/19 09:27	08/20/19 19:37	7439-95-4	
Manganese	376	ug/L	5.0	2.1	1	08/19/19 09:27	08/20/19 19:37	7439-96-5	
Molybdenum	37.8	ug/L	20.0	2.6	1	08/19/19 09:27	08/20/19 19:37	7439-98-7	
Potassium	4820	ug/L	500	79.0	1	08/19/19 09:27	08/20/19 19:37	7440-09-7	
Sodium	41400	ug/L	500	144	1	08/19/19 09:27	08/20/19 19:37	7440-23-5	
200.8 MET ICPMS		Analytical Method: EPA 200.8 Preparation Method: EPA 200.8							
Antimony	<0.078	ug/L	1.0	0.078	1	08/19/19 10:11	08/20/19 12:21	7440-36-0	
Arsenic	15.8	ug/L	1.0	0.065	1	08/19/19 10:11	08/20/19 12:21	7440-38-2	
Cadmium	<0.033	ug/L	0.50	0.033	1	08/19/19 10:11	08/20/19 12:21	7440-43-9	
Chromium	<0.078	ug/L	1.0	0.078	1	08/19/19 10:11	08/20/19 12:21	7440-47-3	
Selenium	<0.085	ug/L	1.0	0.085	1	08/19/19 10:11	08/20/19 12:21	7782-49-2	
Thallium	<0.099	ug/L	1.0	0.099	1	08/19/19 10:11	08/20/19 12:21	7440-28-0	
245.1 Mercury		Analytical Method: EPA 245.1 Preparation Method: EPA 245.1							
Mercury	<0.066	ug/L	0.20	0.066	1	08/20/19 15:57	08/21/19 11:57	7439-97-6	
2320B Alkalinity		Analytical Method: SM 2320B							
Alkalinity, Total as CaCO3	344	mg/L	20.0	6.5	1		08/26/19 13:10		
2540C Total Dissolved Solids		Analytical Method: SM 2540C							
Total Dissolved Solids	830	mg/L	10.0	10.0	1		08/19/19 10:21		
300.0 IC Anions 28 Days		Analytical Method: EPA 300.0							
Chloride	35.2	mg/L	5.0	1.1	5		08/27/19 16:41	16887-00-6	
Fluoride	0.20	mg/L	0.20	0.085	1		08/27/19 16:26	16984-48-8	
Sulfate	222	mg/L	50.0	11.5	50		08/27/19 16:57	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311920

Sample: M-TP-2 **Lab ID: 60311920002** Collected: 08/13/19 13:48 Received: 08/14/19 02:55 Matrix: Water

Comments: • Upon receipt at the laboratory, 5 mls of nitric acid were added to the sample to meet the sample preservation requirement of pH <2 for radiochemistry analysis. The samples were not preserved <2 within the required 5 days of collection.

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							
Barium	64.6	ug/L	5.0	1.4	1	08/19/19 09:27	08/20/19 19:40	7440-39-3	
Beryllium	0.45J	ug/L	1.0	0.25	1	08/19/19 09:27	08/20/19 19:40	7440-41-7	B
Boron	2410	ug/L	100	10.7	1	08/19/19 09:27	08/20/19 19:40	7440-42-8	
Calcium	221000	ug/L	200	50.0	1	08/19/19 09:27	08/20/19 19:40	7440-70-2	M1
Cobalt	<0.84	ug/L	5.0	0.84	1	08/19/19 09:27	08/20/19 19:40	7440-48-4	
Iron	15900	ug/L	50.0	14.0	1	08/19/19 09:27	08/20/19 19:40	7439-89-6	
Lead	<3.4	ug/L	10.0	3.4	1	08/19/19 09:27	08/20/19 19:40	7439-92-1	
Lithium	43.3	ug/L	10.0	5.9	1	08/19/19 09:27	08/20/19 19:40	7439-93-2	
Magnesium	62400	ug/L	50.0	13.0	1	08/19/19 09:27	08/20/19 19:40	7439-95-4	
Manganese	584	ug/L	5.0	2.1	1	08/19/19 09:27	08/20/19 19:40	7439-96-5	
Molybdenum	107	ug/L	20.0	2.6	1	08/19/19 09:27	08/20/19 19:40	7439-98-7	
Potassium	8230	ug/L	500	79.0	1	08/19/19 09:27	08/20/19 19:40	7440-09-7	
Sodium	196000	ug/L	500	144	1	08/19/19 09:27	08/20/19 19:40	7440-23-5	M1
200.8 MET ICPMS		Analytical Method: EPA 200.8 Preparation Method: EPA 200.8							
Antimony	<0.078	ug/L	1.0	0.078	1	08/19/19 10:11	08/20/19 12:23	7440-36-0	
Arsenic	4.0	ug/L	1.0	0.065	1	08/19/19 10:11	08/20/19 12:23	7440-38-2	
Cadmium	<0.033	ug/L	0.50	0.033	1	08/19/19 10:11	08/20/19 12:23	7440-43-9	
Chromium	0.084J	ug/L	1.0	0.078	1	08/19/19 10:11	08/20/19 12:23	7440-47-3	
Selenium	<0.085	ug/L	1.0	0.085	1	08/19/19 10:11	08/20/19 12:23	7782-49-2	
Thallium	<0.099	ug/L	1.0	0.099	1	08/19/19 10:11	08/20/19 12:23	7440-28-0	
245.1 Mercury		Analytical Method: EPA 245.1 Preparation Method: EPA 245.1							
Mercury	<0.066	ug/L	0.20	0.066	1	08/20/19 15:57	08/21/19 12:04	7439-97-6	
2320B Alkalinity		Analytical Method: SM 2320B							
Alkalinity, Total as CaCO3	392	mg/L	20.0	6.5	1		08/27/19 08:30		
2540C Total Dissolved Solids		Analytical Method: SM 2540C							
Total Dissolved Solids	1630	mg/L	13.3	13.3	1		08/19/19 10:21		
300.0 IC Anions 28 Days		Analytical Method: EPA 300.0							
Chloride	271	mg/L	50.0	11.0	50		08/27/19 18:01	16887-00-6	
Fluoride	0.47	mg/L	0.20	0.085	1		08/27/19 17:13	16984-48-8	
Sulfate	456	mg/L	50.0	11.5	50		08/27/19 18:01	14808-79-8	

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ANALYTICAL RESULTS

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311920

Sample: M-NE-DUP-1 **Lab ID: 60311920003** Collected: 08/13/19 08:00 Received: 08/14/19 02:55 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.7 Metals, Total Analytical Method: EPA 200.7 Preparation Method: EPA 200.7									
Barium	246	ug/L	5.0	1.4	1	08/19/19 09:27	08/20/19 19:51	7440-39-3	
Beryllium	0.40J	ug/L	1.0	0.25	1	08/19/19 09:27	08/20/19 19:51	7440-41-7	B
Boron	5370	ug/L	100	10.7	1	08/19/19 09:27	08/20/19 19:51	7440-42-8	
Calcium	135000	ug/L	200	50.0	1	08/19/19 09:27	08/20/19 19:51	7440-70-2	
Cobalt	<0.84	ug/L	5.0	0.84	1	08/19/19 09:27	08/20/19 19:51	7440-48-4	
Iron	14700	ug/L	50.0	14.0	1	08/19/19 09:27	08/20/19 19:51	7439-89-6	
Lead	<3.4	ug/L	10.0	3.4	1	08/19/19 09:27	08/20/19 19:51	7439-92-1	
Lithium	13.7	ug/L	10.0	5.9	1	08/19/19 09:27	08/20/19 19:51	7439-93-2	
Magnesium	47200	ug/L	50.0	13.0	1	08/19/19 09:27	08/20/19 19:51	7439-95-4	
Manganese	372	ug/L	5.0	2.1	1	08/19/19 09:27	08/20/19 19:51	7439-96-5	
Molybdenum	39.6	ug/L	20.0	2.6	1	08/19/19 09:27	08/20/19 19:51	7439-98-7	
Potassium	4830	ug/L	500	79.0	1	08/19/19 09:27	08/20/19 19:51	7440-09-7	
Sodium	41300	ug/L	500	144	1	08/19/19 09:27	08/20/19 19:51	7440-23-5	
200.8 MET ICPMS Analytical Method: EPA 200.8 Preparation Method: EPA 200.8									
Antimony	<0.078	ug/L	1.0	0.078	1	08/19/19 10:11	08/20/19 12:28	7440-36-0	
Arsenic	16.7	ug/L	1.0	0.065	1	08/19/19 10:11	08/20/19 12:28	7440-38-2	
Cadmium	<0.033	ug/L	0.50	0.033	1	08/19/19 10:11	08/20/19 12:28	7440-43-9	
Chromium	0.12J	ug/L	1.0	0.078	1	08/19/19 10:11	08/20/19 12:28	7440-47-3	
Selenium	0.11J	ug/L	1.0	0.085	1	08/19/19 10:11	08/20/19 12:28	7782-49-2	
Thallium	<0.099	ug/L	1.0	0.099	1	08/19/19 10:11	08/20/19 12:28	7440-28-0	
245.1 Mercury Analytical Method: EPA 245.1 Preparation Method: EPA 245.1									
Mercury	<0.066	ug/L	0.20	0.066	1	08/20/19 15:57	08/21/19 12:06	7439-97-6	
2320B Alkalinity Analytical Method: SM 2320B									
Alkalinity, Total as CaCO3	371	mg/L	20.0	6.5	1		08/27/19 08:42		
2540C Total Dissolved Solids Analytical Method: SM 2540C									
Total Dissolved Solids	881	mg/L	10.0	10.0	1		08/19/19 10:21		
300.0 IC Anions 28 Days Analytical Method: EPA 300.0									
Chloride	35.2	mg/L	5.0	1.1	5		08/27/19 19:36	16887-00-6	
Fluoride	0.28	mg/L	0.20	0.085	1		08/27/19 19:20	16984-48-8	
Sulfate	208	mg/L	20.0	4.6	20		08/28/19 12:01	14808-79-8	

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ANALYTICAL RESULTS

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311920

Sample: M-TP-1 **Lab ID: 60312020001** Collected: 08/14/19 14:30 Received: 08/15/19 02:55 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.7 Metals, Total		Analytical Method: EPA 200.7 Preparation Method: EPA 200.7							
Barium	346	ug/L	5.0	1.4	1	08/19/19 09:27	08/20/19 19:13	7440-39-3	
Beryllium	<0.25	ug/L	1.0	0.25	1	08/19/19 09:27	08/20/19 19:13	7440-41-7	
Boron	558	ug/L	100	10.7	1	08/19/19 09:27	08/20/19 19:13	7440-42-8	
Calcium	69800	ug/L	200	50.0	1	08/19/19 09:27	08/20/19 19:13	7440-70-2	
Cobalt	<0.84	ug/L	5.0	0.84	1	08/19/19 09:27	08/20/19 19:13	7440-48-4	
Iron	4930	ug/L	50.0	14.0	1	08/19/19 09:27	08/20/19 19:13	7439-89-6	
Lead	<3.4	ug/L	10.0	3.4	1	08/19/19 09:27	08/20/19 19:13	7439-92-1	
Lithium	10.5	ug/L	10.0	5.9	1	08/19/19 09:27	08/20/19 19:13	7439-93-2	
Magnesium	30400	ug/L	50.0	13.0	1	08/19/19 09:27	08/20/19 19:13	7439-95-4	
Manganese	71.8	ug/L	5.0	2.1	1	08/19/19 09:27	08/20/19 19:13	7439-96-5	
Molybdenum	<2.6	ug/L	20.0	2.6	1	08/19/19 09:27	08/20/19 19:13	7439-98-7	
Potassium	2940	ug/L	500	79.0	1	08/19/19 09:27	08/20/19 19:13	7440-09-7	
Sodium	40000	ug/L	500	144	1	08/19/19 09:27	08/20/19 19:13	7440-23-5	
200.8 MET ICPMS		Analytical Method: EPA 200.8 Preparation Method: EPA 200.8							
Antimony	<0.078	ug/L	1.0	0.078	1	08/19/19 10:11	08/20/19 12:01	7440-36-0	
Arsenic	14.3	ug/L	1.0	0.065	1	08/19/19 10:11	08/20/19 12:01	7440-38-2	
Cadmium	<0.033	ug/L	0.50	0.033	1	08/19/19 10:11	08/20/19 12:01	7440-43-9	
Chromium	4.2	ug/L	1.0	0.078	1	08/19/19 10:11	08/20/19 12:01	7440-47-3	
Selenium	<0.085	ug/L	1.0	0.085	1	08/19/19 10:11	08/20/19 12:01	7782-49-2	
Thallium	<0.099	ug/L	1.0	0.099	1	08/19/19 10:11	08/20/19 12:01	7440-28-0	
245.1 Mercury		Analytical Method: EPA 245.1 Preparation Method: EPA 245.1							
Mercury	<0.066	ug/L	0.20	0.066	1	08/19/19 11:47	08/20/19 15:17	7439-97-6	
2320B Alkalinity		Analytical Method: SM 2320B							
Alkalinity, Total as CaCO3	386	mg/L	20.0	6.5	1		08/19/19 00:00		
2540C Total Dissolved Solids		Analytical Method: SM 2540C							
Total Dissolved Solids	440	mg/L	10.0	10.0	1		08/20/19 09:56		
300.0 IC Anions 28 Days		Analytical Method: EPA 300.0							
Chloride	20.2	mg/L	2.0	0.44	2		08/21/19 00:24	16887-00-6	
Fluoride	0.25	mg/L	0.20	0.085	1		08/21/19 00:07	16984-48-8	
Sulfate	<0.23	mg/L	1.0	0.23	1		08/21/19 00:07	14808-79-8	

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ANALYTICAL RESULTS

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311920

Sample: MW-10 **Lab ID: 60312020002** Collected: 08/14/19 09:32 Received: 08/15/19 02:55 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.7 Metals, Total		Analytical Method: EPA 200.7 Preparation Method: EPA 200.7							
Barium	162	ug/L	5.0	1.4	1	08/19/19 09:27	08/20/19 19:20	7440-39-3	
Beryllium	0.50J	ug/L	1.0	0.25	1	08/19/19 09:27	08/20/19 19:20	7440-41-7	B
Boron	1740	ug/L	100	10.7	1	08/19/19 09:27	08/20/19 19:20	7440-42-8	
Calcium	197000	ug/L	200	50.0	1	08/19/19 09:27	08/20/19 19:20	7440-70-2	
Cobalt	1.6J	ug/L	5.0	0.84	1	08/19/19 09:27	08/20/19 19:20	7440-48-4	
Iron	18200	ug/L	50.0	14.0	1	08/19/19 09:27	08/20/19 19:20	7439-89-6	
Lead	4.0J	ug/L	10.0	3.4	1	08/19/19 09:27	08/20/19 19:20	7439-92-1	
Lithium	37.4	ug/L	10.0	5.9	1	08/19/19 09:27	08/20/19 19:20	7439-93-2	
Magnesium	50800	ug/L	50.0	13.0	1	08/19/19 09:27	08/20/19 19:20	7439-95-4	
Manganese	788	ug/L	5.0	2.1	1	08/19/19 09:27	08/20/19 19:20	7439-96-5	
Molybdenum	4.5J	ug/L	20.0	2.6	1	08/19/19 09:27	08/20/19 19:20	7439-98-7	
Potassium	8180	ug/L	500	79.0	1	08/19/19 09:27	08/20/19 19:20	7440-09-7	
Sodium	61700	ug/L	500	144	1	08/19/19 09:27	08/20/19 19:20	7440-23-5	
200.8 MET ICPMS		Analytical Method: EPA 200.8 Preparation Method: EPA 200.8							
Antimony	<0.078	ug/L	1.0	0.078	1	08/19/19 10:11	08/20/19 12:02	7440-36-0	
Arsenic	11.8	ug/L	1.0	0.065	1	08/19/19 10:11	08/20/19 12:02	7440-38-2	
Cadmium	<0.033	ug/L	0.50	0.033	1	08/19/19 10:11	08/20/19 12:02	7440-43-9	
Chromium	0.11J	ug/L	1.0	0.078	1	08/19/19 10:11	08/20/19 12:02	7440-47-3	
Selenium	<0.085	ug/L	1.0	0.085	1	08/19/19 10:11	08/20/19 12:02	7782-49-2	
Thallium	<0.099	ug/L	1.0	0.099	1	08/19/19 10:11	08/20/19 12:02	7440-28-0	
245.1 Mercury		Analytical Method: EPA 245.1 Preparation Method: EPA 245.1							
Mercury	<0.066	ug/L	0.20	0.066	1	08/19/19 11:47	08/20/19 15:19	7439-97-6	
2320B Alkalinity		Analytical Method: SM 2320B							
Alkalinity, Total as CaCO3	509	mg/L	20.0	6.5	1		08/19/19 12:24		
2540C Total Dissolved Solids		Analytical Method: SM 2540C							
Total Dissolved Solids	1110	mg/L	13.3	13.3	1		08/20/19 09:56		
300.0 IC Anions 28 Days		Analytical Method: EPA 300.0							
Chloride	82.7	mg/L	20.0	4.4	20		08/21/19 01:14	16887-00-6	
Fluoride	0.21	mg/L	0.20	0.085	1		08/21/19 00:41	16984-48-8	
Sulfate	211	mg/L	20.0	4.6	20		08/21/19 01:14	14808-79-8	

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ANALYTICAL RESULTS

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311920

Sample: M-BMW-3 **Lab ID: 60312020003** Collected: 08/14/19 11:05 Received: 08/15/19 02:55 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.7 Metals, Total Analytical Method: EPA 200.7 Preparation Method: EPA 200.7									
Barium	558	ug/L	5.0	1.4	1	08/19/19 09:27	08/20/19 19:22	7440-39-3	
Beryllium	<0.25	ug/L	1.0	0.25	1	08/19/19 09:27	08/20/19 19:22	7440-41-7	
Boron	381	ug/L	100	10.7	1	08/19/19 09:27	08/20/19 19:22	7440-42-8	
Calcium	75100	ug/L	200	50.0	1	08/19/19 09:27	08/20/19 19:22	7440-70-2	M1
Cobalt	<0.84	ug/L	5.0	0.84	1	08/19/19 09:27	08/20/19 19:22	7440-48-4	
Iron	38400	ug/L	50.0	14.0	1	08/19/19 09:27	08/20/19 19:22	7439-89-6	M1
Lead	<3.4	ug/L	10.0	3.4	1	08/19/19 09:27	08/20/19 19:22	7439-92-1	
Lithium	<5.9	ug/L	10.0	5.9	1	08/19/19 09:27	08/20/19 19:22	7439-93-2	
Magnesium	30900	ug/L	50.0	13.0	1	08/19/19 09:27	08/20/19 19:22	7439-95-4	
Manganese	4440	ug/L	5.0	2.1	1	08/19/19 09:27	08/20/19 19:22	7439-96-5	
Molybdenum	<2.6	ug/L	20.0	2.6	1	08/19/19 09:27	08/20/19 19:22	7439-98-7	
Potassium	1170	ug/L	500	79.0	1	08/19/19 09:27	08/20/19 19:22	7440-09-7	
Sodium	37100	ug/L	500	144	1	08/19/19 09:27	08/20/19 19:22	7440-23-5	
200.8 MET ICPMS Analytical Method: EPA 200.8 Preparation Method: EPA 200.8									
Antimony	<0.078	ug/L	1.0	0.078	1	08/19/19 10:11	08/20/19 12:04	7440-36-0	
Arsenic	4.3	ug/L	1.0	0.065	1	08/19/19 10:11	08/20/19 12:04	7440-38-2	
Cadmium	<0.033	ug/L	0.50	0.033	1	08/19/19 10:11	08/20/19 12:04	7440-43-9	
Chromium	0.097J	ug/L	1.0	0.078	1	08/19/19 10:11	08/20/19 12:04	7440-47-3	
Selenium	<0.085	ug/L	1.0	0.085	1	08/19/19 10:11	08/20/19 12:04	7782-49-2	
Thallium	<0.099	ug/L	1.0	0.099	1	08/19/19 10:11	08/20/19 12:04	7440-28-0	
245.1 Mercury Analytical Method: EPA 245.1 Preparation Method: EPA 245.1									
Mercury	<0.066	ug/L	0.20	0.066	1	08/19/19 11:47	08/20/19 15:21	7439-97-6	
2320B Alkalinity Analytical Method: SM 2320B									
Alkalinity, Total as CaCO3	265	mg/L	20.0	6.5	1		08/19/19 12:34		
2540C Total Dissolved Solids Analytical Method: SM 2540C									
Total Dissolved Solids	600	mg/L	10.0	10.0	1		08/20/19 09:56		
300.0 IC Anions 28 Days Analytical Method: EPA 300.0									
Chloride	19.2	mg/L	2.0	0.44	2		08/21/19 02:22	16887-00-6	
Fluoride	0.10J	mg/L	0.20	0.085	1		08/21/19 01:31	16984-48-8	
Sulfate	127	mg/L	20.0	4.6	20		08/21/19 02:39	14808-79-8	

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ANALYTICAL RESULTS

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311920

Sample: M-BMW-4 **Lab ID: 60312020004** Collected: 08/14/19 10:02 Received: 08/15/19 02:55 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.7 Metals, Total									
Analytical Method: EPA 200.7 Preparation Method: EPA 200.7									
Barium	300	ug/L	5.0	1.4	1	08/19/19 09:27	08/20/19 19:26	7440-39-3	
Beryllium	0.39J	ug/L	1.0	0.25	1	08/19/19 09:27	08/20/19 19:26	7440-41-7	B
Boron	40.1J	ug/L	100	10.7	1	08/19/19 09:27	08/20/19 19:26	7440-42-8	
Calcium	42600	ug/L	200	50.0	1	08/19/19 09:27	08/20/19 19:26	7440-70-2	
Cobalt	7.0	ug/L	5.0	0.84	1	08/19/19 09:27	08/20/19 19:26	7440-48-4	
Iron	28400	ug/L	50.0	14.0	1	08/19/19 09:27	08/20/19 19:26	7439-89-6	
Lead	<3.4	ug/L	10.0	3.4	1	08/19/19 09:27	08/20/19 19:26	7439-92-1	
Lithium	<5.9	ug/L	10.0	5.9	1	08/19/19 09:27	08/20/19 19:26	7439-93-2	
Magnesium	19800	ug/L	50.0	13.0	1	08/19/19 09:27	08/20/19 19:26	7439-95-4	
Manganese	3340	ug/L	5.0	2.1	1	08/19/19 09:27	08/20/19 19:26	7439-96-5	
Molybdenum	<2.6	ug/L	20.0	2.6	1	08/19/19 09:27	08/20/19 19:26	7439-98-7	
Potassium	602	ug/L	500	79.0	1	08/19/19 09:27	08/20/19 19:26	7440-09-7	
Sodium	28500	ug/L	500	144	1	08/19/19 09:27	08/20/19 19:26	7440-23-5	
200.8 MET ICPMS									
Analytical Method: EPA 200.8 Preparation Method: EPA 200.8									
Antimony	<0.078	ug/L	1.0	0.078	1	08/19/19 10:11	08/20/19 12:08	7440-36-0	
Arsenic	7.4	ug/L	1.0	0.065	1	08/19/19 10:11	08/20/19 12:08	7440-38-2	
Cadmium	<0.033	ug/L	0.50	0.033	1	08/19/19 10:11	08/20/19 12:08	7440-43-9	
Chromium	0.14J	ug/L	1.0	0.078	1	08/19/19 10:11	08/20/19 12:08	7440-47-3	
Selenium	0.11J	ug/L	1.0	0.085	1	08/19/19 10:11	08/20/19 12:08	7782-49-2	
Thallium	<0.099	ug/L	1.0	0.099	1	08/19/19 10:11	08/20/19 12:08	7440-28-0	
245.1 Mercury									
Analytical Method: EPA 245.1 Preparation Method: EPA 245.1									
Mercury	<0.066	ug/L	0.20	0.066	1	08/19/19 11:47	08/20/19 15:24	7439-97-6	
2320B Alkalinity									
Analytical Method: SM 2320B									
Alkalinity, Total as CaCO3	176	mg/L	20.0	6.5	1		08/19/19 12:39		
2540C Total Dissolved Solids									
Analytical Method: SM 2540C									
Total Dissolved Solids	357	mg/L	5.0	5.0	1		08/20/19 09:56		
300.0 IC Anions 28 Days									
Analytical Method: EPA 300.0									
Chloride	19.8	mg/L	1.0	0.22	1		08/21/19 02:56	16887-00-6	
Fluoride	<0.085	mg/L	0.20	0.085	1		08/21/19 02:56	16984-48-8	
Sulfate	86.5	mg/L	10.0	2.3	10		08/21/19 03:12	14808-79-8	

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ANALYTICAL RESULTS

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311920

Sample: M-BMW-5 **Lab ID: 60312020005** Collected: 08/14/19 09:00 Received: 08/15/19 02:55 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.7 Metals, Total		Analytical Method: EPA 200.7 Preparation Method: EPA 200.7							
Barium	212	ug/L	5.0	1.4	1	08/19/19 09:27	08/20/19 19:28	7440-39-3	
Beryllium	<0.25	ug/L	1.0	0.25	1	08/19/19 09:27	08/20/19 19:28	7440-41-7	
Boron	81.9J	ug/L	100	10.7	1	08/19/19 09:27	08/20/19 19:28	7440-42-8	
Calcium	56800	ug/L	200	50.0	1	08/19/19 09:27	08/20/19 19:28	7440-70-2	
Cobalt	<0.84	ug/L	5.0	0.84	1	08/19/19 09:27	08/20/19 19:28	7440-48-4	
Iron	191	ug/L	50.0	14.0	1	08/19/19 09:27	08/20/19 19:28	7439-89-6	
Lead	<3.4	ug/L	10.0	3.4	1	08/19/19 09:27	08/20/19 19:28	7439-92-1	
Lithium	<5.9	ug/L	10.0	5.9	1	08/19/19 09:27	08/20/19 19:28	7439-93-2	
Magnesium	23500	ug/L	50.0	13.0	1	08/19/19 09:27	08/20/19 19:28	7439-95-4	
Manganese	407	ug/L	5.0	2.1	1	08/19/19 09:27	08/20/19 19:28	7439-96-5	
Molybdenum	<2.6	ug/L	20.0	2.6	1	08/19/19 09:27	08/20/19 19:28	7439-98-7	
Potassium	1110	ug/L	500	79.0	1	08/19/19 09:27	08/20/19 19:28	7440-09-7	
Sodium	36100	ug/L	500	144	1	08/19/19 09:27	08/20/19 19:28	7440-23-5	
200.8 MET ICPMS		Analytical Method: EPA 200.8 Preparation Method: EPA 200.8							
Antimony	<0.078	ug/L	1.0	0.078	1	08/19/19 10:11	08/20/19 12:10	7440-36-0	
Arsenic	0.30J	ug/L	1.0	0.065	1	08/19/19 10:11	08/20/19 12:10	7440-38-2	
Cadmium	<0.033	ug/L	0.50	0.033	1	08/19/19 10:11	08/20/19 12:10	7440-43-9	
Chromium	<0.078	ug/L	1.0	0.078	1	08/19/19 10:11	08/20/19 12:10	7440-47-3	
Selenium	0.61J	ug/L	1.0	0.085	1	08/19/19 10:11	08/20/19 12:10	7782-49-2	
Thallium	<0.099	ug/L	1.0	0.099	1	08/19/19 10:11	08/20/19 12:10	7440-28-0	
245.1 Mercury		Analytical Method: EPA 245.1 Preparation Method: EPA 245.1							
Mercury	<0.066	ug/L	0.20	0.066	1	08/19/19 11:47	08/20/19 15:26	7439-97-6	
2320B Alkalinity		Analytical Method: SM 2320B							
Alkalinity, Total as CaCO3	170	mg/L	20.0	6.5	1		08/19/19 12:43		
2540C Total Dissolved Solids		Analytical Method: SM 2540C							
Total Dissolved Solids	429	mg/L	5.0	5.0	1		08/20/19 09:56		
300.0 IC Anions 28 Days		Analytical Method: EPA 300.0							
Chloride	42.9	mg/L	10.0	2.2	10		08/21/19 03:46	16887-00-6	
Fluoride	<0.085	mg/L	0.20	0.085	1		08/21/19 03:29	16984-48-8	
Sulfate	85.0	mg/L	10.0	2.3	10		08/21/19 03:46	14808-79-8	

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ANALYTICAL RESULTS

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311920

Sample: M-NE-FB-1 **Lab ID: 60312020006** Collected: 08/14/19 10:06 Received: 08/15/19 02:55 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.7 Metals, Total		Analytical Method: EPA 200.7 Preparation Method: EPA 200.7							
Barium	<1.4	ug/L	5.0	1.4	1	08/19/19 09:27	08/20/19 19:31	7440-39-3	
Beryllium	<0.25	ug/L	1.0	0.25	1	08/19/19 09:27	08/20/19 19:31	7440-41-7	
Boron	<10.7	ug/L	100	10.7	1	08/19/19 09:27	08/20/19 19:31	7440-42-8	
Calcium	<50.0	ug/L	200	50.0	1	08/19/19 09:27	08/20/19 19:31	7440-70-2	
Cobalt	<0.84	ug/L	5.0	0.84	1	08/19/19 09:27	08/20/19 19:31	7440-48-4	
Iron	<14.0	ug/L	50.0	14.0	1	08/19/19 09:27	08/20/19 19:31	7439-89-6	
Lead	<3.4	ug/L	10.0	3.4	1	08/19/19 09:27	08/20/19 19:31	7439-92-1	
Lithium	<5.9	ug/L	10.0	5.9	1	08/19/19 09:27	08/20/19 19:31	7439-93-2	
Magnesium	14.0J	ug/L	50.0	13.0	1	08/19/19 09:27	08/20/19 19:31	7439-95-4	
Manganese	<2.1	ug/L	5.0	2.1	1	08/19/19 09:27	08/20/19 19:31	7439-96-5	
Molybdenum	<2.6	ug/L	20.0	2.6	1	08/19/19 09:27	08/20/19 19:31	7439-98-7	
Potassium	<79.0	ug/L	500	79.0	1	08/19/19 09:27	08/20/19 19:31	7440-09-7	
Sodium	<144	ug/L	500	144	1	08/19/19 09:27	08/20/19 19:31	7440-23-5	
200.8 MET ICPMS		Analytical Method: EPA 200.8 Preparation Method: EPA 200.8							
Antimony	<0.078	ug/L	1.0	0.078	1	08/19/19 10:11	08/20/19 12:15	7440-36-0	
Arsenic	<0.065	ug/L	1.0	0.065	1	08/19/19 10:11	08/20/19 12:15	7440-38-2	
Cadmium	<0.033	ug/L	0.50	0.033	1	08/19/19 10:11	08/20/19 12:15	7440-43-9	
Chromium	<0.078	ug/L	1.0	0.078	1	08/19/19 10:11	08/20/19 12:15	7440-47-3	
Selenium	<0.085	ug/L	1.0	0.085	1	08/19/19 10:11	08/20/19 12:15	7782-49-2	
Thallium	<0.099	ug/L	1.0	0.099	1	08/19/19 10:11	08/20/19 12:15	7440-28-0	
245.1 Mercury		Analytical Method: EPA 245.1 Preparation Method: EPA 245.1							
Mercury	<0.066	ug/L	0.20	0.066	1	08/19/19 11:47	08/20/19 15:28	7439-97-6	
2320B Alkalinity		Analytical Method: SM 2320B							
Alkalinity, Total as CaCO3	<6.5	mg/L	20.0	6.5	1		08/19/19 12:46		
2540C Total Dissolved Solids		Analytical Method: SM 2540C							
Total Dissolved Solids	<5.0	mg/L	5.0	5.0	1		08/20/19 09:56		
300.0 IC Anions 28 Days		Analytical Method: EPA 300.0							
Chloride	<0.22	mg/L	1.0	0.22	1		08/21/19 04:03	16887-00-6	
Fluoride	<0.085	mg/L	0.20	0.085	1		08/21/19 04:03	16984-48-8	
Sulfate	<0.23	mg/L	1.0	0.23	1		08/21/19 04:03	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC ENERGY CTR
Pace Project No.: 60311920

QC Batch: 604020 Analysis Method: EPA 245.1
QC Batch Method: EPA 245.1 Analysis Description: 245.1 Mercury
Associated Lab Samples: 60312020001, 60312020002, 60312020003, 60312020004, 60312020005, 60312020006

METHOD BLANK: 2469857 Matrix: Water
Associated Lab Samples: 60312020001, 60312020002, 60312020003, 60312020004, 60312020005, 60312020006

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Mercury	ug/L	<0.066	0.20	0.066	08/20/19 14:59	

LABORATORY CONTROL SAMPLE: 2469858

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury	ug/L	5	4.9	97	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2469859 2469860

Parameter	Units	60312019001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mercury	ug/L	<0.066	5	5	4.7	4.5	93	91	70-130	3	20	

MATRIX SPIKE SAMPLE: 2469861

Parameter	Units	60311645005 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Mercury	ug/L	ND	5	4.9	98	70-130	

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311920

QC Batch: 604387 Analysis Method: EPA 245.1
 QC Batch Method: EPA 245.1 Analysis Description: 245.1 Mercury
 Associated Lab Samples: 60311920001, 60311920002, 60311920003

METHOD BLANK: 2470996 Matrix: Water

Associated Lab Samples: 60311920001, 60311920002, 60311920003

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Mercury	ug/L	<0.066	0.20	0.066	08/21/19 11:09	

LABORATORY CONTROL SAMPLE: 2470997

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury	ug/L	5	5.0	100	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2470998 2470999

Parameter	Units	60311814005		2470998		2470999		% Rec Limits	RPD	Max RPD	Qual	
		MS Result	MSD Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result					MS % Rec
Mercury	ug/L	ND	ND	5	5	5.1	5.0	102	100	70-130	1	20

MATRIX SPIKE SAMPLE: 2471000

Parameter	Units	60311920002 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Mercury	ug/L	<0.066	5	5.1	103	70-130	

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC ENERGY CTR
Pace Project No.: 60311920

QC Batch: 603943 Analysis Method: EPA 200.7
QC Batch Method: EPA 200.7 Analysis Description: 200.7 Metals, Total
Associated Lab Samples: 60311920001, 60311920002, 60311920003, 60312020001, 60312020002, 60312020003, 60312020004, 60312020005, 60312020006

METHOD BLANK: 2469675 Matrix: Water
Associated Lab Samples: 60311920001, 60311920002, 60311920003, 60312020001, 60312020002, 60312020003, 60312020004, 60312020005, 60312020006

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Barium	ug/L	<1.4	5.0	1.4	08/20/19 19:11	
Beryllium	ug/L	0.30J	1.0	0.25	08/20/19 19:11	
Boron	ug/L	<10.7	100	10.7	08/20/19 19:11	
Calcium	ug/L	<50.0	200	50.0	08/20/19 19:11	
Cobalt	ug/L	<0.84	5.0	0.84	08/20/19 19:11	
Iron	ug/L	<14.0	50.0	14.0	08/20/19 19:11	
Lead	ug/L	<3.4	10.0	3.4	08/20/19 19:11	
Lithium	ug/L	<5.9	10.0	5.9	08/20/19 19:11	
Magnesium	ug/L	<13.0	50.0	13.0	08/20/19 19:11	
Manganese	ug/L	<2.1	5.0	2.1	08/20/19 19:11	
Molybdenum	ug/L	<2.6	20.0	2.6	08/20/19 19:11	
Potassium	ug/L	<79.0	500	79.0	08/20/19 19:11	
Sodium	ug/L	<144	500	144	08/20/19 19:11	

LABORATORY CONTROL SAMPLE: 2469676

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Barium	ug/L	1000	957	96	85-115	
Beryllium	ug/L	1000	959	96	85-115	
Boron	ug/L	1000	930	93	85-115	
Calcium	ug/L	10000	9390	94	85-115	
Cobalt	ug/L	1000	988	99	85-115	
Iron	ug/L	10000	9480	95	85-115	
Lead	ug/L	1000	1040	104	85-115	
Lithium	ug/L	1000	991	99	85-115	
Magnesium	ug/L	10000	9680	97	85-115	
Manganese	ug/L	1000	976	98	85-115	
Molybdenum	ug/L	1000	991	99	85-115	
Potassium	ug/L	10000	9520	95	85-115	
Sodium	ug/L	10000	9850	98	85-115	

MATRIX SPIKE SAMPLE: 2469677

Parameter	Units	60312020003 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Barium	ug/L	558	1000	1480	92	70-130	
Beryllium	ug/L	<0.25	1000	940	94	70-130	
Boron	ug/L	381	1000	1310	93	70-130	

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311920

MATRIX SPIKE SAMPLE:		2469677					
Parameter	Units	60312020003 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Calcium	ug/L	75100	10000	79700	45	70-130	M1
Cobalt	ug/L	<0.84	1000	963	96	70-130	
Iron	ug/L	38400	10000	45200	68	70-130	M1
Lead	ug/L	<3.4	1000	1000	100	70-130	
Lithium	ug/L	<5.9	1000	992	99	70-130	
Magnesium	ug/L	30900	10000	38400	76	70-130	
Manganese	ug/L	4440	1000	5150	70	70-130	
Molybdenum	ug/L	<2.6	1000	994	99	70-130	
Potassium	ug/L	1170	10000	10600	94	70-130	
Sodium	ug/L	37100	10000	45000	79	70-130	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE:		2469678			2469679							
Parameter	Units	60311920002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Barium	ug/L	64.6	1000	1000	1040	1050	98	99	70-130	1	20	
Beryllium	ug/L	0.45J	1000	1000	954	967	95	97	70-130	1	20	
Boron	ug/L	2410	1000	1000	3370	3440	95	103	70-130	2	20	
Calcium	ug/L	221000	10000	10000	229000	234000	79	136	70-130	2	20	M1
Cobalt	ug/L	<0.84	1000	1000	963	968	96	97	70-130	1	20	
Iron	ug/L	15900	10000	10000	25100	25500	93	96	70-130	1	20	
Lead	ug/L	<3.4	1000	1000	1000	1000	100	100	70-130	0	20	
Lithium	ug/L	43.3	1000	1000	1060	1070	102	103	70-130	0	20	
Magnesium	ug/L	62400	10000	10000	71800	73200	94	108	70-130	2	20	
Manganese	ug/L	584	1000	1000	1540	1570	96	98	70-130	2	20	
Molybdenum	ug/L	107	1000	1000	1020	1020	91	92	70-130	0	20	
Potassium	ug/L	8230	10000	10000	18100	18400	99	102	70-130	2	20	
Sodium	ug/L	196000	10000	10000	205000	213000	93	171	70-130	4	20	M1

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311920

QC Batch: 603985 Analysis Method: EPA 200.8
 QC Batch Method: EPA 200.8 Analysis Description: 200.8 MET
 Associated Lab Samples: 60311920001, 60311920002, 60311920003, 60312020001, 60312020002, 60312020003, 60312020004, 60312020005, 60312020006

METHOD BLANK: 2469777 Matrix: Water
 Associated Lab Samples: 60311920001, 60311920002, 60311920003, 60312020001, 60312020002, 60312020003, 60312020004, 60312020005, 60312020006

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Antimony	ug/L	<0.078	1.0	0.078	08/20/19 11:55	
Arsenic	ug/L	<0.065	1.0	0.065	08/20/19 11:55	
Cadmium	ug/L	<0.033	0.50	0.033	08/20/19 11:55	
Chromium	ug/L	<0.078	1.0	0.078	08/20/19 11:55	
Selenium	ug/L	<0.085	1.0	0.085	08/20/19 11:55	
Thallium	ug/L	<0.099	1.0	0.099	08/20/19 11:55	

LABORATORY CONTROL SAMPLE: 2469778

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Antimony	ug/L	40	38.5	96	85-115	
Arsenic	ug/L	40	37.8	94	85-115	
Cadmium	ug/L	40	38.6	97	85-115	
Chromium	ug/L	40	40.2	101	85-115	
Selenium	ug/L	40	39.0	97	85-115	
Thallium	ug/L	40	36.6	91	85-115	

MATRIX SPIKE SAMPLE: 2469779

Parameter	Units	60312020003 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Antimony	ug/L	<0.078	40	40.4	101	70-130	
Arsenic	ug/L	4.3	40	43.0	97	70-130	
Cadmium	ug/L	<0.033	40	38.6	96	70-130	
Chromium	ug/L	0.097J	40	41.9	104	70-130	
Selenium	ug/L	<0.085	40	38.6	96	70-130	
Thallium	ug/L	<0.099	40	38.3	96	70-130	

MATRIX SPIKE SAMPLE: 2469780

Parameter	Units	60311920002 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Antimony	ug/L	<0.078	40	38.9	97	70-130	
Arsenic	ug/L	4.0	40	43.0	98	70-130	
Cadmium	ug/L	<0.033	40	36.4	91	70-130	
Chromium	ug/L	0.084J	40	39.5	98	70-130	
Selenium	ug/L	<0.085	40	37.3	93	70-130	

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311920

MATRIX SPIKE SAMPLE:		2469780					
Parameter	Units	60311920002 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Thallium	ug/L	<0.099	40	39.7	99	70-130	

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311920

QC Batch: 603916

Analysis Method: SM 2320B

QC Batch Method: SM 2320B

Analysis Description: 2320B Alkalinity

Associated Lab Samples: 60312020001, 60312020002, 60312020003, 60312020004, 60312020005, 60312020006

METHOD BLANK: 2469612

Matrix: Water

Associated Lab Samples: 60312020001, 60312020002, 60312020003, 60312020004, 60312020005, 60312020006

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Alkalinity, Total as CaCO ₃	mg/L	<6.5	20.0	6.5	08/19/19 10:06	

LABORATORY CONTROL SAMPLE: 2469613

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity, Total as CaCO ₃	mg/L	500	487	97	90-110	

SAMPLE DUPLICATE: 2469766

Parameter	Units	60311993004 Result	Dup Result	RPD	Max RPD	Qualifiers
Alkalinity, Total as CaCO ₃	mg/L	386	387	0	10	

SAMPLE DUPLICATE: 2469767

Parameter	Units	60312019001 Result	Dup Result	RPD	Max RPD	Qualifiers
Alkalinity, Total as CaCO ₃	mg/L	390	412	6	10	

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311920

QC Batch: 605185

Analysis Method: SM 2320B

QC Batch Method: SM 2320B

Analysis Description: 2320B Alkalinity

Associated Lab Samples: 60311920001

METHOD BLANK: 2473734

Matrix: Water

Associated Lab Samples: 60311920001

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Alkalinity, Total as CaCO ₃	mg/L	<6.5	20.0	6.5	08/26/19 10:49	

LABORATORY CONTROL SAMPLE: 2473735

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity, Total as CaCO ₃	mg/L	500	500	100	90-110	

SAMPLE DUPLICATE: 2473736

Parameter	Units	60311820012 Result	Dup Result	RPD	Max RPD	Qualifiers
Alkalinity, Total as CaCO ₃	mg/L	378	393	4	10	

SAMPLE DUPLICATE: 2473737

Parameter	Units	60311736004 Result	Dup Result	RPD	Max RPD	Qualifiers
Alkalinity, Total as CaCO ₃	mg/L	516	515	0	10	

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC ENERGY CTR
Pace Project No.: 60311920

QC Batch: 605686 Analysis Method: SM 2320B
QC Batch Method: SM 2320B Analysis Description: 2320B Alkalinity
Associated Lab Samples: 60311920002, 60311920003

METHOD BLANK: 2475836 Matrix: Water
Associated Lab Samples: 60311920002, 60311920003

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Alkalinity, Total as CaCO ₃	mg/L	<6.5	20.0	6.5	08/27/19 08:19	

LABORATORY CONTROL SAMPLE: 2475837

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity, Total as CaCO ₃	mg/L	500	492	98	90-110	

SAMPLE DUPLICATE: 2475838

Parameter	Units	60311920002 Result	Dup Result	RPD	Max RPD	Qualifiers
Alkalinity, Total as CaCO ₃	mg/L	392	406	4	10	

SAMPLE DUPLICATE: 2475839

Parameter	Units	60312418001 Result	Dup Result	RPD	Max RPD	Qualifiers
Alkalinity, Total as CaCO ₃	mg/L	434	441	2	10	

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311920

QC Batch: 603932

Analysis Method: SM 2540C

QC Batch Method: SM 2540C

Analysis Description: 2540C Total Dissolved Solids

Associated Lab Samples: 60311920001, 60311920002, 60311920003

METHOD BLANK: 2469663

Matrix: Water

Associated Lab Samples: 60311920001, 60311920002, 60311920003

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	<5.0	5.0	5.0	08/19/19 10:20	

LABORATORY CONTROL SAMPLE: 2469664

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

SAMPLE DUPLICATE: 2469665

Parameter	Units	60311920002 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	1630	1620	1	10	

SAMPLE DUPLICATE: 2469666

Parameter	Units	60312087006 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	2950	3460	16	10 D6	

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311920

QC Batch: 604219

Analysis Method: SM 2540C

QC Batch Method: SM 2540C

Analysis Description: 2540C Total Dissolved Solids

Associated Lab Samples: 60312020001, 60312020002, 60312020003, 60312020004, 60312020005, 60312020006

METHOD BLANK: 2470466

Matrix: Water

Associated Lab Samples: 60312020001, 60312020002, 60312020003, 60312020004, 60312020005, 60312020006

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	<5.0	5.0	5.0	08/20/19 09:55	

LABORATORY CONTROL SAMPLE: 2470467

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

SAMPLE DUPLICATE: 2470468

Parameter	Units	60312019001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	696	698	0	10	

SAMPLE DUPLICATE: 2470469

Parameter	Units	60312020006 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	<5.0	<5.0		10	

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC ENERGY CTR
Pace Project No.: 60311920

QC Batch: 604358 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 60312020001, 60312020002, 60312020003, 60312020004, 60312020005, 60312020006

METHOD BLANK: 2470936 Matrix: Water
Associated Lab Samples: 60312020001, 60312020002, 60312020003, 60312020004, 60312020005, 60312020006

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Chloride	mg/L	<0.22	1.0	0.22	08/20/19 15:15	
Fluoride	mg/L	<0.085	0.20	0.085	08/20/19 15:15	
Sulfate	mg/L	<0.23	1.0	0.23	08/20/19 15:15	

LABORATORY CONTROL SAMPLE: 2470937

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	2.4	97	90-110	
Sulfate	mg/L	5	4.8	97	90-110	

MATRIX SPIKE SAMPLE: 2470938

Parameter	Units	60311700004 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	1700	1000	2670	97	80-120	
Fluoride	mg/L	98.0	500	599	100	80-120	
Sulfate	mg/L	ND	1000	1000	97	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2470939 2470940

Parameter	Units	60312019001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	44.2	50	50	94.5	92.2	100	96	80-120	2	15	
Fluoride	mg/L	0.24	2.5	2.5	2.6	2.7	95	98	80-120	2	15	
Sulfate	mg/L	106	50	50	161	156	109	98	80-120	3	15	

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311920

QC Batch: 605755 Analysis Method: EPA 300.0
 QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
 Associated Lab Samples: 60311920001, 60311920002, 60311920003

METHOD BLANK: 2476001 Matrix: Water

Associated Lab Samples: 60311920001, 60311920002, 60311920003

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Chloride	mg/L	<0.22	1.0	0.22	08/27/19 10:51	
Fluoride	mg/L	<0.085	0.20	0.085	08/27/19 10:51	
Sulfate	mg/L	<0.23	1.0	0.23	08/27/19 10:51	

LABORATORY CONTROL SAMPLE: 2476002

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	5	4.6	92	90-110	
Fluoride	mg/L	2.5	2.3	93	90-110	
Sulfate	mg/L	5	5.1	103	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2476003 2476004

Parameter	Units	60311920002		60311920003		60311920002		60311920003		% Rec Limits	RPD	Max RPD	Qual
		Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec					
Chloride	mg/L	271	250	250	508	507	95	94	80-120	0	15		
Fluoride	mg/L	0.47	2.5	2.5	2.9	2.9	99	98	80-120	1	15		
Sulfate	mg/L	456	250	250	703	701	99	98	80-120	0	15		

MATRIX SPIKE SAMPLE: 2476005

Parameter	Units	60312114001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	ND	50	49.6	86	80-120	
Fluoride	mg/L	ND	25	24.6	98	80-120	
Sulfate	mg/L	166	50	214	95	80-120 E	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC ENERGY CTR
Pace Project No.: 60311920

QC Batch: 606064 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 60311920003

METHOD BLANK: 2477152 Matrix: Water
Associated Lab Samples: 60311920003

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Sulfate	mg/L	<0.23	1.0	0.23	08/28/19 10:20	

LABORATORY CONTROL SAMPLE: 2477153

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Sulfate	mg/L	5	4.7	93	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2477154 2477155

Parameter	Units	60310792030		2477154		2477155		% Rec Limits	RPD	Max RPD	Qual	
		MS Result	MSD Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result					MS % Rec
Sulfate	mg/L	29.4	29.4	25	25	54.5	54.4	100	100	80-120	0	15

MATRIX SPIKE SAMPLE: 2477156

Parameter	Units	60310792033 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Sulfate	mg/L	67.5	25	93.3	103	80-120	

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ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311920

Sample: M-MW-9 **Lab ID: 60311920001** Collected: 08/13/19 13:14 Received: 08/14/19 02:55 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	0.686 ± 0.356 (0.124) C:NA T:91%	pCi/L	09/06/19 15:35	13982-63-3	
Radium-228	EPA 904.0	1.02 ± 0.452 (0.753) C:80% T:82%	pCi/L	09/04/19 10:34	15262-20-1	

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ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311920

Sample: M-TP-2 **Lab ID: 60311920002** Collected: 08/13/19 13:48 Received: 08/14/19 02:55 Matrix: Water
PWS: Site ID: Sample Type:

Comments: • Upon receipt at the laboratory, 5 mls of nitric acid were added to the sample to meet the sample preservation requirement of pH <2 for radiochemistry analysis. The samples were not preserved <2 within the required 5 days of collection.

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	0.478 ± 0.523 (0.842) C:NA T:91%	pCi/L	09/06/19 15:35	13982-63-3	
Radium-228	EPA 904.0	0.138 ± 0.341 (0.758) C:77% T:88%	pCi/L	09/04/19 10:35	15262-20-1	

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ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311920

Sample: M-NE-DUP-1 **Lab ID: 60311920003** Collected: 08/13/19 08:00 Received: 08/14/19 02:55 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	0.723 ± 0.420 (0.447) C:NA T:94%	pCi/L	09/06/19 15:35	13982-63-3	
Radium-228	EPA 904.0	0.637 ± 0.392 (0.735) C:79% T:83%	pCi/L	09/04/19 10:35	15262-20-1	

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ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311920

Sample: M-TP-1 **Lab ID: 60312020001** Collected: 08/14/19 14:30 Received: 08/15/19 02:55 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	0.193 ± 0.363 (0.642) C:NA T:96%	pCi/L	09/06/19 15:35	13982-63-3	
Radium-228	EPA 904.0	0.984 ± 0.478 (0.821) C:75% T:81%	pCi/L	09/04/19 11:13	15262-20-1	

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ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311920

Sample: MW-10 **Lab ID: 60312020002** Collected: 08/14/19 09:32 Received: 08/15/19 02:55 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	0.785 ± 0.543 (0.769) C:NA T:92%	pCi/L	09/06/19 15:35	13982-63-3	
Radium-228	EPA 904.0	1.08 ± 0.505 (0.867) C:77% T:83%	pCi/L	09/04/19 11:13	15262-20-1	

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ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311920

Sample: M-BMW-3 **Lab ID: 60312020003** Collected: 08/14/19 11:05 Received: 08/15/19 02:55 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	1.19 ± 0.515 (0.365) C:NA T:96%	pCi/L	09/06/19 15:49	13982-63-3	
Radium-228	EPA 904.0	0.518 ± 0.443 (0.893) C:79% T:82%	pCi/L	09/04/19 11:13	15262-20-1	

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ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311920

Sample: M-BMW-4 **Lab ID: 60312020004** Collected: 08/14/19 10:02 Received: 08/15/19 02:55 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	0.416 ± 0.480 (0.780) C:NA T:87%	pCi/L	09/06/19 15:49	13982-63-3	
Radium-228	EPA 904.0	0.484 ± 0.418 (0.841) C:75% T:79%	pCi/L	09/04/19 11:13	15262-20-1	

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ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311920

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	0.331 ± 0.384 (0.619) C:NA T:92%	pCi/L	09/06/19 15:49	13982-63-3	
Radium-228	EPA 904.0	0.133 ± 0.377 (0.845) C:74% T:84%	pCi/L	09/04/19 14:38	15262-20-1	

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ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311920

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	0.653 ± 0.435 (0.540) C:NA T:89%	pCi/L	09/06/19 15:49	13982-63-3	
Radium-228	EPA 904.0	0.155 ± 0.454 (1.02) C:80% T:72%	pCi/L	09/04/19 14:38	15262-20-1	

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ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311920

Sample: M-TP-2 MS **Lab ID: 60311920010** Collected: 08/13/19 13:48 Received: 08/14/19 02:55 Matrix: Water
PWS: Site ID: Sample Type:

Comments: • Sample collection time on containers does not match COC; client was notified and confirmed correct time is 13:48.

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	87.91 %REC ± NA (NA) C:NA T:NA	pCi/L	09/06/19 15:35	13982-63-3	
Radium-228	EPA 904.0	123.73 %REC ± NA (NA) C:NA T:NA	pCi/L	09/04/19 10:35	15262-20-1	

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ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311920

Sample: M-TP-2 MSD **Lab ID: 60311920011** Collected: 08/13/19 13:48 Received: 08/14/19 02:55 Matrix: Water
PWS: Site ID: Sample Type:

Comments: • Sample collection time on containers does not match COC; client was notified and confirmed correct time is 13:48.

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	85.57 %REC 2.70 RPD ± NA (NA) C:NA T:NA	pCi/L	09/06/19 15:35	13982-63-3	
Radium-228	EPA 904.0	126.02 %REC 1.83 RPD ± NA (NA) C:NA T:NA	pCi/L	09/04/19 10:35	15262-20-1	

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QUALITY CONTROL - RADIOCHEMISTRY

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311920

QC Batch:	357798	Analysis Method:	EPA 903.1
QC Batch Method:	EPA 903.1	Analysis Description:	903.1 Radium-226
Associated Lab Samples:	60311920001, 60311920002, 60311920003, 60311920010, 60311920011, 60312020001, 60312020002, 60312020003, 60312020004, 60312020005, 60312020006		

METHOD BLANK:	1737463	Matrix:	Water
Associated Lab Samples:	60311920001, 60311920002, 60311920003, 60311920010, 60311920011, 60312020001, 60312020002, 60312020003, 60312020004, 60312020005, 60312020006		

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-226	0.497 ± 0.316 (0.382) C:NA T:100%	pCi/L	09/06/19 15:35	

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 - RADIOCHEMISTRY

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311920

QC Batch:	357797	Analysis Method:	EPA 904.0
QC Batch Method:	EPA 904.0	Analysis Description:	904.0 Radium 228
Associated Lab Samples:	60311920001, 60311920002, 60311920003, 60311920010, 60311920011, 60312020001, 60312020002, 60312020003, 60312020004, 60312020005, 60312020006		

METHOD BLANK:	1737457	Matrix:	Water
Associated Lab Samples:	60311920001, 60311920002, 60311920003, 60311920010, 60311920011, 60312020001, 60312020002, 60312020003, 60312020004, 60312020005, 60312020006		

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-228	0.550 ± 0.383 (0.736) C:76% T:81%	pCi/L	09/04/19 10:35	

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QUALIFIERS

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311920

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.

Act - Activity

Unc - Uncertainty: SDWA = 1.96 sigma count uncertainty, all other matrices = Expanded Uncertainty (95% confidence interval).

Gamma Spec = Expanded Uncertainty (95.4% Confidence Interval)

(MDC) - Minimum Detectable Concentration

Trac - Tracer Recovery (%)

Carr - Carrier Recovery (%)

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

PASI-PA Pace Analytical Services - Greensburg

ANALYTE QUALIFIERS

B Analyte was detected in the associated method blank.

D6 The precision between the sample and sample duplicate exceeded laboratory control limits.

E Analyte concentration exceeded the calibration range. The reported result is estimated.

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

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311920

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
60311920001	M-MW-9	EPA 200.7	603943	EPA 200.7	604004
60311920002	M-TP-2	EPA 200.7	603943	EPA 200.7	604004
60311920003	M-NE-DUP-1	EPA 200.7	603943	EPA 200.7	604004
60312020001	M-TP-1	EPA 200.7	603943	EPA 200.7	604004
60312020002	MW-10	EPA 200.7	603943	EPA 200.7	604004
60312020003	M-BMW-3	EPA 200.7	603943	EPA 200.7	604004
60312020004	M-BMW-4	EPA 200.7	603943	EPA 200.7	604004
60312020005	M-BMW-5	EPA 200.7	603943	EPA 200.7	604004
60312020006	M-NE-FB-1	EPA 200.7	603943	EPA 200.7	604004
60311920001	M-MW-9	EPA 200.8	603985	EPA 200.8	604011
60311920002	M-TP-2	EPA 200.8	603985	EPA 200.8	604011
60311920003	M-NE-DUP-1	EPA 200.8	603985	EPA 200.8	604011
60312020001	M-TP-1	EPA 200.8	603985	EPA 200.8	604011
60312020002	MW-10	EPA 200.8	603985	EPA 200.8	604011
60312020003	M-BMW-3	EPA 200.8	603985	EPA 200.8	604011
60312020004	M-BMW-4	EPA 200.8	603985	EPA 200.8	604011
60312020005	M-BMW-5	EPA 200.8	603985	EPA 200.8	604011
60312020006	M-NE-FB-1	EPA 200.8	603985	EPA 200.8	604011
60311920001	M-MW-9	EPA 245.1	604387	EPA 245.1	604433
60311920002	M-TP-2	EPA 245.1	604387	EPA 245.1	604433
60311920003	M-NE-DUP-1	EPA 245.1	604387	EPA 245.1	604433
60312020001	M-TP-1	EPA 245.1	604020	EPA 245.1	604051
60312020002	MW-10	EPA 245.1	604020	EPA 245.1	604051
60312020003	M-BMW-3	EPA 245.1	604020	EPA 245.1	604051
60312020004	M-BMW-4	EPA 245.1	604020	EPA 245.1	604051
60312020005	M-BMW-5	EPA 245.1	604020	EPA 245.1	604051
60312020006	M-NE-FB-1	EPA 245.1	604020	EPA 245.1	604051
60311920001	M-MW-9	EPA 903.1	357798		
60311920002	M-TP-2	EPA 903.1	357798		
60311920003	M-NE-DUP-1	EPA 903.1	357798		
60312020001	M-TP-1	EPA 903.1	357798		
60312020002	MW-10	EPA 903.1	357798		
60312020003	M-BMW-3	EPA 903.1	357798		
60312020004	M-BMW-4	EPA 903.1	357798		
60312020005	M-BMW-5	EPA 903.1	357798		
60312020006	M-NE-FB-1	EPA 903.1	357798		
60311920010	M-TP-2 MS	EPA 903.1	357798		
60311920011	M-TP-2 MSD	EPA 903.1	357798		
60311920001	M-MW-9	EPA 904.0	357797		
60311920002	M-TP-2	EPA 904.0	357797		
60311920003	M-NE-DUP-1	EPA 904.0	357797		
60312020001	M-TP-1	EPA 904.0	357797		
60312020002	MW-10	EPA 904.0	357797		
60312020003	M-BMW-3	EPA 904.0	357797		
60312020004	M-BMW-4	EPA 904.0	357797		
60312020005	M-BMW-5	EPA 904.0	357797		

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60311920

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
60312020006	M-NE-FB-1	EPA 904.0	357797		
60311920010	M-TP-2 MS	EPA 904.0	357797		
60311920011	M-TP-2 MSD	EPA 904.0	357797		
60311920001	M-MW-9	SM 2320B	605185		
60311920002	M-TP-2	SM 2320B	605686		
60311920003	M-NE-DUP-1	SM 2320B	605686		
60312020001	M-TP-1	SM 2320B	603916		
60312020002	MW-10	SM 2320B	603916		
60312020003	M-BMW-3	SM 2320B	603916		
60312020004	M-BMW-4	SM 2320B	603916		
60312020005	M-BMW-5	SM 2320B	603916		
60312020006	M-NE-FB-1	SM 2320B	603916		
60311920001	M-MW-9	SM 2540C	603932		
60311920002	M-TP-2	SM 2540C	603932		
60311920003	M-NE-DUP-1	SM 2540C	603932		
60312020001	M-TP-1	SM 2540C	604219		
60312020002	MW-10	SM 2540C	604219		
60312020003	M-BMW-3	SM 2540C	604219		
60312020004	M-BMW-4	SM 2540C	604219		
60312020005	M-BMW-5	SM 2540C	604219		
60312020006	M-NE-FB-1	SM 2540C	604219		
60311920001	M-MW-9	EPA 300.0	605755		
60311920002	M-TP-2	EPA 300.0	605755		
60311920003	M-NE-DUP-1	EPA 300.0	605755		
60311920003	M-NE-DUP-1	EPA 300.0	606064		
60312020001	M-TP-1	EPA 300.0	604358		
60312020002	MW-10	EPA 300.0	604358		
60312020003	M-BMW-3	EPA 300.0	604358		
60312020004	M-BMW-4	EPA 300.0	604358		
60312020005	M-BMW-5	EPA 300.0	604358		
60312020006	M-NE-FB-1	EPA 300.0	604358		

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Sample Condition Upon Receipt

WO#: 60311920



Client Name: Colder Assoc

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

Tracking #: _____ Pace Shipping Label Used? Yes No

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

Packing Material: Bubble Wrap Bubble Bags Foam None Other CCPIC

Thermometer Used: TJ00 Type of Ice: Wet Blue None

Cooler Temperature (°C): As-read 19.5 Corr. Factor 0-0 Corrected 19.5

Date and initials of person examining contents: 8/15/19

Temperature should be above freezing to 6°C 2.7, 0.2, 18.8 2.7, 0.2, 18.8

Chain of Custody present:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Chain of Custody relinquished:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Samples arrived within holding time:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Short Hold Time analyses (<72hr):	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	
Rush Turn Around Time requested:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	
Sufficient volume:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Correct containers used:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Pace containers used:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Containers intact:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<u>All coolers without ICE</u>
Unpreserved 5035A / TX1005/1006 soils frozen in 48hrs?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	<u>have Radium samples</u>
Filtered volume received for dissolved tests?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Sample labels match COC: Date / time / ID / analyses	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<u>NO time on COC for M-TP-2</u>
Samples contain multiple phases? Matrix: <u>WT</u>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	<u>cont. no 13:48</u>
Containers requiring pH preservation in compliance? (HNO ₃ , H ₂ SO ₄ , HCl<2; NaOH>9 Sulfide, NaOH>10 Cyanide) (Exceptions: VOA, Micro, O&G, KS TPH, OK-DRO)	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> 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)	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Potassium iodide test strip turns blue/purple? (Preserve)	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Trip Blank present:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Headspace in VOA vials (>6mm):	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Samples from USDA Regulated Area: State:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Additional labels attached to 5035A / TX1005 vials in the field?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	

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

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

_____ 8/16/19 _____

Project Manager Review: Jamie Chubb Date: _____

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: <u>Golden Associates</u> Address: <u>1315 Barrett Parkway</u> Email To: <u>Drive Ste 260</u> Phone: <u>636-724-9191</u> Fax: <u>636-724-9333</u> Requested Due Date/TAT: <u>Standard</u>		Section B Required Project Information: Report To: <u>Jeffrey Ingram</u> Copy To: <u>Ryan Feldman</u> Eric Schneider Purchase Order No.: Project Name: <u>American Marine EC-ME</u> Project Number: <u>53-1406-01-00043</u>		Section C Invoice Information: Attention: Company Name: Address: Pace Quote Reference: Pace Project Manager: <u>Jamie Church</u> Pace Profile #: <u>9285</u>	
REGULATORY AGENCY <input type="checkbox"/> NPDES <input checked="" type="checkbox"/> GROUND WATER <input type="checkbox"/> DRINKING WATER <input type="checkbox"/> UST <input type="checkbox"/> RCRA <input type="checkbox"/> OTHER		Site Location STATE: <u>MO</u>		Page: <u>1</u> of <u>1</u> 2013251	

ITEM #	Section D Required Client Information	Matrix Codes MATRIX / CODE	COLLECTED		SAMPLE TYPE (G=GRAB C=COMP)	MATRIX CODE (see valid codes to left)	# OF CONTAINERS	Preservatives	Requested Analysis Filtered (Y/N)	Residual Chlorine (Y/N)	Pace Project No. / Lab I.D.
			COMPOSITE START	COMPOSITE END							
1	M-MV-9	Drinking Water			WTG	WTG	523	Unpreserved			00311920
2	M-TD-2	Waste Water Product			WTG	WTG	569				00311920
3	M-ME-DUP-1	Soil/Solid			WTG	WTG	523				00311920
4		Oil									
5		Wipe									
6		Air									
7		Tissue									
8		Other									
9											
10											
11											
12											

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	TEMP IN °C	RECEIVED ON	ICE (Y/N)	SEALED COOLER (Y/N)	SAMPLES INTACT (Y/N)
	<u>Golden Associates</u>	<u>8/13/19</u>	<u>1735</u>	<u>Ryan Feldman</u>	<u>8-14-19</u>	<u>0855</u>	<u>19.5</u>	<u>A</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>
							<u>18.8</u>	<u>J</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>
							<u>2.2</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>
							<u>2.7</u>	<u>J</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>

SAMPLER NAME AND SIGNATURE
 PRINT Name of SAMPLER: Ryan Feldman
 SIGNATURE of SAMPLER: [Signature]
 DATE Signed (MM/DD/YY): 08/13/19

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



Sample Condition Upon Receipt

WO#: 60312020
Barcode
60312020

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-300 Type of Ice: Wet Blue None

Cooler Temperature (°C): As-read 1.9/0.7 Corr. Factor 0.0 Corrected 1.9/0.7/11.9

Date and initials of person examining contents: PUG/15/19

Temperature should be above freezing to 6°C 11.9/14.6

Table with 2 columns: Question/Field and Yes/No/N/A checkboxes. Rows include Chain of Custody, Short Hold Time, Rush Turn Around Time, etc.

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

Person Contacted: Date/Time:

Comments/ Resolution:

Project Manager Review: Janni Church 8/16/19



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

Section B
 Required Project Information:
 Report To: **Jeffrey Ingram**
 Copy To: **Ryan Feldmann/Eric Schneider**
 Purchase Order No.:
 Project Name: **Ameren Meramec Energy Center**
 Project Number: **153-1406-01.0004 (COC #13)**

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

REGULATORY AGENCY
 NPDES GROUND WATER DRINKING WATER
 UST RCRA OTHER
 Site Location STATE: MO

Page: _____ of _____

ITEM #	Section D Required Client Information	Valid Matrix Codes MATRIX CODE DW WW PW PW P SL OL WP AR OT TS	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED		SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives H ₂ SO ₄ HNO ₃ HCl NaOH Na ₂ S ₂ O ₃ Methanol Other	Analysis Test Metals* Mercury Chloride/Fluoride/Sulfate TDS Alkalinity Radium 226 Radium 228	Requested Analysis Filtered (Y/N)	Temp in °C	Received on Ice (Y/N)	Sealed Cooler (Y/N)	Samples Intact (Y/N)		
					COMPOSITE START	COMPOSITE END/GRAB											
	REQUIRED COMMENTS				DATE	TIME	DATE	TIME									
1	M-TP-1		WT	G	8/14	1430		5									
2	M-TP-2		WT	G													
3	M-UMW-9 (AMW-1)		WT	G	8/14	0932		5									
4	M-UMW-10 (AMW-2) RF		WT	G		105		1									
5	M-BMW-3		WT	G		1002		1									
6	M-BMW-4		WT	G		0900		1									
7	M-BMW-5		WT	G				1									
8	M-NE-FB-1		WT	G		1006		1									
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		
					<i>Ryan Feldmann</i>	8/14/19	1646			<i>Ryan Feldmann</i>	0255	19			Y	Y	
															Y	Y	
															N	N	
															N	N	

SAMPLER NAME AND SIGNATURE
 PRINT Name of SAMPLER: *Ryan Feldmann*
 SIGNATURE of SAMPLER: *Ryan Feldmann*
 DATE Signed (MM/DD/YYYY): *08/14/19*

MEMORANDUM**DATE** October 1, 2019**Project No.** 1531406**TO** Project File
Golder Associates**CC** Amanda Derhake, Jeff Ingram**FROM** Tommy Goodwin**EMAIL** Tommy_Goodwin@golder.com**DATA VALIDATION SUMMARY, MERAMEC ENERGY CENTER – NATURE & EXTENT – DATA PACKAGE 60311920**

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

- When a compound was detected in a sample result between the MDL and the PQL the results were recorded at the detection value and qualified as estimates (J).
- When a compound was detected in a blank (i.e. method, field) and the blank comparison criterion was not met, associated sample results were qualified as estimates (J) non-detects (U).
- When a duplicate comparison criterion was not met, associated sample detections were qualified as estimates (J).
- When MS/MSD recovery exceeded the QC limits, the associated sample result was qualified as an estimate (J).

QA LEVEL II - INORGANIC DATA EVALUATION CHECKLIST

Company Name: Golder Associates
 Project Name: Ameren - MEC - DM/AM
 Reviewer: T Goodwin

Project Manager: J Ingram
 Project Number: 1531406
 Validation Date: 10/1/2019

Laboratory: Pace Analytical - KS

SDG #: 60311920

Analytical Method (type and no.): EPA 200.7/200.8 (Metals); EPA 245.1 (Hg); EPA 903.1/904.0 (Rads); SM 2320B (Alk); SM 2540C (TDS); EPA 300.0 (Anions)

Matrix: Air Soil/Sed. Water Waste _____

Sample Names M-MW-9, M-TP-2, M-NE-DUP-1, M-TP-1, MW-10, M-BMW-3, M-BMW-4, M-BMW-5, M-NE-FB-1, M-TP-2 MS, M-TP-2 MSD

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?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>8/13-8/14/2019</u>
b) Sampling team indicated?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
c) Sample location noted?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
d) Sample depth indicated (Soils)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	_____
e) Sample type indicated (<u>grab</u> /composite)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
f) Field QC noted?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
g) Field parameters collected (note types)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>pH, Sp.Cond, ORP, Temp, DO, Turb</u>
h) Field Calibration within control limits?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
i) Notations of unacceptable field conditions/performances from field logs or field notes?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	_____
j) Does the laboratory narrative indicate deficiencies?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	_____
Note Deficiencies: _____				

Chain-of-Custody (COC)	YES	NO	NA	COMMENTS
a) Was the COC properly completed?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
b) Was the COC signed by both field and laboratory personnel?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
c) Were samples received in good condition?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____

General (reference QAPP or Method)	YES	NO	NA	COMMENTS
a) Were hold times met for sample pretreatment?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<u>See Notes</u>
b) Were hold times met for sample analysis?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
c) Were the correct preservatives used?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
d) Was the correct method used?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
e) Were appropriate reporting limits achieved?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
f) Were any sample dilutions noted?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>See Notes</u>
g) Were any matrix problems noted?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	_____

QA LEVEL II - INORGANIC DATA EVALUATION CHECKLIST

Blanks	YES	NO	NA	COMMENTS
a) Were analytes detected in the method blank(s)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	See Notes
b) Were analytes detected in the field blank(s)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	See Notes
c) Were analytes detected in the equipment blank(s)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
d) Were analytes detected in the trip blank(s)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

Laboratory Control Sample (LCS)	YES	NO	NA	COMMENTS
a) Was a LCS analyzed once per SDG?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
b) Were the proper analytes included in the LCS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
c) Was the LCS accuracy criteria met?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Duplicates	YES	NO	NA	COMMENTS
a) Were field duplicates collected (note original and duplicate sample names)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	DUP-1@M-MW-9
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	FB-1@ MW-10
b) Were field dup. precision criteria met (note RPD)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	See Notes
c) Were lab duplicates analyzed (note original and duplicate samples)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-920002 (Alk, TDS); -020006 (TDS)
d) Were lab dup. precision criteria met (note RPD)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	See Notes

Blind Standards	YES	NO	NA	COMMENTS
a) Was a blind standard used (indicate name, analytes included and concentrations)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
b) Was the %D within control limits?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

Matrix Spike/Matrix Spike Duplicate (MS/MSD)	YES	NO	NA	COMMENTS
a) Was MS accuracy criteria met?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	See Notes
Recovery could not be calculated since sample contained high concentration of analyte?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
b) Was MSD accuracy criteria met?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	See Notes
Recovery could not be calculated since sample contained high concentration of analyte?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
c) Were MS/MSD precision criteria met?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Comments/Notes:

MB: -920001-03,-020001-06: Be (0.30); All: Ra-226 (0.497),

FB: FB-1: Mg (14.0), Ra-226 (0.653)

FD: DUP-1: Be (200), Cr (200), Se (200), F (33), Ra-228 (200)

Max Lab RPD: 4% (Limit 10%)

MS/MSD: -020003: Ca (MS-L), Fe (MS-L); -920002: Ca (MSD-H), Na (MSD-H)

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

Preservation: M-TP-2 was not preserved to <2 within the required 5 days of collection. Preservative added upon arrival at lab for radiochemistry analysis.

October 17, 2019

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

RE: Project: AMEREN MERAMEC ENERGY CTR
Pace Project No.: 60317032

Dear Jeffrey Ingram:

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

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

Sincerely,



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

Enclosures

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



REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
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CERTIFICATIONS

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60317032

Kansas Certification IDs

9608 Loiret Boulevard, Lenexa, KS 66219

Missouri Inorganic Drinking Water Certification #: 10090

Arkansas Drinking Water

Arkansas Certification #: 19-016-0

Arkansas Drinking Water

Illinois Certification #: 004455

Iowa Certification #: 118

Kansas/NELAP Certification #: E-10116

Louisiana Certification #: 03055

Nevada Certification #: KS000212018-1

Oklahoma Certification #: 9205/9935

Florida: Cert E871149 SEKS WET

Texas Certification #: T104704407-18-11

Utah Certification #: KS000212018-8

Illinois Certification #: 004592

Kansas Field Laboratory Accreditation: # E-92587

Missouri SEKS Micro Certification: 10070

REPORT OF LABORATORY ANALYSIS

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SAMPLE SUMMARY

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60317032

Lab ID	Sample ID	Matrix	Date Collected	Date Received
60317032001	M-MW-7	Water	10/03/19 08:55	10/04/19 02:55
60317032002	M-MW-5	Water	10/03/19 10:27	10/04/19 02:55
60317032003	M-MW-DUP-1	Water	10/03/19 10:27	10/04/19 02:55
60317032004	M-MW-FB-1	Water	10/03/19 10:34	10/04/19 02:55

REPORT OF LABORATORY ANALYSIS

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SAMPLE ANALYTE COUNT

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60317032

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
60317032001	M-MW-7	EPA 300.0	MGS	1	PASI-K
60317032002	M-MW-5	SM 2540C	MAP	1	PASI-K
60317032003	M-MW-DUP-1	EPA 300.0	MGS	1	PASI-K
60317032004	M-MW-FB-1	SM 2540C	MAP	1	PASI-K
		EPA 300.0	MGS	1	PASI-K

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60317032

Sample: M-MW-7 **Lab ID: 60317032001** Collected: 10/03/19 08:55 Received: 10/04/19 02:55 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
300.0 IC Anions 28 Days		Analytical Method: EPA 300.0							
Fluoride	0.54	mg/L	0.20	0.085	1		10/15/19 22:15	16984-48-8	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60317032

Sample: M-MW-5 **Lab ID: 60317032002** Collected: 10/03/19 10:27 Received: 10/04/19 02:55 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
2540C Total Dissolved Solids									
Analytical Method: SM 2540C									
Total Dissolved Solids	898	mg/L	10.0	10.0	1		10/08/19 15:23		

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60317032

Sample: M-MW-DUP-1 **Lab ID: 60317032003** Collected: 10/03/19 10:27 Received: 10/04/19 02:55 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
300.0 IC Anions 28 Days									
Analytical Method: EPA 300.0									
Fluoride	0.52	mg/L	0.20	0.085	1		10/15/19 22:32	16984-48-8	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60317032

Sample: M-MW-FB-1 **Lab ID: 60317032004** Collected: 10/03/19 10:34 Received: 10/04/19 02:55 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	6.0	mg/L	5.0	5.0	1		10/08/19 15:23		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Fluoride	<0.085	mg/L	0.20	0.085	1		10/15/19 22:49	16984-48-8	

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC ENERGY CTR
Pace Project No.: 60317032

QC Batch: 614091 Analysis Method: SM 2540C
QC Batch Method: SM 2540C Analysis Description: 2540C Total Dissolved Solids
Associated Lab Samples: 60317032002, 60317032004

METHOD BLANK: 2507725 Matrix: Water
Associated Lab Samples: 60317032002, 60317032004

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	<5.0	5.0	5.0	10/08/19 15:18	

LABORATORY CONTROL SAMPLE: 2507726

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

SAMPLE DUPLICATE: 2507728

Parameter	Units	60317050012 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	47100	45400	4	10	

SAMPLE DUPLICATE: 2507743

Parameter	Units	60317050008 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	947	957	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 MERAMEC ENERGY CTR

Pace Project No.: 60317032

QC Batch: 614196 Analysis Method: EPA 300.0
 QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
 Associated Lab Samples: 60317032001, 60317032003, 60317032004

METHOD BLANK: 2508100 Matrix: Water
 Associated Lab Samples: 60317032001, 60317032003, 60317032004

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Fluoride	mg/L	<0.085	0.20	0.085	10/15/19 15:08	

LABORATORY CONTROL SAMPLE: 2508101

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

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2508102 2508103

Parameter	Units	2508102		2508103		MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
		60317026001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result								
Fluoride	mg/L	0.26	2.5	2.5	2.8	2.9	103	106	80-120	3	15		

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REPORT OF LABORATORY ANALYSIS

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QUALIFIERS

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60317032

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

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60317032

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
60317032002	M-MW-5	SM 2540C	614091		
60317032004	M-MW-FB-1	SM 2540C	614091		
60317032001	M-MW-7	EPA 300.0	614196		
60317032003	M-MW-DUP-1	EPA 300.0	614196		
60317032004	M-MW-FB-1	EPA 300.0	614196		

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Sample Condition Upon Receipt

WO#: 60317032



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 ZPIC

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

Cooler Temperature (°C): As-read 0.6 Corr. Factor +0.0 Corrected 0.6

Date and initials of person examining contents:

Temperature should be above freezing to 6°C

Table with 2 columns: Question/Field and Answer (Yes/No/N/A). Rows include Chain of Custody, Short Hold Time, Rush Turn Around Time, Sufficient volume, Containers intact, etc.

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

Person Contacted: Date/Time:

Comments/ Resolution:

Project Manager Review: Janni Chund Date: 10/8/19



MEMORANDUM

DATE January 29, 2020

Project No. 153140601

TO Project File
Golder Associates

CC Amanda Derhake, Jeff Ingram

FROM Tommy Goodwin

EMAIL Tommy_Goodwin@golder.com

DATA VALIDATION SUMMARY, MERAMEC ENERGY CENTER – DATA PACKAGE 60317032

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

- None.

QA LEVEL II - INORGANIC DATA EVALUATION CHECKLIST

Company Name: Golder Associates
 Project Name: Ameren - Meramec - MEC
 Reviewer: T Goodwin

Project Manager: J Ingram
 Project Number: 153140601
 Validation Date: 1/29/2020

Laboratory: Pace Analytical - KS
 Analytical Method (type and no.): SM 2540C (TDS); EPA 300.0 (Anions)
 Matrix: Air Soil/Sed. Water Waste
 Sample Names M-MW-7, M-MW-5, M-MW-DUP-1, M-MW-FB-1

SDG #: 60317032

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?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>10/3/2019</u>
b) Sampling team indicated?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
c) Sample location noted?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
d) Sample depth indicated (Soils)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
e) Sample type indicated (<u>grab</u> composite)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
f) Field QC noted?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
g) Field parameters collected (note types)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>pH, Sp.Cond, ORP, Temp, DO, Turb</u>
h) Field Calibration within control limits?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
i) Notations of unacceptable field conditions/performances from field logs or field notes?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
j) Does the laboratory narrative indicate deficiencies?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Note Deficiencies: _____				

Chain-of-Custody (COC)	YES	NO	NA	COMMENTS
a) Was the COC properly completed?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
b) Was the COC signed by both field and laboratory personnel?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
c) Were samples received in good condition?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

General (reference QAPP or Method)	YES	NO	NA	COMMENTS
a) Were hold times met for sample pretreatment?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
b) Were hold times met for sample analysis?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
c) Were the correct preservatives used?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
d) Was the correct method used?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
e) Were appropriate reporting limits achieved?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
f) Were any sample dilutions noted?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
g) Were any matrix problems noted?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

QA LEVEL II - INORGANIC DATA EVALUATION CHECKLIST

Blanks	YES	NO	NA	COMMENTS
a) Were analytes detected in the method blank(s)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
b) Were analytes detected in the field blank(s)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	See Notes
c) Were analytes detected in the equipment blank(s)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
d) Were analytes detected in the trip blank(s)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

Laboratory Control Sample (LCS)	YES	NO	NA	COMMENTS
a) Was a LCS analyzed once per SDG?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
b) Were the proper analytes included in the LCS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
c) Was the LCS accuracy criteria met?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Duplicates	YES	NO	NA	COMMENTS
a) Were field duplicates collected (note original and duplicate sample names)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	DUP-1 @ M-MW-7
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	FB-1 @ M-MW-5
b) Were field dup. precision criteria met (note RPD)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	See Notes
c) Were lab duplicates analyzed (note original and duplicate samples)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
d) Were lab dup. precision criteria met (note RPD)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

Blind Standards	YES	NO	NA	COMMENTS
a) Was a blind standard used (indicate name, analytes included and concentrations)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
b) Was the %D within control limits?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

Matrix Spike/Matrix Spike Duplicate (MS/MSD)	YES	NO	NA	COMMENTS
a) Was MS accuracy criteria met?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	See Notes
Recovery could not be calculated since sample contained high concentration of analyte?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
b) Was MSD accuracy criteria met?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	See Notes
Recovery could not be calculated since sample contained high concentration of analyte?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
c) Were MS/MSD precision criteria met?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

Comments/Notes:

FB-1: TDS (6.0)

Max Field DUP RPD: 4% (Limit 20%)

MS/MSD was for unrelated samples; no qualification is necessary.

November 13, 2019

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

RE: Project: AMEREN MERAMEC ENERGY CTR
Pace Project No.: 60318734

Dear Jeffrey Ingram:

Enclosed are the analytical results for sample(s) received by the laboratory on October 19, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

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

Sincerely,



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

Enclosures

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



REPORT OF LABORATORY ANALYSIS

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CERTIFICATIONS

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60318734

Pennsylvania Certification IDs

1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601
ANAB DOD-ELAP Rad Accreditation #: L2417
Alabama Certification #: 41590
Arizona Certification #: AZ0734
Arkansas Certification
California Certification #: 04222CA
Colorado Certification #: PA01547
Connecticut Certification #: PH-0694
Delaware Certification
EPA Region 4 DW Rad
Florida/TNI Certification #: E87683
Georgia Certification #: C040
Florida: Cert E871149 SEKS WET
Guam Certification
Hawaii Certification
Idaho Certification
Illinois Certification
Indiana Certification
Iowa Certification #: 391
Kansas/TNI Certification #: E-10358
Kentucky Certification #: KY90133
KY WW Permit #: KY0098221
KY WW Permit #: KY0000221
Louisiana DHH/TNI Certification #: LA180012
Louisiana DEQ/TNI Certification #: 4086
Maine Certification #: 2017020
Maryland Certification #: 308
Massachusetts Certification #: M-PA1457
Michigan/PADEP Certification #: 9991

Missouri Certification #: 235
Montana Certification #: Cert0082
Nebraska Certification #: NE-OS-29-14
Nevada Certification #: PA014572018-1
New Hampshire/TNI Certification #: 297617
New Jersey/TNI Certification #: PA051
New Mexico Certification #: PA01457
New York/TNI Certification #: 10888
North Carolina Certification #: 42706
North Dakota Certification #: R-190
Ohio EPA Rad Approval: #41249
Oregon/TNI Certification #: PA200002-010
Pennsylvania/TNI Certification #: 65-00282
Puerto Rico Certification #: PA01457
Rhode Island Certification #: 65-00282
South Dakota Certification
Tennessee Certification #: 02867
Texas/TNI Certification #: T104704188-17-3
Utah/TNI Certification #: PA014572017-9
USDA Soil Permit #: P330-17-00091
Vermont Dept. of Health: ID# VT-0282
Virgin Island/PADEP Certification
Virginia/VELAP Certification #: 9526
Washington Certification #: C868
West Virginia DEP Certification #: 143
West Virginia DHHR Certification #: 9964C
Wisconsin Approve List for Rad
Wyoming Certification #: 8TMS-L

Kansas Certification IDs

9608 Loiret Boulevard, Lenexa, KS 66219
Missouri Inorganic Drinking Water Certification #: 10090
Arkansas Drinking Water
Arkansas Certification #: 19-016-0
Arkansas Drinking Water
Illinois Certification #: 004455
Iowa Certification #: 118
Kansas/NELAP Certification #: E-10116
Louisiana Certification #: 03055

Nevada Certification #: KS000212020-2
Oklahoma Certification #: 9205/9935
Florida: Cert E871149 SEKS WET
Texas Certification #: T104704407-19-12
Utah Certification #: KS000212018-8
Illinois Certification #: 004592
Kansas Field Laboratory Accreditation: # E-92587
Missouri SEKS Micro Certification: 10070

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SAMPLE SUMMARY

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60318734

Lab ID	Sample ID	Matrix	Date Collected	Date Received
60318734001	M-MW-10	Water	10/17/19 14:38	10/19/19 03:50

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SAMPLE ANALYTE COUNT

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60318734

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
60318734001	M-MW-10	EPA 200.7	EMR	6	PASI-K
		EPA 200.8	EMR	2	PASI-K
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
		SM 2540C	MAP	1	PASI-K
		EPA 300.0	MJK	3	PASI-K

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ANALYTICAL RESULTS

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60318734

Sample: M-MW-10 **Lab ID: 60318734001** Collected: 10/17/19 14:38 Received: 10/19/19 03:50 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.7 Metals, Total		Analytical Method: EPA 200.7 Preparation Method: EPA 200.7							
Barium	181	ug/L	5.0	1.4	1	10/23/19 08:55	10/24/19 15:03	7440-39-3	
Boron	1780	ug/L	100	10.7	1	10/23/19 08:55	10/24/19 15:03	7440-42-8	
Calcium	208000	ug/L	200	50.0	1	10/23/19 08:55	10/24/19 15:03	7440-70-2	
Cobalt	<0.84	ug/L	5.0	0.84	1	10/23/19 08:55	10/24/19 15:03	7440-48-4	
Lithium	35.0	ug/L	10.0	5.9	1	10/23/19 08:55	10/24/19 15:03	7439-93-2	
Molybdenum	6.6J	ug/L	20.0	2.6	1	10/23/19 08:55	10/24/19 15:03	7439-98-7	
200.8 MET ICPMS		Analytical Method: EPA 200.8 Preparation Method: EPA 200.8							
Arsenic	12.5	ug/L	1.0	0.065	1	10/21/19 17:01	10/23/19 16:21	7440-38-2	
Selenium	<0.085	ug/L	1.0	0.085	1	10/21/19 17:01	10/23/19 16:21	7782-49-2	
2540C Total Dissolved Solids		Analytical Method: SM 2540C							
Total Dissolved Solids	961	mg/L	13.3	13.3	1		10/24/19 09:37		
300.0 IC Anions 28 Days		Analytical Method: EPA 300.0							
Chloride	76.3	mg/L	20.0	4.4	20		11/11/19 21:40	16887-00-6	
Fluoride	0.29	mg/L	0.20	0.085	1		11/11/19 20:50	16984-48-8	
Sulfate	198	mg/L	20.0	4.6	20		11/11/19 21:40	14808-79-8	M1

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60318734

QC Batch: 617629 Analysis Method: EPA 200.7
 QC Batch Method: EPA 200.7 Analysis Description: 200.7 Metals, Total
 Associated Lab Samples: 60318734001

METHOD BLANK: 2520187 Matrix: Water

Associated Lab Samples: 60318734001

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Barium	ug/L	<1.4	5.0	1.4	10/24/19 14:50	
Boron	ug/L	<10.7	100	10.7	10/24/19 14:50	
Calcium	ug/L	<50.0	200	50.0	10/24/19 14:50	
Cobalt	ug/L	<0.84	5.0	0.84	10/24/19 14:50	
Lithium	ug/L	<5.9	10.0	5.9	10/24/19 14:50	
Molybdenum	ug/L	<2.6	20.0	2.6	10/24/19 14:50	

LABORATORY CONTROL SAMPLE: 2520188

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Barium	ug/L	1000	990	99	85-115	
Boron	ug/L	1000	962	96	85-115	
Calcium	ug/L	10000	10200	102	85-115	
Cobalt	ug/L	1000	993	99	85-115	
Lithium	ug/L	1000	979	98	85-115	
Molybdenum	ug/L	1000	1020	102	85-115	

MATRIX SPIKE SAMPLE: 2520189

Parameter	Units	60318736001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Barium	ug/L	155	1000	1130	97	70-130	
Boron	ug/L	9440	1000	10200	81	70-130	
Calcium	ug/L	87100	10000	96300	92	70-130	
Cobalt	ug/L	1.3J	1000	959	96	70-130	
Lithium	ug/L	28.8	1000	994	97	70-130	
Molybdenum	ug/L	292	1000	1290	100	70-130	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2520190 2520191

Parameter	Units	60318735001		MSD		MS		MSD		% Rec Limits	Max RPD	Qual
		Result	Spike Conc.	Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec				
Barium	ug/L	14.2	1000	1000	998	996	98	98	98	70-130	0	20
Boron	ug/L	5260	1000	1000	6480	6410	122	114	114	70-130	1	20
Calcium	ug/L	7340	10000	10000	17700	17700	103	103	103	70-130	0	20
Cobalt	ug/L	<0.84	1000	1000	964	970	96	97	97	70-130	1	20
Lithium	ug/L	12.3	1000	1000	989	985	98	97	97	70-130	0	20
Molybdenum	ug/L	302	1000	1000	1320	1320	101	102	102	70-130	1	20

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60318734

QC Batch: 617202 Analysis Method: EPA 200.8

QC Batch Method: EPA 200.8 Analysis Description: 200.8 MET

Associated Lab Samples: 60318734001

METHOD BLANK: 2518943 Matrix: Water

Associated Lab Samples: 60318734001

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Arsenic	ug/L	<0.065	1.0	0.065	10/23/19 15:53	
Selenium	ug/L	<0.085	1.0	0.085	10/23/19 15:53	

LABORATORY CONTROL SAMPLE: 2518944

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Arsenic	ug/L	40	39.9	100	85-115	
Selenium	ug/L	40	40.9	102	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2518945 2518946

Parameter	Units	60318764002		2518945		2518946		% Rec Limits	RPD	Max RPD	Qual
		MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec				
Arsenic	ug/L	ND	40	40	41.7	42.0	102	103	70-130	1	20
Selenium	ug/L	ND	40	40	39.4	40.1	97	99	70-130	2	20

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60318734

QC Batch: 617744	Analysis Method: SM 2540C
QC Batch Method: SM 2540C	Analysis Description: 2540C Total Dissolved Solids
Associated Lab Samples: 60318734001	

METHOD BLANK: 2520622 Matrix: Water

Associated Lab Samples: 60318734001

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	<5.0	5.0	5.0	10/24/19 09:35	

LABORATORY CONTROL SAMPLE: 2520623

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Dissolved Solids	mg/L	1000	977	98	80-120	

SAMPLE DUPLICATE: 2520624

Parameter	Units	60318634006 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	640	636	1	10	

SAMPLE DUPLICATE: 2520625

Parameter	Units	60318741004 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	625	618	1	10	

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60318734

QC Batch:	621676	Analysis Method:	EPA 300.0
QC Batch Method:	EPA 300.0	Analysis Description:	300.0 IC Anions
Associated Lab Samples:	60318734001		

METHOD BLANK: 2535170 Matrix: Water

Associated Lab Samples: 60318734001

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Chloride	mg/L	<0.22	1.0	0.22	11/11/19 19:42	
Fluoride	mg/L	<0.085	0.20	0.085	11/11/19 19:42	
Sulfate	mg/L	<0.23	1.0	0.23	11/11/19 19:42	

METHOD BLANK: 2535876 Matrix: Water

Associated Lab Samples: 60318734001

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Chloride	mg/L	<0.22	1.0	0.22	11/12/19 21:35	
Fluoride	mg/L	<0.085	0.20	0.085	11/12/19 21:35	
Sulfate	mg/L	<0.23	1.0	0.23	11/12/19 21:35	

LABORATORY CONTROL SAMPLE: 2535171

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	5	4.7	93	90-110	
Fluoride	mg/L	2.5	2.5	99	90-110	
Sulfate	mg/L	5	5.1	102	90-110	

LABORATORY CONTROL SAMPLE: 2535877

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	5	4.8	96	90-110	
Fluoride	mg/L	2.5	2.6	106	90-110	
Sulfate	mg/L	5	5.3	105	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2535172 2535173

Parameter	Units	MS		MSD		MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
		60318734001 Result	Spike Conc.	Spike Conc.	Result						
Chloride	mg/L	76.3	100	100	176	168	100	92	80-120	5	15
Fluoride	mg/L	0.29	2.5	2.5	2.7	2.6	96	94	80-120	2	15
Sulfate	mg/L	198	100	100	319	290	121	92	80-120	9	15 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 MERAMEC ENERGY CTR

Pace Project No.: 60318734

MATRIX SPIKE SAMPLE:		2535174					
Parameter	Units	60319962005 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	4.3	5	9.3	99	80-120	
Fluoride	mg/L	ND	2.5	2.9	116	80-120	
Sulfate	mg/L	17.9	5	23.5	111	80-120	E

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REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60318734

Sample: M-MW-10 **Lab ID: 60318734001** Collected: 10/17/19 14:38 Received: 10/19/19 03:50 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	0.121 ± 0.290 (0.560) C:NA T:89%	pCi/L	11/11/19 13:58	13982-63-3	
Radium-228	EPA 904.0	1.18 ± 0.525 (0.890) C:83% T:87%	pCi/L	11/08/19 17:07	15262-20-1	

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QUALITY CONTROL - RADIOCHEMISTRY

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60318734

QC Batch: 368390

Analysis Method: EPA 903.1

QC Batch Method: EPA 903.1

Analysis Description: 903.1 Radium-226

Associated Lab Samples: 60318734001

METHOD BLANK: 1787310

Matrix: Water

Associated Lab Samples: 60318734001

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-226	0.000 ± 0.306 (0.647) C:NA T:87%	pCi/L	11/11/19 13:45	

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QUALITY CONTROL - RADIOCHEMISTRY

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60318734

QC Batch: 368389

Analysis Method: EPA 904.0

QC Batch Method: EPA 904.0

Analysis Description: 904.0 Radium 228

Associated Lab Samples: 60318734001

METHOD BLANK: 1787305

Matrix: Water

Associated Lab Samples: 60318734001

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-228	0.274 ± 0.426 (0.922) C:70% T:83%	pCi/L	11/08/19 12:59	

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QUALIFIERS

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60318734

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.

Act - Activity

Unc - Uncertainty: SDWA = 1.96 sigma count uncertainty, all other matrices = Expanded Uncertainty (95% confidence interval).

Gamma Spec = Expanded Uncertainty (95.4% Confidence Interval)

(MDC) - Minimum Detectable Concentration

Trac - Tracer Recovery (%)

Carr - Carrier Recovery (%)

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

PASI-PA Pace Analytical Services - Greensburg

ANALYTE QUALIFIERS

E Analyte concentration exceeded the calibration range. The reported result is estimated.

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

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60318734

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
60318734001	M-MW-10	EPA 200.7	617629	EPA 200.7	617750
60318734001	M-MW-10	EPA 200.8	617202	EPA 200.8	617258
60318734001	M-MW-10	EPA 903.1	368390		
60318734001	M-MW-10	EPA 904.0	368389		
60318734001	M-MW-10	SM 2540C	617744		
60318734001	M-MW-10	EPA 300.0	621676		

REPORT OF LABORATORY ANALYSIS

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Sample Condition Upon Receipt

WO# : 60318734

60318734

Client Name: Borden

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: F-796 Type of Ice: Wet Blue None

Cooler Temperature (°C): As-read 2.1, 1.0 Corr. Factor 0.14 Corrected 2.5, 1.4

Date and initials of person examining contents: 10/19/19

Temperature should be above freezing to 6°C

Chain of Custody present:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Chain of Custody relinquished:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Samples arrived within holding time:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Short Hold Time analyses (<72hr):	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	
Rush Turn Around Time requested:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	
Sufficient volume:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Correct containers used:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Pace containers used:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Containers intact:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Unpreserved 5035A / TX1005/1006 soils frozen in 48hrs?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Filtered volume received for dissolved tests?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Sample labels match COC: Date / time / ID / analyses	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Samples contain multiple phases? Matrix: <u>wt</u>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	
Containers requiring pH preservation in compliance? (HNO ₃ , H ₂ SO ₄ , HCl<2; NaOH>9 Sulfide, NaOH>10 Cyanide) (Exceptions: VOA, Micro, O&G, KS TPH, OK-DRO)	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> 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)	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Potassium iodide test strip turns blue/purple? (Preserve)	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Trip Blank present:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Headspace in VOA vials (>6mm):	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Samples from USDA Regulated Area: State:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Additional labels attached to 5035A / TX1005 vials in the field?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> 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 Chank Date: 10/21/19

MEMORANDUM**DATE** January 6, 2020**Project No.** 153140601**TO** Project File
Golder Associates**CC** Amanda Derhake, Jeff Ingram**FROM** Tommy Goodwin**EMAIL** Tommy_Goodwin@golder.com**DATA VALIDATION SUMMARY, MERAMEC ENERGY CENTER – DATA PACKAGE 60318734**

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

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

QA LEVEL II - INORGANIC DATA EVALUATION CHECKLIST

Company Name: Golder Associates
 Project Name: Ameren - Meramec - MEC
 Reviewer: T Goodwin

Project Manager: J Ingram
 Project Number: 153140601
 Validation Date: 1/6/2020

Laboratory: Pace Analytical - KS

SDG #: 60318734

Analytical Method (type and no.): EPA 200.7/200.8 (Metals); EPA 903.1/904.0 (Rads); SM 2540C (TDS); EPA 300.0 (Anions)

Matrix: Air Soil/Sed. Water Waste

Sample Names M-MW-10

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?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>10/17/2019</u>
b) Sampling team indicated?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u></u>
c) Sample location noted?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u></u>
d) Sample depth indicated (Soils)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<u></u>
e) Sample type indicated (<u>grab</u> composite)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u></u>
f) Field QC noted?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u></u>
g) Field parameters collected (note types)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>pH, Sp.Cond, ORP, Temp, DO, Turb</u>
h) Field Calibration within control limits?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u></u>
i) Notations of unacceptable field conditions/performance from field logs or field notes?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<u></u>
j) Does the laboratory narrative indicate deficiencies?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<u></u>
Note Deficiencies: <u></u>				

Chain-of-Custody (COC)	YES	NO	NA	COMMENTS
a) Was the COC properly completed?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u></u>
b) Was the COC signed by both field and laboratory personnel?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u></u>
c) Were samples received in good condition?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u></u>

General (reference QAPP or Method)	YES	NO	NA	COMMENTS
a) Were hold times met for sample pretreatment?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u></u>
b) Were hold times met for sample analysis?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u></u>
c) Were the correct preservatives used?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u></u>
d) Was the correct method used?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u></u>
e) Were appropriate reporting limits achieved?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u></u>
f) Were any sample dilutions noted?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>See Notes</u>
g) Were any matrix problems noted?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<u></u>

QA LEVEL II - INORGANIC DATA EVALUATION CHECKLIST

Blanks	YES	NO	NA	COMMENTS
a) Were analytes detected in the method blank(s)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	_____
b) Were analytes detected in the field blank(s)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	_____
c) Were analytes detected in the equipment blank(s)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	_____
d) Were analytes detected in the trip blank(s)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	_____

Laboratory Control Sample (LCS)	YES	NO	NA	COMMENTS
a) Was a LCS analyzed once per SDG?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
b) Were the proper analytes included in the LCS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
c) Was the LCS accuracy criteria met?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____

Duplicates	YES	NO	NA	COMMENTS
a) Were field duplicates collected (note original and duplicate sample names)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	_____
b) Were field dup. precision criteria met (note RPD)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	_____
c) Were lab duplicates analyzed (note original and duplicate samples)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	_____
d) Were lab dup. precision criteria met (note RPD)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	_____

Blind Standards	YES	NO	NA	COMMENTS
a) Was a blind standard used (indicate name, analytes included and concentrations)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	_____
b) Was the %D within control limits?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	_____

Matrix Spike/Matrix Spike Duplicate (MS/MSD)	YES	NO	NA	COMMENTS
a) Was MS accuracy criteria met?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	See Notes
Recovery could not be calculated since sample contained high concentration of analyte?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	_____
b) Was MSD accuracy criteria met?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Recovery could not be calculated since sample contained high concentration of analyte?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	_____
c) Were MS/MSD precision criteria met?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____

Comments/Notes:

MS/MSD: -734001: SO4 (MS/MSD-H); results qualified as necessary

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

December 16, 2019

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

RE: Project: AMEREN MERAMEC ENERGY CTR
Pace Project No.: 60321788

Dear Jeffrey Ingram:

Enclosed are the analytical results for sample(s) received by the laboratory on November 20, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

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

Sincerely,



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

Enclosures

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



REPORT OF LABORATORY ANALYSIS

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CERTIFICATIONS

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60321788

Pace Analytical Services Pennsylvania

1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601

ANAB DOD-ELAP Rad Accreditation #: L2417

Alabama Certification #: 41590

Arizona Certification #: AZ0734

Arkansas Certification

California Certification #: 04222CA

Colorado Certification #: PA01547

Connecticut Certification #: PH-0694

Delaware Certification

EPA Region 4 DW Rad

Florida/TNI Certification #: E87683

Georgia Certification #: C040

Florida: Cert E871149 SEKS WET

Guam Certification

Hawaii Certification

Idaho Certification

Illinois Certification

Indiana Certification

Iowa Certification #: 391

Kansas/TNI Certification #: E-10358

Kentucky Certification #: KY90133

KY WW Permit #: KY0098221

KY WW Permit #: KY0000221

Louisiana DHH/TNI Certification #: LA180012

Louisiana DEQ/TNI Certification #: 4086

Maine Certification #: 2017020

Maryland Certification #: 308

Massachusetts Certification #: M-PA1457

Michigan/PADEP Certification #: 9991

Missouri Certification #: 235

Montana Certification #: Cert0082

Nebraska Certification #: NE-OS-29-14

Nevada Certification #: PA014572018-1

New Hampshire/TNI Certification #: 297617

New Jersey/TNI Certification #: PA051

New Mexico Certification #: PA01457

New York/TNI Certification #: 10888

North Carolina Certification #: 42706

North Dakota Certification #: R-190

Ohio EPA Rad Approval: #41249

Oregon/TNI Certification #: PA200002-010

Pennsylvania/TNI Certification #: 65-00282

Puerto Rico Certification #: PA01457

Rhode Island Certification #: 65-00282

South Dakota Certification

Tennessee Certification #: 02867

Texas/TNI Certification #: T104704188-17-3

Utah/TNI Certification #: PA014572017-9

USDA Soil Permit #: P330-17-00091

Vermont Dept. of Health: ID# VT-0282

Virgin Island/PADEP Certification

Virginia/VELAP Certification #: 9526

Washington Certification #: C868

West Virginia DEP Certification #: 143

West Virginia DHHR Certification #: 9964C

Wisconsin Approve List for Rad

Wyoming Certification #: 8TMS-L

Pace Analytical Services Kansas

9608 Loiret Boulevard, Lenexa, KS 66219

Missouri Inorganic Drinking Water Certification #: 10090

Arkansas Drinking Water

Arkansas Certification #: 19-016-0

Arkansas Drinking Water

Illinois Certification #: 004455

Iowa Certification #: 118

Kansas/NELAP Certification #: E-10116

Louisiana Certification #: 03055

Nevada Certification #: KS000212020-2

Oklahoma Certification #: 9205/9935

Florida: Cert E871149 SEKS WET

Texas Certification #: T104704407-19-12

Utah Certification #: KS000212018-8

Illinois Certification #: 004592

Kansas Field Laboratory Accreditation: # E-92587

Missouri SEKS Micro Certification: 10070

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SAMPLE SUMMARY

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60321788

Lab ID	Sample ID	Matrix	Date Collected	Date Received
60321788001	M-MW-1	Water	11/18/19 15:20	11/20/19 03:30
60321788002	M-MW-2	Water	11/19/19 09:15	11/20/19 03:30
60321788003	M-MW-3	Water	11/19/19 10:30	11/20/19 03:30
60321788004	M-MW-4	Water	11/18/19 10:42	11/20/19 03:30
60321788005	M-MW-5	Water	11/18/19 12:17	11/20/19 03:30
60321788006	M-MW-6	Water	11/18/19 14:55	11/20/19 03:30
60321788007	M-MW-7	Water	11/18/19 16:18	11/20/19 03:30
60321788008	M-MW-8	Water	11/18/19 16:37	11/20/19 03:30
60321788009	M-BMW-1	Water	11/18/19 13:12	11/20/19 03:30
60321788010	M-BMW-2	Water	11/18/19 10:38	11/20/19 03:30
60321788011	M-MW-10	Water	11/18/19 14:33	11/20/19 03:30
60321788012	M-DUP-1	Water	11/18/19 14:33	11/20/19 03:30
60321788013	M-FB-1	Water	11/18/19 14:57	11/20/19 03:30
60321788014	M-DUP-2	Water	11/18/19 14:57	11/20/19 03:30
60321788015	M-FB-2	Water	11/18/19 14:57	11/20/19 03:30
60321788016	M-MW-6 MS	Water	11/18/19 14:55	11/20/19 03:30
60321788017	M-MW-6 MSD	Water	11/18/19 14:55	11/20/19 03:30

REPORT OF LABORATORY ANALYSIS

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SAMPLE ANALYTE COUNT

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60321788

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
60321788001	M-MW-1	EPA 200.7	HKC	11	PASI-K
		EPA 200.8	JGP	2	PASI-K
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
		SM 2320B	AJS2	1	PASI-K
		SM 2540C	BLA	1	PASI-K
		EPA 300.0	MJK	3	PASI-K
60321788002	M-MW-2	EPA 200.7	HKC	11	PASI-K
		EPA 200.8	JGP	2	PASI-K
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
		SM 2320B	AJS2	1	PASI-K
		SM 2540C	BLA	1	PASI-K
		EPA 300.0	MJK	3	PASI-K
60321788003	M-MW-3	EPA 200.7	HKC	11	PASI-K
		EPA 200.8	JGP	2	PASI-K
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
		SM 2320B	AJS2	1	PASI-K
		SM 2540C	BLA	1	PASI-K
		EPA 300.0	MJK	3	PASI-K
60321788004	M-MW-4	EPA 200.7	HKC	11	PASI-K
		EPA 200.8	JGP	2	PASI-K
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
		SM 2320B	AJS2	1	PASI-K
		SM 2540C	BLA	1	PASI-K
		EPA 300.0	MJK	3	PASI-K
60321788005	M-MW-5	EPA 200.7	HKC	11	PASI-K
		EPA 200.8	JGP	2	PASI-K
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
		SM 2320B	AJS2	1	PASI-K
		SM 2540C	BLA	1	PASI-K
		EPA 300.0	MJK	3	PASI-K
60321788006	M-MW-6	EPA 200.7	HKC	11	PASI-K
		EPA 200.8	JGP	2	PASI-K

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SAMPLE ANALYTE COUNT

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60321788

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
60321788007	M-MW-7	EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
		SM 2320B	AJS2	1	PASI-K
		SM 2540C	BLA	1	PASI-K
		EPA 300.0	MJK	3	PASI-K
		EPA 200.7	HKC	11	PASI-K
		EPA 200.8	JGP	2	PASI-K
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
		SM 2320B	AJS2	1	PASI-K
60321788008	M-MW-8	SM 2540C	BLA	1	PASI-K
		EPA 300.0	MJK	3	PASI-K
		EPA 200.7	HKC	11	PASI-K
		EPA 200.8	JGP	2	PASI-K
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
		SM 2320B	AJS2	1	PASI-K
		SM 2540C	BLA	1	PASI-K
		EPA 300.0	MJK	3	PASI-K
		EPA 200.7	HKC	11	PASI-K
60321788009	M-BMW-1	EPA 200.8	JGP	2	PASI-K
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
		SM 2320B	AJS2	1	PASI-K
		SM 2540C	BLA	1	PASI-K
		EPA 300.0	MJK	3	PASI-K
		EPA 200.7	HKC	11	PASI-K
		EPA 200.8	JGP	2	PASI-K
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
60321788010	M-BMW-2	SM 2320B	AJS2	1	PASI-K
		SM 2540C	BLA	1	PASI-K
		EPA 300.0	MJK	3	PASI-K
		EPA 200.7	HKC	11	PASI-K
		EPA 200.8	JGP	2	PASI-K
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
		SM 2320B	AJS2	1	PASI-K
		SM 2540C	BLA	1	PASI-K
		EPA 300.0	MGS, MJK	3	PASI-K
60321788011	M-MW-10	EPA 200.7	HKC	11	PASI-K
		EPA 200.8	JGP	2	PASI-K
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA

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SAMPLE ANALYTE COUNT

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60321788

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
60321788012	M-DUP-1	SM 2320B	AJS2	1	PASI-K
		SM 2540C	BLA	1	PASI-K
		EPA 300.0	MJK	3	PASI-K
		EPA 200.7	HKC	11	PASI-K
		EPA 200.8	JGP	2	PASI-K
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
		SM 2320B	AJS2	1	PASI-K
60321788013	M-FB-1	SM 2540C	BLA	1	PASI-K
		EPA 300.0	MJK	3	PASI-K
		EPA 200.7	HKC	11	PASI-K
		EPA 200.8	JGP	2	PASI-K
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
		SM 2320B	AJS2	1	PASI-K
		SM 2540C	BLA	1	PASI-K
60321788014	M-DUP-2	EPA 300.0	MJK	3	PASI-K
		EPA 200.7	HKC	11	PASI-K
		EPA 200.8	JGP	2	PASI-K
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
		SM 2320B	AJS2	1	PASI-K
		SM 2540C	BLA	1	PASI-K
		EPA 300.0	MJK	3	PASI-K
60321788015	M-FB-2	EPA 200.7	HKC	11	PASI-K
		EPA 200.8	JGP	2	PASI-K
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
		SM 2320B	AJS2	1	PASI-K
		SM 2540C	BLA	1	PASI-K
		EPA 300.0	MJK	3	PASI-K
		EPA 200.7	HKC	11	PASI-K
60321788016	M-MW-6 MS	EPA 200.8	JGP	2	PASI-K
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
60321788017	M-MW-6 MSD	EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA

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ANALYTICAL RESULTS

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60321788

Sample: M-MW-1 **Lab ID: 60321788001** Collected: 11/18/19 15:20 Received: 11/20/19 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							
Barium	368	ug/L	5.0	1.4	1	12/04/19 10:20	12/04/19 21:04	7440-39-3	
Boron	45.6J	ug/L	100	10.7	1	12/04/19 10:20	12/04/19 21:04	7440-42-8	
Calcium	137000	ug/L	200	50.0	1	12/04/19 10:20	12/04/19 21:04	7440-70-2	
Cobalt	<0.84	ug/L	5.0	0.84	1	12/04/19 10:20	12/04/19 21:04	7440-48-4	
Iron	15700	ug/L	50.0	14.0	1	12/04/19 10:20	12/04/19 21:04	7439-89-6	
Lithium	<5.9	ug/L	10.0	5.9	1	12/04/19 10:20	12/04/19 21:04	7439-93-2	
Magnesium	44800	ug/L	50.0	13.0	1	12/04/19 10:20	12/04/19 21:04	7439-95-4	
Manganese	1950	ug/L	5.0	2.1	1	12/04/19 10:20	12/04/19 21:04	7439-96-5	
Molybdenum	<2.6	ug/L	20.0	2.6	1	12/04/19 10:20	12/04/19 21:04	7439-98-7	
Potassium	1820	ug/L	500	79.0	1	12/04/19 10:20	12/04/19 21:04	7440-09-7	B
Sodium	29700	ug/L	500	144	1	12/04/19 10:20	12/04/19 21:04	7440-23-5	
200.8 MET ICPMS		Analytical Method: EPA 200.8 Preparation Method: EPA 200.8							
Arsenic	0.69J	ug/L	1.0	0.065	1	12/02/19 12:18	12/03/19 11:15	7440-38-2	
Selenium	<0.085	ug/L	1.0	0.085	1	12/02/19 12:18	12/03/19 11:15	7782-49-2	
2320B Alkalinity		Analytical Method: SM 2320B							
Alkalinity, Total as CaCO3	401	mg/L	20.0	6.5	1		11/26/19 10:27		
2540C Total Dissolved Solids		Analytical Method: SM 2540C							
Total Dissolved Solids	655	mg/L	10.0	10.0	1		11/25/19 11:05		
300.0 IC Anions 28 Days		Analytical Method: EPA 300.0							
Chloride	46.1	mg/L	10.0	2.2	10		12/04/19 22:11	16887-00-6	
Fluoride	0.30	mg/L	0.20	0.085	1		12/04/19 21:54	16984-48-8	
Sulfate	110	mg/L	10.0	2.3	10		12/04/19 22:11	14808-79-8	

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ANALYTICAL RESULTS

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60321788

Sample: M-MW-2 **Lab ID: 60321788002** Collected: 11/19/19 09:15 Received: 11/20/19 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							
Barium	309	ug/L	5.0	1.4	1	12/04/19 10:20	12/04/19 21:07	7440-39-3	
Boron	5000	ug/L	100	10.7	1	12/04/19 10:20	12/04/19 21:07	7440-42-8	
Calcium	134000	ug/L	200	50.0	1	12/04/19 10:20	12/04/19 21:07	7440-70-2	
Cobalt	<0.84	ug/L	5.0	0.84	1	12/04/19 10:20	12/04/19 21:07	7440-48-4	
Iron	46800	ug/L	50.0	14.0	1	12/04/19 10:20	12/04/19 21:07	7439-89-6	
Lithium	7.7J	ug/L	10.0	5.9	1	12/04/19 10:20	12/04/19 21:07	7439-93-2	
Magnesium	41000	ug/L	50.0	13.0	1	12/04/19 10:20	12/04/19 21:07	7439-95-4	
Manganese	6110	ug/L	5.0	2.1	1	12/04/19 10:20	12/04/19 21:07	7439-96-5	
Molybdenum	<2.6	ug/L	20.0	2.6	1	12/04/19 10:20	12/04/19 21:07	7439-98-7	
Potassium	2400	ug/L	500	79.0	1	12/04/19 10:20	12/04/19 21:07	7440-09-7	B
Sodium	39000	ug/L	500	144	1	12/04/19 10:20	12/04/19 21:07	7440-23-5	
200.8 MET ICPMS		Analytical Method: EPA 200.8 Preparation Method: EPA 200.8							
Arsenic	1.8	ug/L	1.0	0.065	1	12/02/19 12:18	12/03/19 11:18	7440-38-2	
Selenium	0.12J	ug/L	1.0	0.085	1	12/02/19 12:18	12/03/19 11:18	7782-49-2	
2320B Alkalinity		Analytical Method: SM 2320B							
Alkalinity, Total as CaCO3	275	mg/L	20.0	6.5	1		11/26/19 10:32		
2540C Total Dissolved Solids		Analytical Method: SM 2540C							
Total Dissolved Solids	770	mg/L	10.0	10.0	1		11/26/19 06:43		
300.0 IC Anions 28 Days		Analytical Method: EPA 300.0							
Chloride	27.8	mg/L	2.0	0.44	2		12/04/19 23:35	16887-00-6	
Fluoride	0.17J	mg/L	0.20	0.085	1		12/04/19 22:28	16984-48-8	
Sulfate	305	mg/L	50.0	11.5	50		12/04/19 22:45	14808-79-8	

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ANALYTICAL RESULTS

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60321788

Sample: M-MW-3 **Lab ID: 60321788003** Collected: 11/19/19 10:30 Received: 11/20/19 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							
Barium	200	ug/L	5.0	1.4	1	12/04/19 10:20	12/04/19 21:09	7440-39-3	
Boron	9110	ug/L	100	10.7	1	12/04/19 10:20	12/04/19 21:09	7440-42-8	
Calcium	171000	ug/L	200	50.0	1	12/04/19 10:20	12/04/19 21:09	7440-70-2	
Cobalt	<0.84	ug/L	5.0	0.84	1	12/04/19 10:20	12/04/19 21:09	7440-48-4	
Iron	27400	ug/L	50.0	14.0	1	12/04/19 10:20	12/04/19 21:09	7439-89-6	
Lithium	7.4J	ug/L	10.0	5.9	1	12/04/19 10:20	12/04/19 21:09	7439-93-2	
Magnesium	46200	ug/L	50.0	13.0	1	12/04/19 10:20	12/04/19 21:09	7439-95-4	
Manganese	1990	ug/L	5.0	2.1	1	12/04/19 10:20	12/04/19 21:09	7439-96-5	
Molybdenum	7.7J	ug/L	20.0	2.6	1	12/04/19 10:20	12/04/19 21:09	7439-98-7	
Potassium	2780	ug/L	500	79.0	1	12/04/19 10:20	12/04/19 21:09	7440-09-7	
Sodium	34900	ug/L	500	144	1	12/04/19 10:20	12/04/19 21:09	7440-23-5	
200.8 MET ICPMS		Analytical Method: EPA 200.8 Preparation Method: EPA 200.8							
Arsenic	7.4	ug/L	1.0	0.065	1	12/02/19 12:18	12/03/19 11:19	7440-38-2	
Selenium	0.089J	ug/L	1.0	0.085	1	12/02/19 12:18	12/03/19 11:19	7782-49-2	
2320B Alkalinity		Analytical Method: SM 2320B							
Alkalinity, Total as CaCO3	342	mg/L	20.0	6.5	1		11/26/19 10:47		
2540C Total Dissolved Solids		Analytical Method: SM 2540C							
Total Dissolved Solids	848	mg/L	10.0	10.0	1		11/26/19 06:43		
300.0 IC Anions 28 Days		Analytical Method: EPA 300.0							
Chloride	23.9	mg/L	5.0	1.1	5		12/05/19 00:09	16887-00-6	
Fluoride	0.13J	mg/L	0.20	0.085	1		12/04/19 23:52	16984-48-8	
Sulfate	315	mg/L	50.0	11.5	50		12/05/19 00:26	14808-79-8	

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ANALYTICAL RESULTS

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60321788

Sample: M-MW-4 **Lab ID: 60321788004** Collected: 11/18/19 10:42 Received: 11/20/19 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							
Barium	199	ug/L	5.0	1.4	1	12/04/19 10:20	12/04/19 21:12	7440-39-3	
Boron	9740	ug/L	100	10.7	1	12/04/19 10:20	12/04/19 21:12	7440-42-8	
Calcium	190000	ug/L	200	50.0	1	12/04/19 10:20	12/04/19 21:12	7440-70-2	
Cobalt	<0.84	ug/L	5.0	0.84	1	12/04/19 10:20	12/04/19 21:12	7440-48-4	
Iron	28600	ug/L	50.0	14.0	1	12/04/19 10:20	12/04/19 21:12	7439-89-6	
Lithium	18.6	ug/L	10.0	5.9	1	12/04/19 10:20	12/04/19 21:12	7439-93-2	
Magnesium	53800	ug/L	50.0	13.0	1	12/04/19 10:20	12/04/19 21:12	7439-95-4	
Manganese	798	ug/L	5.0	2.1	1	12/04/19 10:20	12/04/19 21:12	7439-96-5	
Molybdenum	52.4	ug/L	20.0	2.6	1	12/04/19 10:20	12/04/19 21:12	7439-98-7	
Potassium	6420	ug/L	500	79.0	1	12/04/19 10:20	12/04/19 21:12	7440-09-7	
Sodium	47800	ug/L	500	144	1	12/04/19 10:20	12/04/19 21:12	7440-23-5	
200.8 MET ICPMS		Analytical Method: EPA 200.8 Preparation Method: EPA 200.8							
Arsenic	16.1	ug/L	1.0	0.065	1	12/02/19 12:18	12/03/19 11:21	7440-38-2	
Selenium	0.093J	ug/L	1.0	0.085	1	12/02/19 12:18	12/03/19 11:21	7782-49-2	
2320B Alkalinity		Analytical Method: SM 2320B							
Alkalinity, Total as CaCO3	270	mg/L	20.0	6.5	1		11/26/19 10:51		
2540C Total Dissolved Solids		Analytical Method: SM 2540C							
Total Dissolved Solids	1000	mg/L	13.3	13.3	1		11/25/19 11:06		
300.0 IC Anions 28 Days		Analytical Method: EPA 300.0							
Chloride	50.3	mg/L	5.0	1.1	5		12/05/19 00:59	16887-00-6	
Fluoride	0.16J	mg/L	0.20	0.085	1		12/05/19 00:43	16984-48-8	
Sulfate	472	mg/L	50.0	11.5	50		12/05/19 01:16	14808-79-8	

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ANALYTICAL RESULTS

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60321788

Sample: M-MW-5 Lab ID: 60321788005 Collected: 11/18/19 12:17 Received: 11/20/19 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							
Barium	240	ug/L	5.0	1.4	1	12/04/19 10:20	12/04/19 21:14	7440-39-3	
Boron	7670	ug/L	100	10.7	1	12/04/19 10:20	12/04/19 21:14	7440-42-8	
Calcium	170000	ug/L	200	50.0	1	12/04/19 10:20	12/04/19 21:14	7440-70-2	
Cobalt	<0.84	ug/L	5.0	0.84	1	12/04/19 10:20	12/04/19 21:14	7440-48-4	
Iron	17400	ug/L	50.0	14.0	1	12/04/19 10:20	12/04/19 21:14	7439-89-6	
Lithium	17.9	ug/L	10.0	5.9	1	12/04/19 10:20	12/04/19 21:14	7439-93-2	
Magnesium	54700	ug/L	50.0	13.0	1	12/04/19 10:20	12/04/19 21:14	7439-95-4	
Manganese	446	ug/L	5.0	2.1	1	12/04/19 10:20	12/04/19 21:14	7439-96-5	
Molybdenum	98.6	ug/L	20.0	2.6	1	12/04/19 10:20	12/04/19 21:14	7439-98-7	
Potassium	5590	ug/L	500	79.0	1	12/04/19 10:20	12/04/19 21:14	7440-09-7	
Sodium	44700	ug/L	500	144	1	12/04/19 10:20	12/04/19 21:14	7440-23-5	
200.8 MET ICPMS		Analytical Method: EPA 200.8 Preparation Method: EPA 200.8							
Arsenic	21.8	ug/L	1.0	0.065	1	12/02/19 12:18	12/03/19 11:22	7440-38-2	
Selenium	0.093J	ug/L	1.0	0.085	1	12/02/19 12:18	12/03/19 11:22	7782-49-2	
2320B Alkalinity		Analytical Method: SM 2320B							
Alkalinity, Total as CaCO3	343	mg/L	20.0	6.5	1		11/26/19 10:58		
2540C Total Dissolved Solids		Analytical Method: SM 2540C							
Total Dissolved Solids	932	mg/L	10.0	10.0	1		11/25/19 11:06		
300.0 IC Anions 28 Days		Analytical Method: EPA 300.0							
Chloride	42.3	mg/L	5.0	1.1	5		12/05/19 01:50	16887-00-6	
Fluoride	0.23	mg/L	0.20	0.085	1		12/05/19 01:33	16984-48-8	
Sulfate	352	mg/L	50.0	11.5	50		12/05/19 02:07	14808-79-8	

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ANALYTICAL RESULTS

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60321788

Sample: M-MW-6 **Lab ID: 60321788006** Collected: 11/18/19 14:55 Received: 11/20/19 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							
Barium	51.0	ug/L	5.0	1.4	1	12/04/19 10:20	12/04/19 21:17	7440-39-3	
Boron	14000	ug/L	100	10.7	1	12/04/19 10:20	12/04/19 21:17	7440-42-8	
Calcium	333000	ug/L	200	50.0	1	12/04/19 10:20	12/04/19 21:17	7440-70-2	
Cobalt	4.2J	ug/L	5.0	0.84	1	12/04/19 10:20	12/04/19 21:17	7440-48-4	
Iron	8230	ug/L	50.0	14.0	1	12/04/19 10:20	12/04/19 21:17	7439-89-6	
Lithium	127	ug/L	10.0	5.9	1	12/04/19 10:20	12/04/19 21:17	7439-93-2	
Magnesium	24800	ug/L	50.0	13.0	1	12/04/19 10:20	12/04/19 21:17	7439-95-4	
Manganese	1270	ug/L	5.0	2.1	1	12/04/19 10:20	12/04/19 21:17	7439-96-5	
Molybdenum	132	ug/L	20.0	2.6	1	12/04/19 10:20	12/04/19 21:17	7439-98-7	
Potassium	13600	ug/L	500	79.0	1	12/04/19 10:20	12/04/19 21:17	7440-09-7	
Sodium	21900	ug/L	500	144	1	12/04/19 10:20	12/04/19 21:17	7440-23-5	
200.8 MET ICPMS		Analytical Method: EPA 200.8 Preparation Method: EPA 200.8							
Arsenic	3.9	ug/L	1.0	0.065	1	12/02/19 12:18	12/03/19 11:24	7440-38-2	
Selenium	<0.085	ug/L	1.0	0.085	1	12/02/19 12:18	12/03/19 11:24	7782-49-2	
2320B Alkalinity		Analytical Method: SM 2320B							
Alkalinity, Total as CaCO3	444	mg/L	20.0	6.5	1		11/26/19 11:03		
2540C Total Dissolved Solids		Analytical Method: SM 2540C							
Total Dissolved Solids	1270	mg/L	13.3	13.3	1		11/25/19 11:06		
300.0 IC Anions 28 Days		Analytical Method: EPA 300.0							
Chloride	20.2	mg/L	2.0	0.44	2		12/05/19 10:32	16887-00-6	
Fluoride	0.11J	mg/L	0.20	0.085	1		12/05/19 02:57	16984-48-8	
Sulfate	557	mg/L	50.0	11.5	50		12/05/19 03:48	14808-79-8	

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ANALYTICAL RESULTS

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60321788

Sample: M-MW-7 **Lab ID: 60321788007** Collected: 11/18/19 16:18 Received: 11/20/19 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							
Barium	42.6	ug/L	5.0	1.4	1	12/04/19 10:20	12/04/19 21:29	7440-39-3	
Boron	27500	ug/L	100	10.7	1	12/04/19 10:20	12/04/19 21:29	7440-42-8	
Calcium	431000	ug/L	200	50.0	1	12/04/19 10:20	12/04/19 21:29	7440-70-2	
Cobalt	<0.84	ug/L	5.0	0.84	1	12/04/19 10:20	12/04/19 21:29	7440-48-4	
Iron	14.9J	ug/L	50.0	14.0	1	12/04/19 10:20	12/04/19 21:29	7439-89-6	B
Lithium	52.2	ug/L	10.0	5.9	1	12/04/19 10:20	12/04/19 21:29	7439-93-2	
Magnesium	34700	ug/L	50.0	13.0	1	12/04/19 10:20	12/04/19 21:29	7439-95-4	
Manganese	<2.1	ug/L	5.0	2.1	1	12/04/19 10:20	12/04/19 21:29	7439-96-5	
Molybdenum	373	ug/L	20.0	2.6	1	12/04/19 10:20	12/04/19 21:29	7439-98-7	
Potassium	18900	ug/L	500	79.0	1	12/04/19 10:20	12/04/19 21:29	7440-09-7	
Sodium	85200	ug/L	500	144	1	12/04/19 10:20	12/04/19 21:29	7440-23-5	
200.8 MET ICPMS		Analytical Method: EPA 200.8 Preparation Method: EPA 200.8							
Arsenic	2.6	ug/L	1.0	0.065	1	12/02/19 12:18	12/03/19 11:33	7440-38-2	
Selenium	8.2	ug/L	1.0	0.085	1	12/02/19 12:18	12/03/19 11:33	7782-49-2	
2320B Alkalinity		Analytical Method: SM 2320B							
Alkalinity, Total as CaCO3	319	mg/L	20.0	6.5	1		11/26/19 11:15		
2540C Total Dissolved Solids		Analytical Method: SM 2540C							
Total Dissolved Solids	1870	mg/L	20.0	20.0	1		11/25/19 11:06		
300.0 IC Anions 28 Days		Analytical Method: EPA 300.0							
Chloride	67.5	mg/L	10.0	2.2	10		12/05/19 04:55	16887-00-6	
Fluoride	0.55	mg/L	0.20	0.085	1		12/05/19 04:39	16984-48-8	
Sulfate	960	mg/L	100	23.0	100		12/05/19 05:12	14808-79-8	

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ANALYTICAL RESULTS

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60321788

Sample: M-MW-8 **Lab ID: 60321788008** Collected: 11/18/19 16:37 Received: 11/20/19 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							
Barium	142	ug/L	5.0	1.4	1	12/04/19 10:20	12/04/19 21:31	7440-39-3	
Boron	9880	ug/L	100	10.7	1	12/04/19 10:20	12/04/19 21:31	7440-42-8	
Calcium	186000	ug/L	200	50.0	1	12/04/19 10:20	12/04/19 21:31	7440-70-2	
Cobalt	<0.84	ug/L	5.0	0.84	1	12/04/19 10:20	12/04/19 21:31	7440-48-4	
Iron	10800	ug/L	50.0	14.0	1	12/04/19 10:20	12/04/19 21:31	7439-89-6	
Lithium	36.5	ug/L	10.0	5.9	1	12/04/19 10:20	12/04/19 21:31	7439-93-2	
Magnesium	38400	ug/L	50.0	13.0	1	12/04/19 10:20	12/04/19 21:31	7439-95-4	
Manganese	2080	ug/L	5.0	2.1	1	12/04/19 10:20	12/04/19 21:31	7439-96-5	
Molybdenum	221	ug/L	20.0	2.6	1	12/04/19 10:20	12/04/19 21:31	7439-98-7	
Potassium	7070	ug/L	500	79.0	1	12/04/19 10:20	12/04/19 21:31	7440-09-7	
Sodium	35200	ug/L	500	144	1	12/04/19 10:20	12/04/19 21:31	7440-23-5	
200.8 MET ICPMS		Analytical Method: EPA 200.8 Preparation Method: EPA 200.8							
Arsenic	6.4	ug/L	1.0	0.065	1	12/02/19 12:18	12/03/19 11:34	7440-38-2	
Selenium	0.088J	ug/L	1.0	0.085	1	12/02/19 12:18	12/03/19 11:34	7782-49-2	
2320B Alkalinity		Analytical Method: SM 2320B							
Alkalinity, Total as CaCO3	206	mg/L	20.0	6.5	1		11/26/19 11:19		
2540C Total Dissolved Solids		Analytical Method: SM 2540C							
Total Dissolved Solids	937	mg/L	10.0	10.0	1		11/25/19 11:07		
300.0 IC Anions 28 Days		Analytical Method: EPA 300.0							
Chloride	26.1	mg/L	2.0	0.44	2		12/05/19 06:20	16887-00-6	
Fluoride	0.28	mg/L	0.20	0.085	1		12/05/19 06:37	16984-48-8	
Sulfate	497	mg/L	50.0	11.5	50		12/05/19 05:29	14808-79-8	

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ANALYTICAL RESULTS

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60321788

Sample: **M-BMW-1** Lab ID: **60321788009** Collected: 11/18/19 13:12 Received: 11/20/19 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							
Barium	292	ug/L	5.0	1.4	1	12/04/19 10:20	12/04/19 21:34	7440-39-3	
Boron	485	ug/L	100	10.7	1	12/04/19 10:20	12/04/19 21:34	7440-42-8	
Calcium	122000	ug/L	200	50.0	1	12/04/19 10:20	12/04/19 21:34	7440-70-2	
Cobalt	3.2J	ug/L	5.0	0.84	1	12/04/19 10:20	12/04/19 21:34	7440-48-4	
Iron	2710	ug/L	50.0	14.0	1	12/04/19 10:20	12/04/19 21:34	7439-89-6	
Lithium	14.4	ug/L	10.0	5.9	1	12/04/19 10:20	12/04/19 21:34	7439-93-2	
Magnesium	28300	ug/L	50.0	13.0	1	12/04/19 10:20	12/04/19 21:34	7439-95-4	
Manganese	2060	ug/L	5.0	2.1	1	12/04/19 10:20	12/04/19 21:34	7439-96-5	
Molybdenum	5.9J	ug/L	20.0	2.6	1	12/04/19 10:20	12/04/19 21:34	7439-98-7	
Potassium	10500	ug/L	500	79.0	1	12/04/19 10:20	12/04/19 21:34	7440-09-7	
Sodium	55000	ug/L	500	144	1	12/04/19 10:20	12/04/19 21:34	7440-23-5	
200.8 MET ICPMS		Analytical Method: EPA 200.8 Preparation Method: EPA 200.8							
Arsenic	4.7	ug/L	1.0	0.065	1	12/02/19 12:18	12/03/19 11:35	7440-38-2	
Selenium	0.15J	ug/L	1.0	0.085	1	12/02/19 12:18	12/03/19 11:35	7782-49-2	
2320B Alkalinity		Analytical Method: SM 2320B							
Alkalinity, Total as CaCO3	365	mg/L	20.0	6.5	1		11/26/19 11:26		
2540C Total Dissolved Solids		Analytical Method: SM 2540C							
Total Dissolved Solids	599	mg/L	10.0	10.0	1		11/25/19 12:03		
300.0 IC Anions 28 Days		Analytical Method: EPA 300.0							
Chloride	94.4	mg/L	10.0	2.2	10		12/04/19 16:51	16887-00-6	
Fluoride	0.62	mg/L	0.20	0.085	1		12/04/19 16:35	16984-48-8	
Sulfate	32.9	mg/L	10.0	2.3	10		12/04/19 16:51	14808-79-8	

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ANALYTICAL RESULTS

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60321788

Sample: M-BMW-2 **Lab ID: 60321788010** Collected: 11/18/19 10:38 Received: 11/20/19 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							
Barium	558	ug/L	5.0	1.4	1	12/04/19 10:20	12/04/19 21:36	7440-39-3	
Boron	118	ug/L	100	10.7	1	12/04/19 10:20	12/04/19 21:36	7440-42-8	
Calcium	107000	ug/L	200	50.0	1	12/04/19 10:20	12/04/19 21:36	7440-70-2	
Cobalt	<0.84	ug/L	5.0	0.84	1	12/04/19 10:20	12/04/19 21:36	7440-48-4	
Iron	15600	ug/L	50.0	14.0	1	12/04/19 10:20	12/04/19 21:36	7439-89-6	
Lithium	6.5J	ug/L	10.0	5.9	1	12/04/19 10:20	12/04/19 21:36	7439-93-2	
Magnesium	35800	ug/L	50.0	13.0	1	12/04/19 10:20	12/04/19 21:36	7439-95-4	
Manganese	4590	ug/L	5.0	2.1	1	12/04/19 10:20	12/04/19 21:36	7439-96-5	
Molybdenum	<2.6	ug/L	20.0	2.6	1	12/04/19 10:20	12/04/19 21:36	7439-98-7	
Potassium	1490	ug/L	500	79.0	1	12/04/19 10:20	12/04/19 21:36	7440-09-7	B
Sodium	20200	ug/L	500	144	1	12/04/19 10:20	12/04/19 21:36	7440-23-5	
200.8 MET ICPMS		Analytical Method: EPA 200.8 Preparation Method: EPA 200.8							
Arsenic	1.3	ug/L	1.0	0.065	1	12/02/19 12:18	12/03/19 11:37	7440-38-2	
Selenium	<0.085	ug/L	1.0	0.085	1	12/02/19 12:18	12/03/19 11:37	7782-49-2	
2320B Alkalinity		Analytical Method: SM 2320B							
Alkalinity, Total as CaCO3	402	mg/L	20.0	6.5	1		11/26/19 11:31		
2540C Total Dissolved Solids		Analytical Method: SM 2540C							
Total Dissolved Solids	468	mg/L	10.0	10.0	1		11/25/19 12:03		
300.0 IC Anions 28 Days		Analytical Method: EPA 300.0							
Chloride	13.3	mg/L	1.0	0.22	1		12/04/19 17:07	16887-00-6	
Fluoride	0.31	mg/L	0.20	0.085	1		12/04/19 17:07	16984-48-8	
Sulfate	26.4	mg/L	2.0	0.46	2		12/05/19 10:47	14808-79-8	

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ANALYTICAL RESULTS

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60321788

Sample: M-MW-10 **Lab ID: 60321788011** Collected: 11/18/19 14:33 Received: 11/20/19 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							
Barium	180	ug/L	5.0	1.4	1	12/04/19 10:20	12/04/19 21:39	7440-39-3	
Boron	1720	ug/L	100	10.7	1	12/04/19 10:20	12/04/19 21:39	7440-42-8	
Calcium	226000	ug/L	200	50.0	1	12/04/19 10:20	12/04/19 21:39	7440-70-2	
Cobalt	2.8J	ug/L	5.0	0.84	1	12/04/19 10:20	12/04/19 21:39	7440-48-4	
Iron	18900	ug/L	50.0	14.0	1	12/04/19 10:20	12/04/19 21:39	7439-89-6	
Lithium	36.6	ug/L	10.0	5.9	1	12/04/19 10:20	12/04/19 21:39	7439-93-2	
Magnesium	58600	ug/L	50.0	13.0	1	12/04/19 10:20	12/04/19 21:39	7439-95-4	
Manganese	857	ug/L	5.0	2.1	1	12/04/19 10:20	12/04/19 21:39	7439-96-5	
Molybdenum	2.7J	ug/L	20.0	2.6	1	12/04/19 10:20	12/04/19 21:39	7439-98-7	
Potassium	8550	ug/L	500	79.0	1	12/04/19 10:20	12/04/19 21:39	7440-09-7	
Sodium	53000	ug/L	500	144	1	12/04/19 10:20	12/04/19 21:39	7440-23-5	
200.8 MET ICPMS		Analytical Method: EPA 200.8 Preparation Method: EPA 200.8							
Arsenic	10.7	ug/L	1.0	0.065	1	12/02/19 12:18	12/03/19 11:38	7440-38-2	
Selenium	0.093J	ug/L	1.0	0.085	1	12/02/19 12:18	12/03/19 11:38	7782-49-2	
2320B Alkalinity		Analytical Method: SM 2320B							
Alkalinity, Total as CaCO3	588	mg/L	20.0	6.5	1		11/26/19 11:39		
2540C Total Dissolved Solids		Analytical Method: SM 2540C							
Total Dissolved Solids	1030	mg/L	13.3	13.3	1		11/25/19 12:04		
300.0 IC Anions 28 Days		Analytical Method: EPA 300.0							
Chloride	65.1	mg/L	20.0	4.4	20		12/04/19 17:39	16887-00-6	
Fluoride	0.15J	mg/L	0.20	0.085	1		12/04/19 17:23	16984-48-8	
Sulfate	197	mg/L	20.0	4.6	20		12/04/19 17:39	14808-79-8	

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ANALYTICAL RESULTS

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60321788

Sample: M-DUP-1 **Lab ID: 60321788012** Collected: 11/18/19 14:33 Received: 11/20/19 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							
Barium	204	ug/L	5.0	1.4	1	12/04/19 10:20	12/04/19 21:41	7440-39-3	
Boron	9920	ug/L	100	10.7	1	12/04/19 10:20	12/04/19 21:41	7440-42-8	
Calcium	193000	ug/L	200	50.0	1	12/04/19 10:20	12/04/19 21:41	7440-70-2	
Cobalt	<0.84	ug/L	5.0	0.84	1	12/04/19 10:20	12/04/19 21:41	7440-48-4	
Iron	29100	ug/L	50.0	14.0	1	12/04/19 10:20	12/04/19 21:41	7439-89-6	
Lithium	21.2	ug/L	10.0	5.9	1	12/04/19 10:20	12/04/19 21:41	7439-93-2	
Magnesium	54400	ug/L	50.0	13.0	1	12/04/19 10:20	12/04/19 21:41	7439-95-4	
Manganese	808	ug/L	5.0	2.1	1	12/04/19 10:20	12/04/19 21:41	7439-96-5	
Molybdenum	54.7	ug/L	20.0	2.6	1	12/04/19 10:20	12/04/19 21:41	7439-98-7	
Potassium	6540	ug/L	500	79.0	1	12/04/19 10:20	12/04/19 21:41	7440-09-7	
Sodium	48400	ug/L	500	144	1	12/04/19 10:20	12/04/19 21:41	7440-23-5	
200.8 MET ICPMS		Analytical Method: EPA 200.8 Preparation Method: EPA 200.8							
Arsenic	15.8	ug/L	1.0	0.065	1	12/02/19 12:18	12/03/19 11:40	7440-38-2	
Selenium	<0.085	ug/L	1.0	0.085	1	12/02/19 12:18	12/03/19 11:40	7782-49-2	
2320B Alkalinity		Analytical Method: SM 2320B							
Alkalinity, Total as CaCO3	273	mg/L	20.0	6.5	1		11/26/19 11:54		
2540C Total Dissolved Solids		Analytical Method: SM 2540C							
Total Dissolved Solids	1010	mg/L	13.3	13.3	1		11/25/19 12:04		
300.0 IC Anions 28 Days		Analytical Method: EPA 300.0							
Chloride	47.8	mg/L	5.0	1.1	5		12/04/19 18:43	16887-00-6	
Fluoride	0.18J	mg/L	0.20	0.085	1		12/04/19 18:27	16984-48-8	
Sulfate	435	mg/L	50.0	11.5	50		12/04/19 19:00	14808-79-8	

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ANALYTICAL RESULTS

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60321788

Sample: M-FB-1 Lab ID: 60321788013 Collected: 11/18/19 14:57 Received: 11/20/19 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							
Barium	<1.4	ug/L	5.0	1.4	1	12/04/19 10:20	12/04/19 21:44	7440-39-3	
Boron	51.5J	ug/L	100	10.7	1	12/04/19 10:20	12/04/19 21:44	7440-42-8	
Calcium	<50.0	ug/L	200	50.0	1	12/04/19 10:20	12/04/19 21:44	7440-70-2	
Cobalt	<0.84	ug/L	5.0	0.84	1	12/04/19 10:20	12/04/19 21:44	7440-48-4	
Iron	<14.0	ug/L	50.0	14.0	1	12/04/19 10:20	12/04/19 21:44	7439-89-6	
Lithium	<5.9	ug/L	10.0	5.9	1	12/04/19 10:20	12/04/19 21:44	7439-93-2	
Magnesium	<13.0	ug/L	50.0	13.0	1	12/04/19 10:20	12/04/19 21:44	7439-95-4	
Manganese	<2.1	ug/L	5.0	2.1	1	12/04/19 10:20	12/04/19 21:44	7439-96-5	
Molybdenum	<2.6	ug/L	20.0	2.6	1	12/04/19 10:20	12/04/19 21:44	7439-98-7	
Potassium	136J	ug/L	500	79.0	1	12/04/19 10:20	12/04/19 21:44	7440-09-7	B
Sodium	448J	ug/L	500	144	1	12/04/19 10:20	12/04/19 21:44	7440-23-5	
200.8 MET ICPMS		Analytical Method: EPA 200.8 Preparation Method: EPA 200.8							
Arsenic	<0.065	ug/L	1.0	0.065	1	12/02/19 12:18	12/03/19 11:41	7440-38-2	
Selenium	<0.085	ug/L	1.0	0.085	1	12/02/19 12:18	12/03/19 11:41	7782-49-2	
2320B Alkalinity		Analytical Method: SM 2320B							
Alkalinity, Total as CaCO3	<6.5	mg/L	20.0	6.5	1		11/26/19 11:58		
2540C Total Dissolved Solids		Analytical Method: SM 2540C							
Total Dissolved Solids	<5.0	mg/L	5.0	5.0	1		11/25/19 12:04		
300.0 IC Anions 28 Days		Analytical Method: EPA 300.0							
Chloride	0.28J	mg/L	1.0	0.22	1		12/04/19 19:16	16887-00-6	B
Fluoride	<0.085	mg/L	0.20	0.085	1		12/04/19 19:16	16984-48-8	M1
Sulfate	<0.23	mg/L	1.0	0.23	1		12/04/19 19:16	14808-79-8	M1

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ANALYTICAL RESULTS

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60321788

Sample: M-DUP-2 **Lab ID: 60321788014** Collected: 11/18/19 14:57 Received: 11/20/19 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							
Barium	367	ug/L	5.0	1.4	1	12/04/19 10:20	12/04/19 21:47	7440-39-3	
Boron	87.0J	ug/L	100	10.7	1	12/04/19 10:20	12/04/19 21:47	7440-42-8	
Calcium	136000	ug/L	200	50.0	1	12/04/19 10:20	12/04/19 21:47	7440-70-2	
Cobalt	<0.84	ug/L	5.0	0.84	1	12/04/19 10:20	12/04/19 21:47	7440-48-4	
Iron	15600	ug/L	50.0	14.0	1	12/04/19 10:20	12/04/19 21:47	7439-89-6	
Lithium	7.9J	ug/L	10.0	5.9	1	12/04/19 10:20	12/04/19 21:47	7439-93-2	
Magnesium	45200	ug/L	50.0	13.0	1	12/04/19 10:20	12/04/19 21:47	7439-95-4	
Manganese	1960	ug/L	5.0	2.1	1	12/04/19 10:20	12/04/19 21:47	7439-96-5	
Molybdenum	<2.6	ug/L	20.0	2.6	1	12/04/19 10:20	12/04/19 21:47	7439-98-7	
Potassium	1720	ug/L	500	79.0	1	12/04/19 10:20	12/04/19 21:47	7440-09-7	B
Sodium	28800	ug/L	500	144	1	12/04/19 10:20	12/04/19 21:47	7440-23-5	
200.8 MET ICPMS		Analytical Method: EPA 200.8 Preparation Method: EPA 200.8							
Arsenic	0.68J	ug/L	1.0	0.065	1	12/02/19 12:18	12/03/19 11:43	7440-38-2	
Selenium	<0.085	ug/L	1.0	0.085	1	12/02/19 12:18	12/03/19 11:43	7782-49-2	
2320B Alkalinity		Analytical Method: SM 2320B							
Alkalinity, Total as CaCO3	386	mg/L	20.0	6.5	1		11/26/19 12:04		
2540C Total Dissolved Solids		Analytical Method: SM 2540C							
Total Dissolved Solids	647	mg/L	10.0	10.0	1		11/25/19 12:04		
300.0 IC Anions 28 Days		Analytical Method: EPA 300.0							
Chloride	42.9	mg/L	10.0	2.2	10		12/04/19 20:04	16887-00-6	
Fluoride	0.30	mg/L	0.20	0.085	1		12/04/19 19:48	16984-48-8	
Sulfate	105	mg/L	10.0	2.3	10		12/04/19 20:04	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60321788

Sample: M-FB-2 Lab ID: 60321788015 Collected: 11/18/19 14:57 Received: 11/20/19 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							
Barium	<1.4	ug/L	5.0	1.4	1	12/04/19 10:20	12/04/19 21:49	7440-39-3	
Boron	27.1J	ug/L	100	10.7	1	12/04/19 10:20	12/04/19 21:49	7440-42-8	
Calcium	<50.0	ug/L	200	50.0	1	12/04/19 10:20	12/04/19 21:49	7440-70-2	
Cobalt	<0.84	ug/L	5.0	0.84	1	12/04/19 10:20	12/04/19 21:49	7440-48-4	
Iron	<14.0	ug/L	50.0	14.0	1	12/04/19 10:20	12/04/19 21:49	7439-89-6	
Lithium	<5.9	ug/L	10.0	5.9	1	12/04/19 10:20	12/04/19 21:49	7439-93-2	
Magnesium	<13.0	ug/L	50.0	13.0	1	12/04/19 10:20	12/04/19 21:49	7439-95-4	
Manganese	<2.1	ug/L	5.0	2.1	1	12/04/19 10:20	12/04/19 21:49	7439-96-5	
Molybdenum	<2.6	ug/L	20.0	2.6	1	12/04/19 10:20	12/04/19 21:49	7439-98-7	
Potassium	<79.0	ug/L	500	79.0	1	12/04/19 10:20	12/04/19 21:49	7440-09-7	
Sodium	396J	ug/L	500	144	1	12/04/19 10:20	12/04/19 21:49	7440-23-5	
200.8 MET ICPMS		Analytical Method: EPA 200.8 Preparation Method: EPA 200.8							
Arsenic	<0.065	ug/L	1.0	0.065	1	12/02/19 12:18	12/03/19 11:30	7440-38-2	
Selenium	<0.085	ug/L	1.0	0.085	1	12/02/19 12:18	12/03/19 11:30	7782-49-2	
2320B Alkalinity		Analytical Method: SM 2320B							
Alkalinity, Total as CaCO3	<6.5	mg/L	20.0	6.5	1		11/26/19 12:08		
2540C Total Dissolved Solids		Analytical Method: SM 2540C							
Total Dissolved Solids	<5.0	mg/L	5.0	5.0	1		11/25/19 12:04		
300.0 IC Anions 28 Days		Analytical Method: EPA 300.0							
Chloride	0.34J	mg/L	1.0	0.22	1		12/04/19 20:36	16887-00-6	B
Fluoride	<0.085	mg/L	0.20	0.085	1		12/04/19 20:36	16984-48-8	
Sulfate	<0.23	mg/L	1.0	0.23	1		12/04/19 20:36	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60321788

QC Batch: 626041 Analysis Method: EPA 200.7
 QC Batch Method: EPA 200.7 Analysis Description: 200.7 Metals, Total
 Associated Lab Samples: 60321788001, 60321788002, 60321788003, 60321788004, 60321788005, 60321788006, 60321788007, 60321788008, 60321788009, 60321788010, 60321788011, 60321788012, 60321788013, 60321788014, 60321788015

METHOD BLANK: 2551873 Matrix: Water

Associated Lab Samples: 60321788001, 60321788002, 60321788003, 60321788004, 60321788005, 60321788006, 60321788007, 60321788008, 60321788009, 60321788010, 60321788011, 60321788012, 60321788013, 60321788014, 60321788015

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Barium	ug/L	<1.4	5.0	1.4	12/04/19 21:01	
Boron	ug/L	<10.7	100	10.7	12/04/19 21:01	
Calcium	ug/L	<50.0	200	50.0	12/04/19 21:01	
Cobalt	ug/L	<0.84	5.0	0.84	12/04/19 21:01	
Iron	ug/L	25.9J	50.0	14.0	12/04/19 21:01	
Lithium	ug/L	<5.9	10.0	5.9	12/04/19 21:01	
Magnesium	ug/L	<13.0	50.0	13.0	12/04/19 21:01	
Manganese	ug/L	<2.1	5.0	2.1	12/04/19 21:01	
Molybdenum	ug/L	<2.6	20.0	2.6	12/04/19 21:01	
Potassium	ug/L	260J	500	79.0	12/04/19 21:01	
Sodium	ug/L	<144	500	144	12/05/19 12:09	

LABORATORY CONTROL SAMPLE: 2551874

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Barium	ug/L	1000	1020	102	85-115	
Boron	ug/L	1000	992	99	85-115	
Calcium	ug/L	10000	10100	101	85-115	
Cobalt	ug/L	1000	1040	104	85-115	
Iron	ug/L	10000	10200	102	85-115	
Lithium	ug/L	1000	957	96	85-115	
Magnesium	ug/L	10000	10000	100	85-115	
Manganese	ug/L	1000	1020	102	85-115	
Molybdenum	ug/L	1000	1040	104	85-115	
Potassium	ug/L	10000	9980	100	85-115	
Sodium	ug/L	10000	10900	109	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2551875 2551876

Parameter	Units	MS		MSD		MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual	
		60321788006	Spike Conc.	Spike Conc.	MS Result							MSD Result
Barium	ug/L	51.0	1000	1000	1070	1060	102	101	70-130	1	20	
Boron	ug/L	14000	1000	1000	15000	14800	100	80	70-130	1	20	
Calcium	ug/L	333000	10000	10000	342000	340000	93	72	70-130	1	20	
Cobalt	ug/L	4.2J	1000	1000	1020	1000	101	100	70-130	1	20	

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60321788

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2551875													
Parameter	Units	60321788006			2551876			% Rec	% Rec	% Rec	Limits	Max RPD	Qual
		Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec						
Iron	ug/L	8230	10000	10000	18400	18200	101	100	70-130	1	20		
Lithium	ug/L	127	1000	1000	1110	1100	98	97	70-130	1	20		
Magnesium	ug/L	24800	10000	10000	34400	34300	96	95	70-130	0	20		
Manganese	ug/L	1270	1000	1000	2290	2260	102	99	70-130	1	20		
Molybdenum	ug/L	132	1000	1000	1200	1180	107	105	70-130	1	20		
Potassium	ug/L	13600	10000	10000	23600	23500	100	99	70-130	1	20		
Sodium	ug/L	21900	10000	10000	31800	31500	99	96	70-130	1	20		

MATRIX SPIKE SAMPLE: 2551877								
Parameter	Units	60322250002 Result	Spike Conc.	MS Result	MS % Rec	% Rec	Limits	Qualifiers
Barium	ug/L		9.5	1000	1030	102	70-130	
Boron	ug/L		ND	1000	1110	101	70-130	
Calcium	ug/L		57100	10000	68200	111	70-130	
Cobalt	ug/L		ND	1000	1040	104	70-130	
Iron	ug/L		584	10000	10800	103	70-130	
Lithium	ug/L		43.3	1000	1010	96	70-130	
Magnesium	ug/L		5680	10000	15600	100	70-130	
Manganese	ug/L		11.3	1000	1020	101	70-130	
Molybdenum	ug/L		ND	1000	1060	106	70-130	
Potassium	ug/L		6570	10000	16700	101	70-130	
Sodium	ug/L		64800	10000	75500	107	70-130	

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60321788

QC Batch:	625419	Analysis Method:	EPA 200.8
QC Batch Method:	EPA 200.8	Analysis Description:	200.8 MET
Associated Lab Samples:	60321788001, 60321788002, 60321788003, 60321788004, 60321788005, 60321788006, 60321788007, 60321788008, 60321788009, 60321788010, 60321788011, 60321788012, 60321788013, 60321788014, 60321788015		

METHOD BLANK:	2550309	Matrix:	Water
Associated Lab Samples:	60321788001, 60321788002, 60321788003, 60321788004, 60321788005, 60321788006, 60321788007, 60321788008, 60321788009, 60321788010, 60321788011, 60321788012, 60321788013, 60321788014, 60321788015		

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Arsenic	ug/L	<0.065	1.0	0.065	12/03/19 11:12	
Selenium	ug/L	<0.085	1.0	0.085	12/03/19 11:12	

LABORATORY CONTROL SAMPLE:	2550310					
Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Arsenic	ug/L	40	37.6	94	85-115	
Selenium	ug/L	40	38.0	95	85-115	

MATRIX SPIKE SAMPLE:	2550311						
Parameter	Units	60321788001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Arsenic	ug/L	0.69J	40	39.3	97	70-130	
Selenium	ug/L	<0.085	40	37.5	94	70-130	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE:	2550312			2550313								
Parameter	Units	60321788006 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Arsenic	ug/L	3.9	40	40	43.8	44.0	100	100	70-130	1	20	
Selenium	ug/L	<0.085	40	40	37.6	37.5	94	94	70-130	0	20	

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60321788

QC Batch: 624825 Analysis Method: SM 2320B
 QC Batch Method: SM 2320B Analysis Description: 2320B Alkalinity
 Associated Lab Samples: 60321788001, 60321788002, 60321788003, 60321788004, 60321788005, 60321788006, 60321788007, 60321788008, 60321788009, 60321788010, 60321788011, 60321788012, 60321788013, 60321788014, 60321788015

METHOD BLANK: 2547622 Matrix: Water
 Associated Lab Samples: 60321788001, 60321788002, 60321788003, 60321788004, 60321788005, 60321788006, 60321788007, 60321788008, 60321788009, 60321788010, 60321788011, 60321788012, 60321788013, 60321788014, 60321788015

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Alkalinity, Total as CaCO3	mg/L	<6.5	20.0	6.5	11/26/19 09:43	

LABORATORY CONTROL SAMPLE: 2547623

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity, Total as CaCO3	mg/L	500	487	97	90-110	

SAMPLE DUPLICATE: 2547624

Parameter	Units	60321687015 Result	Dup Result	RPD	Max RPD	Qualifiers
Alkalinity, Total as CaCO3	mg/L	331	337	2	10	

SAMPLE DUPLICATE: 2547625

Parameter	Units	60321788006 Result	Dup Result	RPD	Max RPD	Qualifiers
Alkalinity, Total as CaCO3	mg/L	444	446	0	10	

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60321788

QC Batch: 624428

Analysis Method: SM 2540C

QC Batch Method: SM 2540C

Analysis Description: 2540C Total Dissolved Solids

Associated Lab Samples: 60321788001, 60321788004, 60321788005, 60321788006, 60321788007, 60321788008

METHOD BLANK: 2546269

Matrix: Water

Associated Lab Samples: 60321788001, 60321788004, 60321788005, 60321788006, 60321788007, 60321788008

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	<5.0	5.0	5.0	11/25/19 11:03	

LABORATORY CONTROL SAMPLE: 2546270

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Dissolved Solids	mg/L	1000	994	99	80-120	

SAMPLE DUPLICATE: 2546271

Parameter	Units	60321687012 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	923	908	2	10	

SAMPLE DUPLICATE: 2546272

Parameter	Units	60321788006 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	1270	1210	5	10	

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60321788

QC Batch: 624429

Analysis Method: SM 2540C

QC Batch Method: SM 2540C

Analysis Description: 2540C Total Dissolved Solids

Associated Lab Samples: 60321788009, 60321788010, 60321788011, 60321788012, 60321788013, 60321788014, 60321788015

METHOD BLANK: 2546273

Matrix: Water

Associated Lab Samples: 60321788009, 60321788010, 60321788011, 60321788012, 60321788013, 60321788014, 60321788015

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	<5.0	5.0	5.0	11/25/19 12:03	

LABORATORY CONTROL SAMPLE: 2546274

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Dissolved Solids	mg/L	1000	978	98	80-120	

SAMPLE DUPLICATE: 2546275

Parameter	Units	60321788009 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	599	617	3	10	

SAMPLE DUPLICATE: 2546276

Parameter	Units	60321808004 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	907	945	4	10	

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC ENERGY CTR
Pace Project No.: 60321788

QC Batch: 624637 Analysis Method: SM 2540C
QC Batch Method: SM 2540C Analysis Description: 2540C Total Dissolved Solids
Associated Lab Samples: 60321788002, 60321788003

METHOD BLANK: 2547071 Matrix: Water
Associated Lab Samples: 60321788002, 60321788003

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	<5.0	5.0	5.0	11/26/19 06:41	

LABORATORY CONTROL SAMPLE: 2547072

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

SAMPLE DUPLICATE: 2547073

Parameter	Units	60321719001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	964	880	9	10	

SAMPLE DUPLICATE: 2547074

Parameter	Units	60322107003 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	15600	15600	0	10	

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC ENERGY CTR
Pace Project No.: 60321788

QC Batch: 625953 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 60321788001, 60321788002, 60321788003, 60321788004, 60321788005, 60321788006, 60321788007, 60321788008

METHOD BLANK: 2551524 Matrix: Water
Associated Lab Samples: 60321788001, 60321788002, 60321788003, 60321788004, 60321788005, 60321788006, 60321788007, 60321788008

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Chloride	mg/L	<0.22	1.0	0.22	12/04/19 09:17	
Fluoride	mg/L	<0.085	0.20	0.085	12/04/19 09:17	
Sulfate	mg/L	<0.23	1.0	0.23	12/04/19 09:17	

METHOD BLANK: 2552886 Matrix: Water
Associated Lab Samples: 60321788001, 60321788002, 60321788003, 60321788004, 60321788005, 60321788006, 60321788007, 60321788008

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Chloride	mg/L	<0.22	1.0	0.22	12/05/19 09:21	
Fluoride	mg/L	<0.085	0.20	0.085	12/05/19 09:21	
Sulfate	mg/L	<0.23	1.0	0.23	12/05/19 09:21	

LABORATORY CONTROL SAMPLE: 2551525

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

LABORATORY CONTROL SAMPLE: 2552887

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	5	5.0	99	90-110	
Fluoride	mg/L	2.5	2.6	102	90-110	
Sulfate	mg/L	5	5.1	101	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2551526 2551527

Parameter	Units	MS		MSD		MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
		60320950001 Result	Spike Conc.	Spike Conc.	Result						
Chloride	mg/L	21.5	10	10	32.4	32.0	109	105	80-120	1	15
Fluoride	mg/L	0.74	2.5	2.5	3.5	3.4	108	106	80-120	2	15
Sulfate	mg/L	125	100	100	246	189	121	64	80-120	26	15 M1,R1

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60321788

Parameter	Units	MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2551528			2551529			% Rec	% Rec	% Rec	Limits	RPD	Max RPD	Qual
		60321788006	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec							
Chloride	mg/L	20.2	10	10	30.6	31.1	105	109	80-120	1	15			
Fluoride	mg/L	0.11J	2.5	2.5	2.9	2.8	112	108	80-120	4	15			
Sulfate	mg/L	557	250	250	795	777	95	88	80-120	2	15			

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC ENERGY CTR
Pace Project No.: 60321788

QC Batch: 625956 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 60321788009, 60321788010, 60321788011, 60321788012, 60321788013, 60321788014, 60321788015

METHOD BLANK: 2551535 Matrix: Water
Associated Lab Samples: 60321788009, 60321788010, 60321788011, 60321788012, 60321788013, 60321788014, 60321788015

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Chloride	mg/L	<0.22	1.0	0.22	12/04/19 13:38	
Fluoride	mg/L	<0.085	0.20	0.085	12/04/19 13:38	
Sulfate	mg/L	<0.23	1.0	0.23	12/04/19 13:38	

METHOD BLANK: 2552784 Matrix: Water
Associated Lab Samples: 60321788009, 60321788010, 60321788011, 60321788012, 60321788013, 60321788014, 60321788015

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Chloride	mg/L	0.27J	1.0	0.22	12/05/19 09:18	
Fluoride	mg/L	<0.085	0.20	0.085	12/05/19 09:18	
Sulfate	mg/L	<0.23	1.0	0.23	12/05/19 09:18	

LABORATORY CONTROL SAMPLE: 2551536

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	100	95.8	96	90-110	
Fluoride	mg/L	50	53.4	107	90-110	
Sulfate	mg/L	100	93.2	93	90-110	

LABORATORY CONTROL SAMPLE: 2552787

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	5	4.7	93	90-110	
Fluoride	mg/L	2.5	2.6	102	90-110	
Sulfate	mg/L	5	4.8	95	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2551537 2551538

Parameter	Units	MS		MSD		MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
		60322173001 Result	Spike Conc.	Spike Conc.	MS Result						
Chloride	mg/L	273	250	250	509	514	95	97	80-120	1	15
Fluoride	mg/L	ND	125	125	129	131	103	105	80-120	1	15
Sulfate	mg/L	23.7J	250	250	273	274	100	100	80-120	0	15

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60321788

MATRIX SPIKE SAMPLE:		2551539					
Parameter	Units	60321788013 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	0.28J	5	4.7	88	80-120	
Fluoride	mg/L	<0.085	2.5	3.1	123	80-120	M1
Sulfate	mg/L	<0.23	5	7.2	145	80-120	M1

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ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60321788

Sample: M-MW-1 **Lab ID: 60321788001** Collected: 11/18/19 15:20 Received: 11/20/19 03:30 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	0.0144 ± 0.462 (0.927) C:NA T:92%	pCi/L	12/13/19 13:04	13982-63-3	
Radium-228	EPA 904.0	0.613 ± 0.345 (0.603) C:70% T:83%	pCi/L	12/12/19 11:46	15262-20-1	

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ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60321788

Sample: M-MW-2 **Lab ID: 60321788002** Collected: 11/19/19 09:15 Received: 11/20/19 03:30 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	0.0282 ± 0.398 (0.812) C:NA T:88%	pCi/L	12/13/19 13:04	13982-63-3	
Radium-228	EPA 904.0	0.263 ± 0.309 (0.647) C:73% T:86%	pCi/L	12/12/19 11:46	15262-20-1	

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ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60321788

Sample: M-MW-3 **Lab ID: 60321788003** Collected: 11/19/19 10:30 Received: 11/20/19 03:30 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	0.643 ± 0.610 (0.882) C:NA T:80%	pCi/L	12/13/19 13:04	13982-63-3	
Radium-228	EPA 904.0	0.425 ± 0.333 (0.653) C:71% T:89%	pCi/L	12/12/19 11:46	15262-20-1	

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ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60321788

Sample: M-MW-4 **Lab ID: 60321788004** Collected: 11/18/19 10:42 Received: 11/20/19 03:30 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	0.238 ± 0.380 (0.215) C:NA T:86%	pCi/L	12/13/19 13:04	13982-63-3	
Radium-228	EPA 904.0	0.779 ± 0.509 (0.951) C:75% T:82%	pCi/L	12/12/19 15:11	15262-20-1	

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ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60321788

Sample: M-MW-5 **Lab ID: 60321788005** Collected: 11/18/19 12:17 Received: 11/20/19 03:30 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	0.221 ± 0.429 (0.748) C:NA T:95%	pCi/L	12/13/19 13:04	13982-63-3	
Radium-228	EPA 904.0	1.54 ± 0.562 (0.758) C:73% T:92%	pCi/L	12/12/19 15:11	15262-20-1	

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ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60321788

Sample: M-MW-6 **Lab ID: 60321788006** Collected: 11/18/19 14:55 Received: 11/20/19 03:30 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	0.0880 ± 0.283 (0.545) C:NA T:81%	pCi/L	12/13/19 13:04	13982-63-3	
Radium-228	EPA 904.0	0.349 ± 0.446 (0.946) C:76% T:86%	pCi/L	12/12/19 15:11	15262-20-1	

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ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60321788

Sample: M-MW-7 **Lab ID: 60321788007** Collected: 11/18/19 16:18 Received: 11/20/19 03:30 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	-0.307 ± 0.489 (1.11) C:NA T:87%	pCi/L	12/13/19 13:04	13982-63-3	
Radium-228	EPA 904.0	0.658 ± 0.406 (0.764) C:78% T:85%	pCi/L	12/12/19 14:53	15262-20-1	

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ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60321788

Sample: M-MW-8 **Lab ID: 60321788008** Collected: 11/18/19 16:37 Received: 11/20/19 03:30 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	0.598 ± 0.558 (0.780) C:NA T:81%	pCi/L	12/13/19 13:19	13982-63-3	
Radium-228	EPA 904.0	0.176 ± 0.338 (0.742) C:74% T:92%	pCi/L	12/12/19 14:53	15262-20-1	

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ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60321788

Sample: M-BMW-1 **Lab ID: 60321788009** Collected: 11/18/19 13:12 Received: 11/20/19 03:30 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	0.389 ± 0.314 (0.176) C:NA T:93%	pCi/L	12/13/19 13:19	13982-63-3	
Radium-228	EPA 904.0	1.45 ± 0.507 (0.711) C:74% T:88%	pCi/L	12/12/19 14:53	15262-20-1	

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ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60321788

Sample: M-BMW-2 **Lab ID: 60321788010** Collected: 11/18/19 10:38 Received: 11/20/19 03:30 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	0.719 ± 0.433 (0.177) C:NA T:91%	pCi/L	12/13/19 13:19	13982-63-3	
Radium-228	EPA 904.0	0.667 ± 0.472 (0.926) C:75% T:79%	pCi/L	12/12/19 14:53	15262-20-1	

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ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60321788

Sample: M-MW-10 **Lab ID: 60321788011** Collected: 11/18/19 14:33 Received: 11/20/19 03:30 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	0.490 ± 0.437 (0.562) C:NA T:85%	pCi/L	12/13/19 13:19	13982-63-3	
Radium-228	EPA 904.0	0.697 ± 0.412 (0.768) C:77% T:85%	pCi/L	12/12/19 14:54	15262-20-1	

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ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60321788

Sample: M-DUP-1 **Lab ID: 60321788012** Collected: 11/18/19 14:33 Received: 11/20/19 03:30 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	0.0950 ± 0.406 (0.783) C:NA T:86%	pCi/L	12/13/19 13:19	13982-63-3	
Radium-228	EPA 904.0	1.12 ± 0.511 (0.864) C:75% T:76%	pCi/L	12/12/19 14:54	15262-20-1	

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ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60321788

Sample: M-FB-1 **Lab ID: 60321788013** Collected: 11/18/19 14:57 Received: 11/20/19 03:30 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	0.443 ± 0.396 (0.509) C:NA T:92%	pCi/L	12/13/19 13:19	13982-63-3	
Radium-228	EPA 904.0	0.182 ± 0.423 (0.942) C:74% T:82%	pCi/L	12/12/19 17:59	15262-20-1	

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ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60321788

Sample: M-DUP-2 **Lab ID: 60321788014** Collected: 11/18/19 14:57 Received: 11/20/19 03:30 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	0.258 ± 0.340 (0.531) C:NA T:92%	pCi/L	12/13/19 13:19	13982-63-3	
Radium-228	EPA 904.0	0.642 ± 0.506 (0.991) C:75% T:78%	pCi/L	12/12/19 17:59	15262-20-1	

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ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60321788

Sample: M-FB-2 **Lab ID: 60321788015** Collected: 11/18/19 14:57 Received: 11/20/19 03:30 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	0.128 ± 0.583 (1.08) C:NA T:90%	pCi/L	12/13/19 13:19	13982-63-3	
Radium-228	EPA 904.0	0.419 ± 0.330 (0.651) C:76% T:91%	pCi/L	12/12/19 14:55	15262-20-1	

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ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60321788

Sample: M-MW-6 MS **Lab ID: 60321788016** Collected: 11/18/19 14:55 Received: 11/20/19 03:30 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	92.95 %REC ± NA (NA) C:NA T:NA	pCi/L	12/13/19 13:48	13982-63-3	
Radium-228	EPA 904.0	98.59 %REC ± NA (NA) C:NA T:NA	pCi/L	12/12/19 14:55	15262-20-1	

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ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60321788

Sample: M-MW-6 MSD		Lab ID: 60321788017	Collected: 11/18/19 14:55	Received: 11/20/19 03:30	Matrix: Water		
PWS:		Site ID:	Sample Type:				
Parameters	Method	Act ± Unc (MDC) Carr Trac		Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	77.73 %REC	17.83 RPD ±	pCi/L	12/13/19 13:48	13982-63-3	
		NA (NA)					
		C:NA T:NA					
Radium-228	EPA 904.0	103.81 %REC	5.16 RPD ±	pCi/L	12/12/19 14:55	15262-20-1	
		NA (NA)					
		C:NA T:NA					

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QUALITY CONTROL - RADIOCHEMISTRY

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60321788

QC Batch:	373620	Analysis Method:	EPA 904.0
QC Batch Method:	EPA 904.0	Analysis Description:	904.0 Radium 228
Associated Lab Samples:	60321788001, 60321788002, 60321788003, 60321788004, 60321788005, 60321788006, 60321788007, 60321788008, 60321788009, 60321788010, 60321788011, 60321788012, 60321788013, 60321788014, 60321788015, 60321788016, 60321788017		

METHOD BLANK: 1812929 Matrix: Water

Associated Lab Samples: 60321788001, 60321788002, 60321788003, 60321788004, 60321788005, 60321788006, 60321788007, 60321788008, 60321788009, 60321788010, 60321788011, 60321788012, 60321788013, 60321788014, 60321788015, 60321788016, 60321788017

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-228	-0.0391 ± 0.291 (0.692) C:74% T:83%	pCi/L	12/12/19 11:45	

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QUALIFIERS

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60321788

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.

Act - Activity

Unc - Uncertainty: SDWA = 1.96 sigma count uncertainty, all other matrices = Expanded Uncertainty (95% confidence interval).

Gamma Spec = Expanded Uncertainty (95.4% Confidence Interval)

(MDC) - Minimum Detectable Concentration

Trac - Tracer Recovery (%)

Carr - Carrier Recovery (%)

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

PASI-PA Pace Analytical Services - Greensburg

ANALYTE QUALIFIERS

B Analyte was detected in the associated method blank.

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

R1 RPD value was outside control limits.

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60321788

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
60321788001	M-MW-1	EPA 200.7	626041	EPA 200.7	626085
60321788002	M-MW-2	EPA 200.7	626041	EPA 200.7	626085
60321788003	M-MW-3	EPA 200.7	626041	EPA 200.7	626085
60321788004	M-MW-4	EPA 200.7	626041	EPA 200.7	626085
60321788005	M-MW-5	EPA 200.7	626041	EPA 200.7	626085
60321788006	M-MW-6	EPA 200.7	626041	EPA 200.7	626085
60321788007	M-MW-7	EPA 200.7	626041	EPA 200.7	626085
60321788008	M-MW-8	EPA 200.7	626041	EPA 200.7	626085
60321788009	M-BMW-1	EPA 200.7	626041	EPA 200.7	626085
60321788010	M-BMW-2	EPA 200.7	626041	EPA 200.7	626085
60321788011	M-MW-10	EPA 200.7	626041	EPA 200.7	626085
60321788012	M-DUP-1	EPA 200.7	626041	EPA 200.7	626085
60321788013	M-FB-1	EPA 200.7	626041	EPA 200.7	626085
60321788014	M-DUP-2	EPA 200.7	626041	EPA 200.7	626085
60321788015	M-FB-2	EPA 200.7	626041	EPA 200.7	626085
60321788001	M-MW-1	EPA 200.8	625419	EPA 200.8	625603
60321788002	M-MW-2	EPA 200.8	625419	EPA 200.8	625603
60321788003	M-MW-3	EPA 200.8	625419	EPA 200.8	625603
60321788004	M-MW-4	EPA 200.8	625419	EPA 200.8	625603
60321788005	M-MW-5	EPA 200.8	625419	EPA 200.8	625603
60321788006	M-MW-6	EPA 200.8	625419	EPA 200.8	625603
60321788007	M-MW-7	EPA 200.8	625419	EPA 200.8	625603
60321788008	M-MW-8	EPA 200.8	625419	EPA 200.8	625603
60321788009	M-BMW-1	EPA 200.8	625419	EPA 200.8	625603
60321788010	M-BMW-2	EPA 200.8	625419	EPA 200.8	625603
60321788011	M-MW-10	EPA 200.8	625419	EPA 200.8	625603
60321788012	M-DUP-1	EPA 200.8	625419	EPA 200.8	625603
60321788013	M-FB-1	EPA 200.8	625419	EPA 200.8	625603
60321788014	M-DUP-2	EPA 200.8	625419	EPA 200.8	625603
60321788015	M-FB-2	EPA 200.8	625419	EPA 200.8	625603
60321788001	M-MW-1	EPA 903.1	373619		
60321788002	M-MW-2	EPA 903.1	373619		
60321788003	M-MW-3	EPA 903.1	373619		
60321788004	M-MW-4	EPA 903.1	373619		
60321788005	M-MW-5	EPA 903.1	373619		
60321788006	M-MW-6	EPA 903.1	373619		
60321788007	M-MW-7	EPA 903.1	373619		
60321788008	M-MW-8	EPA 903.1	373619		
60321788009	M-BMW-1	EPA 903.1	373619		
60321788010	M-BMW-2	EPA 903.1	373619		
60321788011	M-MW-10	EPA 903.1	373619		
60321788012	M-DUP-1	EPA 903.1	373619		
60321788013	M-FB-1	EPA 903.1	373619		
60321788014	M-DUP-2	EPA 903.1	373619		
60321788015	M-FB-2	EPA 903.1	373619		
60321788016	M-MW-6 MS	EPA 903.1	373619		
60321788017	M-MW-6 MSD	EPA 903.1	373619		

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60321788

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
60321788001	M-MW-1	EPA 904.0	373620		
60321788002	M-MW-2	EPA 904.0	373620		
60321788003	M-MW-3	EPA 904.0	373620		
60321788004	M-MW-4	EPA 904.0	373620		
60321788005	M-MW-5	EPA 904.0	373620		
60321788006	M-MW-6	EPA 904.0	373620		
60321788007	M-MW-7	EPA 904.0	373620		
60321788008	M-MW-8	EPA 904.0	373620		
60321788009	M-BMW-1	EPA 904.0	373620		
60321788010	M-BMW-2	EPA 904.0	373620		
60321788011	M-MW-10	EPA 904.0	373620		
60321788012	M-DUP-1	EPA 904.0	373620		
60321788013	M-FB-1	EPA 904.0	373620		
60321788014	M-DUP-2	EPA 904.0	373620		
60321788015	M-FB-2	EPA 904.0	373620		
60321788016	M-MW-6 MS	EPA 904.0	373620		
60321788017	M-MW-6 MSD	EPA 904.0	373620		
60321788001	M-MW-1	SM 2320B	624825		
60321788002	M-MW-2	SM 2320B	624825		
60321788003	M-MW-3	SM 2320B	624825		
60321788004	M-MW-4	SM 2320B	624825		
60321788005	M-MW-5	SM 2320B	624825		
60321788006	M-MW-6	SM 2320B	624825		
60321788007	M-MW-7	SM 2320B	624825		
60321788008	M-MW-8	SM 2320B	624825		
60321788009	M-BMW-1	SM 2320B	624825		
60321788010	M-BMW-2	SM 2320B	624825		
60321788011	M-MW-10	SM 2320B	624825		
60321788012	M-DUP-1	SM 2320B	624825		
60321788013	M-FB-1	SM 2320B	624825		
60321788014	M-DUP-2	SM 2320B	624825		
60321788015	M-FB-2	SM 2320B	624825		
60321788001	M-MW-1	SM 2540C	624428		
60321788002	M-MW-2	SM 2540C	624637		
60321788003	M-MW-3	SM 2540C	624637		
60321788004	M-MW-4	SM 2540C	624428		
60321788005	M-MW-5	SM 2540C	624428		
60321788006	M-MW-6	SM 2540C	624428		
60321788007	M-MW-7	SM 2540C	624428		
60321788008	M-MW-8	SM 2540C	624428		
60321788009	M-BMW-1	SM 2540C	624429		
60321788010	M-BMW-2	SM 2540C	624429		
60321788011	M-MW-10	SM 2540C	624429		
60321788012	M-DUP-1	SM 2540C	624429		
60321788013	M-FB-1	SM 2540C	624429		
60321788014	M-DUP-2	SM 2540C	624429		

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: AMEREN MERAMEC ENERGY CTR

Pace Project No.: 60321788

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
60321788015	M-FB-2	SM 2540C	624429		
60321788001	M-MW-1	EPA 300.0	625953		
60321788002	M-MW-2	EPA 300.0	625953		
60321788003	M-MW-3	EPA 300.0	625953		
60321788004	M-MW-4	EPA 300.0	625953		
60321788005	M-MW-5	EPA 300.0	625953		
60321788006	M-MW-6	EPA 300.0	625953		
60321788007	M-MW-7	EPA 300.0	625953		
60321788008	M-MW-8	EPA 300.0	625953		
60321788009	M-BMW-1	EPA 300.0	625956		
60321788010	M-BMW-2	EPA 300.0	625956		
60321788011	M-MW-10	EPA 300.0	625956		
60321788012	M-DUP-1	EPA 300.0	625956		
60321788013	M-FB-1	EPA 300.0	625956		
60321788014	M-DUP-2	EPA 300.0	625956		
60321788015	M-FB-2	EPA 300.0	625956		

REPORT OF LABORATORY ANALYSIS

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Sample Condition Upon Receipt

WO#: 60321788



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 APIC

Thermometer Used: True Type of Ice: Wet Blue None

Cooler Temperature (°C): As-read 0.6, 0.8, Corr. Factor +0.0 Corrected 0.6, 0.8,
Temperature should be above freezing to 6°C 17.5, 17.3 17.5, 17.3

Date and initials of person examining contents: VB 11/20/19

Chain of Custody present:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Chain of Custody relinquished:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Samples arrived within holding time:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Short Hold Time analyses (<72hr):	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	<u>Coolers at 17.5 and 17.3</u>
Rush Turn Around Time requested:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	<u>only contained BpIN</u>
Sufficient volume:	<input checked="" type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	<u>containers</u>
Correct containers used:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<u>1 M-MW-4 BpIN has low</u>
Pace containers used:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<u>volume</u>
Containers intact:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Unpreserved 5035A / TX1005/1006 soils frozen in 48hrs?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Filtered volume received for dissolved tests?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Sample labels match COC: Date / time / ID / analyses	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Samples contain multiple phases? Matrix: <u>WT</u>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	
Containers requiring pH preservation in compliance? (HNO ₃ , H ₂ SO ₄ , HCl<2; NaOH>9 Sulfide, NaOH>10 Cyanide) (Exceptions: VOA, Micro, O&G, KS TPH, OK-DRO)	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> 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)	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Potassium iodide test strip turns blue/purple? (Preserve)	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Trip Blank present:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Headspace in VOA vials (>6mm):	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Samples from USDA Regulated Area: State:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Additional labels attached to 5035A / TX1005 vials in the field?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> 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: Jamie Clark Date: 11/20/19

MEMORANDUM**DATE** January 14, 2020**Project No.** 153140601**TO** Project File
Golder Associates**CC** Amanda Derhake, Jeff Ingram**FROM** Tommy Goodwin**EMAIL** Tommy_Goodwin@golder.com**DATA VALIDATION SUMMARY, MERAMEC ENERGY CENTER – DATA PACKAGE 60321788**

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

- When a compound was detected in a sample result between the MDL and the PQL the results were recorded at the detection value and qualified as estimates (J).
- When a compound was detected in a blank (i.e. method, field), and the blank comparison criterion was not met, associated sample results were qualified as estimates (J) or non-detects (U).

QA LEVEL II - INORGANIC DATA EVALUATION CHECKLIST

Blanks	YES	NO	NA	COMMENTS
a) Were analytes detected in the method blank(s)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	See Notes
b) Were analytes detected in the field blank(s)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	See Notes
c) Were analytes detected in the equipment blank(s)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
d) Were analytes detected in the trip blank(s)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

Laboratory Control Sample (LCS)	YES	NO	NA	COMMENTS
a) Was a LCS analyzed once per SDG?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
b) Were the proper analytes included in the LCS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
c) Was the LCS accuracy criteria met?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Duplicates	YES	NO	NA	COMMENTS
a) Were field duplicates collected (note original and duplicate sample names)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	DUP-1 @ M-MW-4; DUP-2 @ M-MW-1 FB-1 @ M-MW-10; FB-2 @ M-MW-7
b) Were field dup. precision criteria met (note RPD)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	See Notes
c) Were lab duplicates analyzed (note original and duplicate samples)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-88006: Alk, TDS; -88009: TDS
d) Were lab dup. precision criteria met (note RPD)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	See Notes

Blind Standards	YES	NO	NA	COMMENTS
a) Was a blind standard used (indicate name, analytes included and concentrations)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
b) Was the %D within control limits?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

Matrix Spike/Matrix Spike Duplicate (MS/MSD)	YES	NO	NA	COMMENTS
a) Was MS accuracy criteria met?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	See Notes
Recovery could not be calculated since sample contained high concentration of analyte?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
b) Was MSD accuracy criteria met?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Recovery could not be calculated since sample contained high concentration of analyte?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
c) Were MS/MSD precision criteria met?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Comments/Notes:

FB-1: B (51.5), K (136), Na (448), Cl (0.28); FB-2: B (27.1), Na (396), Cl (0.34)

MB: -88001-15: Fe (25.9), K (260); -88009-15 {12/05/19 09:18} Cl (0.27)

MS/MSD: -88013: F MS-H(123% of 80-120%), SO4 MS-H(145% of 80-120%); Results are non-detect

DUP-1: Se (200); DUP-2: B (62), Li (200); no qualification is necessary for DUP-1 or DUP-2 samples

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

January 02, 2020

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

RE: Project: AMEREN MERAMEC ENERGY CENTER
Pace Project No.: 60323864

Dear Jeffrey Ingram:

Enclosed are the analytical results for sample(s) received by the laboratory on December 11, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

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

Sincerely,



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

Enclosures

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



REPORT OF LABORATORY ANALYSIS

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CERTIFICATIONS

Project: AMEREN MERAMEC ENERGY CENTER

Pace Project No.: 60323864

Pace Analytical Services Pennsylvania

1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601

ANAB DOD-ELAP Rad Accreditation #: L2417

Alabama Certification #: 41590

Arizona Certification #: AZ0734

Arkansas Certification

California Certification #: 04222CA

Colorado Certification #: PA01547

Connecticut Certification #: PH-0694

Delaware Certification

EPA Region 4 DW Rad

Florida/TNI Certification #: E87683

Georgia Certification #: C040

Florida: Cert E871149 SEKS WET

Guam Certification

Hawaii Certification

Idaho Certification

Illinois Certification

Indiana Certification

Iowa Certification #: 391

Kansas/TNI Certification #: E-10358

Kentucky Certification #: KY90133

KY WW Permit #: KY0098221

KY WW Permit #: KY0000221

Louisiana DHH/TNI Certification #: LA180012

Louisiana DEQ/TNI Certification #: 4086

Maine Certification #: 2017020

Maryland Certification #: 308

Massachusetts Certification #: M-PA1457

Michigan/PADEP Certification #: 9991

Missouri Certification #: 235

Montana Certification #: Cert0082

Nebraska Certification #: NE-OS-29-14

Nevada Certification #: PA014572018-1

New Hampshire/TNI Certification #: 297617

New Jersey/TNI Certification #: PA051

New Mexico Certification #: PA01457

New York/TNI Certification #: 10888

North Carolina Certification #: 42706

North Dakota Certification #: R-190

Ohio EPA Rad Approval: #41249

Oregon/TNI Certification #: PA200002-010

Pennsylvania/TNI Certification #: 65-00282

Puerto Rico Certification #: PA01457

Rhode Island Certification #: 65-00282

South Dakota Certification

Tennessee Certification #: 02867

Texas/TNI Certification #: T104704188-17-3

Utah/TNI Certification #: PA014572017-9

USDA Soil Permit #: P330-17-00091

Vermont Dept. of Health: ID# VT-0282

Virgin Island/PADEP Certification

Virginia/VELAP Certification #: 9526

Washington Certification #: C868

West Virginia DEP Certification #: 143

West Virginia DHHR Certification #: 9964C

Wisconsin Approve List for Rad

Wyoming Certification #: 8TMS-L

Pace Analytical Services Kansas

9608 Loiret Boulevard, Lenexa, KS 66219

Missouri Inorganic Drinking Water Certification #: 10090

Arkansas Drinking Water

Arkansas Certification #: 19-016-0

Arkansas Drinking Water

Illinois Certification #: 004455

Iowa Certification #: 118

Kansas/NELAP Certification #: E-10116

Louisiana Certification #: 03055

Nevada Certification #: KS000212020-2

Oklahoma Certification #: 9205/9935

Florida: Cert E871149 SEKS WET

Texas Certification #: T104704407-19-12

Utah Certification #: KS000212018-8

Illinois Certification #: 004592

Kansas Field Laboratory Accreditation: # E-92587

Missouri SEKS Micro Certification: 10070

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SAMPLE SUMMARY

Project: AMEREN MERAMEC ENERGY CENTER

Pace Project No.: 60323864

Lab ID	Sample ID	Matrix	Date Collected	Date Received
60323864001	M-MW-9	Water	12/10/19 12:15	12/11/19 03:00
60323864002	M-TP-1	Water	12/10/19 13:55	12/11/19 03:00

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SAMPLE ANALYTE COUNT

Project: AMEREN MERAMEC ENERGY CENTER

Pace Project No.: 60323864

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
60323864001	M-MW-9	EPA 200.7	HKC	13	PASI-K
		EPA 200.8	LRS	6	PASI-K
		EPA 245.1	JLH	1	PASI-K
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
		SM 2320B	LDF	1	PASI-K
		SM 2540C	BLA	1	PASI-K
		EPA 300.0	CNB, MJK	3	PASI-K
		60323864002	M-TP-1	EPA 200.7	HKC
EPA 200.8	LRS			6	PASI-K
EPA 245.1	JLH			1	PASI-K
EPA 903.1	MK1			1	PASI-PA
EPA 904.0	VAL			1	PASI-PA
SM 2320B	LDF			1	PASI-K
SM 2540C	BLA			1	PASI-K
EPA 300.0	MJK			3	PASI-K

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ANALYTICAL RESULTS

Project: AMEREN MERAMEC ENERGY CENTER

Pace Project No.: 60323864

Sample: M-MW-9 **Lab ID: 60323864001** Collected: 12/10/19 12:15 Received: 12/11/19 03:00 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							
Barium	207	ug/L	5.0	1.4	1	12/17/19 12:45	12/18/19 14:17	7440-39-3	
Beryllium	<0.25	ug/L	1.0	0.25	1	12/17/19 12:45	12/18/19 14:17	7440-41-7	
Boron	3860	ug/L	100	10.7	1	12/17/19 12:45	12/18/19 14:17	7440-42-8	
Calcium	118000	ug/L	200	50.0	1	12/17/19 12:45	12/18/19 14:17	7440-70-2	
Cobalt	<0.84	ug/L	5.0	0.84	1	12/17/19 12:45	12/18/19 14:17	7440-48-4	
Iron	12300	ug/L	50.0	14.0	1	12/17/19 12:45	12/18/19 14:17	7439-89-6	
Lead	<3.4	ug/L	10.0	3.4	1	12/17/19 12:45	12/18/19 14:17	7439-92-1	
Lithium	9.8J	ug/L	10.0	5.9	1	12/17/19 12:45	12/18/19 14:17	7439-93-2	
Magnesium	39700	ug/L	50.0	13.0	1	12/17/19 12:45	12/18/19 14:17	7439-95-4	
Manganese	302	ug/L	5.0	2.1	1	12/17/19 12:45	12/18/19 14:17	7439-96-5	
Molybdenum	37.6	ug/L	20.0	2.6	1	12/17/19 12:45	12/18/19 14:17	7439-98-7	
Potassium	4550	ug/L	500	79.0	1	12/17/19 12:45	12/18/19 14:17	7440-09-7	
Sodium	40000	ug/L	500	144	1	12/17/19 12:45	12/18/19 14:17	7440-23-5	
200.8 MET ICPMS		Analytical Method: EPA 200.8 Preparation Method: EPA 200.8							
Antimony	<0.078	ug/L	1.0	0.078	1	12/13/19 08:30	12/19/19 11:47	7440-36-0	
Arsenic	17.1	ug/L	1.0	0.065	1	12/13/19 08:30	12/19/19 11:47	7440-38-2	
Cadmium	<0.033	ug/L	0.50	0.033	1	12/13/19 08:30	12/19/19 11:47	7440-43-9	
Chromium	0.10J	ug/L	1.0	0.078	1	12/13/19 08:30	12/19/19 11:47	7440-47-3	
Selenium	<0.085	ug/L	1.0	0.085	1	12/13/19 08:30	12/19/19 11:47	7782-49-2	
Thallium	<0.099	ug/L	1.0	0.099	1	12/13/19 08:30	12/19/19 11:47	7440-28-0	
245.1 Mercury		Analytical Method: EPA 245.1 Preparation Method: EPA 245.1							
Mercury	<0.052	ug/L	0.20	0.052	1	12/13/19 10:20	12/16/19 14:15	7439-97-6	
2320B Alkalinity		Analytical Method: SM 2320B							
Alkalinity, Total as CaCO3	367	mg/L	20.0	6.5	1		12/17/19 18:32		
2540C Total Dissolved Solids		Analytical Method: SM 2540C							
Total Dissolved Solids	620	mg/L	10.0	10.0	1		12/16/19 07:33		
300.0 IC Anions 28 Days		Analytical Method: EPA 300.0							
Chloride	32.1	mg/L	5.0	1.1	5		12/17/19 23:22	16887-00-6	
Fluoride	0.25	mg/L	0.20	0.085	1		12/17/19 23:06	16984-48-8	
Sulfate	133	mg/L	10.0	2.3	10		12/18/19 20:21	14808-79-8	

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ANALYTICAL RESULTS

Project: AMEREN MERAMEC ENERGY CENTER

Pace Project No.: 60323864

Sample: M-TP-1 **Lab ID:** 60323864002 Collected: 12/10/19 13:55 Received: 12/11/19 03:00 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							
Barium	357	ug/L	5.0	1.4	1	12/17/19 12:45	12/18/19 14:20	7440-39-3	
Beryllium	0.28J	ug/L	1.0	0.25	1	12/17/19 12:45	12/18/19 14:20	7440-41-7	B
Boron	592	ug/L	100	10.7	1	12/17/19 12:45	12/18/19 14:20	7440-42-8	
Calcium	75000	ug/L	200	50.0	1	12/17/19 12:45	12/18/19 14:20	7440-70-2	
Cobalt	<0.84	ug/L	5.0	0.84	1	12/17/19 12:45	12/18/19 14:20	7440-48-4	
Iron	7470	ug/L	50.0	14.0	1	12/17/19 12:45	12/18/19 14:20	7439-89-6	
Lead	<3.4	ug/L	10.0	3.4	1	12/17/19 12:45	12/18/19 14:20	7439-92-1	
Lithium	15.7	ug/L	10.0	5.9	1	12/17/19 12:45	12/18/19 14:20	7439-93-2	
Magnesium	30700	ug/L	50.0	13.0	1	12/17/19 12:45	12/18/19 14:20	7439-95-4	
Manganese	87.9	ug/L	5.0	2.1	1	12/17/19 12:45	12/18/19 14:20	7439-96-5	
Molybdenum	<2.6	ug/L	20.0	2.6	1	12/17/19 12:45	12/18/19 14:20	7439-98-7	
Potassium	2950	ug/L	500	79.0	1	12/17/19 12:45	12/18/19 14:20	7440-09-7	
Sodium	43400	ug/L	500	144	1	12/17/19 12:45	12/18/19 14:20	7440-23-5	
200.8 MET ICPMS		Analytical Method: EPA 200.8 Preparation Method: EPA 200.8							
Antimony	<0.078	ug/L	1.0	0.078	1	12/13/19 08:30	12/19/19 11:49	7440-36-0	
Arsenic	6.6	ug/L	1.0	0.065	1	12/13/19 08:30	12/19/19 11:49	7440-38-2	
Cadmium	<0.033	ug/L	0.50	0.033	1	12/13/19 08:30	12/19/19 11:49	7440-43-9	
Chromium	0.11J	ug/L	1.0	0.078	1	12/13/19 08:30	12/19/19 11:49	7440-47-3	
Selenium	<0.085	ug/L	1.0	0.085	1	12/13/19 08:30	12/19/19 11:49	7782-49-2	
Thallium	<0.099	ug/L	1.0	0.099	1	12/13/19 08:30	12/19/19 11:49	7440-28-0	
245.1 Mercury		Analytical Method: EPA 245.1 Preparation Method: EPA 245.1							
Mercury	<0.052	ug/L	0.20	0.052	1	12/13/19 10:20	12/16/19 14:20	7439-97-6	
2320B Alkalinity		Analytical Method: SM 2320B							
Alkalinity, Total as CaCO3	387	mg/L	20.0	6.5	1		12/17/19 18:37		
2540C Total Dissolved Solids		Analytical Method: SM 2540C							
Total Dissolved Solids	410	mg/L	10.0	10.0	1		12/16/19 07:33		
300.0 IC Anions 28 Days		Analytical Method: EPA 300.0							
Chloride	23.3	mg/L	2.0	0.44	2		12/18/19 00:43	16887-00-6	
Fluoride	0.32	mg/L	0.20	0.085	1		12/18/19 00:27	16984-48-8	
Sulfate	<0.23	mg/L	1.0	0.23	1		12/18/19 00:27	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC ENERGY CENTER

Pace Project No.: 60323864

QC Batch: 628095

Analysis Method: EPA 245.1

QC Batch Method: EPA 245.1

Analysis Description: 245.1 Mercury

Associated Lab Samples: 60323864001, 60323864002

METHOD BLANK: 2560016

Matrix: Water

Associated Lab Samples: 60323864001, 60323864002

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Mercury	ug/L	<0.052	0.20	0.052	12/16/19 13:42	

LABORATORY CONTROL SAMPLE: 2560017

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury	ug/L	5	5.1	101	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2560018 2560019

Parameter	Units	60323977001		2560018		2560019		% Rec Limits	RPD	Max RPD	Qual	
		MS Result	MSD Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result					MS % Rec
Mercury	ug/L	ND	ND	5	5	4.9	4.9	99	99	70-130	0	20

MATRIX SPIKE SAMPLE: 2560020

Parameter	Units	60323864001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Mercury	ug/L	<0.052	5	4.6	92	70-130	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC ENERGY CENTER

Pace Project No.: 60323864

QC Batch: 628789 Analysis Method: EPA 200.7
 QC Batch Method: EPA 200.7 Analysis Description: 200.7 Metals, Total
 Associated Lab Samples: 60323864001, 60323864002

METHOD BLANK: 2562752 Matrix: Water

Associated Lab Samples: 60323864001, 60323864002

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Barium	ug/L	<1.8	5.0	1.8	12/18/19 13:32	
Beryllium	ug/L	0.49J	1.0		12/18/19 13:32	
Boron	ug/L	<11.7	100	11.7	12/18/19 13:32	
Calcium	ug/L	36.1J	200	32.4	12/18/19 13:32	
Cobalt	ug/L	<1.5	5.0	1.5	12/18/19 13:32	
Iron	ug/L	<26.8	50.0	26.8	12/18/19 13:32	
Lead	ug/L	<4.6	10.0	4.6	12/18/19 13:32	
Lithium	ug/L	<4.6	10.0	4.6	12/18/19 13:32	
Magnesium	ug/L	<19.7	50.0	19.7	12/18/19 13:32	
Manganese	ug/L	<0.97	5.0	0.97	12/18/19 13:32	
Molybdenum	ug/L	<1.7	20.0	1.7	12/18/19 13:32	
Potassium	ug/L	<189	500	189	12/18/19 13:32	
Sodium	ug/L	126J	500	107	12/18/19 13:32	

LABORATORY CONTROL SAMPLE: 2562753

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Barium	ug/L	1000	972	97	85-115	
Beryllium	ug/L	1000	974	97	85-115	
Boron	ug/L	1000	939	94	85-115	
Calcium	ug/L	10000	9840	98	85-115	
Cobalt	ug/L	1000	1020	102	85-115	
Iron	ug/L	10000	9820	98	85-115	
Lead	ug/L	1000	1010	101	85-115	
Lithium	ug/L	1000	955	95	85-115	
Magnesium	ug/L	10000	9810	98	85-115	
Manganese	ug/L	1000	997	100	85-115	
Molybdenum	ug/L	1000	1020	102	85-115	
Potassium	ug/L	10000	9760	98	85-115	
Sodium	ug/L	10000	10200	102	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2562754 2562755

Parameter	Units	MS		MSD		MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual	
		60324131001 Result	Spike Conc.	Spike Conc.	Result							Result
Barium	ug/L	141	1000	1000	1130	1120	99	98	70-130	1	20	
Beryllium	ug/L	ND	1000	1000	1010	1000	101	100	70-130	1	20	
Boron	ug/L	447	1000	1000	1420	1420	97	97	70-130	0	20	

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC ENERGY CENTER

Pace Project No.: 60323864

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2562754												2562755	
Parameter	Units	60324131001		MS	MSD	MS	MSD	MS	MSD	% Rec	Max		
		Result	Conc.	Spike	Spike	Result	Result	% Rec	% Rec	Limits	RPD		
Calcium	ug/L	212000	10000	10000	225000	224000	131	120	70-130	0	20 M1		
Cobalt	ug/L	ND	1000	1000	994	982	99	98	70-130	1	20		
Iron	ug/L	173	10000	10000	10200	10100	100	100	70-130	1	20		
Lead	ug/L	ND	1000	1000	970	959	97	96	70-130	1	20		
Lithium	ug/L	230	1000	1000	1190	1190	96	96	70-130	0	20		
Magnesium	ug/L	94000	10000	10000	105000	104000	106	98	70-130	1	20		
Manganese	ug/L	27.1	1000	1000	992	985	96	96	70-130	1	20		
Molybdenum	ug/L	ND	1000	1000	1040	1040	104	103	70-130	1	20		
Potassium	ug/L	16200	10000	10000	26400	26400	102	102	70-130	0	20		
Sodium	ug/L	255000	10000	10000	268000	267000	130	117	70-130	0	20		

MATRIX SPIKE SAMPLE: 2562756											
Parameter	Units	60324192003		Spike	MS	MS	% Rec				
		Result	Conc.	Conc.	Result	% Rec	Limits	Qualifiers			
Barium	ug/L		126	1000	1130	101	70-130				
Beryllium	ug/L		ND	1000	1000	100	70-130				
Boron	ug/L		ND	1000	952J	95	70-130				
Calcium	ug/L		53900	10000	65300	114	70-130				
Cobalt	ug/L		ND	1000	1060	105	70-130				
Iron	ug/L		ND	10000	10700	104	70-130				
Lead	ug/L		ND	1000	1010	100	70-130				
Lithium	ug/L		ND	1000	982	98	70-130				
Magnesium	ug/L		8610	10000	18600	99	70-130				
Manganese	ug/L		ND	1000	1020	101	70-130				
Molybdenum	ug/L		ND	1000	1020	102	70-130				
Potassium	ug/L		5250	10000	15200	100	70-130				
Sodium	ug/L		28100	10000	37900	98	70-130				

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC ENERGY CENTER

Pace Project No.: 60323864

QC Batch: 628102 Analysis Method: EPA 200.8
QC Batch Method: EPA 200.8 Analysis Description: 200.8 MET
Associated Lab Samples: 60323864001, 60323864002

METHOD BLANK: 2560041 Matrix: Water

Associated Lab Samples: 60323864001, 60323864002

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Antimony	ug/L	<0.097	1.0	0.097	12/19/19 10:45	
Arsenic	ug/L	<0.086	1.0	0.086	12/19/19 10:45	
Cadmium	ug/L	<0.056	0.50	0.056	12/19/19 10:45	
Chromium	ug/L	<0.22	1.0	0.22	12/19/19 10:45	
Selenium	ug/L	<0.18	1.0	0.18	12/19/19 10:45	
Thallium	ug/L	<0.093	1.0	0.093	12/19/19 10:45	

LABORATORY CONTROL SAMPLE: 2560042

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Antimony	ug/L	40	40.3	101	85-115	
Arsenic	ug/L	40	41.2	103	85-115	
Cadmium	ug/L	40	40.2	100	85-115	
Chromium	ug/L	40	39.6	99	85-115	
Selenium	ug/L	40	41.6	104	85-115	
Thallium	ug/L	40	39.9	100	85-115	

MATRIX SPIKE SAMPLE: 2560043

Parameter	Units	60323935004 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Antimony	ug/L	0.12J	40	38.8	97	70-130	
Arsenic	ug/L	1.2	40	42.0	102	70-130	
Cadmium	ug/L	0.055J	40	36.3	91	70-130	
Chromium	ug/L	0.60J	40	41.2	102	70-130	
Selenium	ug/L	0.091J	40	38.0	95	70-130	
Thallium	ug/L	<0.099	40	37.1	93	70-130	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2560044 2560045

Parameter	Units	MS		MSD		MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	Max RPD	Qual
		60323886001 Result	Spike Conc.	Spike Conc.	MS Conc.							
Antimony	ug/L	ND	40	40	38.6	38.6	95	95	70-130	0	20	
Arsenic	ug/L	ND	40	40	41.4	41.6	102	102	70-130	0	20	
Cadmium	ug/L	ND	40	40	36.4	36.2	91	90	70-130	1	20	
Chromium	ug/L	2.4	40	40	42.6	42.5	100	100	70-130	0	20	
Selenium	ug/L	4.7	40	40	42.0	41.7	93	92	70-130	1	20	
Thallium	ug/L	ND	40	40	36.3	36.5	91	91	70-130	0	20	

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC ENERGY CENTER

Pace Project No.: 60323864

QC Batch: 628835 Analysis Method: SM 2320B

QC Batch Method: SM 2320B Analysis Description: 2320B Alkalinity

Associated Lab Samples: 60323864001, 60323864002

METHOD BLANK: 2562954 Matrix: Water

Associated Lab Samples: 60323864001, 60323864002

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Alkalinity, Total as CaCO ₃	mg/L	<8.4	20.0	8.4	12/17/19 16:38	

LABORATORY CONTROL SAMPLE: 2562955

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity, Total as CaCO ₃	mg/L	500	472	94	90-110	

SAMPLE DUPLICATE: 2562956

Parameter	Units	60323570001 Result	Dup Result	RPD	Max RPD	Qualifiers
Alkalinity, Total as CaCO ₃	mg/L	602	603	0	10	

SAMPLE DUPLICATE: 2562957

Parameter	Units	60323800002 Result	Dup Result	RPD	Max RPD	Qualifiers
Alkalinity, Total as CaCO ₃	mg/L	1480	1580	6	10	

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC ENERGY CENTER

Pace Project No.: 60323864

QC Batch: 628400

Analysis Method: SM 2540C

QC Batch Method: SM 2540C

Analysis Description: 2540C Total Dissolved Solids

Associated Lab Samples: 60323864001, 60323864002

METHOD BLANK: 2561610

Matrix: Water

Associated Lab Samples: 60323864001, 60323864002

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	<5.0	5.0	5.0	12/16/19 07:33	

LABORATORY CONTROL SAMPLE: 2561611

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Dissolved Solids	mg/L	1000	985	98	80-120	

SAMPLE DUPLICATE: 2561612

Parameter	Units	60324058001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	141000	139000	2	10	

SAMPLE DUPLICATE: 2561613

Parameter	Units	60324174001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	318	324	2	10	

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC ENERGY CENTER

Pace Project No.: 60323864

QC Batch: 628838 Analysis Method: EPA 300.0

QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions

Associated Lab Samples: 60323864001, 60323864002

METHOD BLANK: 2562965 Matrix: Water

Associated Lab Samples: 60323864001, 60323864002

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Chloride	mg/L	<0.22	1.0	0.22	12/17/19 09:27	
Fluoride	mg/L	<0.085	0.20	0.085	12/17/19 09:27	
Sulfate	mg/L	<0.23	1.0	0.23	12/17/19 09:27	

METHOD BLANK: 2563581 Matrix: Water

Associated Lab Samples: 60323864001, 60323864002

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Chloride	mg/L	<0.22	1.0	0.22	12/18/19 16:55	
Fluoride	mg/L	<0.085	0.20	0.085	12/18/19 16:55	
Sulfate	mg/L	<0.23	1.0	0.23	12/18/19 16:55	

LABORATORY CONTROL SAMPLE: 2562966

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	5	4.7	95	90-110	
Fluoride	mg/L	2.5	2.6	104	90-110	
Sulfate	mg/L	5	4.8	97	90-110	

LABORATORY CONTROL SAMPLE: 2563582

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	2.4	95	90-110	
Sulfate	mg/L	5	5.0	99	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2562967 2562968

Parameter	Units	MS		MSD		MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual	
		60324384001 Result	Spike Conc.	Spike Conc.	MS Result							MSD Result
Chloride	mg/L	190	50	50	251	244	122	108	80-120	3	15	E,M1
Fluoride	mg/L	ND	25	25	26.9	26.6	108	106	80-120	1	15	
Sulfate	mg/L	387	250	250	649	647	105	104	80-120	0	15	

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC ENERGY CENTER

Pace Project No.: 60323864

MATRIX SPIKE SAMPLE:		2562969					
Parameter	Units	60324321004 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	13600	5000	19300	114	80-120	
Fluoride	mg/L	ND	2500	2680	107	80-120	
Sulfate	mg/L	ND	5000	5170	103	80-120	

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ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: AMEREN MERAMEC ENERGY CENTER

Pace Project No.: 60323864

Sample: M-MW-9 **Lab ID: 60323864001** Collected: 12/10/19 12:15 Received: 12/11/19 03:00 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	0.317 ± 0.361 (0.570) C:NA T:91%	pCi/L	01/02/20 12:25	13982-63-3	
Radium-228	EPA 904.0	0.404 ± 0.381 (0.782) C:68% T:90%	pCi/L	12/31/19 12:15	15262-20-1	

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ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: AMEREN MERAMEC ENERGY CENTER

Pace Project No.: 60323864

Sample: M-TP-1 **Lab ID: 60323864002** Collected: 12/10/19 13:55 Received: 12/11/19 03:00 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	0.135 ± 0.384 (0.713) C:NA T:101%	pCi/L	01/02/20 12:25	13982-63-3	
Radium-228	EPA 904.0	0.719 ± 0.386 (0.687) C:68% T:96%	pCi/L	12/31/19 12:15	15262-20-1	

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QUALITY CONTROL - RADIOCHEMISTRY

Project: AMEREN MERAMEC ENERGY CENTER

Pace Project No.: 60323864

QC Batch:	376355	Analysis Method:	EPA 903.1
QC Batch Method:	EPA 903.1	Analysis Description:	903.1 Radium-226
Associated Lab Samples:	60323864001, 60323864002		

METHOD BLANK:	1825595	Matrix:	Water
Associated Lab Samples:	60323864001, 60323864002		

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-226	-0.0798 ± 0.182 (0.430) C:NA T:88%	pCi/L	01/02/20 11:46	

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QUALITY CONTROL - RADIOCHEMISTRY

Project: AMEREN MERAMEC ENERGY CENTER

Pace Project No.: 60323864

QC Batch: 376354

Analysis Method: EPA 904.0

QC Batch Method: EPA 904.0

Analysis Description: 904.0 Radium 228

Associated Lab Samples: 60323864001, 60323864002

METHOD BLANK: 1825593

Matrix: Water

Associated Lab Samples: 60323864001, 60323864002

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-228	0.748 ± 0.359 (0.613) C:75% T:98%	pCi/L	12/31/19 12:15	

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QUALIFIERS

Project: AMEREN MERAMEC ENERGY CENTER

Pace Project No.: 60323864

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.

Act - Activity

Unc - Uncertainty: SDWA = 1.96 sigma count uncertainty, all other matrices = Expanded Uncertainty (95% confidence interval).

Gamma Spec = Expanded Uncertainty (95.4% Confidence Interval)

(MDC) - Minimum Detectable Concentration

Trac - Tracer Recovery (%)

Carr - Carrier Recovery (%)

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

PASI-PA Pace Analytical Services - Greensburg

ANALYTE QUALIFIERS

B Analyte was detected in the associated method blank.

E Analyte concentration exceeded the calibration range. The reported result is estimated.

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

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: AMEREN MERAMEC ENERGY CENTER

Pace Project No.: 60323864

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
60323864001	M-MW-9	EPA 200.7	628789	EPA 200.7	628865
60323864002	M-TP-1	EPA 200.7	628789	EPA 200.7	628865
60323864001	M-MW-9	EPA 200.8	628102	EPA 200.8	628208
60323864002	M-TP-1	EPA 200.8	628102	EPA 200.8	628208
60323864001	M-MW-9	EPA 245.1	628095	EPA 245.1	628185
60323864002	M-TP-1	EPA 245.1	628095	EPA 245.1	628185
60323864001	M-MW-9	EPA 903.1	376355		
60323864002	M-TP-1	EPA 903.1	376355		
60323864001	M-MW-9	EPA 904.0	376354		
60323864002	M-TP-1	EPA 904.0	376354		
60323864001	M-MW-9	SM 2320B	628835		
60323864002	M-TP-1	SM 2320B	628835		
60323864001	M-MW-9	SM 2540C	628400		
60323864002	M-TP-1	SM 2540C	628400		
60323864001	M-MW-9	EPA 300.0	628838		
60323864002	M-TP-1	EPA 300.0	628838		

REPORT OF LABORATORY ANALYSIS

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Sample Condition Upon Receipt

WO#: 60323864
60323864

Client Name: Golded

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: 2-299 Type of Ice: Wet Blue None

Cooler Temperature (°C): As-read 3.0 Corr. Factor 0.2 Corrected 3.2

Date and initials of person examining contents: 12/11/19

Temperature should be above freezing to 6°C

Chain of Custody present:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Chain of Custody relinquished:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Samples arrived within holding time:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Short Hold Time analyses (<72hr):	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	
Rush Turn Around Time requested:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	
Sufficient volume:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Correct containers used:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Pace containers used:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Containers intact:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Unpreserved 5035A / TX1005/1006 soils frozen in 48hrs?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Filtered volume received for dissolved tests?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Sample labels match COC: Date / time / ID / analyses	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Samples contain multiple phases? Matrix: <u>WT</u>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	
Containers requiring pH preservation in compliance? (HNO ₃ , H ₂ SO ₄ , HCl<2; NaOH>9 Sulfide, NaOH>10 Cyanide) (Exceptions: VOA, Micro, O&G, KS TPH, OK-DRO)	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> 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)	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Potassium iodide test strip turns blue/purple? (Preserve)	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Trip Blank present:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Headspace in VOA vials (>6mm):	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Samples from USDA Regulated Area: State:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Additional labels attached to 5035A / TX1005 vials in the field?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> 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: Jamie Church _____ Date: 12/11/19

Project Manager Review: _____ Date: _____



MEMORANDUM

DATE January 6, 2020

Project No. 153140601

TO Project File
Golder Associates

CC Amanda Derhake, Jeff Ingram

FROM Tommy Goodwin

EMAIL Tommy_Goodwin@golder.com

DATA VALIDATION SUMMARY, MERAMEC ENERGY CENTER – DATA PACKAGE 60323864

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

- When a compound was detected in a sample result between the MDL and the PQL the results were recorded at the detection value and qualified as estimates (J).
- When a compound was detected in a blank (i.e. method, field) and the blank comparison criterion was not met, associated sample results were qualified as estimates (J) or non-detects (U).

QA LEVEL II - INORGANIC DATA EVALUATION CHECKLIST

Company Name: Golder Associates
 Project Name: Ameren - Meramec - MEC
 Reviewer: T Goodwin

Project Manager: J Ingram
 Project Number: 153140601
 Validation Date: 1/6/2020

Laboratory: Pace Analytical - KS

SDG #: 60323864

Analytical Method (type and no.): EPA 200.7/200.8 (Metals); EPA 903.1/904.0 (Rads); EPA 245.1 (Hg); SM 2320B (Alk); SM 2540C (TDS); EPA 300.0 (Anions)

Matrix: Air Soil/Sed. Water Waste _____

Sample Names M-MW-9, M-TP-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?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>12/10/2019</u>
b) Sampling team indicated?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
c) Sample location noted?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
d) Sample depth indicated (Soils)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	_____
e) Sample type indicated (<u>grab</u> /composite)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
f) Field QC noted?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
g) Field parameters collected (note types)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>pH, Sp.Cond, ORP, Temp, DO, Turb</u>
h) Field Calibration within control limits?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
i) Notations of unacceptable field conditions/performances from field logs or field notes?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	_____
j) Does the laboratory narrative indicate deficiencies?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	_____
Note Deficiencies: _____				

Chain-of-Custody (COC)	YES	NO	NA	COMMENTS
a) Was the COC properly completed?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
b) Was the COC signed by both field and laboratory personnel?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
c) Were samples received in good condition?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____

General (reference QAPP or Method)	YES	NO	NA	COMMENTS
a) Were hold times met for sample pretreatment?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
b) Were hold times met for sample analysis?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
c) Were the correct preservatives used?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
d) Was the correct method used?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
e) Were appropriate reporting limits achieved?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
f) Were any sample dilutions noted?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>See Notes</u>
g) Were any matrix problems noted?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	_____

QA LEVEL II - INORGANIC DATA EVALUATION CHECKLIST

Blanks	YES	NO	NA	COMMENTS
a) Were analytes detected in the method blank(s)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	See Notes
b) Were analytes detected in the field blank(s)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
c) Were analytes detected in the equipment blank(s)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
d) Were analytes detected in the trip blank(s)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

Laboratory Control Sample (LCS)	YES	NO	NA	COMMENTS
a) Was a LCS analyzed once per SDG?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
b) Were the proper analytes included in the LCS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
c) Was the LCS accuracy criteria met?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Duplicates	YES	NO	NA	COMMENTS
a) Were field duplicates collected (note original and duplicate sample names)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
b) Were field dup. precision criteria met (note RPD)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
c) Were lab duplicates analyzed (note original and duplicate samples)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
d) Were lab dup. precision criteria met (note RPD)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

Blind Standards	YES	NO	NA	COMMENTS
a) Was a blind standard used (indicate name, analytes included and concentrations)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
b) Was the %D within control limits?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

Matrix Spike/Matrix Spike Duplicate (MS/MSD)	YES	NO	NA	COMMENTS
a) Was MS accuracy criteria met?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Recovery could not be calculated since sample contained high concentration of analyte?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
b) Was MSD accuracy criteria met?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Recovery could not be calculated since sample contained high concentration of analyte?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
c) Were MS/MSD precision criteria met?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

Comments/Notes:

MB: 01-02: Be (0.49), Ca (36.1), Na (126), Ra-228 (0.748)

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

January 13, 2020

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

RE: Project: AMEREN MERAMEC ENERGY CENTER
Pace Project No.: 60324976

Dear Jeffrey Ingram:

Enclosed are the analytical results for sample(s) received by the laboratory on December 21, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

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

Sincerely,



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

Enclosures

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



REPORT OF LABORATORY ANALYSIS

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CERTIFICATIONS

Project: AMEREN MERAMEC ENERGY CENTER

Pace Project No.: 60324976

Pace Analytical Services Pennsylvania

1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601

ANAB DOD-ELAP Rad Accreditation #: L2417

Alabama Certification #: 41590

Arizona Certification #: AZ0734

Arkansas Certification

California Certification #: 04222CA

Colorado Certification #: PA01547

Connecticut Certification #: PH-0694

Delaware Certification

EPA Region 4 DW Rad

Florida/TNI Certification #: E87683

Georgia Certification #: C040

Guam Certification

Florida: Cert E871149 SEKS WET

Hawaii Certification

Idaho Certification

Illinois Certification

Indiana Certification

Iowa Certification #: 391

Kansas/TNI Certification #: E-10358

Kentucky Certification #: KY90133

KY WW Permit #: KY0098221

KY WW Permit #: KY0000221

Louisiana DHH/TNI Certification #: LA180012

Louisiana DEQ/TNI Certification #: 4086

Maine Certification #: 2017020

Maryland Certification #: 308

Massachusetts Certification #: M-PA1457

Michigan/PADEP Certification #: 9991

Missouri Certification #: 235

Montana Certification #: Cert0082

Nebraska Certification #: NE-OS-29-14

Nevada Certification #: PA014572018-1

New Hampshire/TNI Certification #: 297617

New Jersey/TNI Certification #: PA051

New Mexico Certification #: PA01457

New York/TNI Certification #: 10888

North Carolina Certification #: 42706

North Dakota Certification #: R-190

Ohio EPA Rad Approval: #41249

Oregon/TNI Certification #: PA200002-010

Pennsylvania/TNI Certification #: 65-00282

Puerto Rico Certification #: PA01457

Rhode Island Certification #: 65-00282

South Dakota Certification

Tennessee Certification #: 02867

Texas/TNI Certification #: T104704188-17-3

Utah/TNI Certification #: PA014572017-9

USDA Soil Permit #: P330-17-00091

Vermont Dept. of Health: ID# VT-0282

Virgin Island/PADEP Certification

Virginia/VELAP Certification #: 9526

Washington Certification #: C868

West Virginia DEP Certification #: 143

West Virginia DHHR Certification #: 9964C

Wisconsin Approve List for Rad

Wyoming Certification #: 8TMS-L

Pace Analytical Services Kansas

9608 Loiret Boulevard, Lenexa, KS 66219

Missouri Inorganic Drinking Water Certification #: 10090

Arkansas Drinking Water

Arkansas Certification #: 19-016-0

Arkansas Drinking Water

Illinois Certification #: 004455

Iowa Certification #: 118

Kansas/NELAP Certification #: E-10116

Louisiana Certification #: 03055

Nevada Certification #: KS000212020-2

Oklahoma Certification #: 9205/9935

Florida: Cert E871149 SEKS WET

Texas Certification #: T104704407-19-12

Utah Certification #: KS000212018-8

Illinois Certification #: 004592

Kansas Field Laboratory Accreditation: # E-92587

Missouri SEKS Micro Certification: 10070

REPORT OF LABORATORY ANALYSIS

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SAMPLE SUMMARY

Project: AMEREN MERAMEC ENERGY CENTER

Pace Project No.: 60324976

Lab ID	Sample ID	Matrix	Date Collected	Date Received
60324976001	M-MW-9	Water	12/20/19 09:50	12/21/19 03:25

REPORT OF LABORATORY ANALYSIS

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SAMPLE ANALYTE COUNT

Project: AMEREN MERAMEC ENERGY CENTER

Pace Project No.: 60324976

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
60324976001	M-MW-9	EPA 200.7	HKC	13	PASI-K
		EPA 200.8	JGP	6	PASI-K
		EPA 7470	JLH	1	PASI-K
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
		SM 2320B	AJS2	1	PASI-K
		SM 2540C	MAP	1	PASI-K
		EPA 300.0	CNB	3	PASI-K

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: AMEREN MERAMEC ENERGY CENTER

Pace Project No.: 60324976

Sample: M-MW-9 **Lab ID: 60324976001** Collected: 12/20/19 09:50 Received: 12/21/19 03:25 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.7 Metals, Total		Analytical Method: EPA 200.7 Preparation Method: EPA 200.7							
Barium	192	ug/L	5.0	1.4	1	12/23/19 15:15	12/24/19 11:46	7440-39-3	
Beryllium	<0.25	ug/L	1.0	0.25	1	12/23/19 15:15	12/24/19 11:46	7440-41-7	
Boron	3440	ug/L	100	10.7	1	12/23/19 15:15	12/24/19 11:46	7440-42-8	
Calcium	106000	ug/L	200	50.0	1	12/23/19 15:15	12/24/19 11:46	7440-70-2	
Cobalt	<0.84	ug/L	5.0	0.84	1	12/23/19 15:15	12/24/19 11:46	7440-48-4	
Iron	11000	ug/L	50.0	14.0	1	12/23/19 15:15	12/24/19 11:46	7439-89-6	
Lead	<3.4	ug/L	10.0	3.4	1	12/23/19 15:15	12/24/19 11:46	7439-92-1	
Lithium	16.1	ug/L	10.0	5.9	1	12/23/19 15:15	12/24/19 11:46	7439-93-2	
Magnesium	37300	ug/L	50.0	13.0	1	12/23/19 15:15	12/24/19 11:46	7439-95-4	
Manganese	277	ug/L	5.0	2.1	1	12/23/19 15:15	12/24/19 11:46	7439-96-5	
Molybdenum	34.2	ug/L	20.0	2.6	1	12/23/19 15:15	12/24/19 11:46	7439-98-7	
Potassium	4270	ug/L	500	79.0	1	12/23/19 15:15	12/24/19 11:46	7440-09-7	
Sodium	37600	ug/L	500	144	1	12/23/19 15:15	12/24/19 11:46	7440-23-5	
200.8 MET ICPMS		Analytical Method: EPA 200.8 Preparation Method: EPA 200.8							
Antimony	<0.097	ug/L	1.0	0.097	1	12/26/19 12:42	12/30/19 16:38	7440-36-0	
Arsenic	18.6	ug/L	1.0	0.086	1	12/26/19 12:42	12/30/19 16:38	7440-38-2	
Cadmium	<0.056	ug/L	0.50	0.056	1	12/26/19 12:42	12/30/19 16:38	7440-43-9	
Chromium	<0.22	ug/L	1.0	0.22	1	12/26/19 12:42	12/30/19 16:38	7440-47-3	
Selenium	<0.18	ug/L	1.0	0.18	1	12/26/19 12:42	12/30/19 16:38	7782-49-2	
Thallium	<0.093	ug/L	1.0	0.093	1	12/26/19 12:42	12/30/19 16:38	7440-28-0	
7470 Mercury		Analytical Method: EPA 7470 Preparation Method: EPA 7470							
Mercury	<0.085	ug/L	0.20	0.085	1	12/30/19 10:23	12/31/19 10:51	7439-97-6	
2320B Alkalinity		Analytical Method: SM 2320B							
Alkalinity, Total as CaCO3	358	mg/L	20.0	8.4	1		12/27/19 10:57		
2540C Total Dissolved Solids		Analytical Method: SM 2540C							
Total Dissolved Solids	634	mg/L	10.0	10.0	1		12/23/19 14:15		
300.0 IC Anions 28 Days		Analytical Method: EPA 300.0							
Chloride	33.1	mg/L	10.0	2.2	10		12/26/19 23:16	16887-00-6	
Fluoride	0.21	mg/L	0.20	0.085	1		12/26/19 23:00	16984-48-8	
Sulfate	127	mg/L	10.0	2.3	10		12/26/19 23:16	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC ENERGY CENTER

Pace Project No.: 60324976

QC Batch: 630876	Analysis Method: EPA 7470
QC Batch Method: EPA 7470	Analysis Description: 7470 Mercury
Associated Lab Samples: 60324976001	

METHOD BLANK: 2570066 Matrix: Water
Associated Lab Samples: 60324976001

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Mercury	ug/L	<0.085	0.20	0.085	12/31/19 10:40	

LABORATORY CONTROL SAMPLE: 2570067

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury	ug/L	5	4.9	98	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2570068 2570069

Parameter	Units	60325171001		MS		MSD		MS		MSD		% Rec Limits	RPD	Max RPD	Qual
		Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec							
Mercury	ug/L	<0.085	5	5	5.0	5.0	100	100	75-125	0	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

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC ENERGY CENTER

Pace Project No.: 60324976

QC Batch: 630016 Analysis Method: EPA 200.7
 QC Batch Method: EPA 200.7 Analysis Description: 200.7 Metals, Total
 Associated Lab Samples: 60324976001

METHOD BLANK: 2567679 Matrix: Water

Associated Lab Samples: 60324976001

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Barium	ug/L	<1.8	5.0	1.8	12/24/19 11:19	
Beryllium	ug/L	<0.49	1.0	0.49	12/24/19 11:19	
Boron	ug/L	<11.7	100	11.7	12/24/19 11:19	
Calcium	ug/L	<32.4	200	32.4	12/24/19 11:19	
Cobalt	ug/L	<1.5	5.0	1.5	12/24/19 11:19	
Iron	ug/L	<26.8	50.0	26.8	12/24/19 11:19	
Lead	ug/L	<4.6	10.0	4.6	12/24/19 11:19	
Lithium	ug/L	<4.6	10.0	4.6	12/24/19 11:19	
Magnesium	ug/L	<19.7	50.0	19.7	12/24/19 11:19	
Manganese	ug/L	<0.97	5.0	0.97	12/24/19 11:19	
Molybdenum	ug/L	<1.7	20.0	1.7	12/24/19 11:19	
Potassium	ug/L	<189	500	189	12/24/19 11:19	
Sodium	ug/L	<107	500	107	12/24/19 11:19	

LABORATORY CONTROL SAMPLE: 2567680

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Barium	ug/L	1000	883	88	85-115	
Beryllium	ug/L	1000	886	89	85-115	
Boron	ug/L	1000	875	88	85-115	
Calcium	ug/L	10000	8800	88	85-115	
Cobalt	ug/L	1000	891	89	85-115	
Iron	ug/L	10000	8830	88	85-115	
Lead	ug/L	1000	924	92	85-115	
Lithium	ug/L	1000	867	87	85-115	
Magnesium	ug/L	10000	8960	90	85-115	
Manganese	ug/L	1000	881	88	85-115	
Molybdenum	ug/L	1000	896	90	85-115	
Potassium	ug/L	10000	8690	87	85-115	
Sodium	ug/L	10000	8900	89	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2567681 2567682

Parameter	Units	MS		MSD		MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual	
		2627103003 Result	Spike Conc.	Spike Conc.	Result							Result
Barium	ug/L	ND	1000	1000	941	933	94	93	70-130	1	20	
Beryllium	ug/L	ND	1000	1000	942	934	94	93	70-130	1	20	
Boron	ug/L	ND	1000	1000	902	902	90	90	70-130	0	20	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC ENERGY CENTER

Pace Project No.: 60324976

Parameter	Units	2567681		2567682		MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
		2627103003 Result	MS Spike Conc.	MSD Spike Conc.									
Calcium	ug/L	ND	10000	10000	9330	9300	91	91	70-130	0	20		
Cobalt	ug/L	ND	1000	1000	940	934	94	93	70-130	1	20		
Iron	ug/L	ND	10000	10000	9210	9120	92	91	70-130	1	20		
Lead	ug/L	ND	1000	1000	975	971	97	97	70-130	0	20		
Lithium	ug/L	ND	1000	1000	914	908	91	91	70-130	1	20		
Magnesium	ug/L	102	10000	10000	9530	9510	94	94	70-130	0	20		
Manganese	ug/L	ND	1000	1000	952	953	95	95	70-130	0	20		
Molybdenum	ug/L	ND	1000	1000	951	948	95	95	70-130	0	20		
Potassium	ug/L	ND	10000	10000	9270	9140	90	89	70-130	1	20		
Sodium	ug/L	1900	10000	10000	11100	11000	92	91	70-130	1	20		

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC ENERGY CENTER

Pace Project No.: 60324976

QC Batch: 630507 Analysis Method: EPA 200.8
 QC Batch Method: EPA 200.8 Analysis Description: 200.8 MET
 Associated Lab Samples: 60324976001

METHOD BLANK: 2569008 Matrix: Water

Associated Lab Samples: 60324976001

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Antimony	ug/L	<0.097	1.0	0.097	12/30/19 16:08	
Arsenic	ug/L	<0.086	1.0	0.086	12/30/19 16:08	
Cadmium	ug/L	<0.056	0.50	0.056	12/30/19 16:08	
Chromium	ug/L	<0.22	1.0	0.22	12/30/19 16:08	
Selenium	ug/L	<0.18	1.0	0.18	12/30/19 16:08	
Thallium	ug/L	<0.093	1.0	0.093	12/30/19 16:08	

LABORATORY CONTROL SAMPLE: 2569009

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Antimony	ug/L	40	38.7	97	85-115	
Arsenic	ug/L	40	40.9	102	85-115	
Cadmium	ug/L	40	40.1	100	85-115	
Chromium	ug/L	40	41.1	103	85-115	
Selenium	ug/L	40	41.0	102	85-115	
Thallium	ug/L	40	38.0	95	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2569010 2569011

Parameter	Units	MS		MSD		MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
		60325167001 Result	Spike Conc.	Spike Conc.	Conc.								
Antimony	ug/L	<0.097	40	40	40	36.0	39.5	90	99	70-130	9	20	
Arsenic	ug/L	0.50J	40	40	40	41.6	45.5	103	113	70-130	9	20	
Cadmium	ug/L	0.37J	40	40	40	36.5	40.0	90	99	70-130	9	20	
Chromium	ug/L	0.75J	40	40	40	51.5	57.3	127	141	70-130	11	20 M1	
Selenium	ug/L	<0.18	40	40	40	41.0	45.2	102	113	70-130	10	20	
Thallium	ug/L	3.5	40	40	40	43.3	48.7	100	113	70-130	12	20	

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC ENERGY CENTER

Pace Project No.: 60324976

QC Batch:	630622	Analysis Method:	SM 2320B
QC Batch Method:	SM 2320B	Analysis Description:	2320B Alkalinity
Associated Lab Samples:	60324976001		

METHOD BLANK: 2569347 Matrix: Water

Associated Lab Samples: 60324976001

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Alkalinity, Total as CaCO ₃	mg/L	<8.4	20.0	8.4	12/27/19 10:17	

LABORATORY CONTROL SAMPLE: 2569348

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity, Total as CaCO ₃	mg/L	500	470	94	90-110	

SAMPLE DUPLICATE: 2569349

Parameter	Units	60325105001 Result	Dup Result	RPD	Max RPD	Qualifiers
Alkalinity, Total as CaCO ₃	mg/L	267	270	1	10	

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC ENERGY CENTER

Pace Project No.: 60324976

QC Batch: 630031

Analysis Method: SM 2540C

QC Batch Method: SM 2540C

Analysis Description: 2540C Total Dissolved Solids

Associated Lab Samples: 60324976001

METHOD BLANK: 2567691

Matrix: Water

Associated Lab Samples: 60324976001

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	<5.0	5.0	5.0	12/23/19 14:13	

LABORATORY CONTROL SAMPLE: 2567692

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Dissolved Solids	mg/L	1000	1040	104	80-120	

SAMPLE DUPLICATE: 2567693

Parameter	Units	60324810002 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	430	426	1	10	

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC ENERGY CENTER

Project No.: 60324976

QC Batch: 630399

Analysis Method: EPA 300.0

QC Batch Method: EPA 300.0

Analysis Description: 300.0 IC Anions

Associated Lab Samples: 60324976001

METHOD BLANK: 2568812

Matrix: Water

Associated Lab Samples: 60324976001

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Chloride	mg/L	<0.22	1.0	0.22	12/26/19 14:48	
Fluoride	mg/L	<0.085	0.20	0.085	12/26/19 14:48	
Sulfate	mg/L	<0.23	1.0	0.23	12/26/19 14:48	

METHOD BLANK: 2569447

Matrix: Water

Associated Lab Samples: 60324976001

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Chloride	mg/L	<0.22	1.0	0.22	12/27/19 15:13	
Fluoride	mg/L	<0.085	0.20	0.085	12/27/19 15:13	
Sulfate	mg/L	<0.23	1.0	0.23	12/27/19 15:13	

METHOD BLANK: 2570116

Matrix: Water

Associated Lab Samples: 60324976001

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Chloride	mg/L	<0.22	1.0	0.22	12/31/19 14:59	
Fluoride	mg/L	<0.085	0.20	0.085	12/31/19 14:59	
Sulfate	mg/L	<0.23	1.0	0.23	12/31/19 14:59	

LABORATORY CONTROL SAMPLE: 2568813

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	5	4.9	97	90-110	
Fluoride	mg/L	2.5	2.6	104	90-110	
Sulfate	mg/L	5	5.1	101	90-110	

LABORATORY CONTROL SAMPLE: 2569448

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	5	4.8	96	90-110	
Fluoride	mg/L	2.5	2.4	96	90-110	
Sulfate	mg/L	5	5.0	99	90-110	

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QUALITY CONTROL DATA

Project: AMEREN MERAMEC ENERGY CENTER

Pace Project No.: 60324976

LABORATORY CONTROL SAMPLE: 2570117

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	5	4.7	95	90-110	
Fluoride	mg/L	2.5	2.3	92	90-110	
Sulfate	mg/L	5	4.5	90	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2568814 2568815

Parameter	Units	60325171001		MSD		MS		MSD		% Rec Limits	RPD	Max RPD	Qual
		Result	Spike Conc.	Spike Conc.	Result	Result	% Rec	% Rec					
Chloride	mg/L	124	50	50	179	183	110	119	80-120	2	15		
Fluoride	mg/L	<0.85	25	25	29.9	29.6	116	115	80-120	1	15		
Sulfate	mg/L	154	50	50	209	213	110	118	80-120	2	15	E	

MATRIX SPIKE SAMPLE: 2568816

Parameter	Units	60325161001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	124	250	385	104	80-120	
Fluoride	mg/L	ND	125	139	112	80-120	
Sulfate	mg/L	104	250	382	111	80-120	

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ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: AMEREN MERAMEC ENERGY CENTER

Pace Project No.: 60324976

Sample: M-MW-9 **Lab ID: 60324976001** Collected: 12/20/19 09:50 Received: 12/21/19 03:25 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	0.322 ± 0.632 (1.14) C:NA T:76%	pCi/L	01/09/20 12:35	13982-63-3	
Radium-228	EPA 904.0	0.263 ± 0.274 (0.564) C:82% T:85%	pCi/L	01/10/20 10:52	15262-20-1	

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL - RADIOCHEMISTRY

Project: AMEREN MERAMEC ENERGY CENTER

Pace Project No.: 60324976

QC Batch: 377186

Analysis Method: EPA 903.1

QC Batch Method: EPA 903.1

Analysis Description: 903.1 Radium-226

Associated Lab Samples: 60324976001

METHOD BLANK: 1829503

Matrix: Water

Associated Lab Samples: 60324976001

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-226	0.121 ± 0.335 (0.651) C:NA T:75%	pCi/L	01/09/20 12:35	

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QUALITY CONTROL - RADIOCHEMISTRY

Project: AMEREN MERAMEC ENERGY CENTER

Pace Project No.: 60324976

QC Batch:	377187	Analysis Method:	EPA 904.0
QC Batch Method:	EPA 904.0	Analysis Description:	904.0 Radium 228
Associated Lab Samples:	60324976001		

METHOD BLANK:	1829504	Matrix:	Water
Associated Lab Samples:	60324976001		

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-228	0.474 ± 0.327 (0.619) C:85% T:71%	pCi/L	01/10/20 10:51	

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QUALIFIERS

Project: AMEREN MERAMEC ENERGY CENTER

Pace Project No.: 60324976

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.

Act - Activity

Unc - Uncertainty: SDWA = 1.96 sigma count uncertainty, all other matrices = Expanded Uncertainty (95% confidence interval).

Gamma Spec = Expanded Uncertainty (95.4% Confidence Interval)

(MDC) - Minimum Detectable Concentration

Trac - Tracer Recovery (%)

Carr - Carrier Recovery (%)

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

PASI-PA Pace Analytical Services - Greensburg

ANALYTE QUALIFIERS

E Analyte concentration exceeded the calibration range. The reported result is estimated.

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

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: AMEREN MERAMEC ENERGY CENTER

Pace Project No.: 60324976

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
60324976001	M-MW-9	EPA 200.7	630016	EPA 200.7	630089
60324976001	M-MW-9	EPA 200.8	630507	EPA 200.8	630549
60324976001	M-MW-9	EPA 7470	630876	EPA 7470	630900
60324976001	M-MW-9	EPA 903.1	377186		
60324976001	M-MW-9	EPA 904.0	377187		
60324976001	M-MW-9	SM 2320B	630622		
60324976001	M-MW-9	SM 2540C	630031		
60324976001	M-MW-9	EPA 300.0	630399		

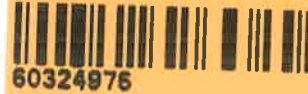
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Sample Condition Upon Receipt

WO#: 60324976



Client Name: Golder Associates

Courier: FedEx [] UPS [] VIA [] Clay [] PEX [] ECI [] Pace [] Xroads [x] Client [] Other []

Tracking #: _____ Pace Shipping Label Used? Yes [] No [x]

Custody Seal on Cooler/Box Present: Yes [x] No [] Seals intact: Yes [x] No []

Packing Material: Bubble Wrap [] Bubble Bags [] Foam [] None [x] Other []

Thermometer Used: 1298 Type of Ice: Wet [x] Blue [] None []

Cooler Temperature (°C): As-read 0.1 Corr. Factor 10.1 Corrected 0.1

Date and initials of person examining contents: VB 12/21/19

Temperature should be above freezing to 6°C

Table with 2 columns: Question/Requirement and Yes/No/N/A checkboxes. Rows include Chain of Custody, Short Hold Time, Rush Turn Around Time, Sufficient volume, Containers intact, etc.

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

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: [Signature] Date: 12/23/19

Project Manager Review: _____ Date: _____



MEMORANDUM

DATE January 13, 2020

Project No. 153140601

TO Project File
Golder Associates

CC Amanda Derhake, Jeff Ingram

FROM Tommy Goodwin

EMAIL Tommy_Goodwin@golder.com

DATA VALIDATION SUMMARY, MERAMEC ENERGY CENTER – DATA PACKAGE 60324976

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

- None.

QA LEVEL II - INORGANIC DATA EVALUATION CHECKLIST

Company Name: Golder Associates
 Project Name: Ameren - Meramec - MEC
 Reviewer: T Goodwin

Project Manager: J Ingram
 Project Number: 153140601
 Validation Date: 1/13/2020

Laboratory: Pace Analytical - KS

SDG #: 60324976

Analytical Method (type and no.): EPA 200.7/200.8 (Metals); EPA 903.1/904.0 (Rads); EPA 7470 (Hg); SM 2320B (Alk); SM 2540C (TDS); EPA 300.0 (Anions)

Matrix: Air Soil/Sed. Water Waste

Sample Names M-MW-9

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?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>12/20/2019</u>
b) Sampling team indicated?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
c) Sample location noted?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
d) Sample depth indicated (Soils)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	_____
e) Sample type indicated (<u>grab</u> composite)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
f) Field QC noted?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
g) Field parameters collected (note types)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>pH, Sp.Cond, ORP, Temp, DO, Turb</u>
h) Field Calibration within control limits?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
i) Notations of unacceptable field conditions/performances from field logs or field notes?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	_____
j) Does the laboratory narrative indicate deficiencies?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	_____
Note Deficiencies: _____				

Chain-of-Custody (COC)	YES	NO	NA	COMMENTS
a) Was the COC properly completed?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
b) Was the COC signed by both field and laboratory personnel?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
c) Were samples received in good condition?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____

General (reference QAPP or Method)	YES	NO	NA	COMMENTS
a) Were hold times met for sample pretreatment?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
b) Were hold times met for sample analysis?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
c) Were the correct preservatives used?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
d) Was the correct method used?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
e) Were appropriate reporting limits achieved?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
f) Were any sample dilutions noted?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>See Notes</u>
g) Were any matrix problems noted?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	_____

QA LEVEL II - INORGANIC DATA EVALUATION CHECKLIST

Blanks	YES	NO	NA	COMMENTS
a) Were analytes detected in the method blank(s)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	_____
b) Were analytes detected in the field blank(s)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	_____
c) Were analytes detected in the equipment blank(s)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	_____
d) Were analytes detected in the trip blank(s)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	_____

Laboratory Control Sample (LCS)	YES	NO	NA	COMMENTS
a) Was a LCS analyzed once per SDG?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
b) Were the proper analytes included in the LCS?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
c) Was the LCS accuracy criteria met?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____

Duplicates	YES	NO	NA	COMMENTS
a) Were field duplicates collected (note original and duplicate sample names)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	_____
b) Were field dup. precision criteria met (note RPD)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	_____
c) Were lab duplicates analyzed (note original and duplicate samples)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	_____
d) Were lab dup. precision criteria met (note RPD)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	_____

Blind Standards	YES	NO	NA	COMMENTS
a) Was a blind standard used (indicate name, analytes included and concentrations)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	_____
b) Was the %D within control limits?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	_____

Matrix Spike/Matrix Spike Duplicate (MS/MSD)	YES	NO	NA	COMMENTS
a) Was MS accuracy criteria met?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	_____
Recovery could not be calculated since sample contained high concentration of analyte?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	_____
b) Was MSD accuracy criteria met?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	_____
Recovery could not be calculated since sample contained high concentration of analyte?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	_____
c) Were MS/MSD precision criteria met?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	_____

Comments/Notes:

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

APPENDIX C

**November 2018 Assessment
Monitoring Statistical Evaluation**

TECHNICAL MEMORANDUM**DATE** February 28, 2019**Project No.** 153-1406**TO** Bill Kutosky
Ameren Missouri**CC** Susan Knowles, Craig Giesmann, Paul Pike, Charlie Henderson**FROM** Mark Haddock - Golder Associates**EMAIL** mhaddock@golder.com**ASSESSMENT MONITORING STATISTICAL EVALUATION FOR THE MULTI-UNIT SURFACE IMPOUNDMENT NETWORK, MERAMEC ENERGY CENTER, ST LOUIS COUNTY MISSOURI**

This Technical Memorandum provides the results of the Assessment Monitoring Statistical Evaluation for the Multi-unit Surface Impoundment Network November 2018 sampling event at the Meramec Energy Center located in St. Louis County Missouri. Included in this memorandum is a brief summary of constituents that are present at a Statistically Significant Level (SSL), a list of site-specific Groundwater Protection Standards (**Table 1**), and the Sanitas Technologies™ (Sanitas) statistical software output for each of the Appendix IV parameters (**Appendix A** and **Appendix B**).

SSLs were calculated using the methods and procedures outlined in the Groundwater Monitoring Plan's (GMP) Statistical Analysis Plan (SAP). In addition to the outliers that were noted in previous statistical analysis, the following outliers were removed prior to the calculation of confidence limits:

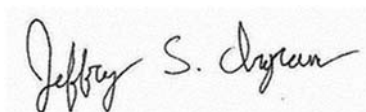
- Arsenic at MW-5 on 11/19/2018: result was statistically lower than other values at the same well

One new SSL was noted for lithium in MW-7 during the November 2018 sampling event. A summary of SSLs at corresponding wells is as follows:

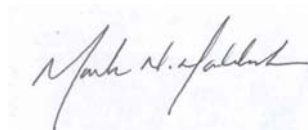
- Arsenic at MW-4 and MW-5
- Lithium at MW-6 and MW-7
- Molybdenum at MW-6, MW-7 and MW-8

Golder appreciates this opportunity to provide hydrogeological and engineering support services to Ameren. If you have any questions or comments regarding the information provided, please call our office at (314) 984-8800.

Sincerely,



Jeffrey Ingram, R.G.
Project Geologist



Mark Haddock, P.E., R.G.
Principal, Practice Leader

Enclosures:

Table 1 – MEC Groundwater Protection Standards

Appendix A – Sanitas Confidence Interval Statistical Output

Appendix B – Sanitas Trending Confidence Bands Statistical Output

**Meramec Groundwater Protection Standards
Meramec Surface Impoundments
Meramec Energy Center, St. Louis County, MO**

Parameter	Units	MCL or Health Based GWPS	Site GWPS	Value to Return to Detection Monitoring ⁷
Antimony	µg/L	6	6	DQR
Arsenic	µg/L	10	10	2.344
Barium	µg/L	2000	2000	566
Beryllium	µg/L	4	4	DQR
Cadmium	µg/L	5	5	DQR
Chromium	µg/L	100	100	1.8
Cobalt	µg/L	6	6	DQR
Fluoride	mg/l	4	4	0.5215
Lead	µg/L	15	15	DQR
Lithium	µg/L	40	40	16
Mercury	µg/L	2	2	DQR
Molybdenum	µg/L	100	100	DQR
Radium 226 + 228	pCi/L	5	5	1.888
Selenium	µg/L	50	50	DQR
Thallium	µg/L	2	2	DQR

Notes:

1. µg/L - micrograms per liter

2. mg/L - milligrams per liter

3. pCi/L - picocuries per liter

4. MCL - Maximum Contaminant Level. MCLs from United States Environmental Protection Agency (USEPA) 2012 Edition of the Drinking Water Standards and Health Advisories. Spring 2012.

<http://water.epa.gov/drink/contaminants/index.cfm>.5. Health Based Groundwater Protection Standards (GWPS) were adopted for Appendix IV parameters without an MCL (i.e. cobalt, lithium, molybdenum, and lead). Information available at <https://www.epa.gov/coalash/coal-ash-rule>.

6. Values were calculated using statistical methods outlined for Detection Monitoring and are used for returning to Detection Monitoring based on available data to date.

7. DQR - Double Quantification Rule. If all baseline data are less than the Practical Quantitation Limit (PQL), then the DQR will be used. More information on the DQR is provided in the Statistical Analysis Plan.

8. Site GWPS is either the MCL/Health Based GWPS or based on background levels (calculated as described in the Statistical Analysis Plan for Assessment Monitoring), whichever is higher.

9. GWPS and background values calculated using baseline sampling results from monitoring wells BMW-1 and BMW-2.

Prepared by: JSI 10/3/2018

Checked by: TJG 10/5/2018

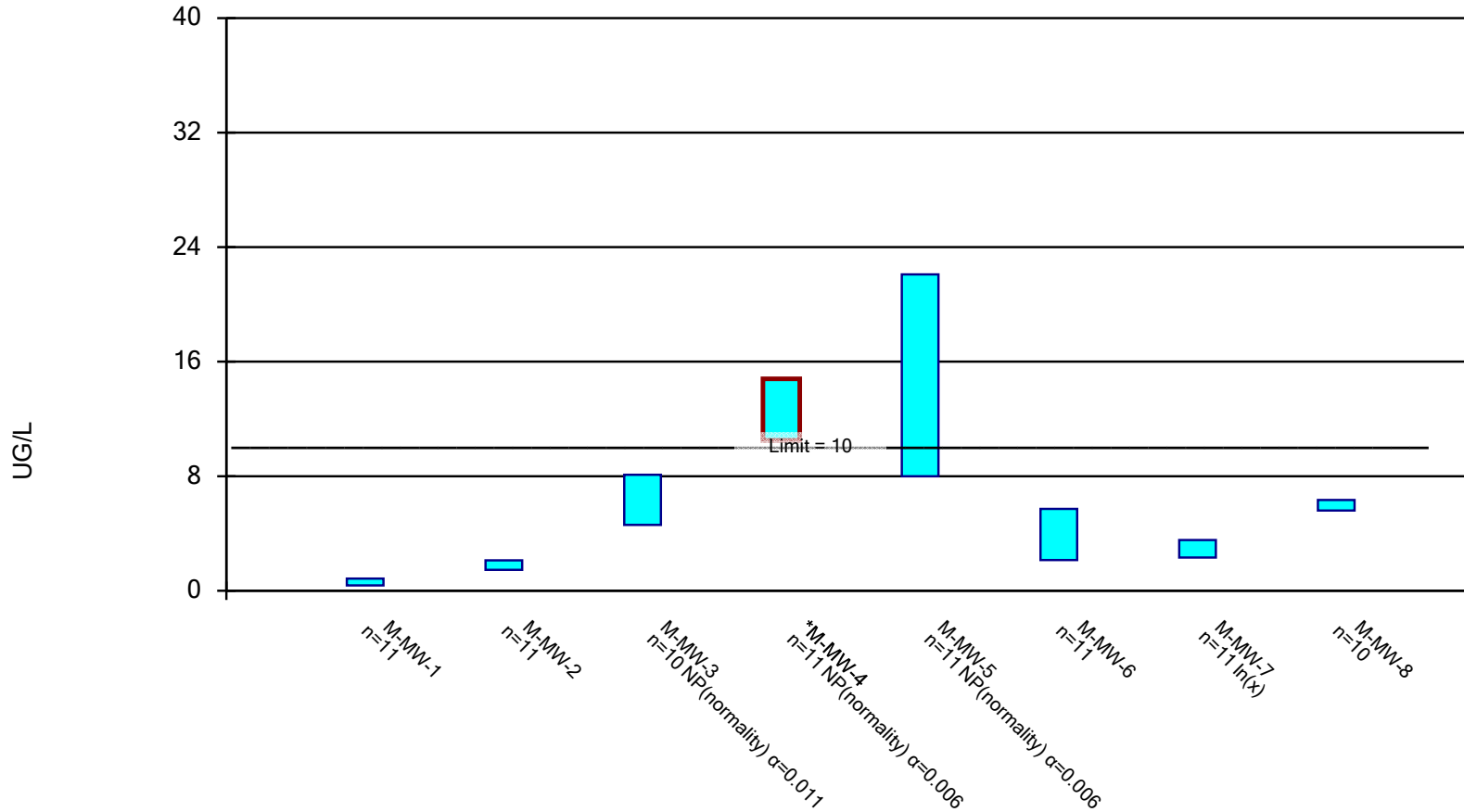
Reviewed by: MNH 10/11/2018

APPENDIX A

**Sanitas Confidence Interval
Statistical Output**

Parametric and Non-Parametric (NP) Confidence Interval

Compliance limit is exceeded.* Per-well alpha = 0.01 except as noted. Normality Test: Shapiro Wilk, alpha based on n.

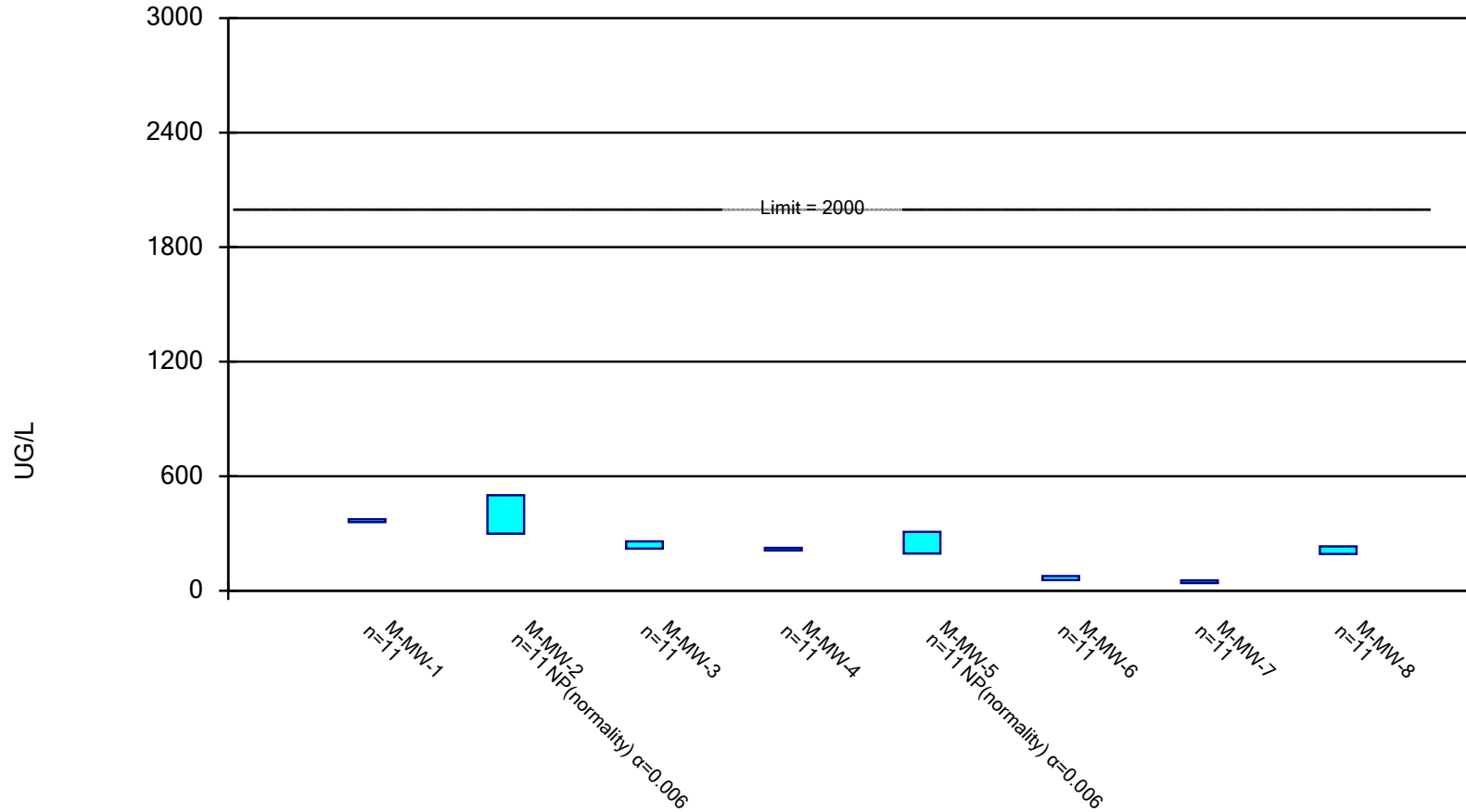


Constituent: ARSENIC, TOTAL Analysis Run 2/20/2019 10:39 AM

Meramec E.C. Client: Ameren Data: MEC Data

Parametric and Non-Parametric (NP) Confidence Interval

Compliance Limit is not exceeded. Per-well alpha = 0.01 except as noted. Normality Test: Shapiro Wilk, alpha based on n.

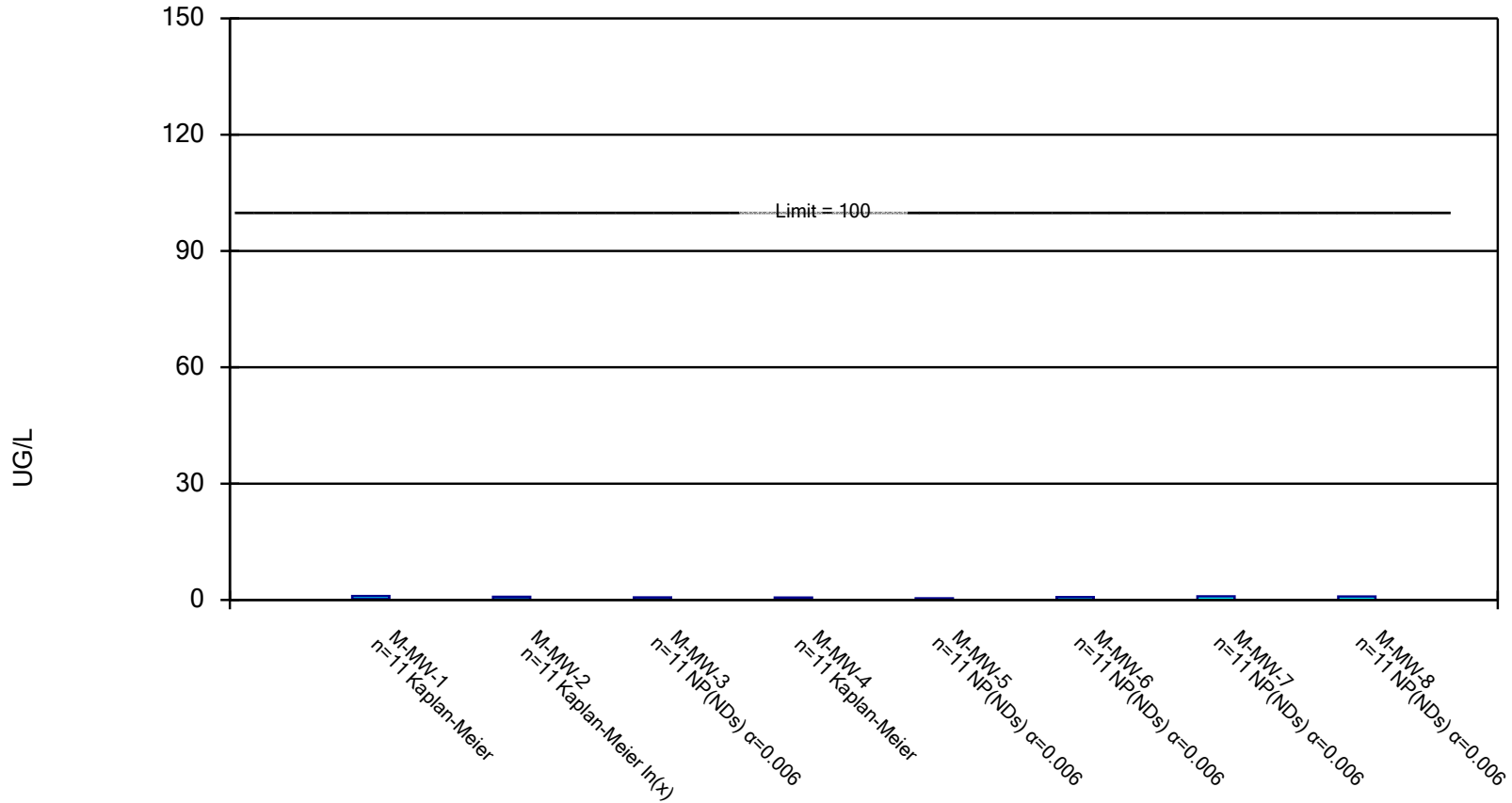


Constituent: BARIUM, TOTAL Analysis Run 2/20/2019 10:39 AM

Meramec E.C. Client: Ameren Data: MEC Data

Parametric and Non-Parametric (NP) Confidence Interval

Compliance Limit is not exceeded. Per-well alpha = 0.01 except as noted. Normality Test: Shapiro Wilk, alpha based on n.

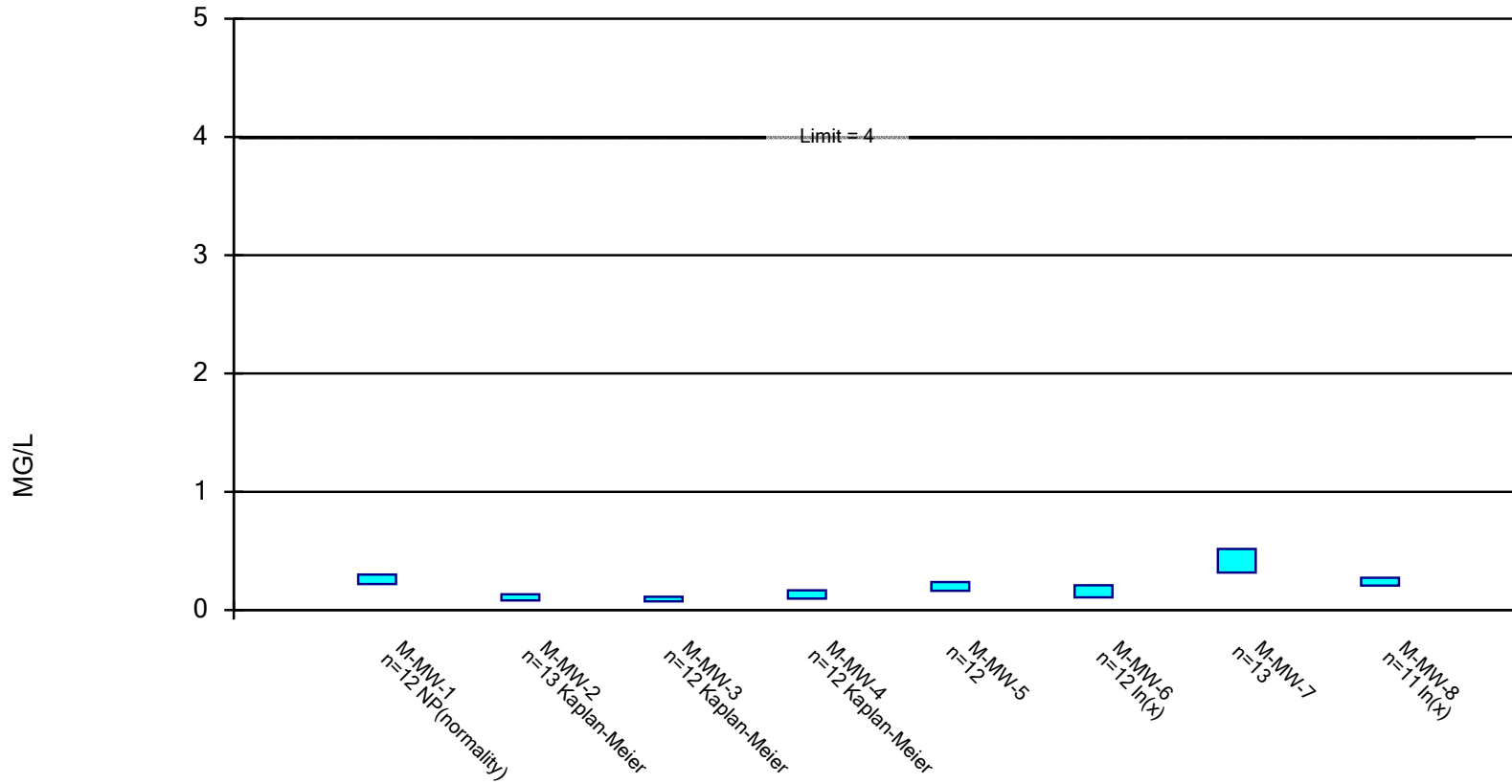


Constituent: CHROMIUM, TOTAL Analysis Run 2/20/2019 10:39 AM

Meramec E.C. Client: Ameren Data: MEC Data

Parametric and Non-Parametric (NP) Confidence Interval

Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.

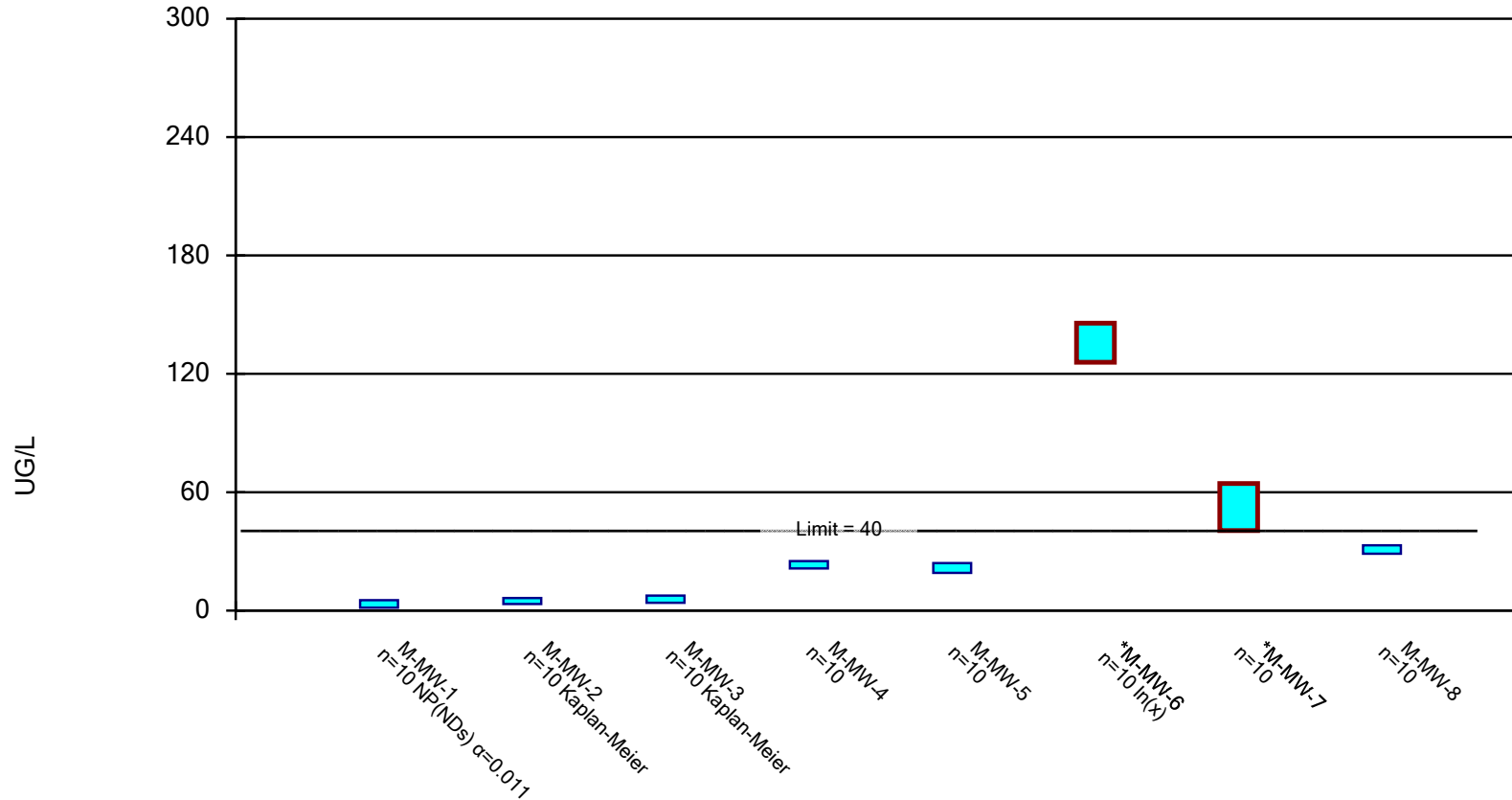


Constituent: FLUORIDE, TOTAL Analysis Run 2/20/2019 10:39 AM

Meramec E.C. Client: Ameren Data: MEC Data

Parametric and Non-Parametric (NP) Confidence Interval

Compliance limit is exceeded.* Per-well alpha = 0.01 except as noted. Normality Test: Shapiro Wilk, alpha based on n.

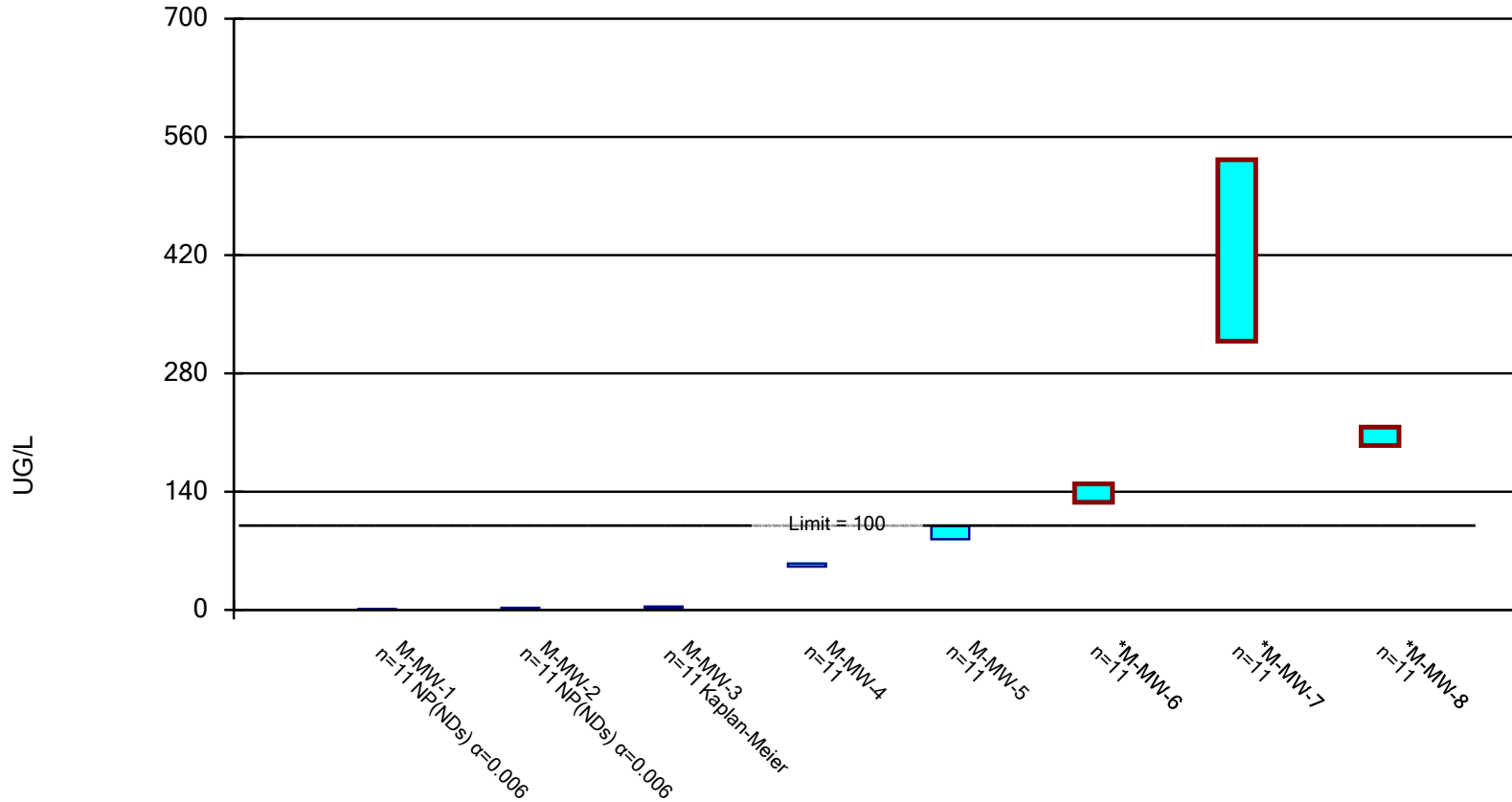


Constituent: LITHIUM, TOTAL Analysis Run 2/20/2019 10:39 AM

Meramec E.C. Client: Ameren Data: MEC Data

Parametric and Non-Parametric (NP) Confidence Interval

Compliance limit is exceeded.* Per-well alpha = 0.01 except as noted. Normality Test: Shapiro Wilk, alpha based on n.

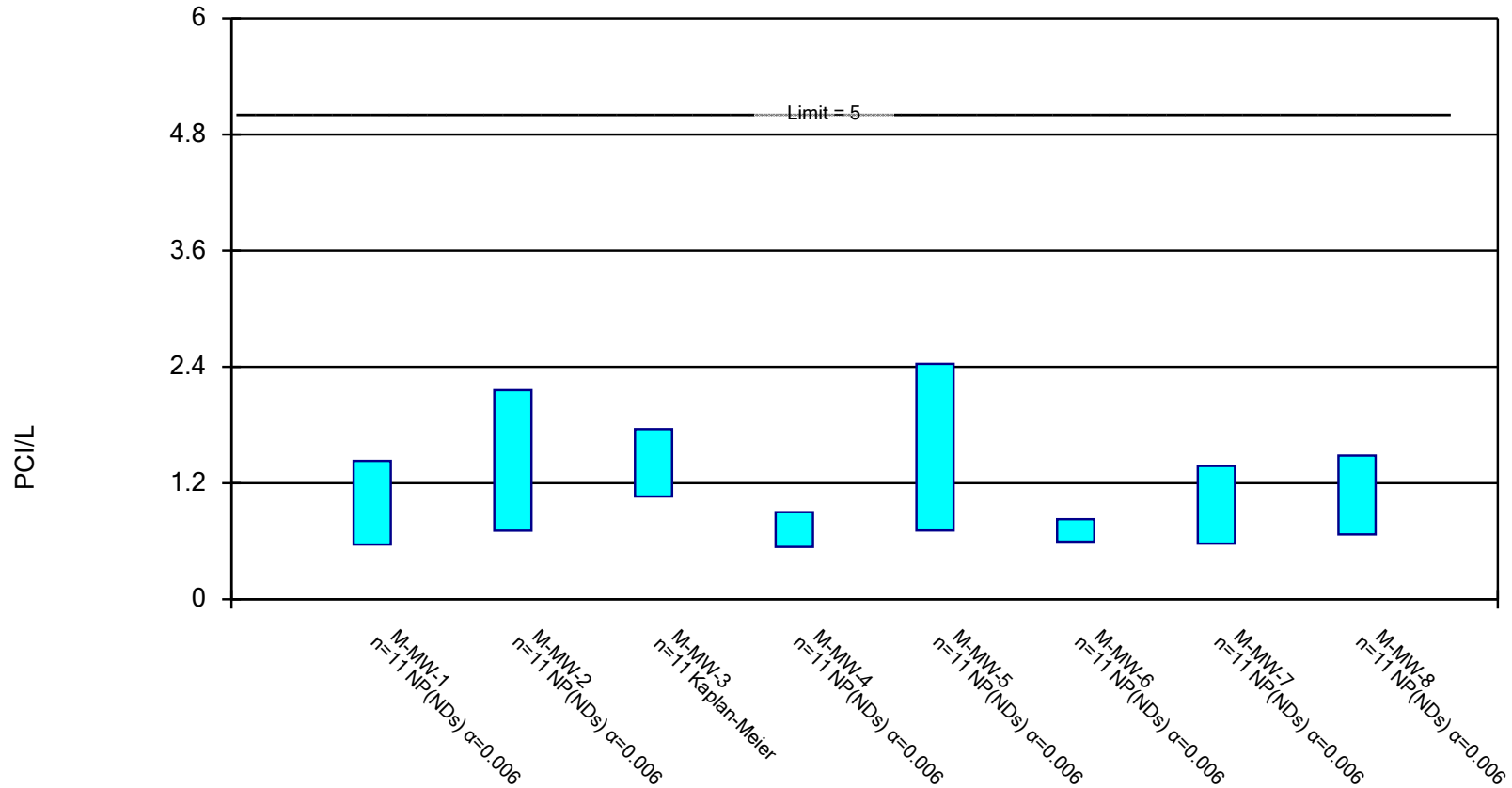


Constituent: MOLYBDENUM, TOTAL Analysis Run 2/20/2019 10:39 AM

Meramec E.C. Client: Ameren Data: MEC Data

Parametric and Non-Parametric (NP) Confidence Interval

Compliance Limit is not exceeded. Per-well alpha = 0.01 except as noted. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Radium [226 + 228] Analysis Run 2/20/2019 10:39 AM

Meramec E.C. Client: Ameren Data: MEC Data

Confidence Interval

Meramec E.C. Client: Ameren Data: MEC Data Printed 2/20/2019, 10:39 AM

<u>Constituent</u>	<u>Well</u>	<u>Upper Lim.</u>	<u>Lower Lim.</u>	<u>Compliance</u>	<u>Sig.</u>	<u>N</u>	<u>%NDs</u>	<u>Transform</u>	<u>Alpha</u>	<u>Method</u>
ARSENIC, TOTAL (UG/L)	M-MW-1	0.8512	0.3663	10	No	11	9.091	No	0.01	Param.
ARSENIC, TOTAL (UG/L)	M-MW-2	2.125	1.457	10	No	11	0	No	0.01	Param.
ARSENIC, TOTAL (UG/L)	M-MW-3	8.1	4.6	10	No	10	0	No	0.011	NP (normality)
ARSENIC, TOTAL (UG/L)	M-MW-4	14.8	10.5	10	Yes	11	0	No	0.006	NP (normality)
ARSENIC, TOTAL (UG/L)	M-MW-5	22.1	8	10	No	11	0	No	0.006	NP (normality)
ARSENIC, TOTAL (UG/L)	M-MW-6	5.721	2.143	10	No	11	9.091	No	0.01	Param.
ARSENIC, TOTAL (UG/L)	M-MW-7	3.542	2.314	10	No	11	0	ln(x)	0.01	Param.
ARSENIC, TOTAL (UG/L)	M-MW-8	6.339	5.601	10	No	10	0	No	0.01	Param.
BARIUM, TOTAL (UG/L)	M-MW-1	374.1	359.2	2000	No	11	0	No	0.01	Param.
BARIUM, TOTAL (UG/L)	M-MW-2	500	299	2000	No	11	0	No	0.006	NP (normality)
BARIUM, TOTAL (UG/L)	M-MW-3	258.6	220.1	2000	No	11	0	No	0.01	Param.
BARIUM, TOTAL (UG/L)	M-MW-4	224.4	211.1	2000	No	11	0	No	0.01	Param.
BARIUM, TOTAL (UG/L)	M-MW-5	308	195	2000	No	11	0	No	0.006	NP (normality)
BARIUM, TOTAL (UG/L)	M-MW-6	76.6	55.95	2000	No	11	0	No	0.01	Param.
BARIUM, TOTAL (UG/L)	M-MW-7	53.86	40.3	2000	No	11	0	No	0.01	Param.
BARIUM, TOTAL (UG/L)	M-MW-8	232.2	192.2	2000	No	11	0	No	0.01	Param.
CHROMIUM, TOTAL (UG/L)	M-MW-1	0.9947	0.2402	100	No	11	27.27	No	0.01	Param.
CHROMIUM, TOTAL (UG/L)	M-MW-2	0.8113	0.1301	100	No	11	36.36	ln(x)	0.01	Param.
CHROMIUM, TOTAL (UG/L)	M-MW-3	0.64	0.027	100	No	11	54.55	No	0.006	NP (NDs)
CHROMIUM, TOTAL (UG/L)	M-MW-4	0.6153	0.1218	100	No	11	45.45	No	0.01	Param.
CHROMIUM, TOTAL (UG/L)	M-MW-5	0.42	0.027	100	No	11	54.55	No	0.006	NP (NDs)
CHROMIUM, TOTAL (UG/L)	M-MW-6	0.71	0.027	100	No	11	54.55	No	0.006	NP (NDs)
CHROMIUM, TOTAL (UG/L)	M-MW-7	0.91	0.027	100	No	11	54.55	No	0.006	NP (NDs)
CHROMIUM, TOTAL (UG/L)	M-MW-8	0.88	0.027	100	No	11	72.73	No	0.006	NP (NDs)
FLUORIDE, TOTAL (MG/L)	M-MW-1	0.3	0.22	4	No	12	0	No	0.01	NP (normality)
FLUORIDE, TOTAL (MG/L)	M-MW-2	0.1337	0.08117	4	No	13	23.08	No	0.01	Param.
FLUORIDE, TOTAL (MG/L)	M-MW-3	0.1129	0.07364	4	No	12	33.33	No	0.01	Param.
FLUORIDE, TOTAL (MG/L)	M-MW-4	0.1671	0.09686	4	No	12	16.67	No	0.01	Param.
FLUORIDE, TOTAL (MG/L)	M-MW-5	0.2368	0.1632	4	No	12	0	No	0.01	Param.
FLUORIDE, TOTAL (MG/L)	M-MW-6	0.21	0.1072	4	No	12	8.333	ln(x)	0.01	Param.
FLUORIDE, TOTAL (MG/L)	M-MW-7	0.5169	0.317	4	No	13	0	No	0.01	Param.
FLUORIDE, TOTAL (MG/L)	M-MW-8	0.2735	0.2065	4	No	11	0	ln(x)	0.01	Param.
LITHIUM, TOTAL (UG/L)	M-MW-1	5.3	1.45	40	No	10	80	No	0.011	NP (NDs)
LITHIUM, TOTAL (UG/L)	M-MW-2	6.368	3.292	40	No	10	30	No	0.01	Param.
LITHIUM, TOTAL (UG/L)	M-MW-3	7.559	3.981	40	No	10	30	No	0.01	Param.
LITHIUM, TOTAL (UG/L)	M-MW-4	25.07	21.33	40	No	10	0	No	0.01	Param.
LITHIUM, TOTAL (UG/L)	M-MW-5	24.04	19.12	40	No	10	0	No	0.01	Param.
LITHIUM, TOTAL (UG/L)	M-MW-6	145.6	125.8	40	Yes	10	0	ln(x)	0.01	Param.
LITHIUM, TOTAL (UG/L)	M-MW-7	64.42	40.56	40	Yes	10	0	No	0.01	Param.
LITHIUM, TOTAL (UG/L)	M-MW-8	33.1	28.82	40	No	10	0	No	0.01	Param.
MOLYBDENUM, TOTAL (UG/L)	M-MW-1	0.84	0.26	100	No	11	90.91	No	0.006	NP (NDs)
MOLYBDENUM, TOTAL (UG/L)	M-MW-2	2.5	0.26	100	No	11	72.73	No	0.006	NP (NDs)
MOLYBDENUM, TOTAL (UG/L)	M-MW-3	4.028	1.537	100	No	11	27.27	No	0.01	Param.
MOLYBDENUM, TOTAL (UG/L)	M-MW-4	54.9	51.31	100	No	11	0	No	0.01	Param.
MOLYBDENUM, TOTAL (UG/L)	M-MW-5	99.32	83.7	100	No	11	0	No	0.01	Param.
MOLYBDENUM, TOTAL (UG/L)	M-MW-6	149.2	127.4	100	Yes	11	0	No	0.01	Param.
MOLYBDENUM, TOTAL (UG/L)	M-MW-7	533	318.1	100	Yes	11	0	No	0.01	Param.
MOLYBDENUM, TOTAL (UG/L)	M-MW-8	216.4	194.7	100	Yes	11	0	No	0.01	Param.
Radium [226 + 228] (PCI/L)	M-MW-1	1.43	0.565	5	No	11	81.82	No	0.006	NP (NDs)
Radium [226 + 228] (PCI/L)	M-MW-2	2.16	0.7075	5	No	11	63.64	No	0.006	NP (NDs)

Confidence Interval

Meramec E.C. Client: Ameren Data: MEC Data Printed 2/20/2019, 10:39 AM

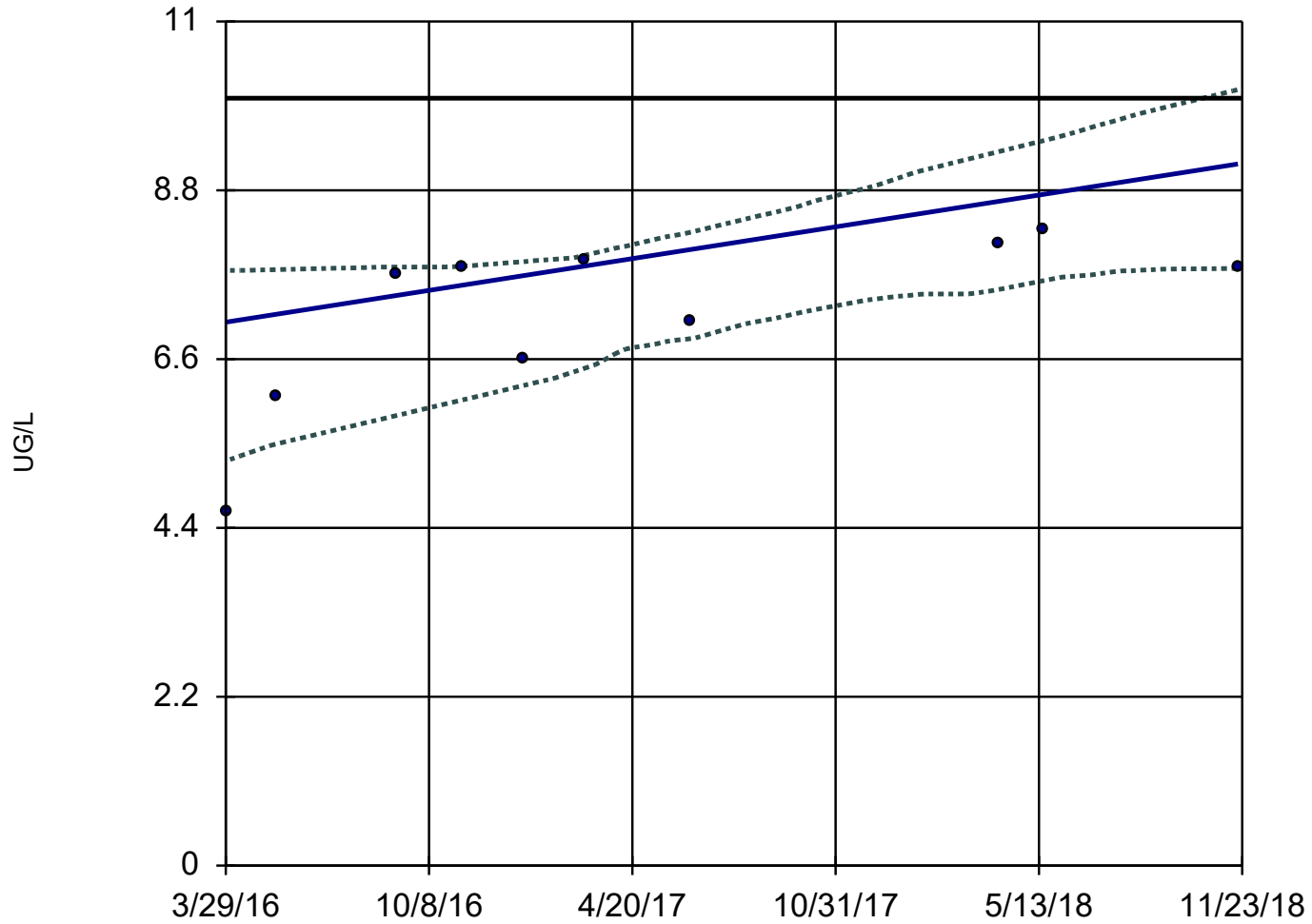
<u>Constituent</u>	<u>Well</u>	<u>Upper Lim.</u>	<u>Lower Lim.</u>	<u>Compliance</u>	<u>Sig.</u>	<u>N</u>	<u>%NDs</u>	<u>Transform</u>	<u>Alpha</u>	<u>Method</u>
Radium [226 + 228] (PCI/L)	M-MW-3	1.756	1.06	5	No	11	36.36	No	0.01	Param.
Radium [226 + 228] (PCI/L)	M-MW-4	0.9	0.541	5	No	11	90.91	No	0.006	NP (NDs)
Radium [226 + 228] (PCI/L)	M-MW-5	2.432	0.71	5	No	11	54.55	No	0.006	NP (NDs)
Radium [226 + 228] (PCI/L)	M-MW-6	0.827	0.5945	5	No	11	100	No	0.006	NP (NDs)
Radium [226 + 228] (PCI/L)	M-MW-7	1.376	0.575	5	No	11	81.82	No	0.006	NP (NDs)
Radium [226 + 228] (PCI/L)	M-MW-8	1.483	0.669	5	No	11	72.73	No	0.006	NP (NDs)

APPENDIX B

**Sanitas Trending Confidence
Bands Statistical Output**

Sen's Slope and 95% Confidence Band

M-MW-3



n = 10

Slope = 0.7799
units per year.

Mann-Kendall
statistic = 28
critical = 27

Increasing trend
significant at 98%
confidence level
($\alpha = 0.01$ per
tail).

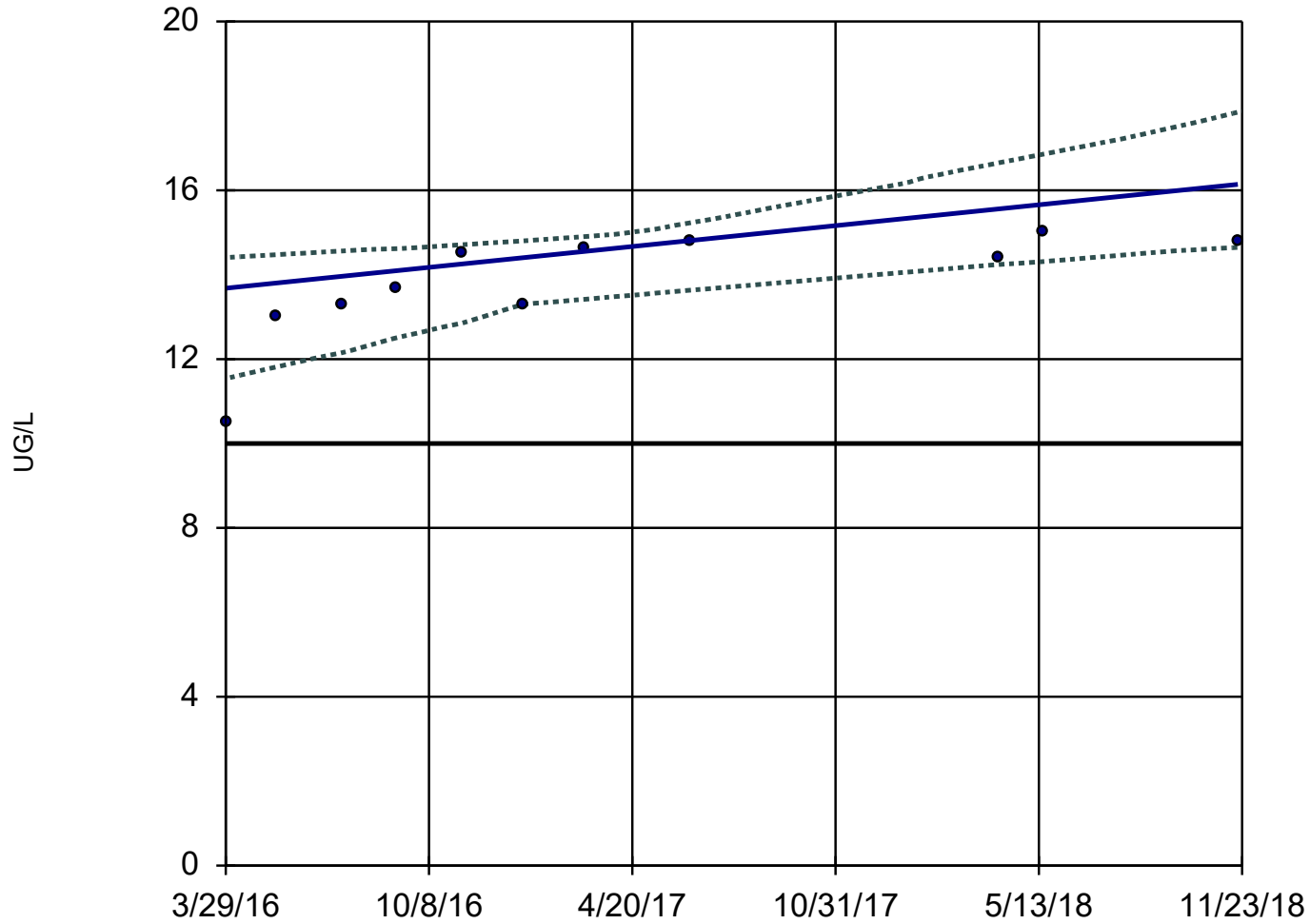
GWPS = 10.

Constituent: ARSENIC, TOTAL Analysis Run 2/20/2019 10:43 AM

Meramec E.C. Client: Ameren Data: MEC Data

Sen's Slope and 95% Confidence Band

M-MW-4



n = 11

Slope = 0.9303
units per year.

Mann-Kendall
statistic = 41
critical = 31

Increasing trend
significant at 98%
confidence level
($\alpha = 0.01$ per
tail).

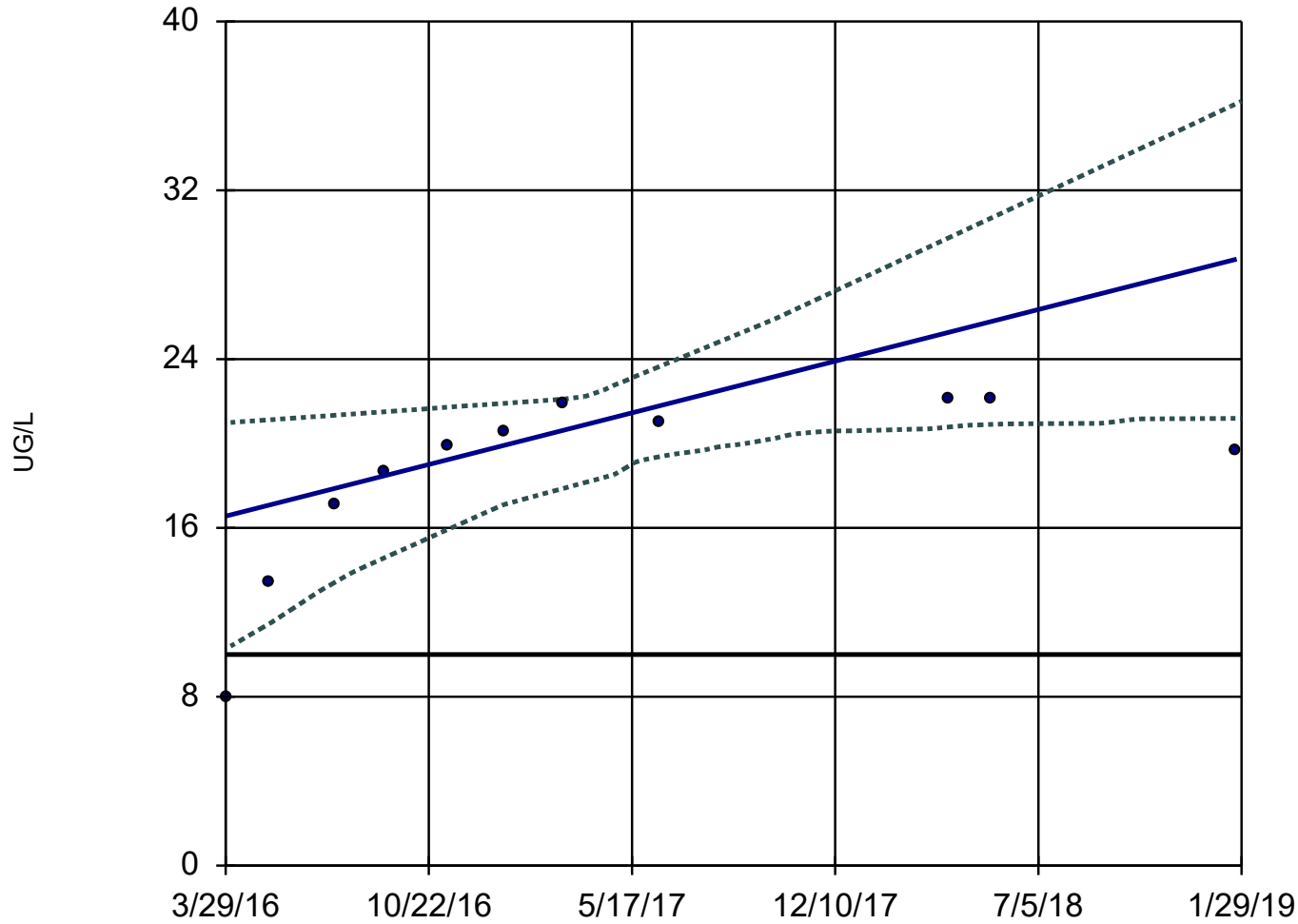
GWPS = 10.

Constituent: ARSENIC, TOTAL Analysis Run 2/20/2019 10:43 AM

Meramec E.C. Client: Ameren Data: MEC Data

Sen's Slope and 95% Confidence Band

M-MW-5



n = 11

Slope = 4.314
units per year.

Mann-Kendall
statistic = 40
critical = 31

Increasing trend
significant at 98%
confidence level
($\alpha = 0.01$ per
tail).

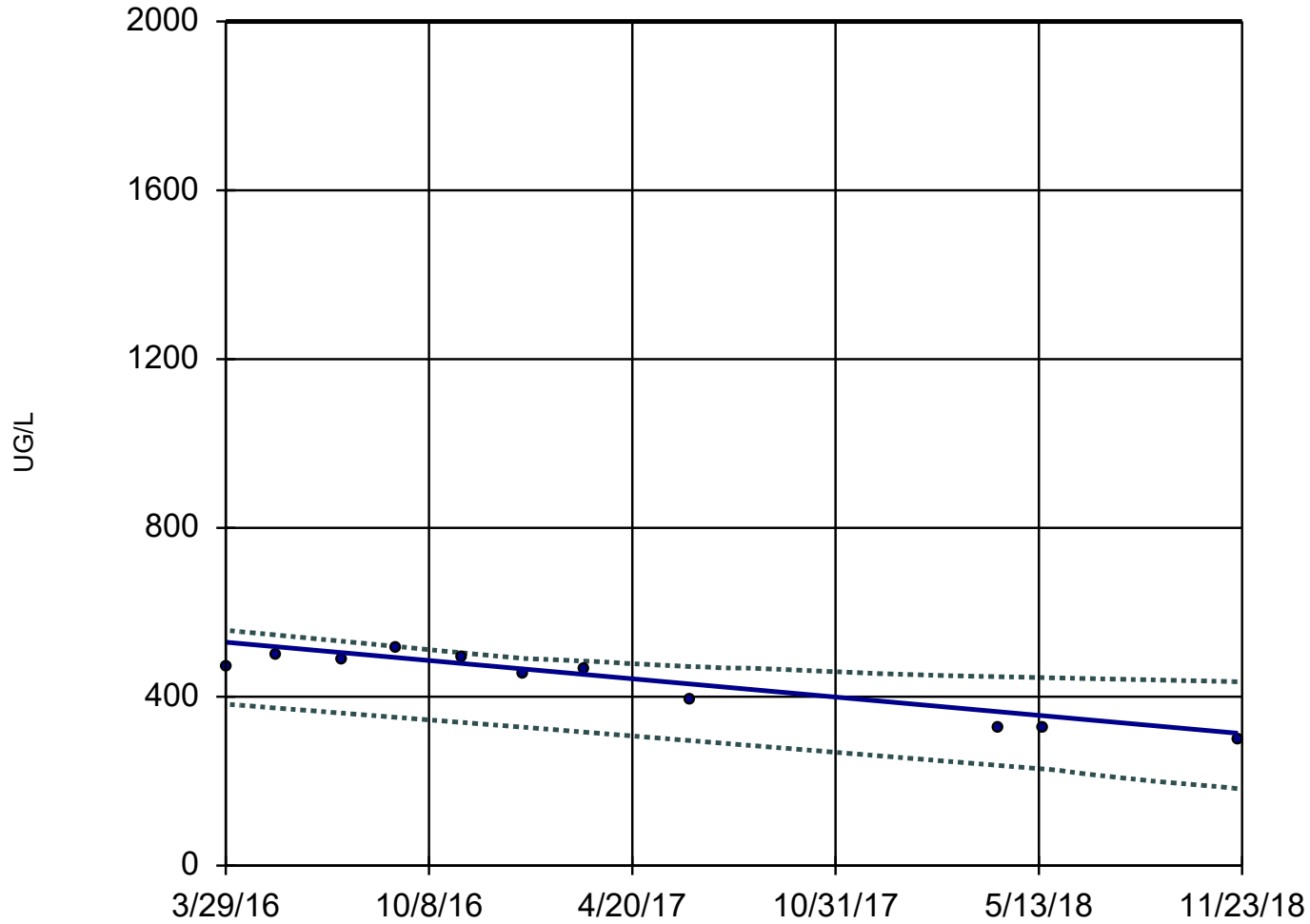
GWPS = 10.

Constituent: ARSENIC, TOTAL Analysis Run 2/20/2019 10:43 AM

Meramec E.C. Client: Ameren Data: MEC Data

Sen's Slope and 95% Confidence Band

M-MW-2



n = 11

Slope = -81.63
units per year.

Mann-Kendall
statistic = -37
critical = -31

Decreasing trend
significant at 98%
confidence level
($\alpha = 0.01$ per
tail).

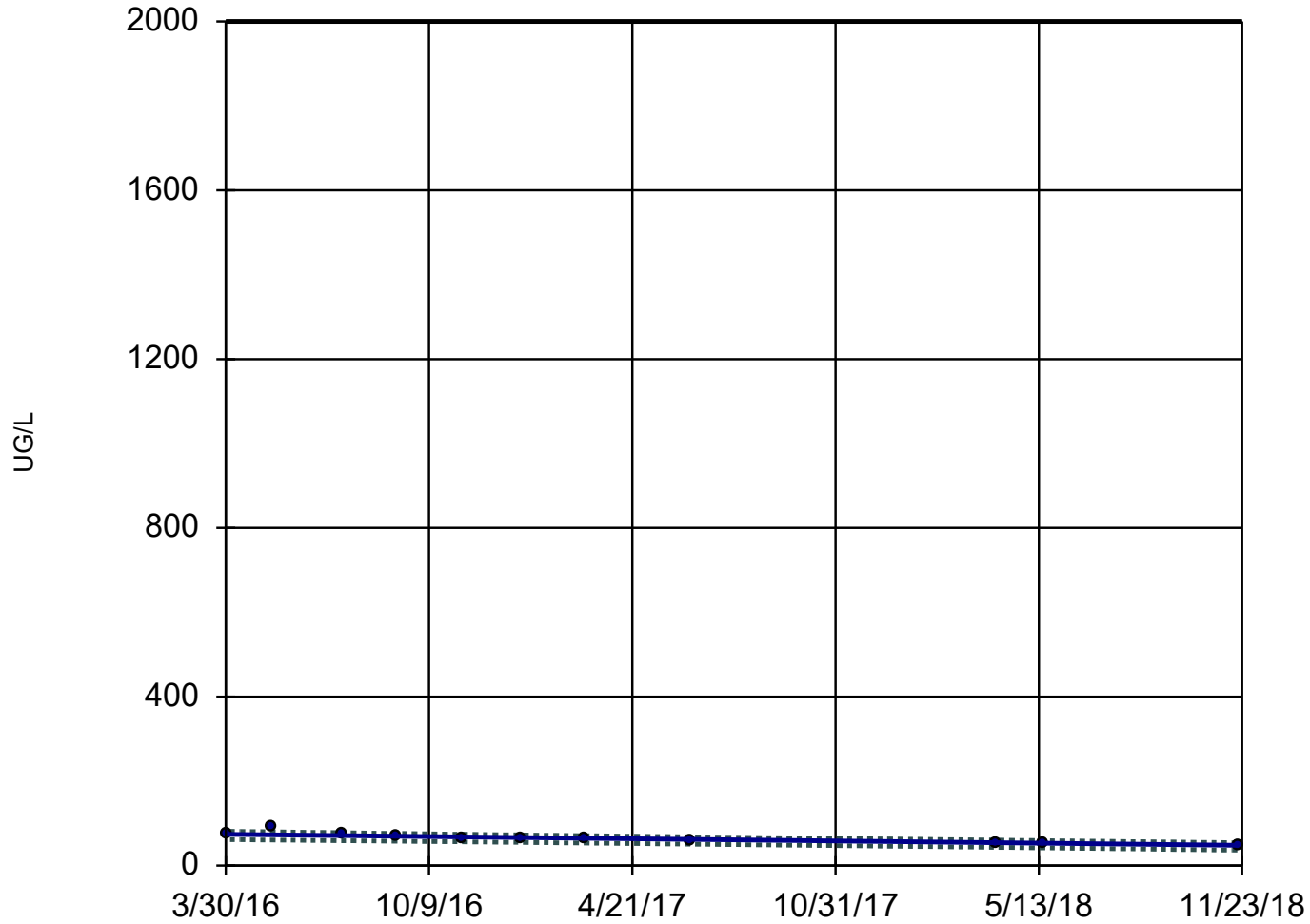
GWPS = 2000.

Constituent: BARIUM, TOTAL Analysis Run 2/20/2019 10:43 AM

Meramec E.C. Client: Ameren Data: MEC Data

Sen's Slope and 95% Confidence Band

M-MW-6



n = 11

Slope = -9.917
units per year.

Mann-Kendall
statistic = -51
critical = -31

Decreasing trend
significant at 98%
confidence level
($\alpha = 0.01$ per
tail).

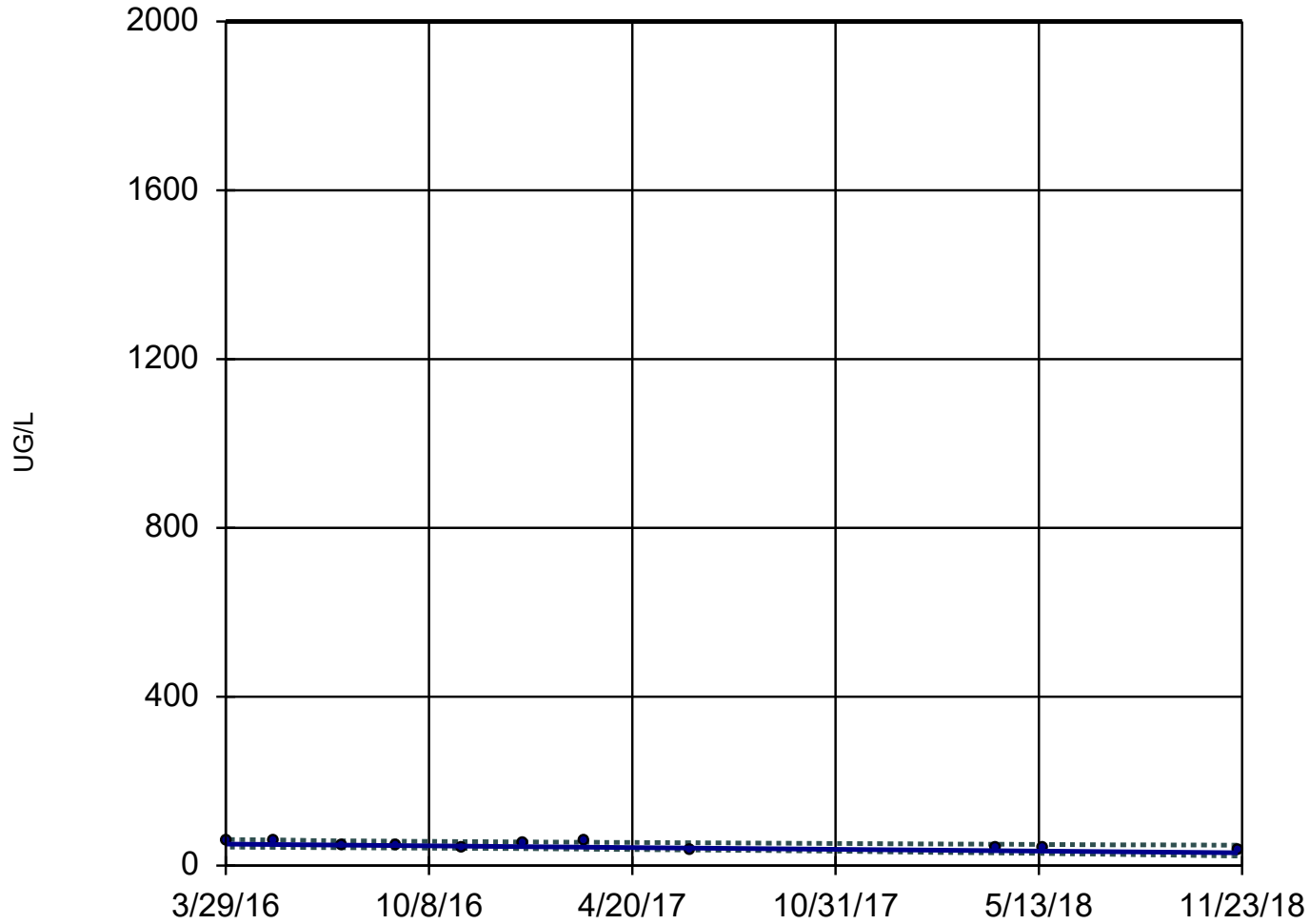
GWPS = 2000.

Constituent: BARIUM, TOTAL Analysis Run 2/20/2019 10:43 AM

Meramec E.C. Client: Ameren Data: MEC Data

Sen's Slope and 95% Confidence Band

M-MW-7



n = 11

Slope = -7.747
units per year.

Mann-Kendall
statistic = -33
critical = -31

Decreasing trend
significant at 98%
confidence level
($\alpha = 0.01$ per
tail).

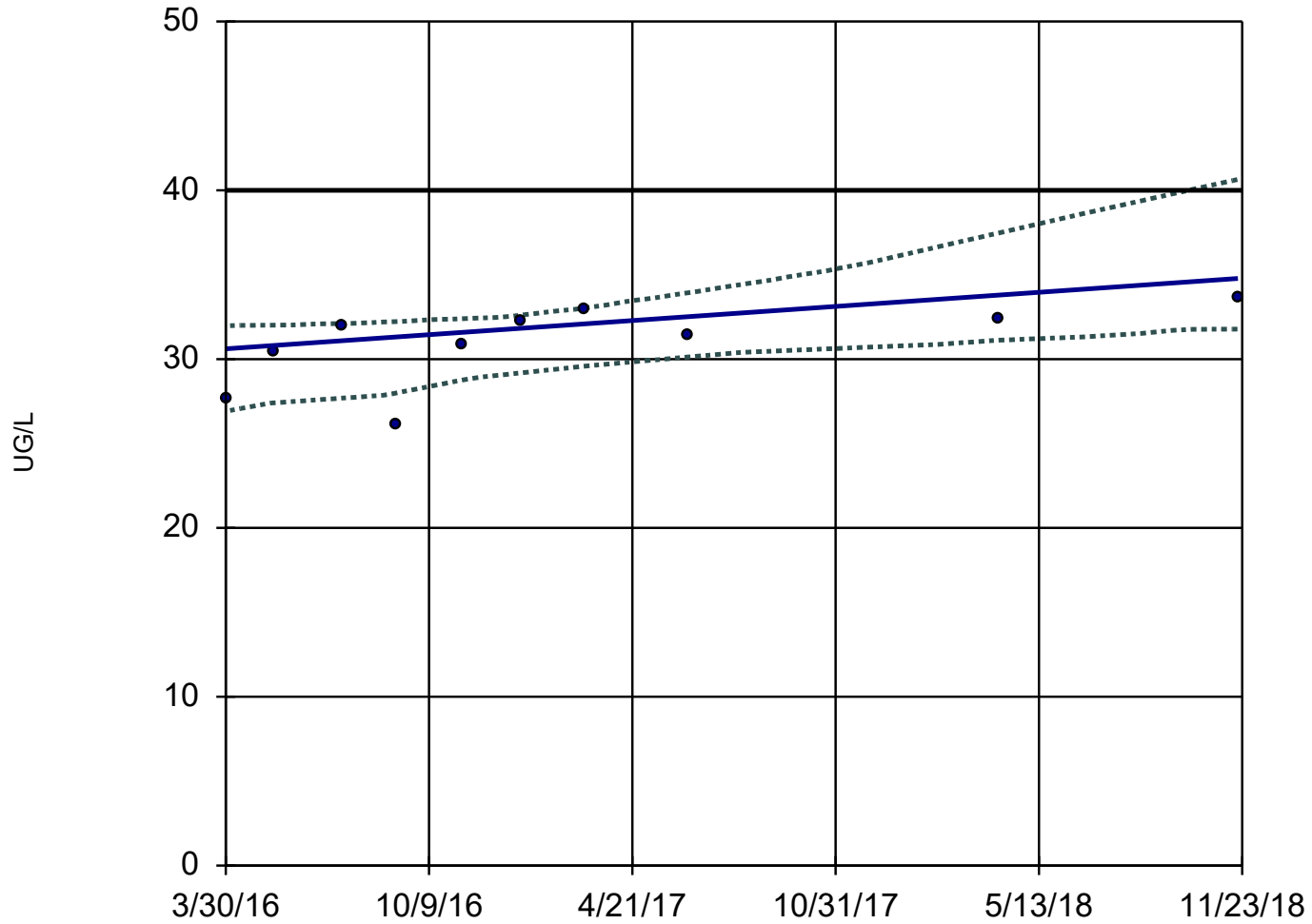
GWPS = 2000.

Constituent: BARIUM, TOTAL Analysis Run 2/20/2019 10:43 AM

Meramec E.C. Client: Ameren Data: MEC Data

Sen's Slope and 95% Confidence Band

M-MW-8



n = 10

Slope = 1.58
units per year.

Mann-Kendall
statistic = 29
critical = 27

Increasing trend
significant at 98%
confidence level
($\alpha = 0.01$ per
tail).

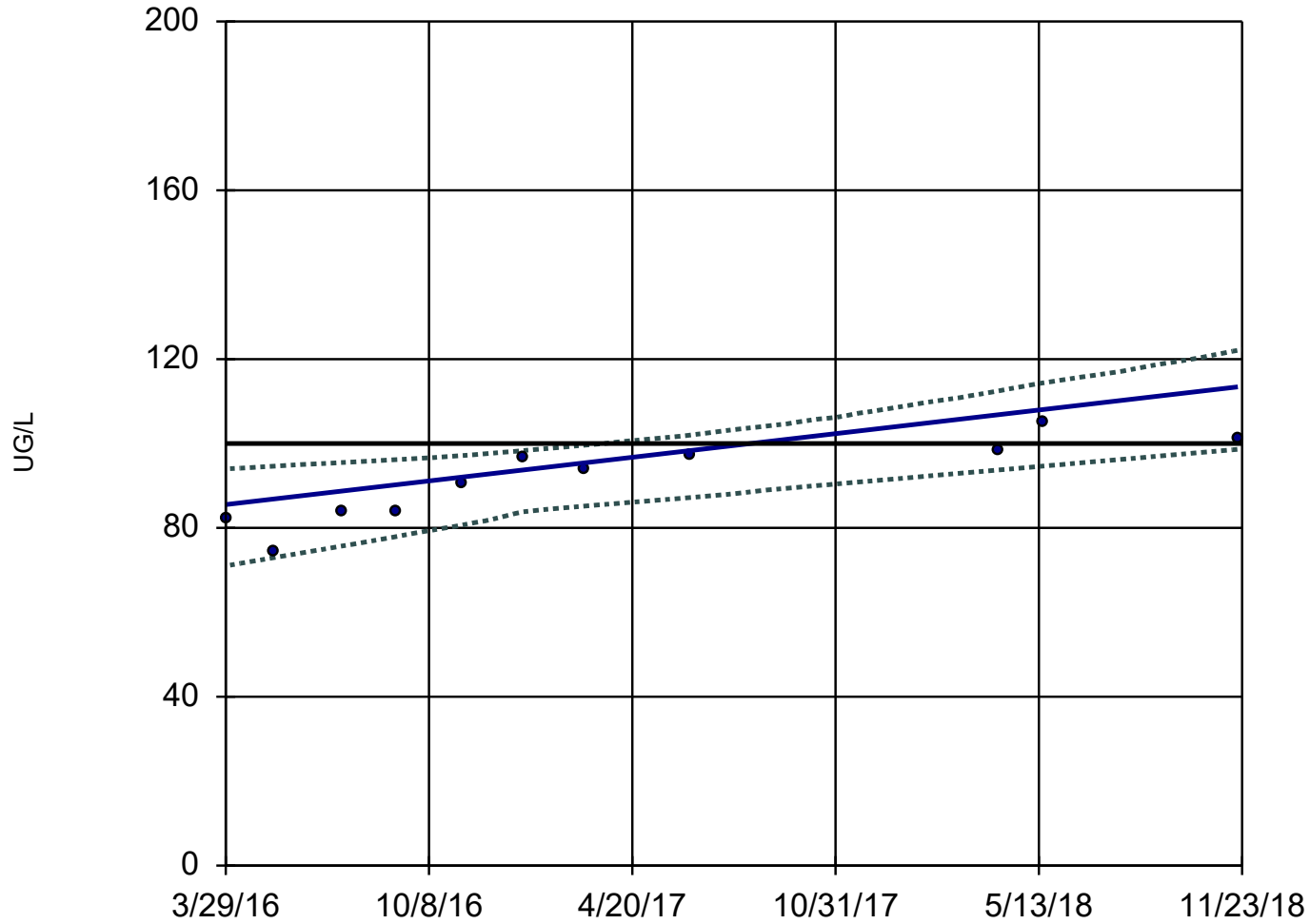
GWPS = 40.

Constituent: LITHIUM, TOTAL Analysis Run 2/20/2019 10:44 AM

Meramec E.C. Client: Ameren Data: MEC Data

Sen's Slope and 95% Confidence Band

M-MW-5



n = 11

Slope = 10.55
units per year.

Mann-Kendall
statistic = 47
critical = 31

Increasing trend
significant at 98%
confidence level
($\alpha = 0.01$ per
tail).

GWPS = 100.

Constituent: MOLYBDENUM, TOTAL Analysis Run 2/20/2019 10:44 AM

Meramec E.C. Client: Ameren Data: MEC Data

APPENDIX D

**August 2019 Assessment
Monitoring Statistical Evaluation**

TECHNICAL MEMORANDUM

DATE November 22, 2019

Project No. 153-140601

TO Bill Kutosky
Ameren Missouri

CC Susan Knowles, Craig Giesmann, Paul Pike, Charlie Henderson

FROM Jeffrey Ingram - Golder Associates

EMAIL JIngram@Golder.com

ASSESSMENT MONITORING STATISTICAL EVALUATION FOR THE MULTI-UNIT SURFACE IMPOUNDMENT NETWORK, MERAMEC ENERGY CENTER, ST LOUIS COUNTY MISSOURI

This Technical Memorandum provides the results of the Assessment Monitoring Statistical Evaluation for the Multi-unit Surface Impoundment Network August 2018 sampling event at the Meramec Energy Center located in St. Louis County Missouri. Included in this memorandum is a brief summary of constituents that are present at a Statistically Significant Level (SSL), a list of site-specific Groundwater Protection Standards (**Table 1**), and the Sanitas Technologies™ (Sanitas) statistical software output for each of the Appendix IV parameters (**Appendix A** and **Appendix B**).

SSLs were calculated using the methods and procedures outlined in the Groundwater Monitoring Plan's (GMP) Statistical Analysis Plan (SAP). In addition to the outliers that were noted in previous statistical analysis, the following outliers were removed prior to the calculation of confidence limits:

- Antimony
 - MW-1 on 3/29/2016 at 0.063 µg/L and on 3/7/2017 at Non-detect: Values were statistically higher and lower than other values at the same well.
 - MW-7 on 7/19/2016 at 0.065 J µg/L and on 1/6/2017 at Non-detect: Values were statistically lower than other values at the same well.
- Arsenic
 - MW-1 on 6/14/2017 at Non-detect: Value was statistically lower than other values at the same well.
 - MW-4 on 3/29/2016 at 10.5 µg/L: Value was statistically lower than other values at the same well.
 - MW-5 on 3/29/2016 at 8.0 µg/L and on 5/13/2016 at 13.4 µg/L: Values were statistically lower than other values at the same well.
 - MW-6 on 7/19/2016 at Non-detect: Value was statistically lower than other values at the same well.
- Beryllium
 - MW-6 on 4/3/2018 at 0.36 J µg/L: Value was statically higher than the other values at the same well.

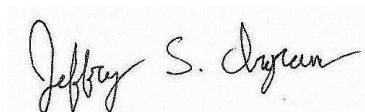
- MW-7 on 4/3/2018 at 0.35 J $\mu\text{g/L}$: Value was statically higher than the other values at the same well.
- Cadmium
 - MW-3 on 4/4/2018 at 0.11 J $\mu\text{g/L}$: Value was statically higher than the other values at the same well.
 - MW-4 on 4/4/2018 at 0.16 J $\mu\text{g/L}$: Value was statically higher than the other values at the same well.
- Cobalt
 - MW-1 on 3/29/2016 at 1.5 J $\mu\text{g/L}$: Value was statically higher than the other values at the same well.
 - MW-7 on 5/13/2016 at 1.2 J $\mu\text{g/L}$: Value was statically higher than the other values at the same well.
- Fluoride
 - MW-1 on 4/4/2018 at 0.069 J mg/L : Value was statistically lower than other values at the same well.
- Lithium
 - MW-6 on 5/12/2016 at 164 $\mu\text{g/L}$: Value was statically higher than the other values at the same well.
- Radium 226 + 228
 - MW-1 on 11/20/2018 at 1.663 J pCi/L : Value was statically higher than the other values at the same well.
 - MW-7 on 7/19/2016 at 1.917 pCi/L and on 11/19/2018 at 1.376 pCi/L : Values were statistically higher than other values at the same well.

Lithium at MW-7, which was added as an SSL in the November 2018 sampling event, is no longer an SSL, as the lower confidence limit is at 39.67 $\mu\text{g/L}$, and no statistically significant trend is observed; however, it is noteworthy that there is an obvious downward trend in the concentration of lithium in MW-7 over the past two years. The other SSLs at Meramec have not changed. A summary of SSLs at corresponding wells is as follows:

- Arsenic at MW-4 and MW-5
- Lithium at MW-6
- Molybdenum at MW-6, MW-7 and MW-8

Golder appreciates this opportunity to provide hydrogeological and engineering support services to Ameren. If you have any questions or comments regarding the information provided, please call our office at (314) 984-8800.

Sincerely,



Jeffrey Ingram, R.G.
Project Geologist



Sean Paulsen, P.G.
Associate, Senior Consultant

JSI/SCP

Enclosures:

Table 1 – MEC Groundwater Protection Standards

Appendix A – Sanitas Confidence Interval Statistical Output

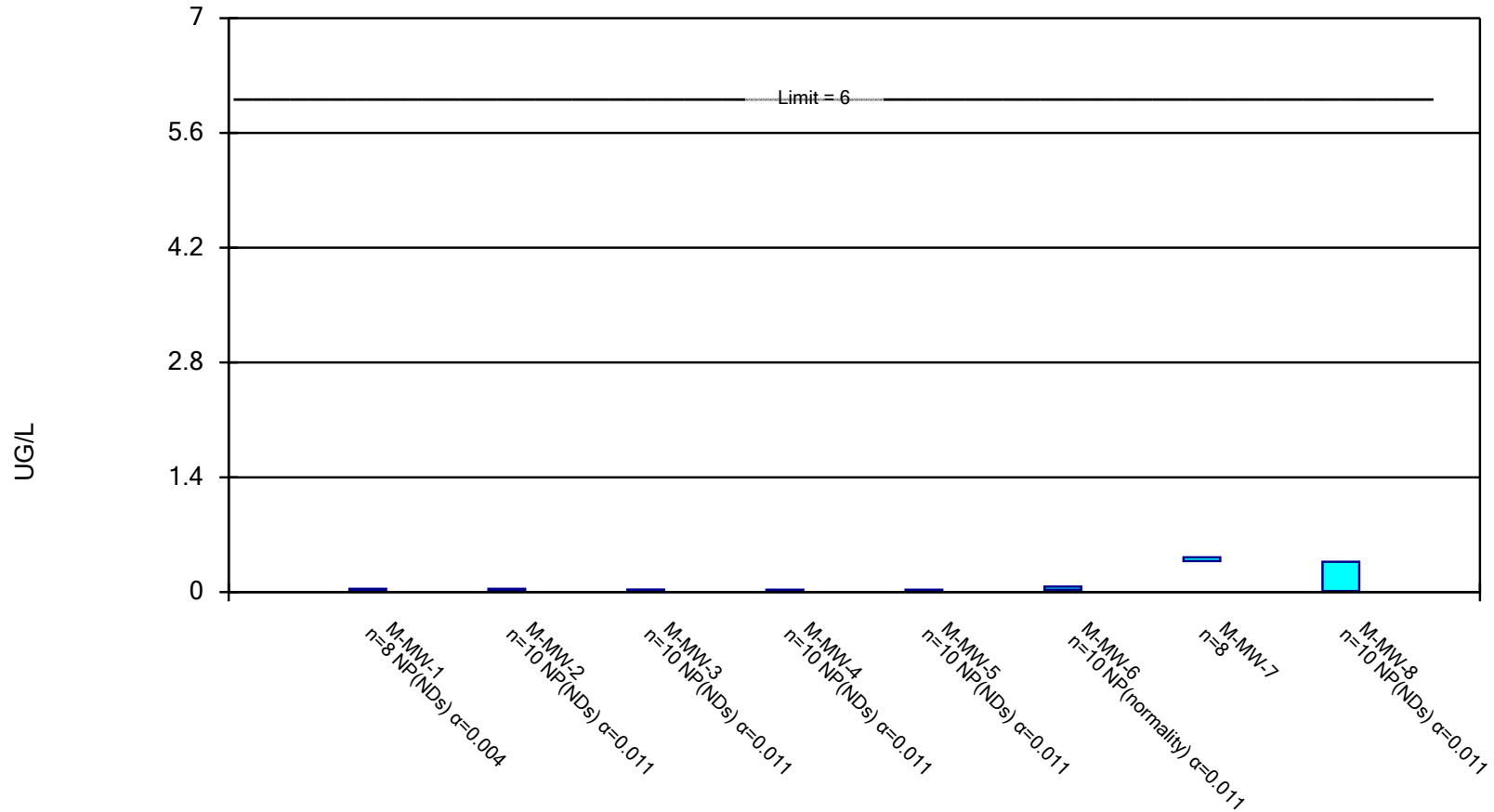
Appendix B – Sanitas Trending Confidence Bands Statistical Output

APPENDIX A

Sanitas Confidence Interval Statistical Output

Parametric and Non-Parametric (NP) Confidence Interval

Compliance Limit is not exceeded. Per-well alpha = 0.01 except as noted. Normality Test: Shapiro Wilk, alpha based on n.

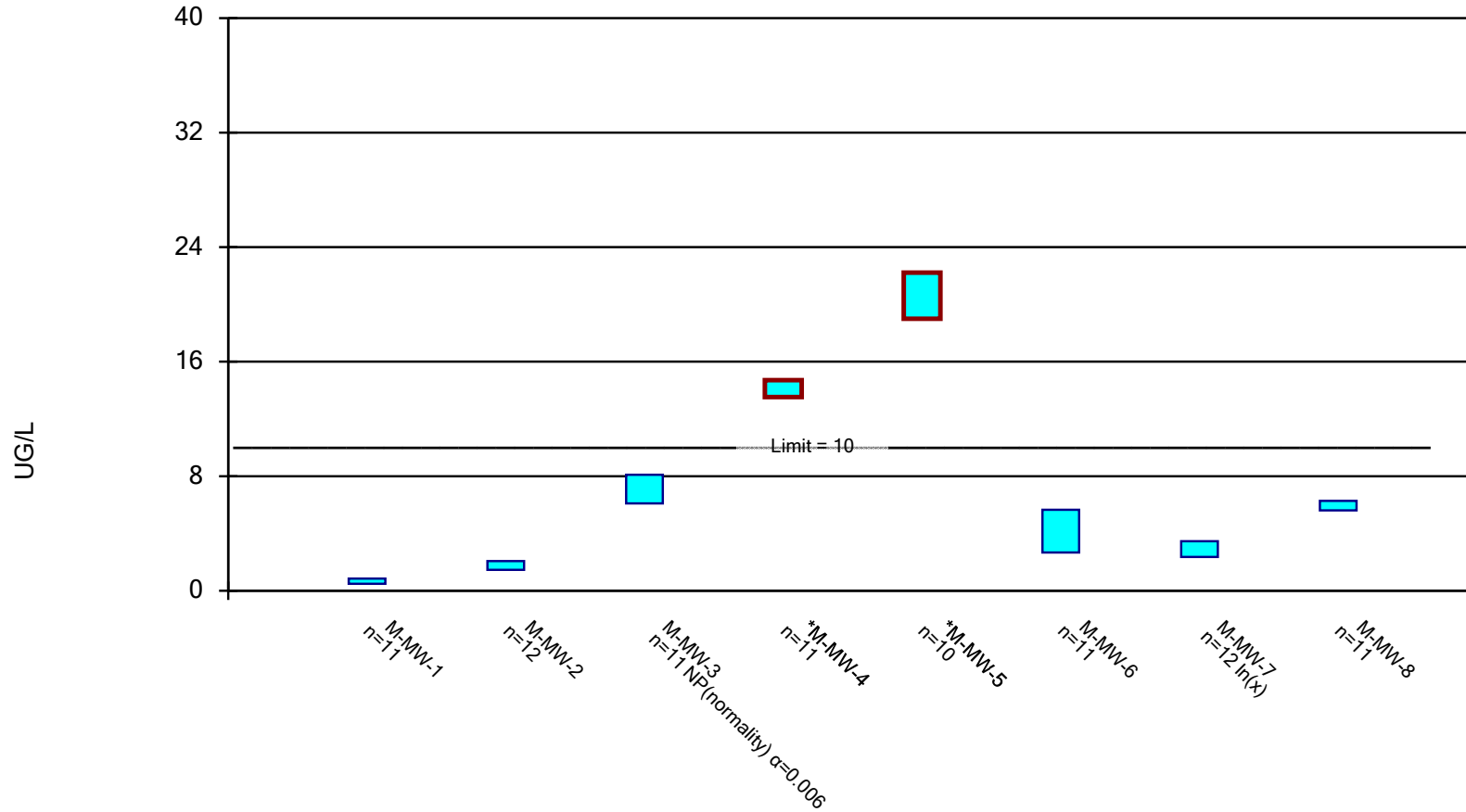


Constituent: ANTIMONY, TOTAL Analysis Run 11/22/2019 8:08 AM

Meramec E.C. Client: Ameren Data: MEC Data

Parametric and Non-Parametric (NP) Confidence Interval

Compliance limit is exceeded.* Per-well alpha = 0.01 except as noted. Normality Test: Shapiro Wilk, alpha based on n.

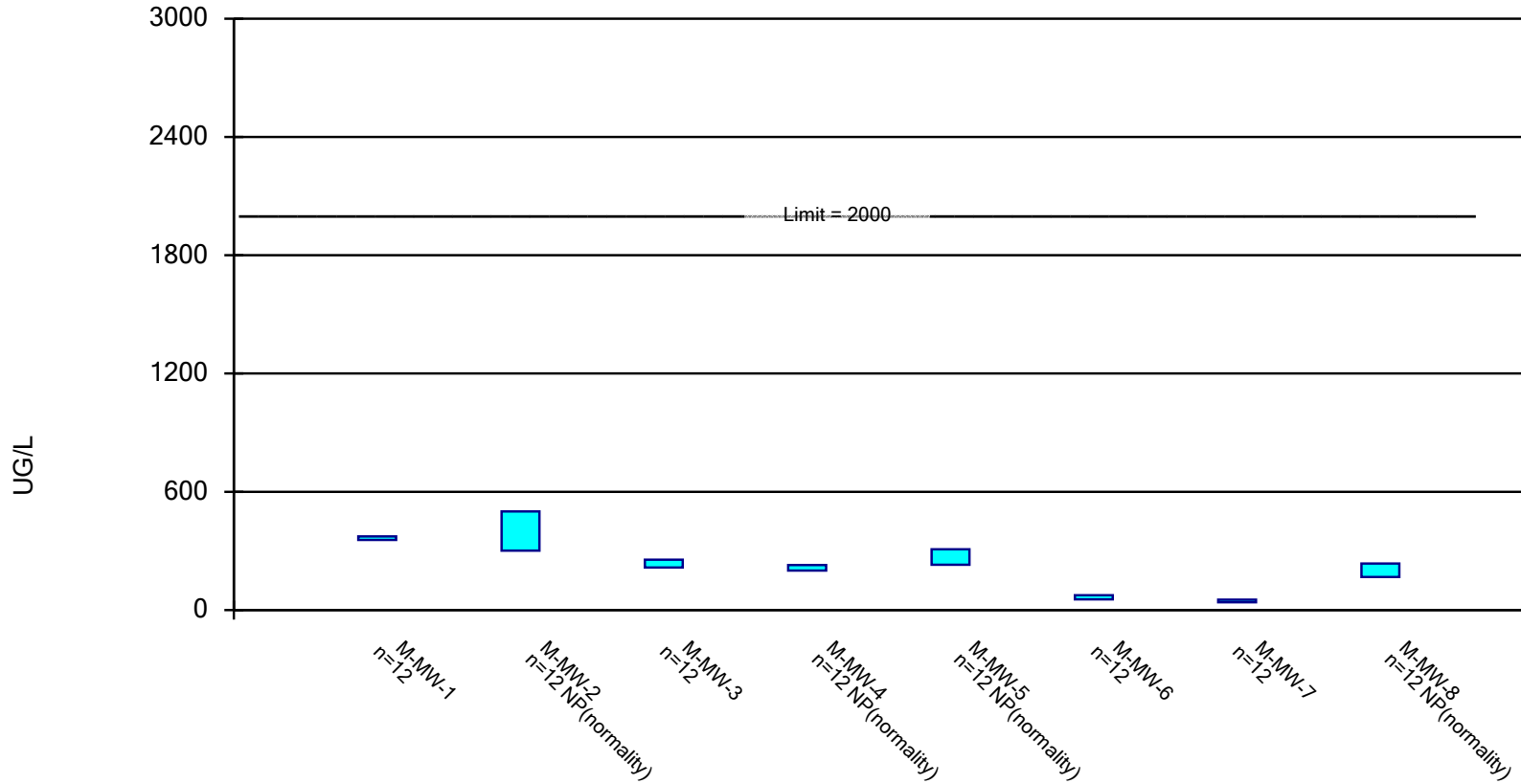


Constituent: ARSENIC, TOTAL Analysis Run 11/22/2019 8:08 AM

Meramec E.C. Client: Ameren Data: MEC Data

Parametric and Non-Parametric (NP) Confidence Interval

Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.

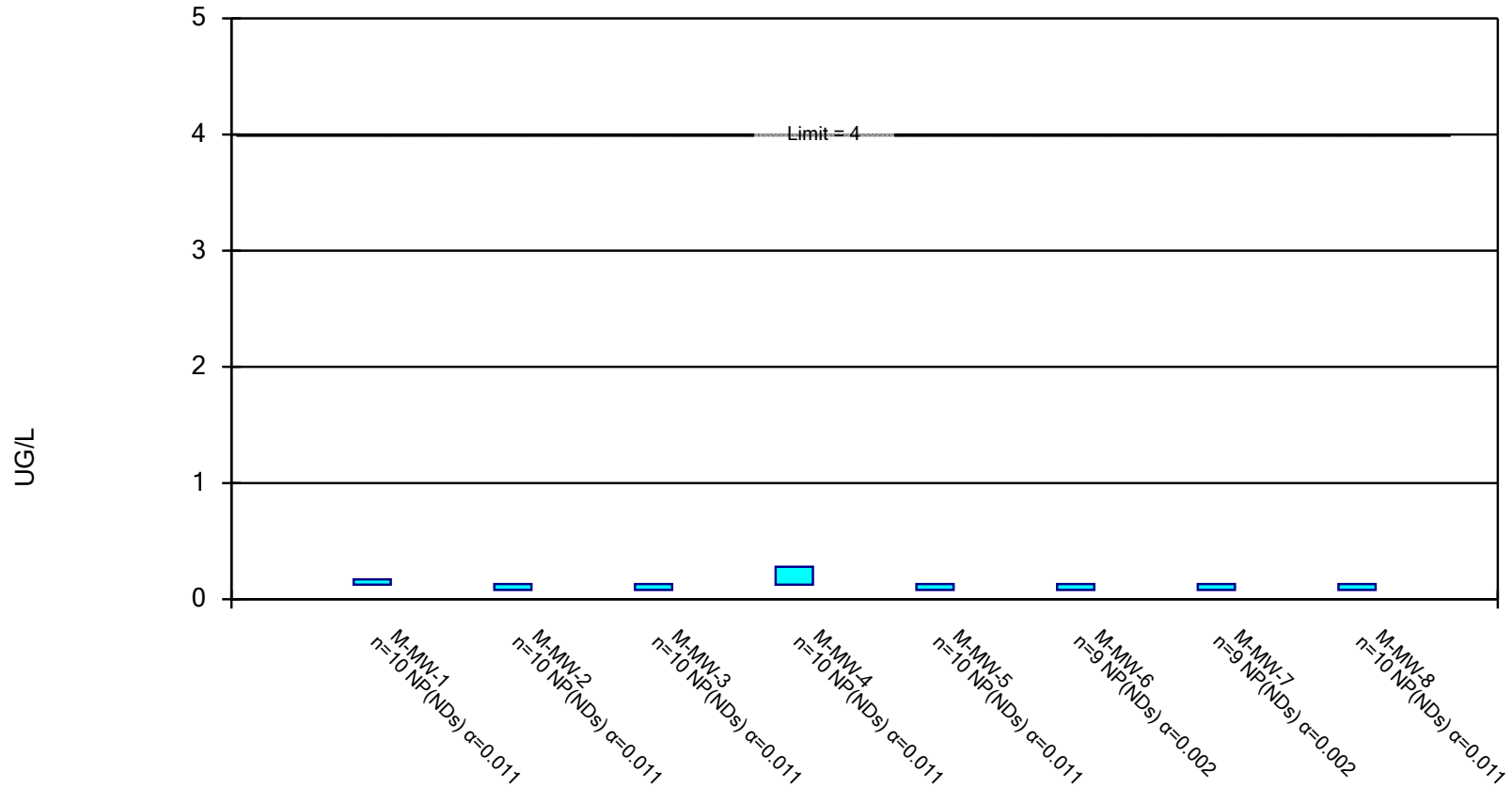


Constituent: BARIUM, TOTAL Analysis Run 11/22/2019 8:08 AM

Meramec E.C. Client: Ameren Data: MEC Data

Non-Parametric Confidence Interval

Compliance Limit is not exceeded.

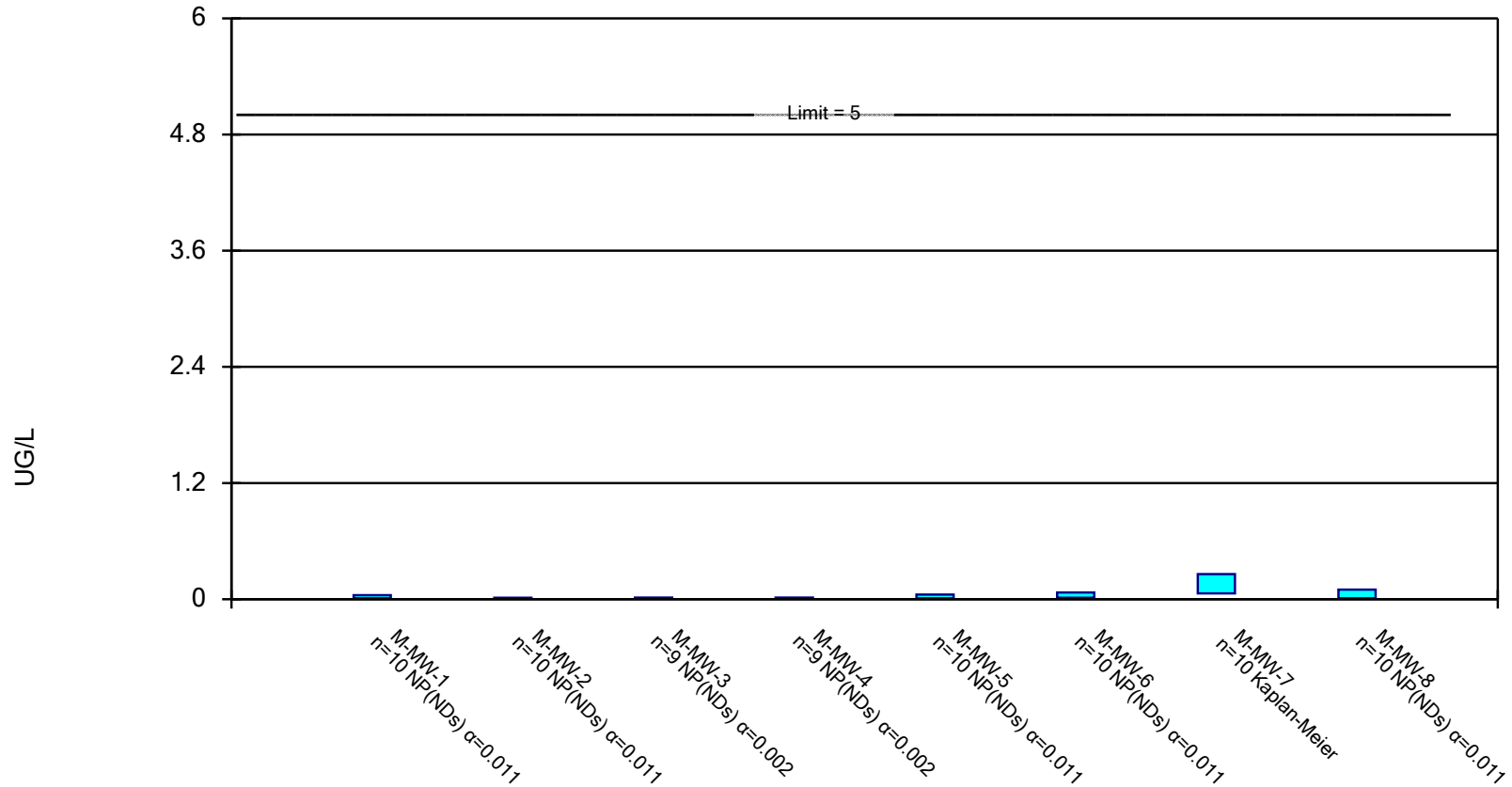


Constituent: BERYLLIUM, TOTAL Analysis Run 11/22/2019 8:08 AM

Meramec E.C. Client: Ameren Data: MEC Data

Parametric and Non-Parametric (NP) Confidence Interval

Compliance Limit is not exceeded. Per-well alpha = 0.01 except as noted. Normality Test: Shapiro Wilk, alpha based on n.

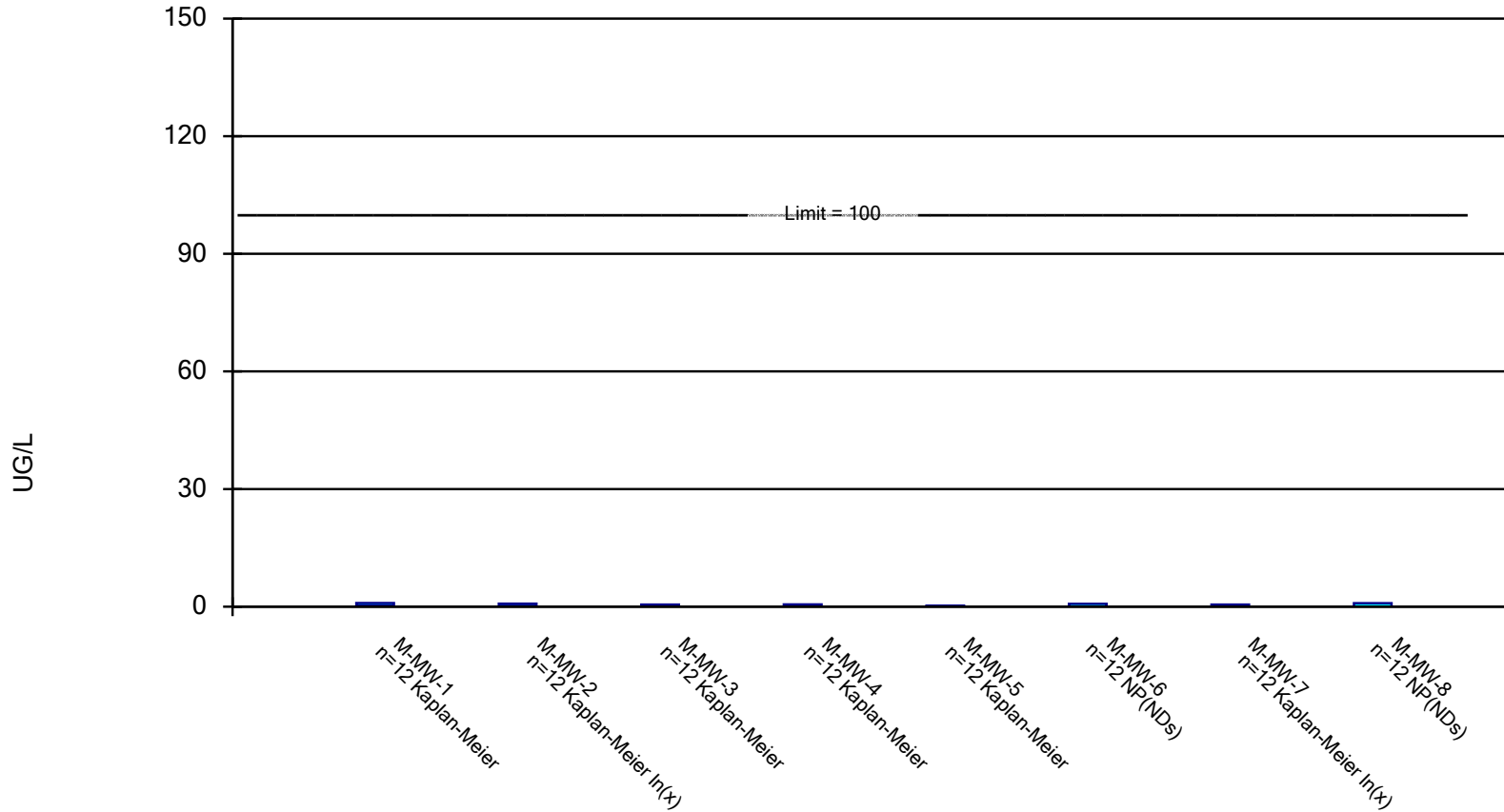


Constituent: CADMIUM, TOTAL Analysis Run 11/22/2019 8:08 AM

Meramec E.C. Client: Ameren Data: MEC Data

Parametric and Non-Parametric (NP) Confidence Interval

Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.

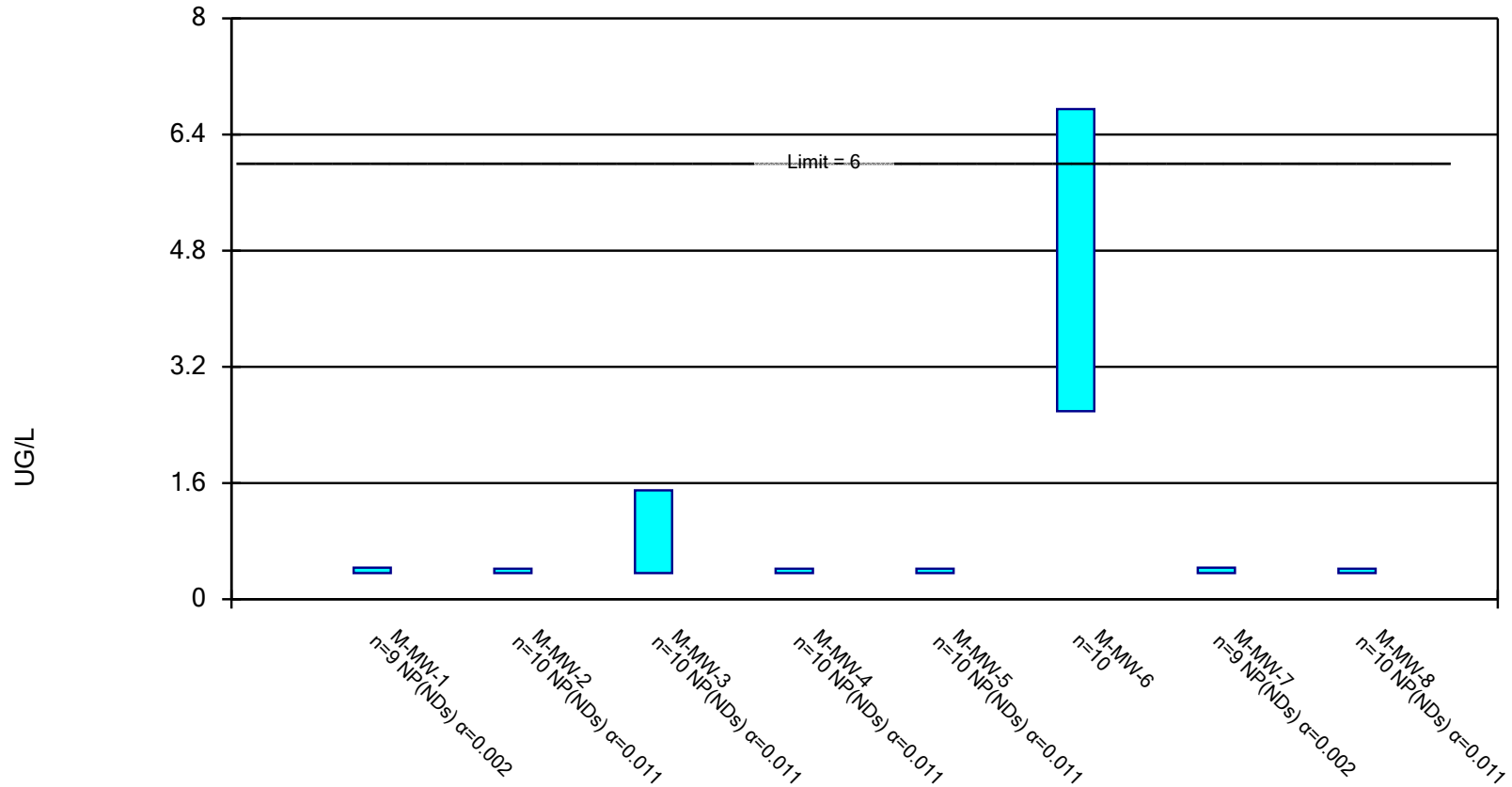


Constituent: CHROMIUM, TOTAL Analysis Run 11/22/2019 8:08 AM

Meramec E.C. Client: Ameren Data: MEC Data

Parametric and Non-Parametric (NP) Confidence Interval

Compliance Limit is not exceeded. Per-well alpha = 0.01 except as noted. Normality Test: Shapiro Wilk, alpha based on n.

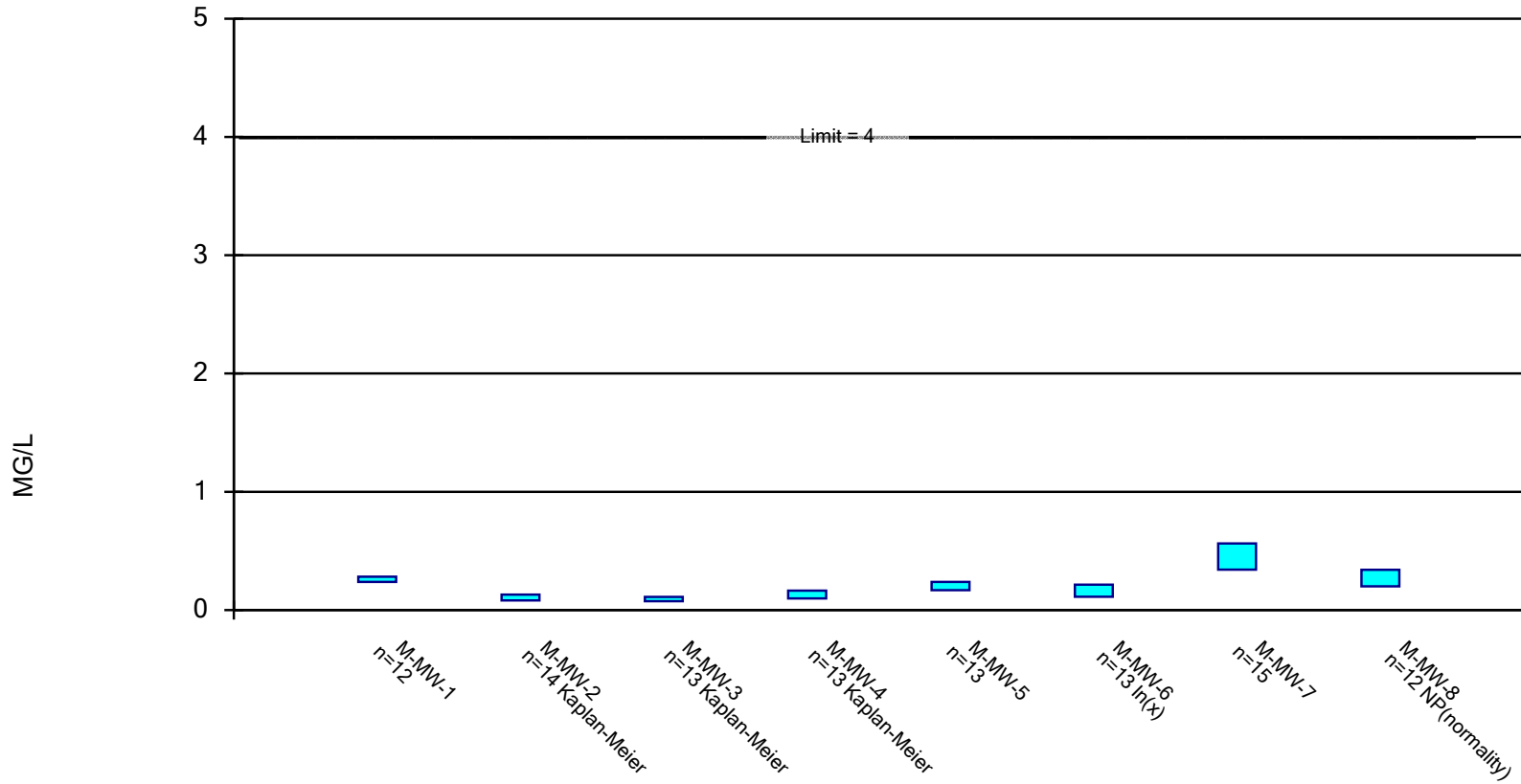


Constituent: COBALT, TOTAL Analysis Run 11/22/2019 8:08 AM

Meramec E.C. Client: Ameren Data: MEC Data

Parametric and Non-Parametric (NP) Confidence Interval

Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.

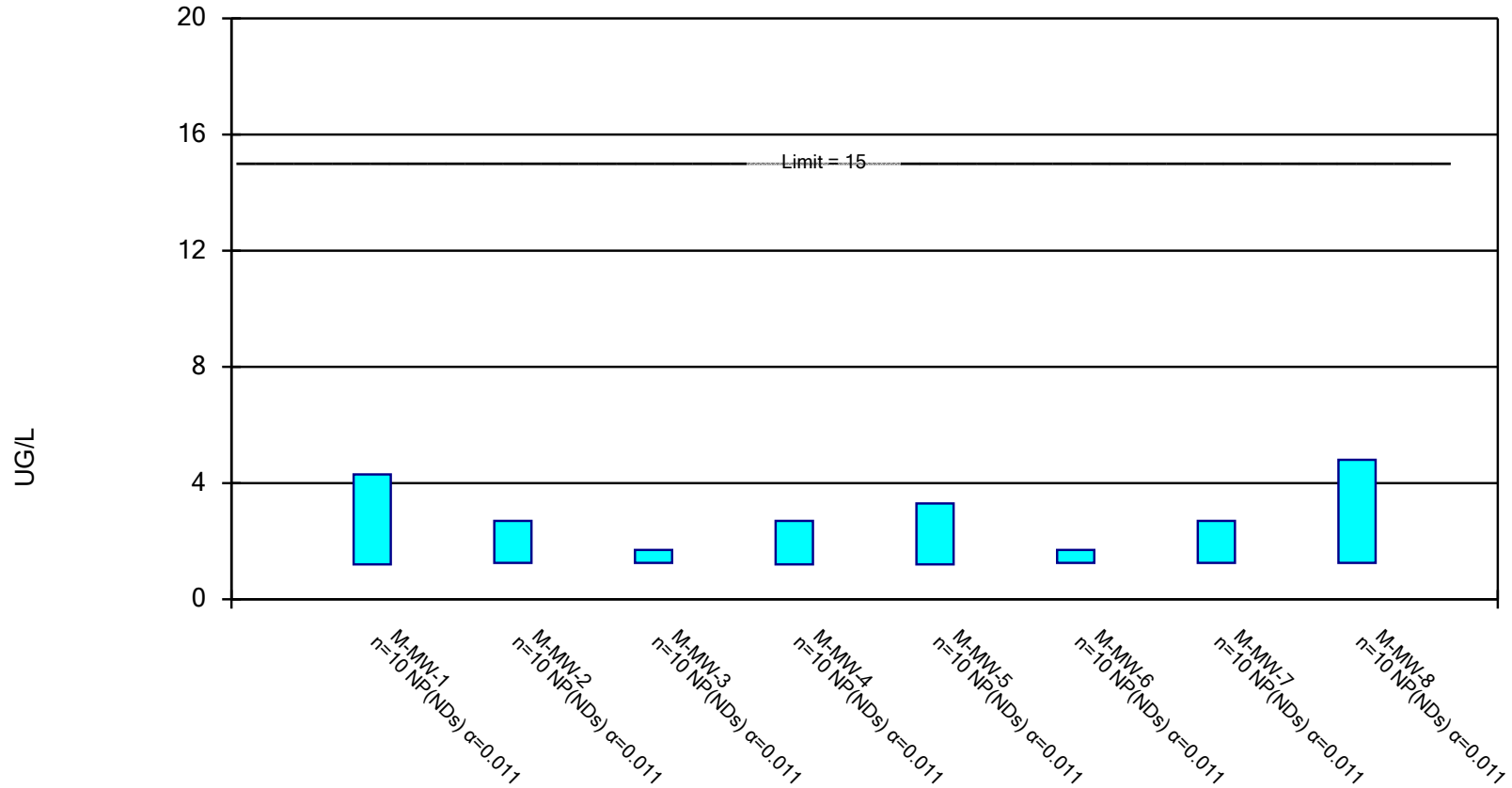


Constituent: FLUORIDE, TOTAL Analysis Run 11/22/2019 8:08 AM

Meramec E.C. Client: Ameren Data: MEC Data

Non-Parametric Confidence Interval

Compliance Limit is not exceeded.

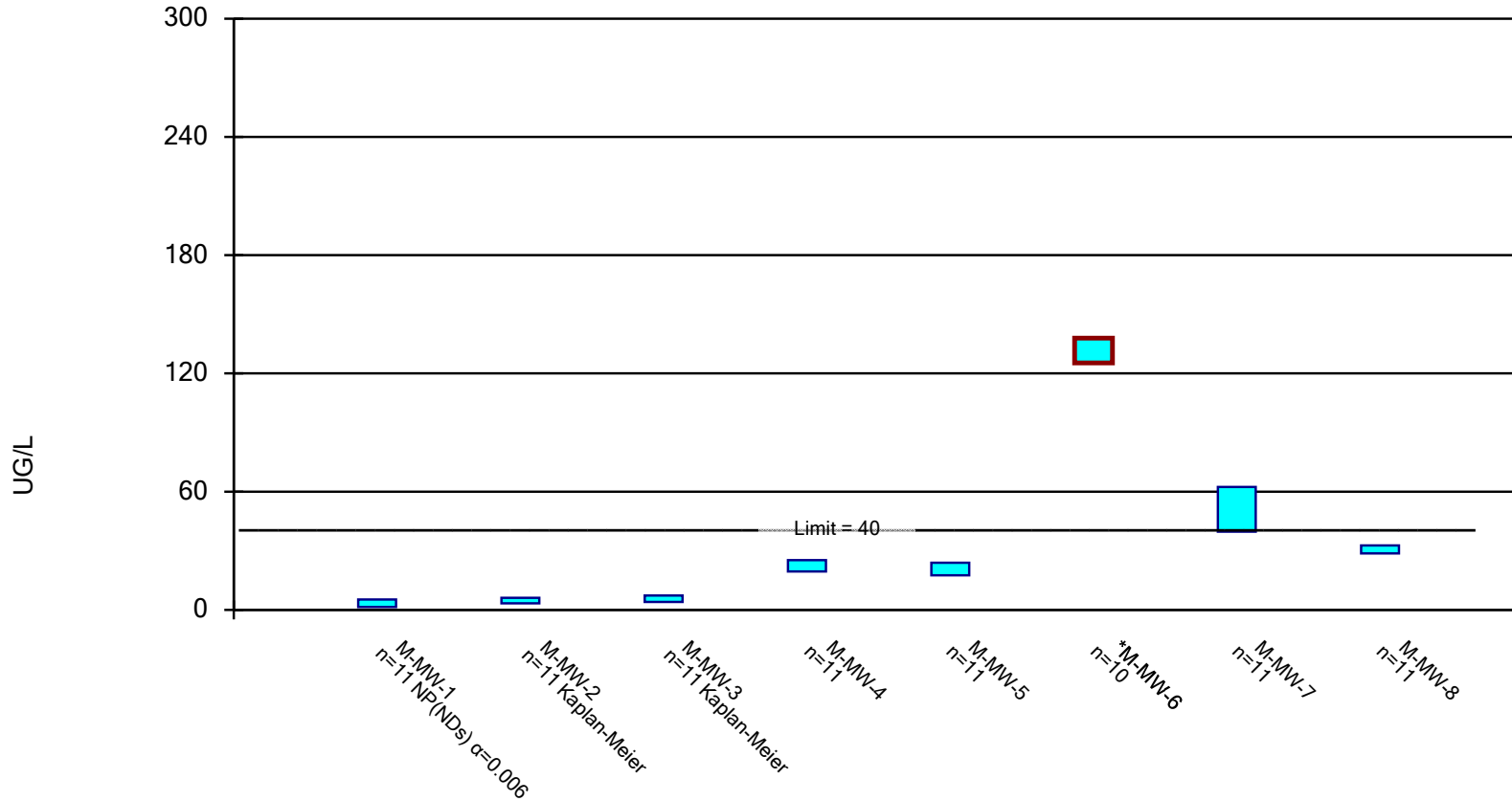


Constituent: LEAD, TOTAL Analysis Run 11/22/2019 8:08 AM

Meramec E.C. Client: Ameren Data: MEC Data

Parametric and Non-Parametric (NP) Confidence Interval

Compliance limit is exceeded.* Per-well alpha = 0.01 except as noted. Normality Test: Shapiro Wilk, alpha based on n.

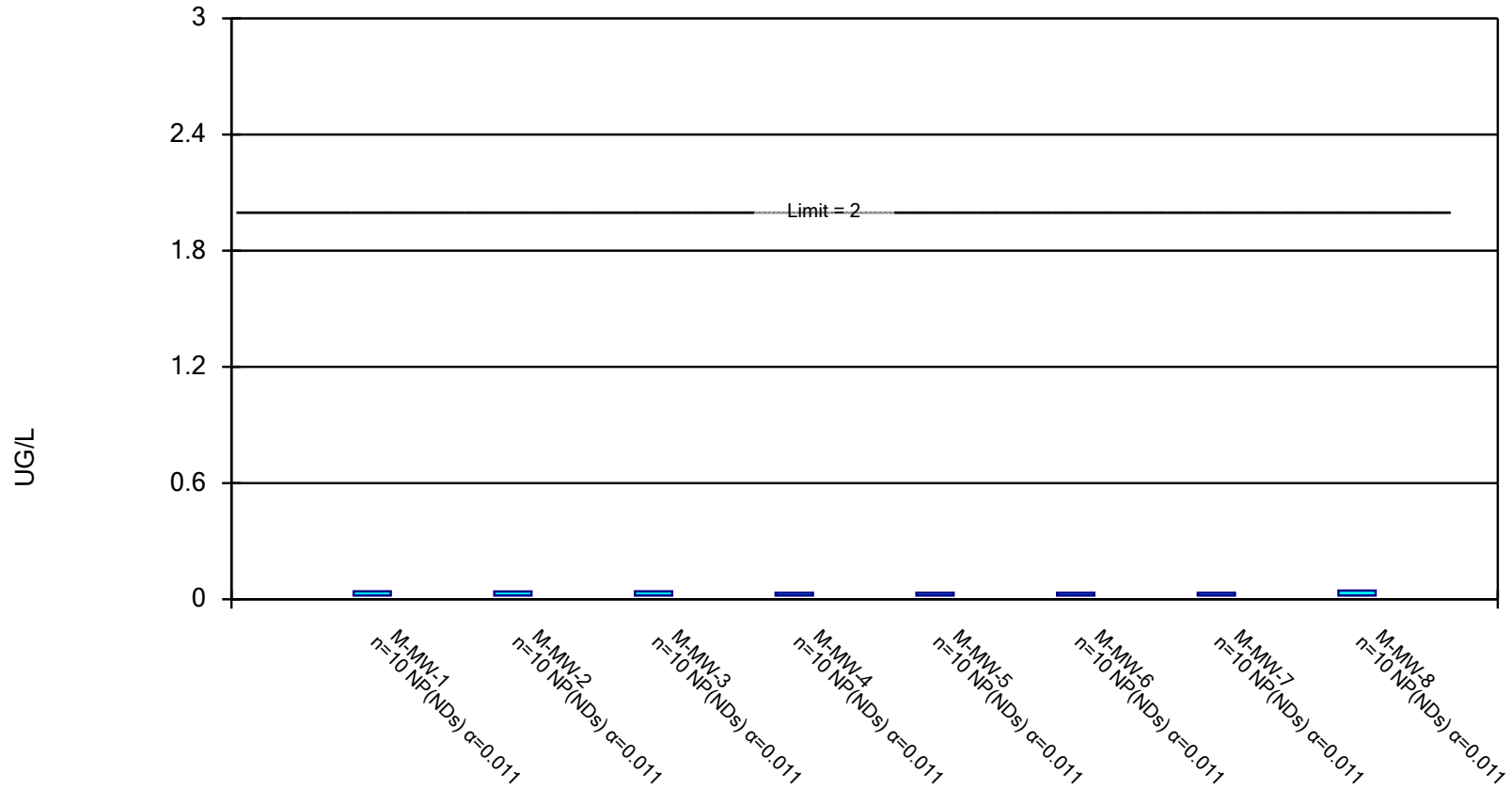


Constituent: LITHIUM, TOTAL Analysis Run 11/22/2019 8:09 AM

Meramec E.C. Client: Ameren Data: MEC Data

Non-Parametric Confidence Interval

Compliance Limit is not exceeded.

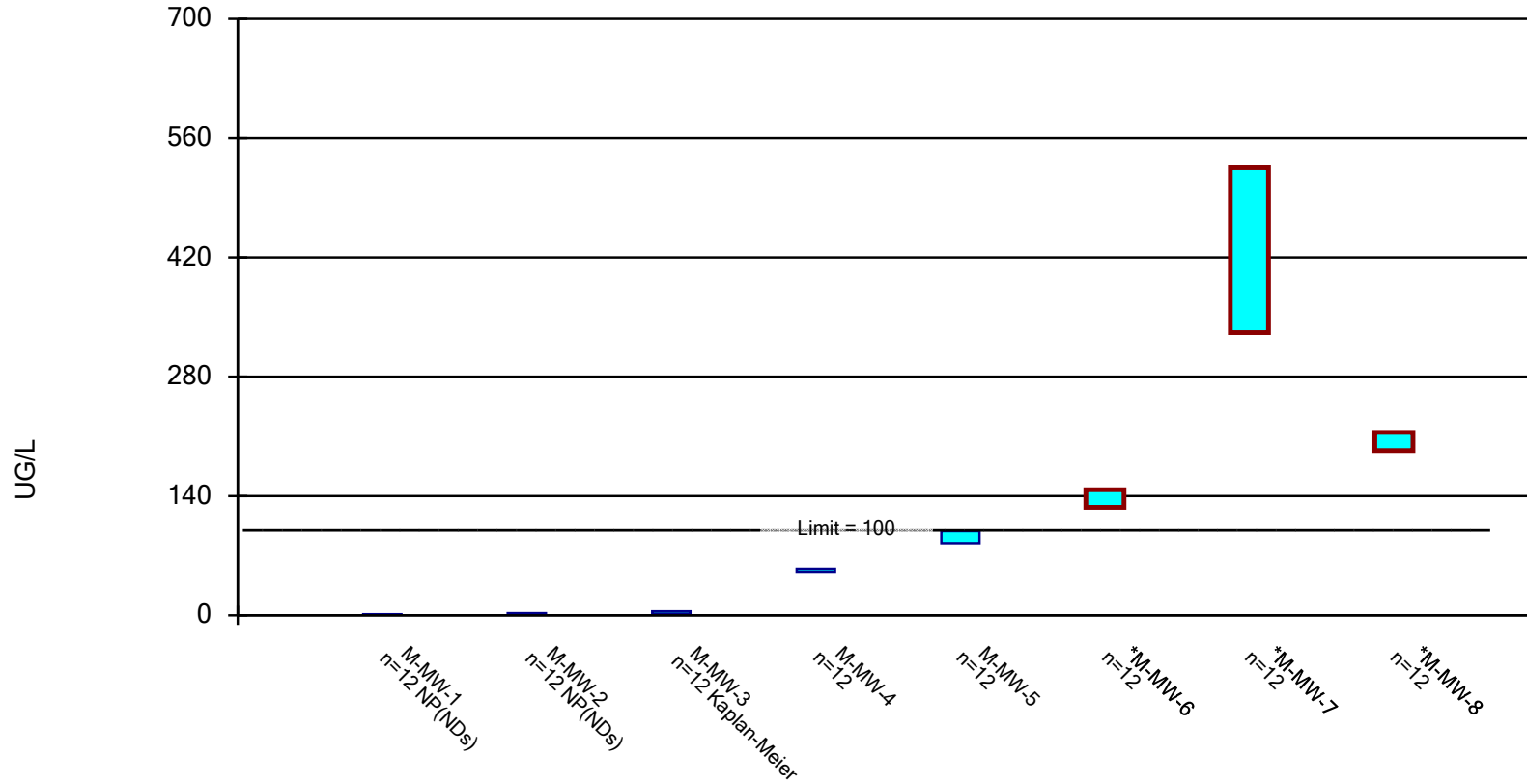


Constituent: MERCURY, TOTAL Analysis Run 11/22/2019 8:09 AM

Meramec E.C. Client: Ameren Data: MEC Data

Parametric and Non-Parametric (NP) Confidence Interval

Compliance limit is exceeded.* Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.

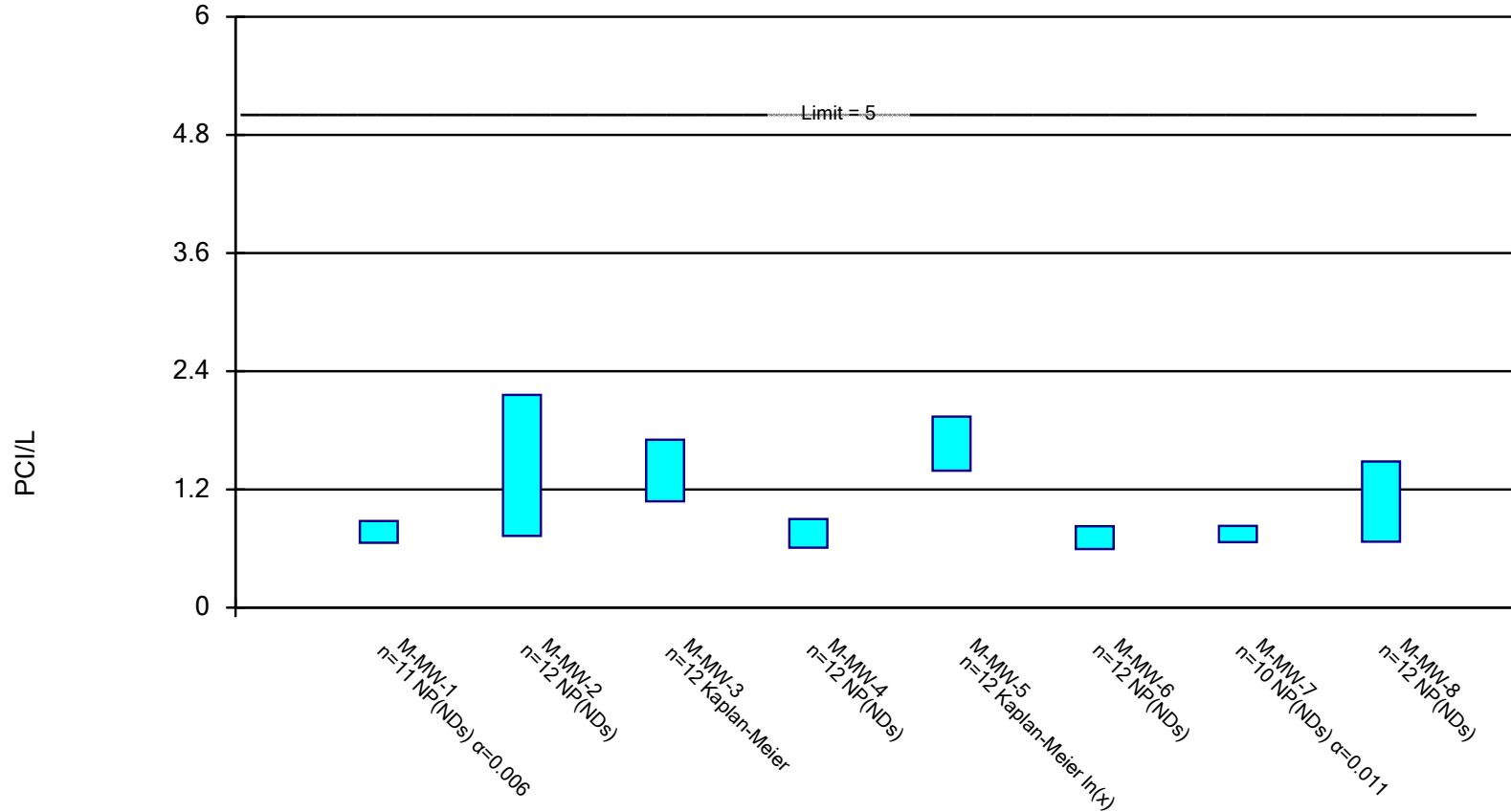


Constituent: MOLYBDENUM, TOTAL Analysis Run 11/22/2019 8:09 AM

Meramec E.C. Client: Ameren Data: MEC Data

Parametric and Non-Parametric (NP) Confidence Interval

Compliance Limit is not exceeded. Per-well alpha = 0.01 except as noted. Normality Test: Shapiro Wilk, alpha based on n.

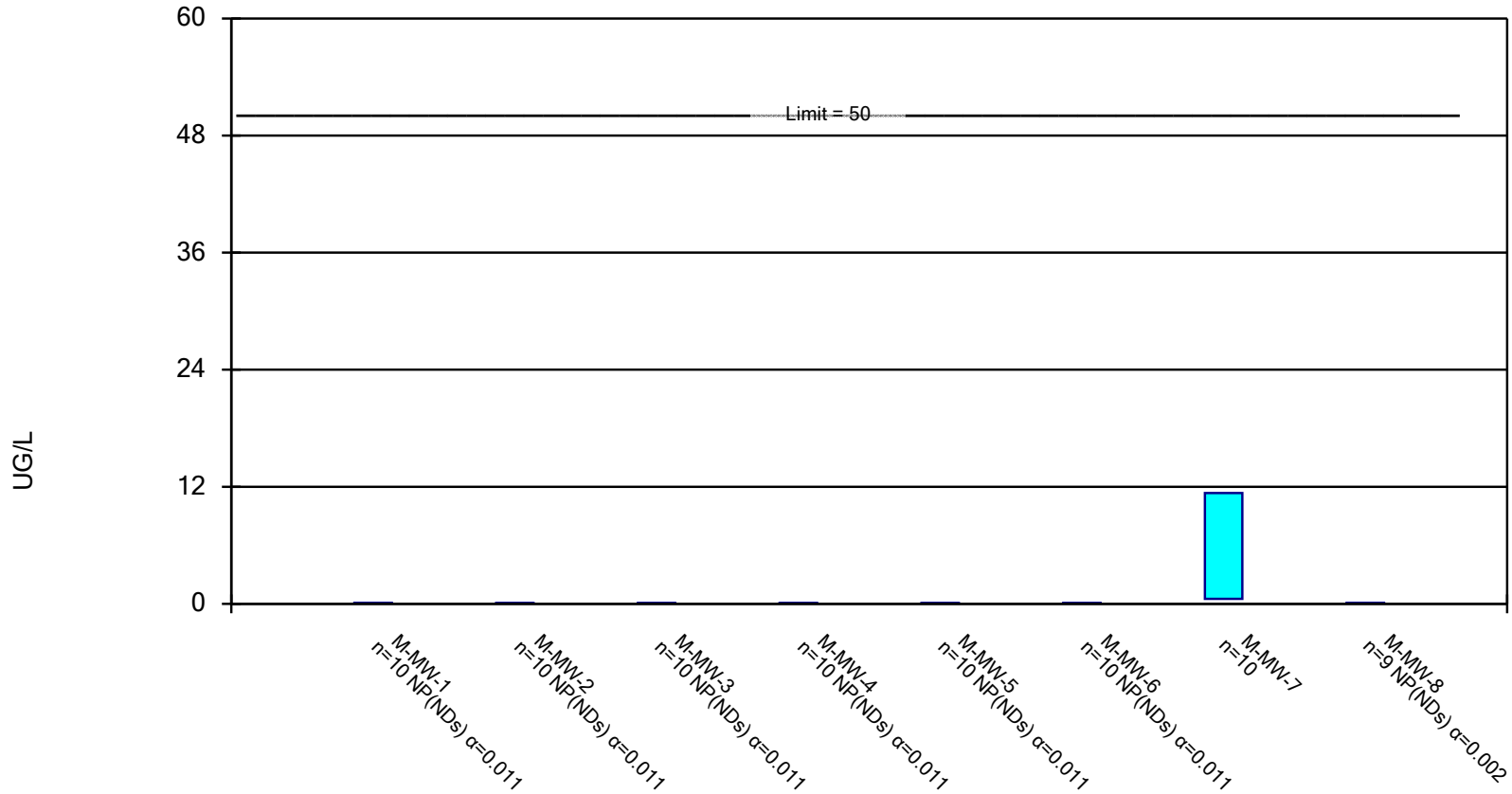


Constituent: Radium [226 + 228] Analysis Run 11/22/2019 8:09 AM

Meramec E.C. Client: Ameren Data: MEC Data

Parametric and Non-Parametric (NP) Confidence Interval

Compliance Limit is not exceeded. Per-well alpha = 0.01 except as noted. Normality Test: Shapiro Wilk, alpha based on n.

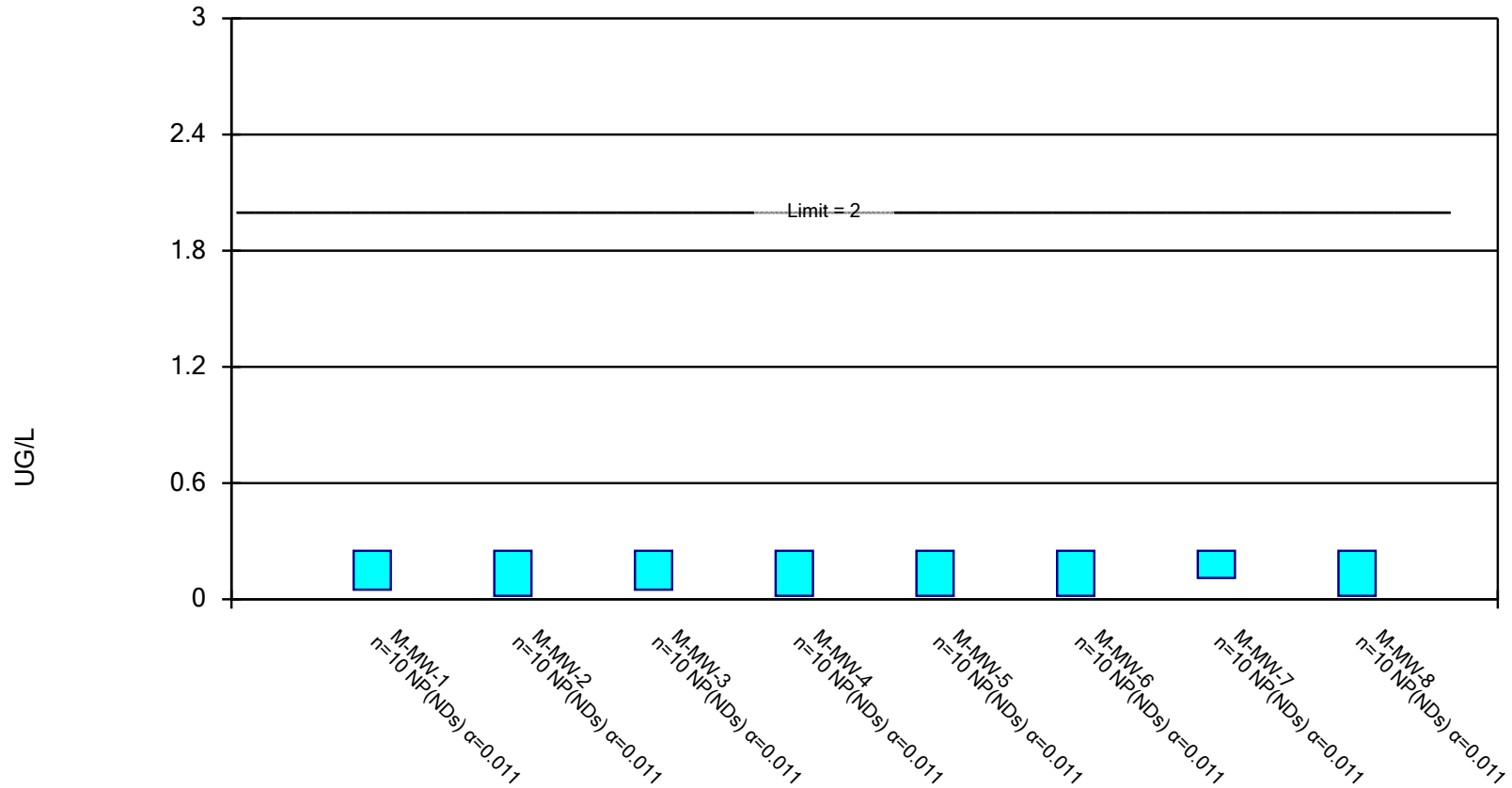


Constituent: SELENIUM, TOTAL Analysis Run 11/22/2019 8:09 AM

Meramec E.C. Client: Ameren Data: MEC Data

Non-Parametric Confidence Interval

Compliance Limit is not exceeded.



Constituent: THALLIUM, TOTAL Analysis Run 11/22/2019 8:09 AM

Meramec E.C. Client: Ameren Data: MEC Data

Confidence Interval

Meramec E.C. Client: Ameren Data: MEC Data Printed 11/22/2019, 8:09 AM

<u>Constituent</u>	<u>Well</u>	<u>Upper Lim.</u>	<u>Lower Lim.</u>	<u>Compliance</u>	<u>Sig.</u>	<u>N</u>	<u>%NDs</u>	<u>Transform</u>	<u>Alpha</u>	<u>Method</u>
ANTIMONY, TOTAL (UG/L)	M-MW-1	0.039	0.028	6	No	8	75	No	0.004	NP (NDs)
ANTIMONY, TOTAL (UG/L)	M-MW-2	0.039	0.013	6	No	10	90	No	0.011	NP (NDs)
ANTIMONY, TOTAL (UG/L)	M-MW-3	0.031	0.013	6	No	10	90	No	0.011	NP (NDs)
ANTIMONY, TOTAL (UG/L)	M-MW-4	0.029	0.013	6	No	10	90	No	0.011	NP (NDs)
ANTIMONY, TOTAL (UG/L)	M-MW-5	0.029	0.013	6	No	10	90	No	0.011	NP (NDs)
ANTIMONY, TOTAL (UG/L)	M-MW-6	0.066	0.029	6	No	10	50	No	0.011	NP (normality)
ANTIMONY, TOTAL (UG/L)	M-MW-7	0.4242	0.3783	6	No	8	0	No	0.01	Param.
ANTIMONY, TOTAL (UG/L)	M-MW-8	0.37	0.013	6	No	10	70	No	0.011	NP (NDs)
ARSENIC, TOTAL (UG/L)	M-MW-1	0.8476	0.4852	10	No	11	0	No	0.01	Param.
ARSENIC, TOTAL (UG/L)	M-MW-2	2.074	1.459	10	No	12	0	No	0.01	Param.
ARSENIC, TOTAL (UG/L)	M-MW-3	8.1	6.1	10	No	11	0	No	0.006	NP (normality)
ARSENIC, TOTAL (UG/L)	M-MW-4	14.71	13.53	10	Yes	11	0	No	0.01	Param.
ARSENIC, TOTAL (UG/L)	M-MW-5	22.22	19	10	Yes	10	0	No	0.01	Param.
ARSENIC, TOTAL (UG/L)	M-MW-6	5.659	2.668	10	No	11	0	No	0.01	Param.
ARSENIC, TOTAL (UG/L)	M-MW-7	3.459	2.361	10	No	12	0	ln(x)	0.01	Param.
ARSENIC, TOTAL (UG/L)	M-MW-8	6.28	5.611	10	No	11	0	No	0.01	Param.
BARIUM, TOTAL (UG/L)	M-MW-1	373.3	355.7	2000	No	12	0	No	0.01	Param.
BARIUM, TOTAL (UG/L)	M-MW-2	500	301	2000	No	12	0	No	0.01	NP (normality)
BARIUM, TOTAL (UG/L)	M-MW-3	255.6	215.9	2000	No	12	0	No	0.01	Param.
BARIUM, TOTAL (UG/L)	M-MW-4	228	200	2000	No	12	0	No	0.01	NP (normality)
BARIUM, TOTAL (UG/L)	M-MW-5	308	230	2000	No	12	0	No	0.01	NP (normality)
BARIUM, TOTAL (UG/L)	M-MW-6	74.97	53.88	2000	No	12	0	No	0.01	Param.
BARIUM, TOTAL (UG/L)	M-MW-7	52.74	39.74	2000	No	12	0	No	0.01	Param.
BARIUM, TOTAL (UG/L)	M-MW-8	236	168	2000	No	12	0	No	0.01	NP (normality)
BERYLLIUM, TOTAL (UG/L)	M-MW-1	0.17	0.125	4	No	10	80	No	0.011	NP (NDs)
BERYLLIUM, TOTAL (UG/L)	M-MW-2	0.13	0.08	4	No	10	100	No	0.011	NP (NDs)
BERYLLIUM, TOTAL (UG/L)	M-MW-3	0.13	0.08	4	No	10	100	No	0.011	NP (NDs)
BERYLLIUM, TOTAL (UG/L)	M-MW-4	0.28	0.125	4	No	10	70	No	0.011	NP (NDs)
BERYLLIUM, TOTAL (UG/L)	M-MW-5	0.13	0.08	4	No	10	100	No	0.011	NP (NDs)
BERYLLIUM, TOTAL (UG/L)	M-MW-6	0.13	0.08	4	No	9	100	No	0.002	NP (NDs)
BERYLLIUM, TOTAL (UG/L)	M-MW-7	0.13	0.08	4	No	9	100	No	0.002	NP (NDs)
BERYLLIUM, TOTAL (UG/L)	M-MW-8	0.13	0.08	4	No	10	100	No	0.011	NP (NDs)
CADMIUM, TOTAL (UG/L)	M-MW-1	0.042	0.009	5	No	10	80	No	0.011	NP (NDs)
CADMIUM, TOTAL (UG/L)	M-MW-2	0.0145	0.009	5	No	10	100	No	0.011	NP (NDs)
CADMIUM, TOTAL (UG/L)	M-MW-3	0.0165	0.009	5	No	9	100	No	0.002	NP (NDs)
CADMIUM, TOTAL (UG/L)	M-MW-4	0.0165	0.009	5	No	9	100	No	0.002	NP (NDs)
CADMIUM, TOTAL (UG/L)	M-MW-5	0.048	0.009	5	No	10	80	No	0.011	NP (NDs)
CADMIUM, TOTAL (UG/L)	M-MW-6	0.069	0.0145	5	No	10	60	No	0.011	NP (NDs)
CADMIUM, TOTAL (UG/L)	M-MW-7	0.2595	0.05993	5	No	10	20	No	0.01	Param.
CADMIUM, TOTAL (UG/L)	M-MW-8	0.099	0.009	5	No	10	60	No	0.011	NP (NDs)
CHROMIUM, TOTAL (UG/L)	M-MW-1	0.9378	0.2585	100	No	12	25	No	0.01	Param.
CHROMIUM, TOTAL (UG/L)	M-MW-2	0.755	0.1534	100	No	12	33.33	ln(x)	0.01	Param.
CHROMIUM, TOTAL (UG/L)	M-MW-3	0.5184	0.07647	100	No	12	50	No	0.01	Param.
CHROMIUM, TOTAL (UG/L)	M-MW-4	0.5716	0.1012	100	No	12	50	No	0.01	Param.
CHROMIUM, TOTAL (UG/L)	M-MW-5	0.2749	0.0857	100	No	12	50	No	0.01	Param.
CHROMIUM, TOTAL (UG/L)	M-MW-6	0.71	0.027	100	No	12	58.33	No	0.01	NP (NDs)
CHROMIUM, TOTAL (UG/L)	M-MW-7	0.5339	0.08681	100	No	12	50	ln(x)	0.01	Param.
CHROMIUM, TOTAL (UG/L)	M-MW-8	0.88	0.039	100	No	12	75	No	0.01	NP (NDs)
COBALT, TOTAL (UG/L)	M-MW-1	0.435	0.36	6	No	9	100	No	0.002	NP (NDs)
COBALT, TOTAL (UG/L)	M-MW-2	0.42	0.36	6	No	10	100	No	0.011	NP (NDs)

Confidence Interval

Meramec E.C. Client: Ameren Data: MEC Data Printed 11/22/2019, 8:09 AM

Constituent	Well	Upper Lim.	Lower Lim.	Compliance	Sig.	N	%NDs	Transform	Alpha	Method
COBALT, TOTAL (UG/L)	M-MW-3	1.5	0.36	6	No	10	60	No	0.011	NP (NDs)
COBALT, TOTAL (UG/L)	M-MW-4	0.42	0.36	6	No	10	100	No	0.011	NP (NDs)
COBALT, TOTAL (UG/L)	M-MW-5	0.42	0.36	6	No	10	100	No	0.011	NP (NDs)
COBALT, TOTAL (UG/L)	M-MW-6	6.749	2.591	6	No	10	0	No	0.01	Param.
COBALT, TOTAL (UG/L)	M-MW-7	0.435	0.36	6	No	9	100	No	0.002	NP (NDs)
COBALT, TOTAL (UG/L)	M-MW-8	0.42	0.36	6	No	10	100	No	0.011	NP (NDs)
FLUORIDE, TOTAL (MG/L)	M-MW-1	0.2822	0.2378	4	No	12	0	No	0.01	Param.
FLUORIDE, TOTAL (MG/L)	M-MW-2	0.1307	0.0815	4	No	14	21.43	No	0.01	Param.
FLUORIDE, TOTAL (MG/L)	M-MW-3	0.1107	0.07416	4	No	13	30.77	No	0.01	Param.
FLUORIDE, TOTAL (MG/L)	M-MW-4	0.1638	0.09783	4	No	13	15.38	No	0.01	Param.
FLUORIDE, TOTAL (MG/L)	M-MW-5	0.2375	0.1687	4	No	13	0	No	0.01	Param.
FLUORIDE, TOTAL (MG/L)	M-MW-6	0.2142	0.113	4	No	13	7.692	ln(x)	0.01	Param.
FLUORIDE, TOTAL (MG/L)	M-MW-7	0.5631	0.3409	4	No	15	0	No	0.01	Param.
FLUORIDE, TOTAL (MG/L)	M-MW-8	0.34	0.2	4	No	12	0	No	0.01	NP (normality)
LEAD, TOTAL (UG/L)	M-MW-1	4.3	1.2	15	No	10	80	No	0.011	NP (NDs)
LEAD, TOTAL (UG/L)	M-MW-2	2.7	1.25	15	No	10	60	No	0.011	NP (NDs)
LEAD, TOTAL (UG/L)	M-MW-3	1.7	1.25	15	No	10	90	No	0.011	NP (NDs)
LEAD, TOTAL (UG/L)	M-MW-4	2.7	1.2	15	No	10	80	No	0.011	NP (NDs)
LEAD, TOTAL (UG/L)	M-MW-5	3.3	1.2	15	No	10	70	No	0.011	NP (NDs)
LEAD, TOTAL (UG/L)	M-MW-6	1.7	1.25	15	No	10	90	No	0.011	NP (NDs)
LEAD, TOTAL (UG/L)	M-MW-7	2.7	1.25	15	No	10	80	No	0.011	NP (NDs)
LEAD, TOTAL (UG/L)	M-MW-8	4.8	1.25	15	No	10	70	No	0.011	NP (NDs)
LITHIUM, TOTAL (UG/L)	M-MW-1	5.3	1.45	40	No	11	81.82	No	0.006	NP (NDs)
LITHIUM, TOTAL (UG/L)	M-MW-2	6.134	3.303	40	No	11	36.36	No	0.01	Param.
LITHIUM, TOTAL (UG/L)	M-MW-3	7.278	3.985	40	No	11	36.36	No	0.01	Param.
LITHIUM, TOTAL (UG/L)	M-MW-4	25.21	19.52	40	No	11	0	No	0.01	Param.
LITHIUM, TOTAL (UG/L)	M-MW-5	23.94	17.52	40	No	11	0	No	0.01	Param.
LITHIUM, TOTAL (UG/L)	M-MW-6	137.9	125.3	40	Yes	10	0	No	0.01	Param.
LITHIUM, TOTAL (UG/L)	M-MW-7	62.35	39.67	40	No	11	0	No	0.01	Param.
LITHIUM, TOTAL (UG/L)	M-MW-8	32.73	28.62	40	No	11	0	No	0.01	Param.
MERCURY, TOTAL (UG/L)	M-MW-1	0.041	0.0195	2	No	10	90	No	0.011	NP (NDs)
MERCURY, TOTAL (UG/L)	M-MW-2	0.04	0.0195	2	No	10	90	No	0.011	NP (NDs)
MERCURY, TOTAL (UG/L)	M-MW-3	0.041	0.0195	2	No	10	90	No	0.011	NP (NDs)
MERCURY, TOTAL (UG/L)	M-MW-4	0.033	0.0195	2	No	10	100	No	0.011	NP (NDs)
MERCURY, TOTAL (UG/L)	M-MW-5	0.033	0.0195	2	No	10	100	No	0.011	NP (NDs)
MERCURY, TOTAL (UG/L)	M-MW-6	0.033	0.0195	2	No	10	100	No	0.011	NP (NDs)
MERCURY, TOTAL (UG/L)	M-MW-7	0.033	0.0195	2	No	10	100	No	0.011	NP (NDs)
MERCURY, TOTAL (UG/L)	M-MW-8	0.045	0.0195	2	No	10	90	No	0.011	NP (NDs)
MOLYBDENUM, TOTAL (UG/L)	M-MW-1	1.3	0.26	100	No	12	91.67	No	0.01	NP (NDs)
MOLYBDENUM, TOTAL (UG/L)	M-MW-2	2.5	0.26	100	No	12	75	No	0.01	NP (NDs)
MOLYBDENUM, TOTAL (UG/L)	M-MW-3	4.695	1.657	100	No	12	25	No	0.01	Param.
MOLYBDENUM, TOTAL (UG/L)	M-MW-4	54.63	51.32	100	No	12	0	No	0.01	Param.
MOLYBDENUM, TOTAL (UG/L)	M-MW-5	99	84.82	100	No	12	0	No	0.01	Param.
MOLYBDENUM, TOTAL (UG/L)	M-MW-6	147.4	126.6	100	Yes	12	0	No	0.01	Param.
MOLYBDENUM, TOTAL (UG/L)	M-MW-7	525.5	331.8	100	Yes	12	0	No	0.01	Param.
MOLYBDENUM, TOTAL (UG/L)	M-MW-8	214.6	193.2	100	Yes	12	0	No	0.01	Param.
Radium [226 + 228] (PCI/L)	M-MW-1	0.8785	0.6585	5	No	11	90.91	No	0.006	NP (NDs)
Radium [226 + 228] (PCI/L)	M-MW-2	2.16	0.728	5	No	12	66.67	No	0.01	NP (NDs)
Radium [226 + 228] (PCI/L)	M-MW-3	1.704	1.079	5	No	12	33.33	No	0.01	Param.
Radium [226 + 228] (PCI/L)	M-MW-4	0.9	0.6095	5	No	12	91.67	No	0.01	NP (NDs)

Confidence Interval

Meramec E.C. Client: Ameren Data: MEC Data Printed 11/22/2019, 8:09 AM

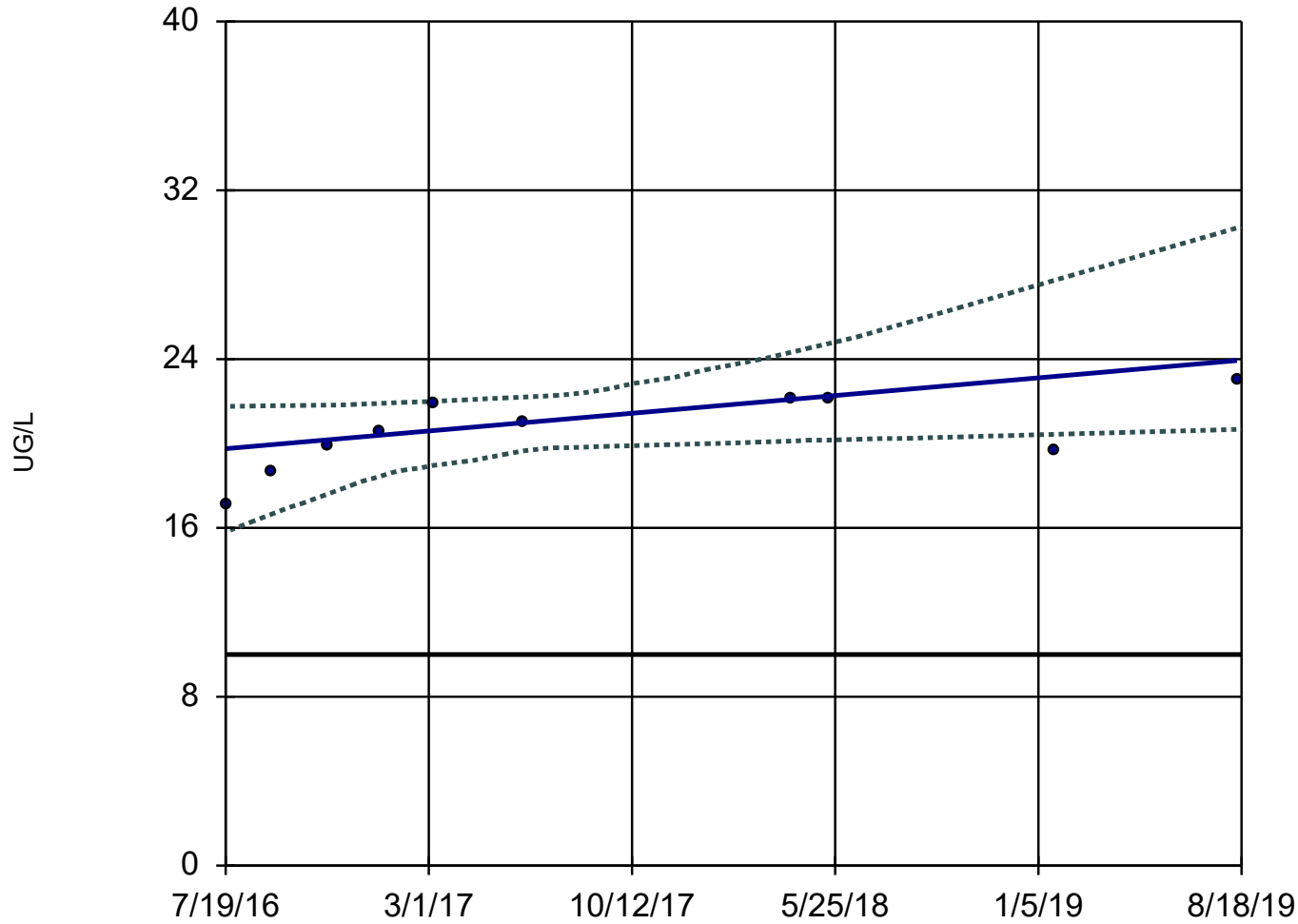
<u>Constituent</u>	<u>Well</u>	<u>Upper Lim.</u>	<u>Lower Lim.</u>	<u>Compliance</u>	<u>Sig.</u>	<u>N</u>	<u>%NDs</u>	<u>Transform</u>	<u>Alpha</u>	<u>Method</u>
Radium [226 + 228] (PCI/L)	M-MW-5	1.939	1.39	5	No	12	50	ln(x)	0.01	Param.
Radium [226 + 228] (PCI/L)	M-MW-6	0.827	0.5945	5	No	12	100	No	0.01	NP (NDs)
Radium [226 + 228] (PCI/L)	M-MW-7	0.83	0.6655	5	No	10	100	No	0.011	NP (NDs)
Radium [226 + 228] (PCI/L)	M-MW-8	1.483	0.669	5	No	12	75	No	0.01	NP (NDs)
SELENIUM, TOTAL (UG/L)	M-MW-1	0.1	0.043	50	No	10	80	No	0.011	NP (NDs)
SELENIUM, TOTAL (UG/L)	M-MW-2	0.09	0.043	50	No	10	90	No	0.011	NP (NDs)
SELENIUM, TOTAL (UG/L)	M-MW-3	0.09	0.043	50	No	10	90	No	0.011	NP (NDs)
SELENIUM, TOTAL (UG/L)	M-MW-4	0.09	0.043	50	No	10	90	No	0.011	NP (NDs)
SELENIUM, TOTAL (UG/L)	M-MW-5	0.09	0.043	50	No	10	100	No	0.011	NP (NDs)
SELENIUM, TOTAL (UG/L)	M-MW-6	0.09	0.043	50	No	10	90	No	0.011	NP (NDs)
SELENIUM, TOTAL (UG/L)	M-MW-7	11.36	0.5045	50	No	10	10	No	0.01	Param.
SELENIUM, TOTAL (UG/L)	M-MW-8	0.11	0.043	50	No	9	88.89	No	0.002	NP (NDs)
THALLIUM, TOTAL (UG/L)	M-MW-1	0.25	0.0495	2	No	10	80	No	0.011	NP (NDs)
THALLIUM, TOTAL (UG/L)	M-MW-2	0.25	0.018	2	No	10	100	No	0.011	NP (NDs)
THALLIUM, TOTAL (UG/L)	M-MW-3	0.25	0.0495	2	No	10	80	No	0.011	NP (NDs)
THALLIUM, TOTAL (UG/L)	M-MW-4	0.25	0.018	2	No	10	100	No	0.011	NP (NDs)
THALLIUM, TOTAL (UG/L)	M-MW-5	0.25	0.018	2	No	10	100	No	0.011	NP (NDs)
THALLIUM, TOTAL (UG/L)	M-MW-6	0.25	0.018	2	No	10	90	No	0.011	NP (NDs)
THALLIUM, TOTAL (UG/L)	M-MW-7	0.25	0.11	2	No	10	70	No	0.011	NP (NDs)
THALLIUM, TOTAL (UG/L)	M-MW-8	0.25	0.018	2	No	10	100	No	0.011	NP (NDs)

APPENDIX B

Sanitas Trending Confidence Bands Statistical Output

Sen's Slope and 95% Confidence Band

M-MW-5



n = 10

Slope = 1.361
units per year.

Mann-Kendall
statistic = 30
critical = 27

Increasing trend
significant at 98%
confidence level
($\alpha = 0.01$ per
tail).

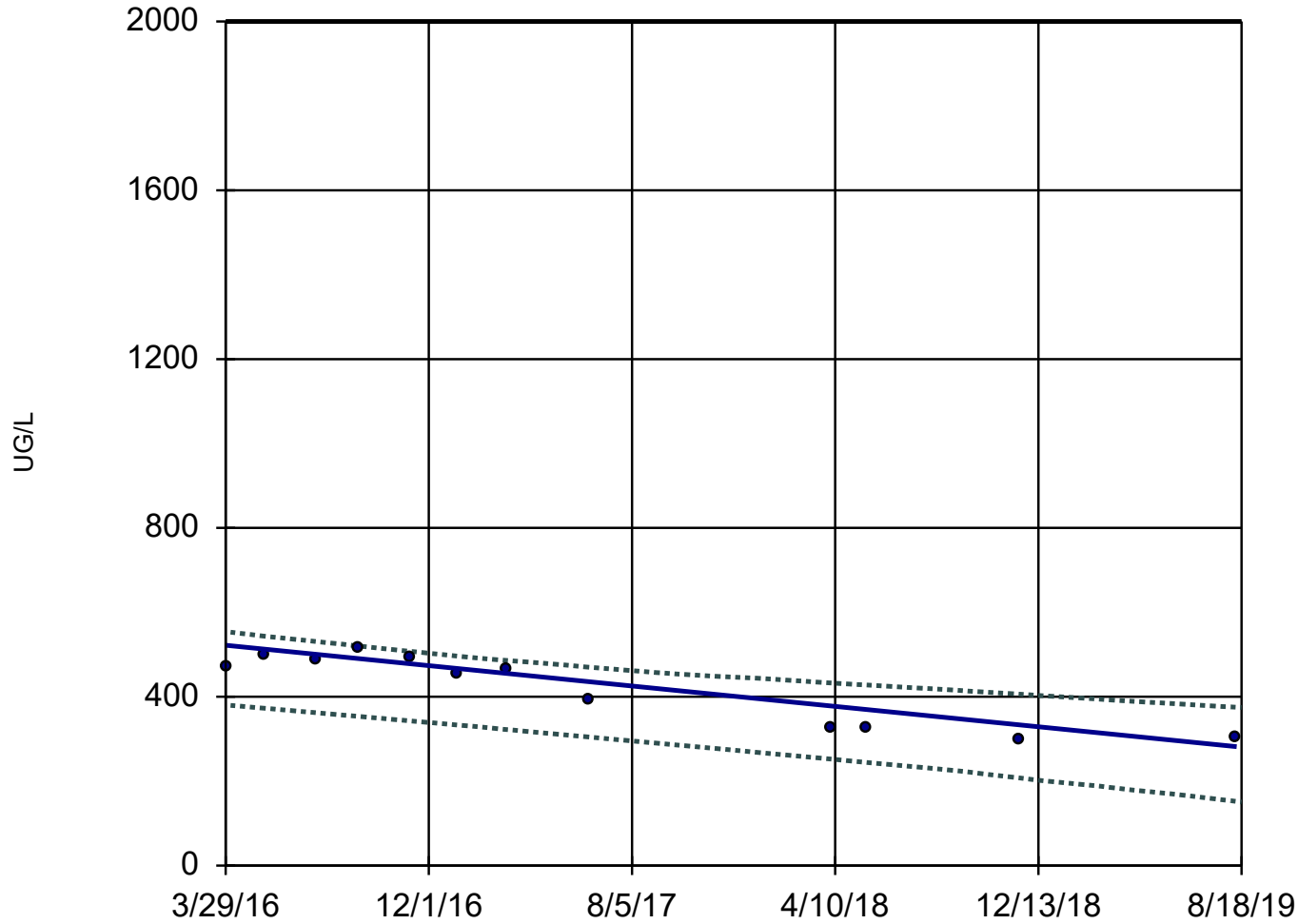
GWPS = 10.

Constituent: ARSENIC, TOTAL Analysis Run 11/22/2019 8:10 AM

Meramec E.C. Client: Ameren Data: MEC Data

Sen's Slope and 95% Confidence Band

M-MW-2



n = 12

Slope = -71.28
units per year.

Mann-Kendall
statistic = -46
critical = -35

Decreasing trend
significant at 98%
confidence level
($\alpha = 0.01$ per
tail).

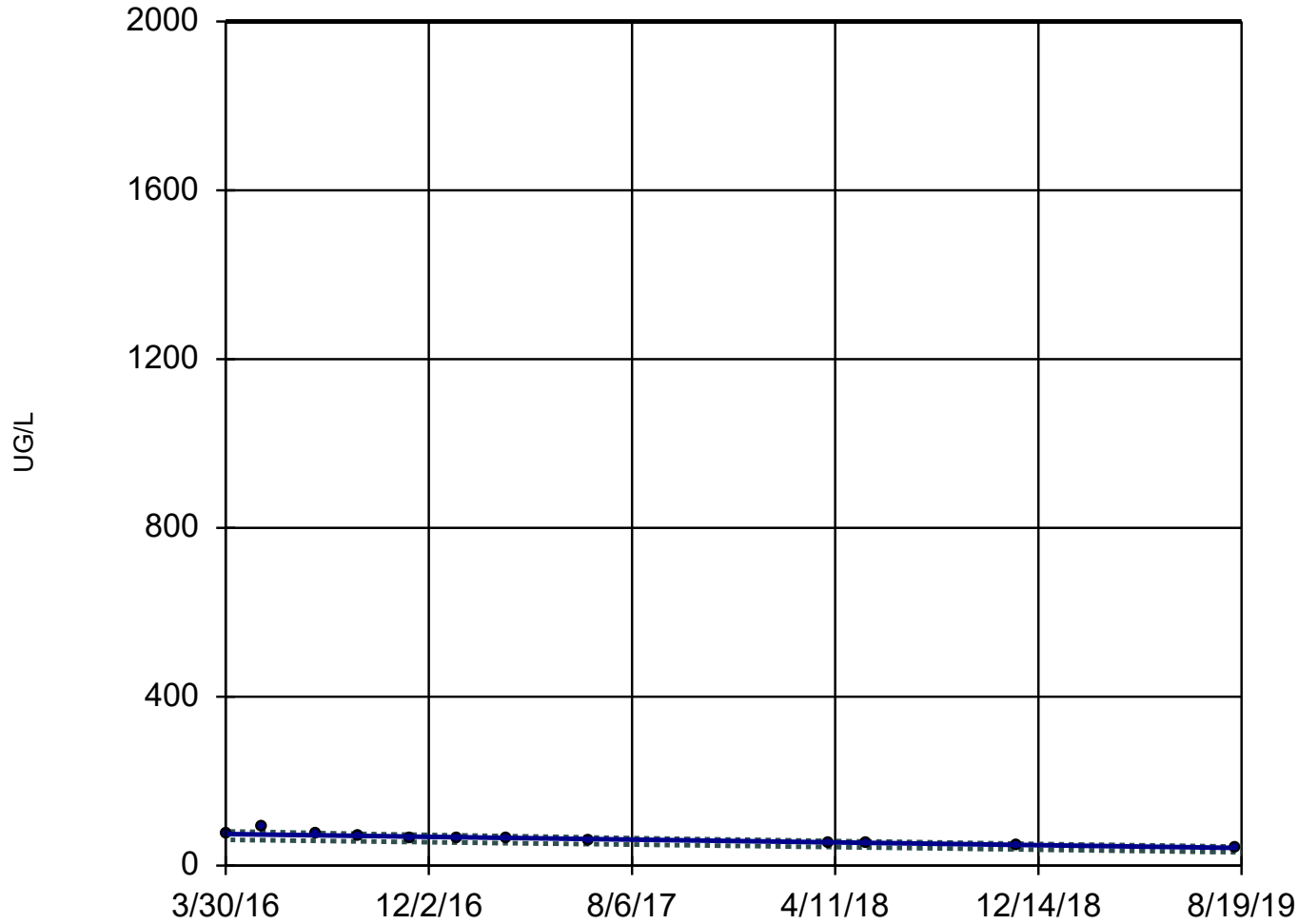
GWPS = 2000.

Constituent: BARIUM, TOTAL Analysis Run 11/22/2019 8:10 AM

Meramec E.C. Client: Ameren Data: MEC Data

Sen's Slope and 95% Confidence Band

M-MW-6



n = 12

Slope = -9.754
units per year.

Mann-Kendall
statistic = -62
critical = -35

Decreasing trend
significant at 98%
confidence level
($\alpha = 0.01$ per
tail).

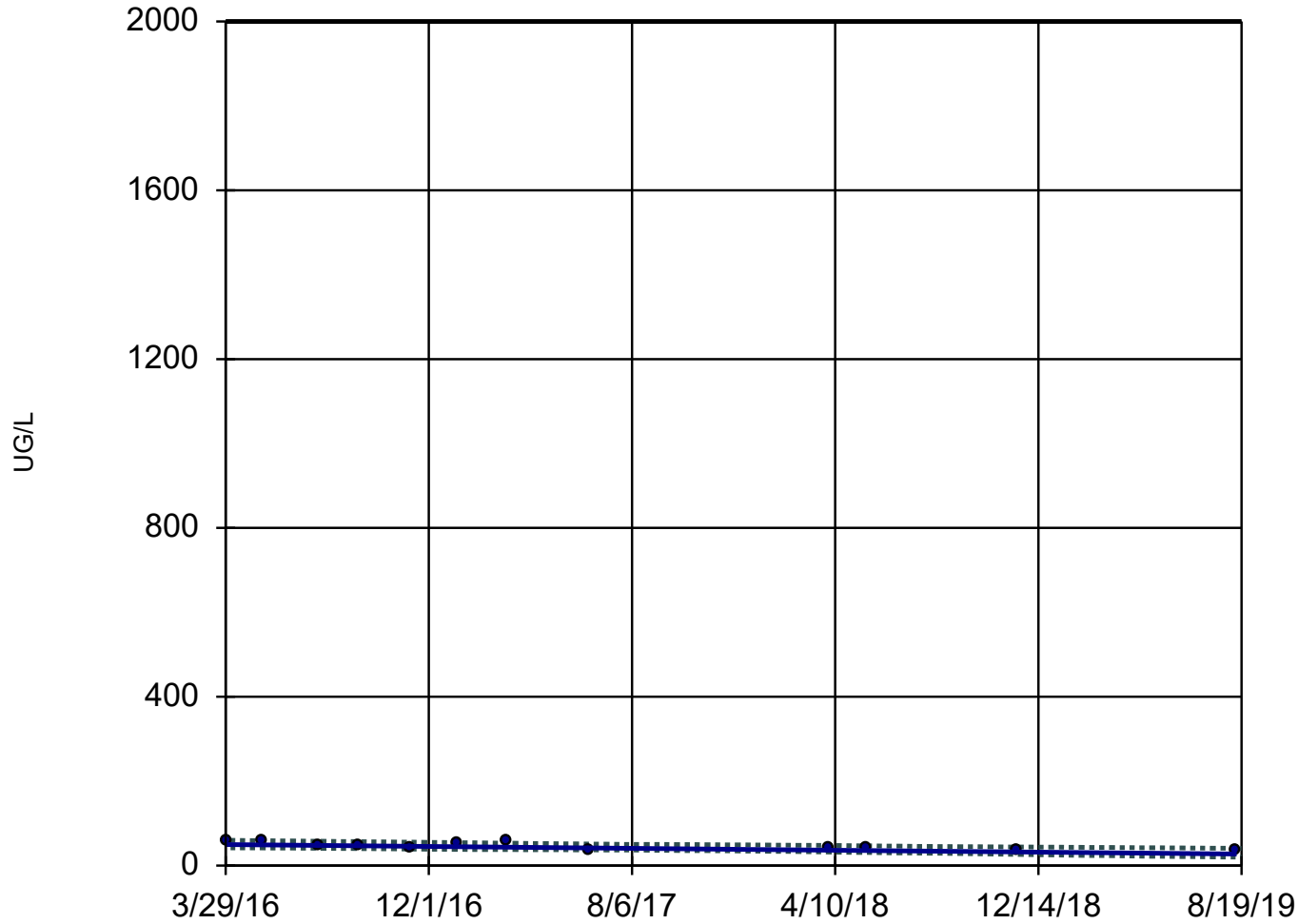
GWPS = 2000.

Constituent: BARIUM, TOTAL Analysis Run 11/22/2019 8:10 AM

Meramec E.C. Client: Ameren Data: MEC Data

Sen's Slope and 95% Confidence Band

M-MW-7



n = 12

Slope = -6.569
units per year.

Mann-Kendall
statistic = -42
critical = -35

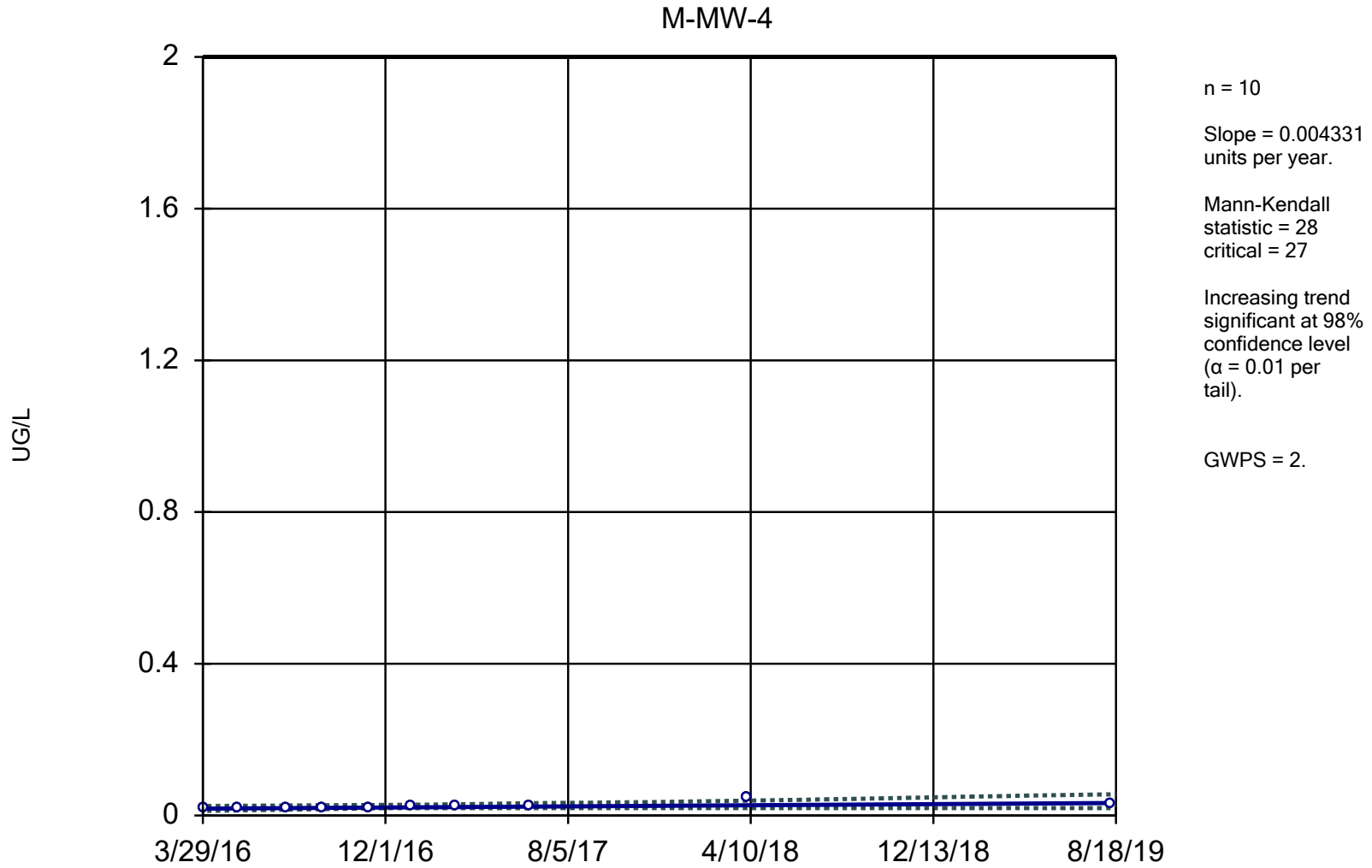
Decreasing trend
significant at 98%
confidence level
($\alpha = 0.01$ per
tail).

GWPS = 2000.

Constituent: BARIUM, TOTAL Analysis Run 11/22/2019 8:10 AM

Meramec E.C. Client: Ameren Data: MEC Data

Sen's Slope and 95% Confidence Band

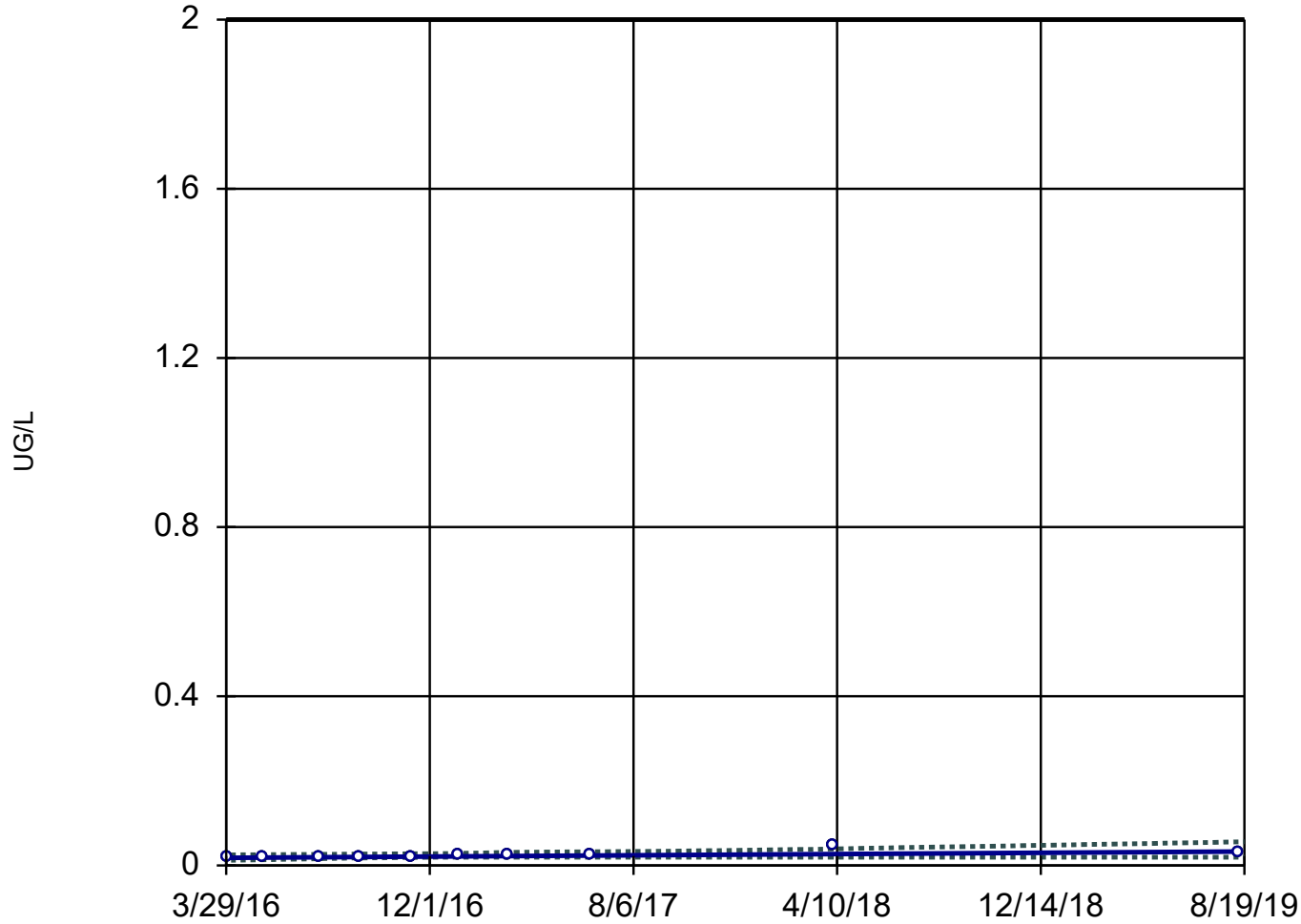


Constituent: MERCURY, TOTAL Analysis Run 11/22/2019 8:11 AM

Meramec E.C. Client: Ameren Data: MEC Data

Sen's Slope and 95% Confidence Band

M-MW-5



n = 10

Slope = 0.004287
units per year.

Mann-Kendall
statistic = 28
critical = 27

Increasing trend
significant at 98%
confidence level
($\alpha = 0.01$ per
tail).

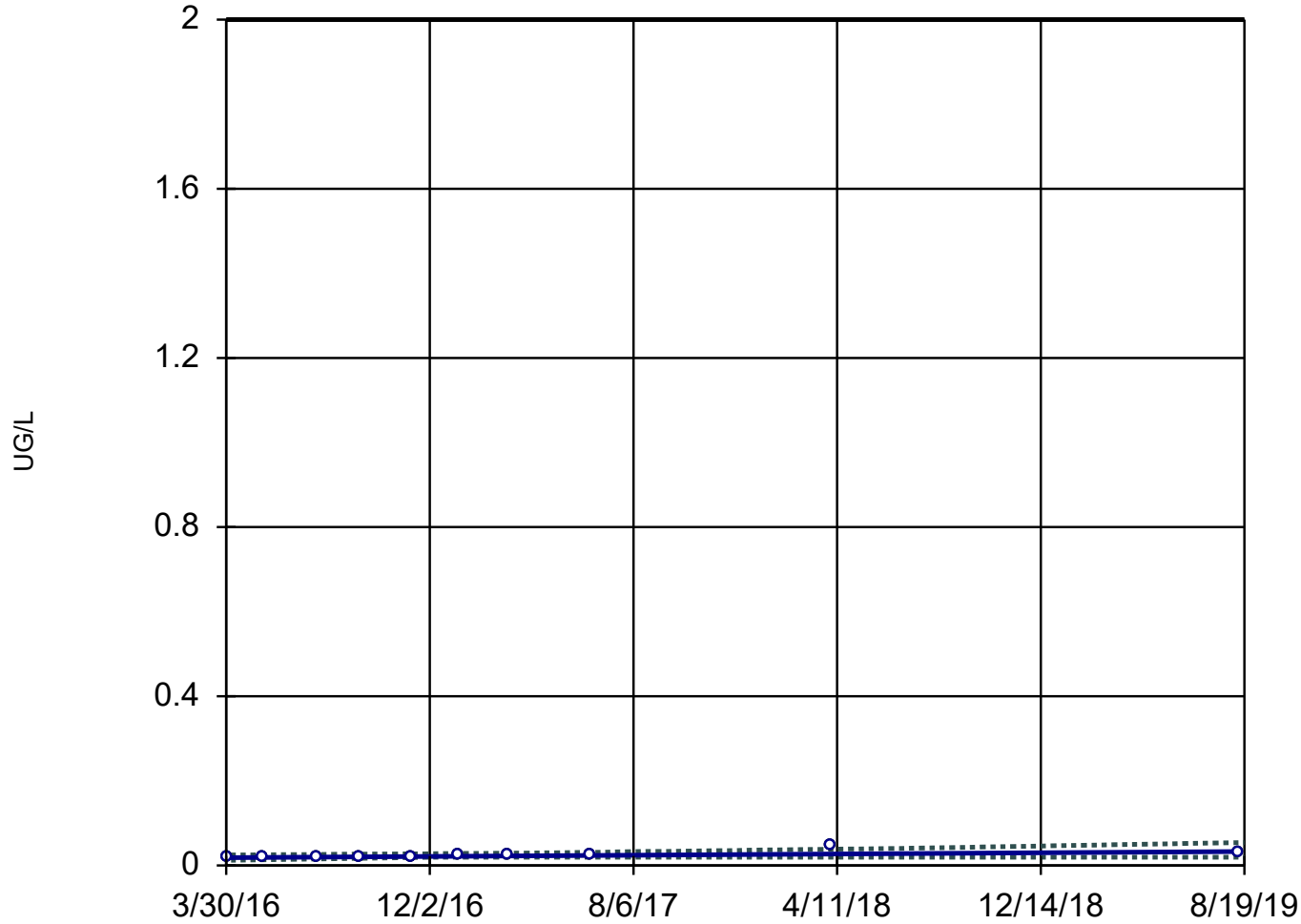
GWPS = 2.

Constituent: MERCURY, TOTAL Analysis Run 11/22/2019 8:11 AM

Meramec E.C. Client: Ameren Data: MEC Data

Sen's Slope and 95% Confidence Band

M-MW-6



n = 10

Slope = 0.004287
units per year.

Mann-Kendall
statistic = 28
critical = 27

Increasing trend
significant at 98%
confidence level
($\alpha = 0.01$ per
tail).

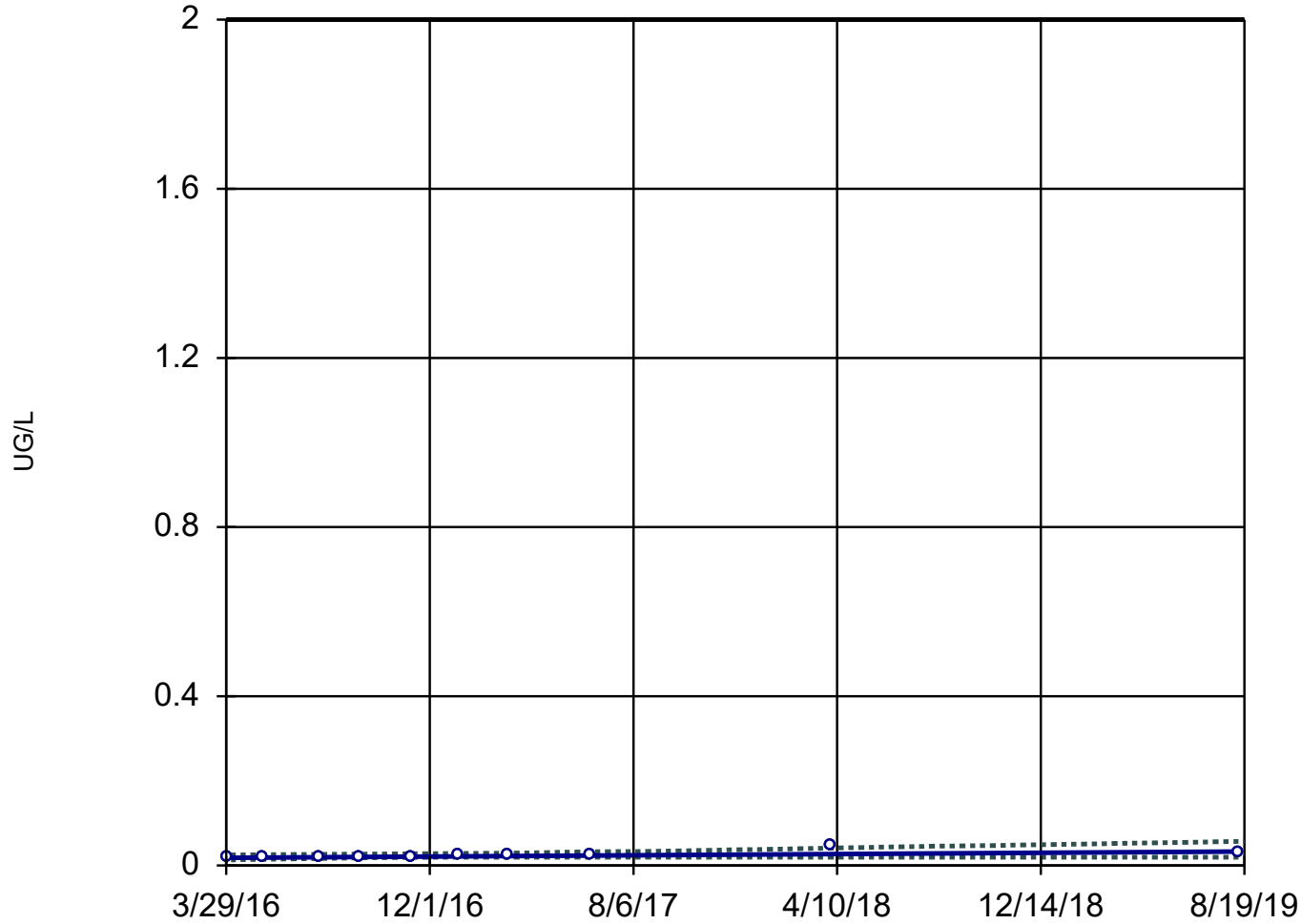
GWPS = 2.

Constituent: MERCURY, TOTAL Analysis Run 11/22/2019 8:11 AM

Meramec E.C. Client: Ameren Data: MEC Data

Sen's Slope and 95% Confidence Band

M-MW-7



n = 10

Slope = 0.004287
units per year.

Mann-Kendall
statistic = 28
critical = 27

Increasing trend
significant at 98%
confidence level
($\alpha = 0.01$ per
tail).

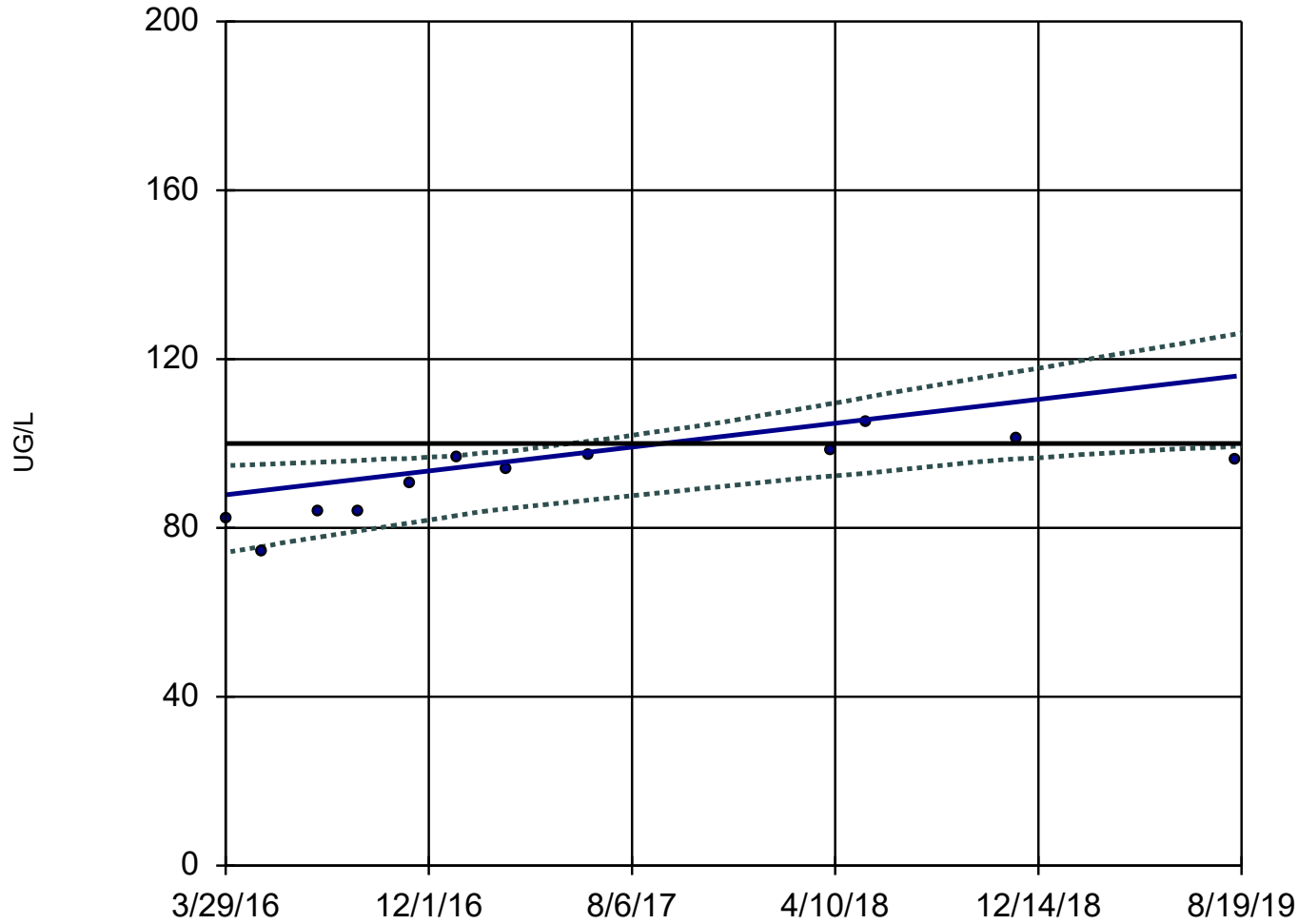
GWPS = 2.

Constituent: MERCURY, TOTAL Analysis Run 11/22/2019 8:11 AM

Meramec E.C. Client: Ameren Data: MEC Data

Sen's Slope and 95% Confidence Band

M-MW-5



n = 12

Slope = 8.333
units per year.

Mann-Kendall
statistic = 48
critical = 35

Increasing trend
significant at 98%
confidence level
($\alpha = 0.01$ per
tail).

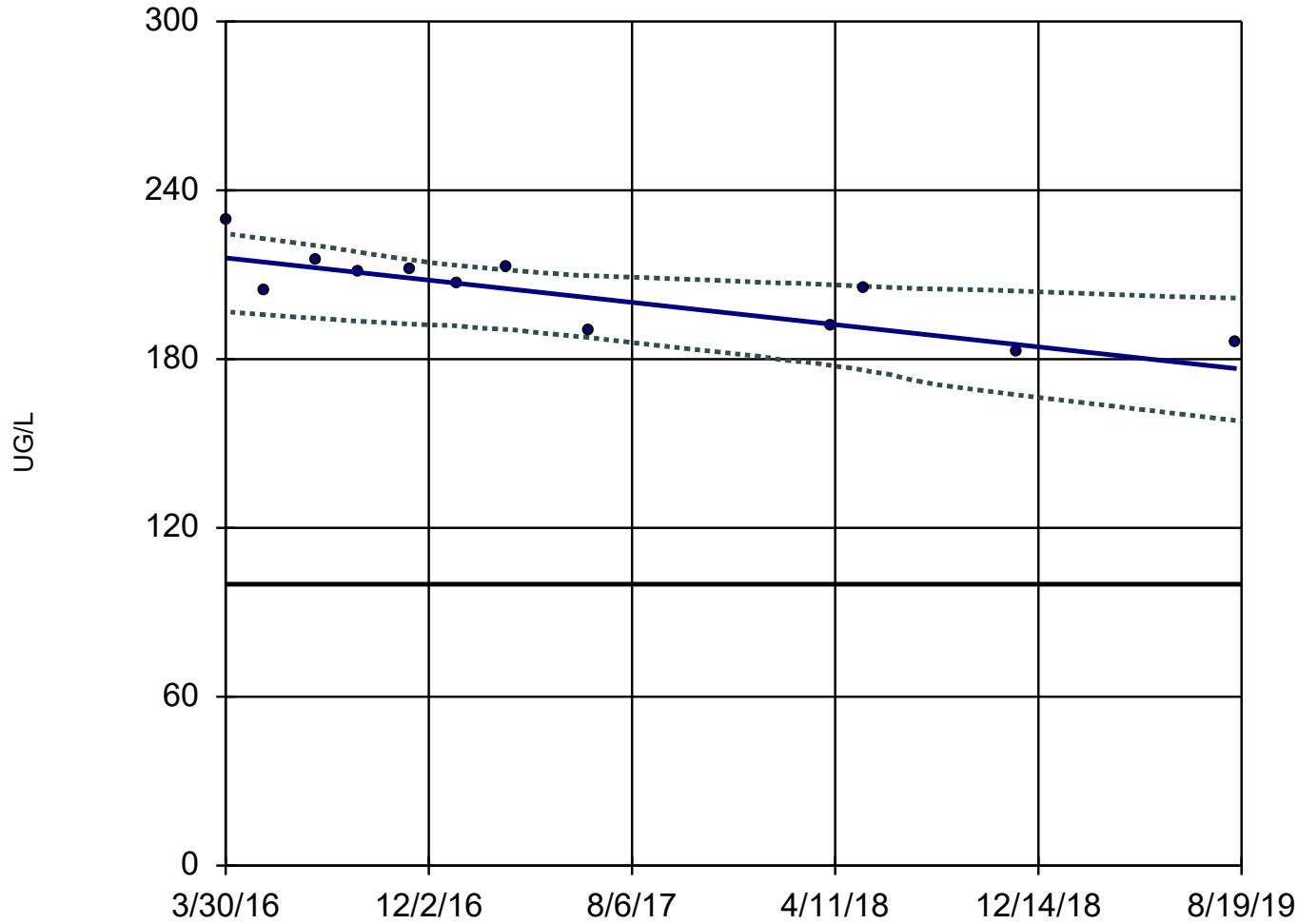
GWPS = 100.

Constituent: MOLYBDENUM, TOTAL Analysis Run 11/22/2019 8:11 AM

Meramec E.C. Client: Ameren Data: MEC Data

Sen's Slope and 95% Confidence Band

M-MW-8



n = 12

Slope = -11.66
units per year.

Mann-Kendall
statistic = -38
critical = -35

Decreasing trend
significant at 98%
confidence level
($\alpha = 0.01$ per
tail).

GWPS = 100.

Constituent: MOLYBDENUM, TOTAL Analysis Run 11/22/2019 8:11 AM

Meramec E.C. Client: Ameren Data: MEC Data

Trend Test

Meramec E.C. Client: Ameren Data: MEC Data Printed 11/22/2019, 8:14 AM

Constituent	Well	Slope	Calc.	Critical	Sig.	N	%NDs	Normality	Xform	Alpha	Method
ANTIMONY, TOTAL (UG/L)	M-MW-1	0	6	20	No	8	75	n/a	n/a	0.02	NP
ANTIMONY, TOTAL (UG/L)	M-MW-2	0	3	27	No	10	90	n/a	n/a	0.02	NP
ANTIMONY, TOTAL (UG/L)	M-MW-3	0	3	27	No	10	90	n/a	n/a	0.02	NP
ANTIMONY, TOTAL (UG/L)	M-MW-4	0	-7	-27	No	10	90	n/a	n/a	0.02	NP
ANTIMONY, TOTAL (UG/L)	M-MW-5	0	-9	-27	No	10	90	n/a	n/a	0.02	NP
ANTIMONY, TOTAL (UG/L)	M-MW-6	0.002028	11	27	No	10	50	n/a	n/a	0.02	NP
ANTIMONY, TOTAL (UG/L)	M-MW-7	0	1	20	No	8	0	n/a	n/a	0.02	NP
ANTIMONY, TOTAL (UG/L)	M-MW-8	-0.01017	-12	-27	No	10	70	n/a	n/a	0.02	NP
ARSENIC, TOTAL (UG/L)	M-MW-1	0.0199	7	31	No	11	0	n/a	n/a	0.02	NP
ARSENIC, TOTAL (UG/L)	M-MW-2	0	0	35	No	12	0	n/a	n/a	0.02	NP
ARSENIC, TOTAL (UG/L)	M-MW-3	0.4885	26	31	No	11	0	n/a	n/a	0.02	NP
ARSENIC, TOTAL (UG/L)	M-MW-4	0.5069	29	31	No	11	0	n/a	n/a	0.02	NP
ARSENIC, TOTAL (UG/L)	M-MW-5	1.361	30	27	Yes	10	0	n/a	n/a	0.02	NP
ARSENIC, TOTAL (UG/L)	M-MW-6	-0.7116	-17	-31	No	11	0	n/a	n/a	0.02	NP
ARSENIC, TOTAL (UG/L)	M-MW-7	0	2	35	No	12	0	n/a	n/a	0.02	NP
ARSENIC, TOTAL (UG/L)	M-MW-8	-0.106	-12	-31	No	11	0	n/a	n/a	0.02	NP
BARIUM, TOTAL (UG/L)	M-MW-1	-3.68	-19	-35	No	12	0	n/a	n/a	0.02	NP
BARIUM, TOTAL (UG/L)	M-MW-2	-71.28	-46	-35	Yes	12	0	n/a	n/a	0.02	NP
BARIUM, TOTAL (UG/L)	M-MW-3	-9.07	-17	-35	No	12	0	n/a	n/a	0.02	NP
BARIUM, TOTAL (UG/L)	M-MW-4	-7.17	-30	-35	No	12	0	n/a	n/a	0.02	NP
BARIUM, TOTAL (UG/L)	M-MW-5	-16.93	-10	-35	No	12	0	n/a	n/a	0.02	NP
BARIUM, TOTAL (UG/L)	M-MW-6	-9.754	-62	-35	Yes	12	0	n/a	n/a	0.02	NP
BARIUM, TOTAL (UG/L)	M-MW-7	-6.569	-42	-35	Yes	12	0	n/a	n/a	0.02	NP
BARIUM, TOTAL (UG/L)	M-MW-8	-21.48	-24	-35	No	12	0	n/a	n/a	0.02	NP
BERYLLIUM, TOTAL (UG/L)	M-MW-1	0	0	27	No	10	80	n/a	n/a	0.02	NP
BERYLLIUM, TOTAL (UG/L)	M-MW-2	-0.00...	-21	-27	No	10	100	n/a	n/a	0.02	NP
BERYLLIUM, TOTAL (UG/L)	M-MW-3	-0.00...	-21	-27	No	10	100	n/a	n/a	0.02	NP
BERYLLIUM, TOTAL (UG/L)	M-MW-4	0	-5	-27	No	10	70	n/a	n/a	0.02	NP
BERYLLIUM, TOTAL (UG/L)	M-MW-5	-0.00...	-21	-27	No	10	100	n/a	n/a	0.02	NP
BERYLLIUM, TOTAL (UG/L)	M-MW-6	-0.00...	-16	-23	No	9	100	n/a	n/a	0.02	NP
BERYLLIUM, TOTAL (UG/L)	M-MW-7	-0.00...	-16	-23	No	9	100	n/a	n/a	0.02	NP
BERYLLIUM, TOTAL (UG/L)	M-MW-8	-0.00...	-21	-27	No	10	100	n/a	n/a	0.02	NP
CADMIUM, TOTAL (UG/L)	M-MW-1	0	-4	-27	No	10	80	n/a	n/a	0.02	NP
CADMIUM, TOTAL (UG/L)	M-MW-2	0	-9	-27	No	10	100	n/a	n/a	0.02	NP
CADMIUM, TOTAL (UG/L)	M-MW-3	0	-4	-23	No	9	100	n/a	n/a	0.02	NP
CADMIUM, TOTAL (UG/L)	M-MW-4	0	-4	-23	No	9	100	n/a	n/a	0.02	NP
CADMIUM, TOTAL (UG/L)	M-MW-5	0	-6	-27	No	10	80	n/a	n/a	0.02	NP
CADMIUM, TOTAL (UG/L)	M-MW-6	0.02103	21	27	No	10	60	n/a	n/a	0.02	NP
CADMIUM, TOTAL (UG/L)	M-MW-7	0.1	23	27	No	10	20	n/a	n/a	0.02	NP
CADMIUM, TOTAL (UG/L)	M-MW-8	0	2	27	No	10	60	n/a	n/a	0.02	NP
CHROMIUM, TOTAL (UG/L)	M-MW-1	-0.1845	-19	-35	No	12	25	n/a	n/a	0.02	NP
CHROMIUM, TOTAL (UG/L)	M-MW-2	-0.05794	-9	-35	No	12	33.33	n/a	n/a	0.02	NP
CHROMIUM, TOTAL (UG/L)	M-MW-3	-0.1103	-18	-35	No	12	50	n/a	n/a	0.02	NP
CHROMIUM, TOTAL (UG/L)	M-MW-4	-0.1776	-27	-35	No	12	50	n/a	n/a	0.02	NP
CHROMIUM, TOTAL (UG/L)	M-MW-5	-0.06273	-15	-35	No	12	50	n/a	n/a	0.02	NP
CHROMIUM, TOTAL (UG/L)	M-MW-6	-0.02208	-11	-35	No	12	58.33	n/a	n/a	0.02	NP
CHROMIUM, TOTAL (UG/L)	M-MW-7	-0.09339	-11	-35	No	12	50	n/a	n/a	0.02	NP
CHROMIUM, TOTAL (UG/L)	M-MW-8	-0.04154	-13	-35	No	12	75	n/a	n/a	0.02	NP
COBALT, TOTAL (UG/L)	M-MW-1	0.009294	23	23	No	9	100	n/a	n/a	0.02	NP
COBALT, TOTAL (UG/L)	M-MW-2	0.006541	27	27	No	10	100	n/a	n/a	0.02	NP

Trend Test

Meramec E.C. Client: Ameren Data: MEC Data Printed 11/22/2019, 8:14 AM

Constituent	Well	Slope	Calc.	Critical	Sig.	N	%NDs	Normality	Xform	Alpha	Method
COBALT, TOTAL (UG/L)	M-MW-3	0.007866	7	27	No	10	60	n/a	n/a	0.02	NP
COBALT, TOTAL (UG/L)	M-MW-4	0.006541	27	27	No	10	100	n/a	n/a	0.02	NP
COBALT, TOTAL (UG/L)	M-MW-5	0.006541	27	27	No	10	100	n/a	n/a	0.02	NP
COBALT, TOTAL (UG/L)	M-MW-6	1.708	16	27	No	10	0	n/a	n/a	0.02	NP
COBALT, TOTAL (UG/L)	M-MW-7	0.009246	23	23	No	9	100	n/a	n/a	0.02	NP
COBALT, TOTAL (UG/L)	M-MW-8	0.006541	27	27	No	10	100	n/a	n/a	0.02	NP
FLUORIDE, TOTAL (MG/L)	M-MW-1	0	-1	-35	No	12	0	n/a	n/a	0.02	NP
FLUORIDE, TOTAL (MG/L)	M-MW-2	-0.00...	-12	-44	No	14	21.43	n/a	n/a	0.02	NP
FLUORIDE, TOTAL (MG/L)	M-MW-3	-0.01032	-15	-39	No	13	30.77	n/a	n/a	0.02	NP
FLUORIDE, TOTAL (MG/L)	M-MW-4	-0.01883	-23	-39	No	13	15.38	n/a	n/a	0.02	NP
FLUORIDE, TOTAL (MG/L)	M-MW-5	-0.00...	-12	-39	No	13	0	n/a	n/a	0.02	NP
FLUORIDE, TOTAL (MG/L)	M-MW-6	-0.00...	-4	-39	No	13	7.692	n/a	n/a	0.02	NP
FLUORIDE, TOTAL (MG/L)	M-MW-7	0.03515	20	48	No	15	0	n/a	n/a	0.02	NP
FLUORIDE, TOTAL (MG/L)	M-MW-8	0	-1	-35	No	12	0	n/a	n/a	0.02	NP
LEAD, TOTAL (UG/L)	M-MW-1	0	-6	-27	No	10	80	n/a	n/a	0.02	NP
LEAD, TOTAL (UG/L)	M-MW-2	-0.2669	-10	-27	No	10	60	n/a	n/a	0.02	NP
LEAD, TOTAL (UG/L)	M-MW-3	0	14	27	No	10	90	n/a	n/a	0.02	NP
LEAD, TOTAL (UG/L)	M-MW-4	0	-2	-27	No	10	80	n/a	n/a	0.02	NP
LEAD, TOTAL (UG/L)	M-MW-5	-0.156	-13	-27	No	10	70	n/a	n/a	0.02	NP
LEAD, TOTAL (UG/L)	M-MW-6	0	12	27	No	10	90	n/a	n/a	0.02	NP
LEAD, TOTAL (UG/L)	M-MW-7	0.1322	13	27	No	10	80	n/a	n/a	0.02	NP
LEAD, TOTAL (UG/L)	M-MW-8	0	3	27	No	10	70	n/a	n/a	0.02	NP
LITHIUM, TOTAL (UG/L)	M-MW-1	0	9	31	No	11	81.82	n/a	n/a	0.02	NP
LITHIUM, TOTAL (UG/L)	M-MW-2	0.1592	9	31	No	11	36.36	n/a	n/a	0.02	NP
LITHIUM, TOTAL (UG/L)	M-MW-3	-0.06827	-4	-31	No	11	36.36	n/a	n/a	0.02	NP
LITHIUM, TOTAL (UG/L)	M-MW-4	0.04279	2	31	No	11	0	n/a	n/a	0.02	NP
LITHIUM, TOTAL (UG/L)	M-MW-5	-0.7742	-5	-31	No	11	0	n/a	n/a	0.02	NP
LITHIUM, TOTAL (UG/L)	M-MW-6	0.7573	7	27	No	10	0	n/a	n/a	0.02	NP
LITHIUM, TOTAL (UG/L)	M-MW-7	3.293	7	31	No	11	0	n/a	n/a	0.02	NP
LITHIUM, TOTAL (UG/L)	M-MW-8	1.06	23	31	No	11	0	n/a	n/a	0.02	NP
MERCURY, TOTAL (UG/L)	M-MW-1	0.003996	18	27	No	10	90	n/a	n/a	0.02	NP
MERCURY, TOTAL (UG/L)	M-MW-2	0.004003	18	27	No	10	90	n/a	n/a	0.02	NP
MERCURY, TOTAL (UG/L)	M-MW-3	0.004003	18	27	No	10	90	n/a	n/a	0.02	NP
MERCURY, TOTAL (UG/L)	M-MW-4	0.004331	28	27	Yes	10	100	n/a	n/a	0.02	NP
MERCURY, TOTAL (UG/L)	M-MW-5	0.004287	28	27	Yes	10	100	n/a	n/a	0.02	NP
MERCURY, TOTAL (UG/L)	M-MW-6	0.004287	28	27	Yes	10	100	n/a	n/a	0.02	NP
MERCURY, TOTAL (UG/L)	M-MW-7	0.004287	28	27	Yes	10	100	n/a	n/a	0.02	NP
MERCURY, TOTAL (UG/L)	M-MW-8	0.004003	16	27	No	10	90	n/a	n/a	0.02	NP
MOLYBDENUM, TOTAL (UG/L)	M-MW-1	0.116	26	35	No	12	91.67	n/a	n/a	0.02	NP
MOLYBDENUM, TOTAL (UG/L)	M-MW-2	0.09732	16	35	No	12	75	n/a	n/a	0.02	NP
MOLYBDENUM, TOTAL (UG/L)	M-MW-3	1.332	26	35	No	12	25	n/a	n/a	0.02	NP
MOLYBDENUM, TOTAL (UG/L)	M-MW-4	0.6885	14	35	No	12	0	n/a	n/a	0.02	NP
MOLYBDENUM, TOTAL (UG/L)	M-MW-5	8.333	48	35	Yes	12	0	n/a	n/a	0.02	NP
MOLYBDENUM, TOTAL (UG/L)	M-MW-6	0.5122	1	35	No	12	0	n/a	n/a	0.02	NP
MOLYBDENUM, TOTAL (UG/L)	M-MW-7	39.5	14	35	No	12	0	n/a	n/a	0.02	NP
MOLYBDENUM, TOTAL (UG/L)	M-MW-8	-11.66	-38	-35	Yes	12	0	n/a	n/a	0.02	NP
Radium [226 + 228] (PCI/L)	M-MW-1	-0.0683	-25	-31	No	11	90.91	n/a	n/a	0.02	NP
Radium [226 + 228] (PCI/L)	M-MW-2	0.04024	14	35	No	12	66.67	n/a	n/a	0.02	NP
Radium [226 + 228] (PCI/L)	M-MW-3	0.1502	20	35	No	12	33.33	n/a	n/a	0.02	NP
Radium [226 + 228] (PCI/L)	M-MW-4	-0.03385	-10	-35	No	12	91.67	n/a	n/a	0.02	NP

Trend Test

Meramec E.C. Client: Ameren Data: MEC Data Printed 11/22/2019, 8:14 AM

<u>Constituent</u>	<u>Well</u>	<u>Slope</u>	<u>Calc.</u>	<u>Critical</u>	<u>Sig.</u>	<u>N</u>	<u>%NDs</u>	<u>Normality</u>	<u>Xform</u>	<u>Alpha</u>	<u>Method</u>
Radium [226 + 228] (PCI/L)	M-MW-5	0.01531	2	35	No	12	50	n/a	n/a	0.02	NP
Radium [226 + 228] (PCI/L)	M-MW-6	-0.03362	-14	-35	No	12	100	n/a	n/a	0.02	NP
Radium [226 + 228] (PCI/L)	M-MW-7	0.01506	1	27	No	10	100	n/a	n/a	0.02	NP
Radium [226 + 228] (PCI/L)	M-MW-8	0.1018	12	35	No	12	75	n/a	n/a	0.02	NP
SELENIUM, TOTAL (UG/L)	M-MW-1	0	5	27	No	10	80	n/a	n/a	0.02	NP
SELENIUM, TOTAL (UG/L)	M-MW-2	0	-9	-27	No	10	90	n/a	n/a	0.02	NP
SELENIUM, TOTAL (UG/L)	M-MW-3	0	-9	-27	No	10	90	n/a	n/a	0.02	NP
SELENIUM, TOTAL (UG/L)	M-MW-4	0	-13	-27	No	10	90	n/a	n/a	0.02	NP
SELENIUM, TOTAL (UG/L)	M-MW-5	-0.01461	-27	-27	No	10	100	n/a	n/a	0.02	NP
SELENIUM, TOTAL (UG/L)	M-MW-6	-0.00...	-21	-27	No	10	90	n/a	n/a	0.02	NP
SELENIUM, TOTAL (UG/L)	M-MW-7	0.2109	3	27	No	10	10	n/a	n/a	0.02	NP
SELENIUM, TOTAL (UG/L)	M-MW-8	0	-7	-23	No	9	88.89	n/a	n/a	0.02	NP
THALLIUM, TOTAL (UG/L)	M-MW-1	-0.06523	-26	-27	No	10	80	n/a	n/a	0.02	NP
THALLIUM, TOTAL (UG/L)	M-MW-2	-0.06186	-21	-27	No	10	100	n/a	n/a	0.02	NP
THALLIUM, TOTAL (UG/L)	M-MW-3	-0.06191	-26	-27	No	10	80	n/a	n/a	0.02	NP
THALLIUM, TOTAL (UG/L)	M-MW-4	-0.06186	-21	-27	No	10	100	n/a	n/a	0.02	NP
THALLIUM, TOTAL (UG/L)	M-MW-5	-0.06165	-21	-27	No	10	100	n/a	n/a	0.02	NP
THALLIUM, TOTAL (UG/L)	M-MW-6	-0.06534	-23	-27	No	10	90	n/a	n/a	0.02	NP
THALLIUM, TOTAL (UG/L)	M-MW-7	-0.06165	-26	-27	No	10	70	n/a	n/a	0.02	NP
THALLIUM, TOTAL (UG/L)	M-MW-8	-0.06181	-21	-27	No	10	100	n/a	n/a	0.02	NP

APPENDIX E

**Nature and Extent Technical
Memorandum**

Technical Memorandum

DATE January 2020

Project No. 153140601

TO Bill Kutosky
Ameren Missouri

CC Susan Knowles, Craig Giesmann, Charley Henderson, Paul Pike

FROM Jeffrey Ingram, Mark Haddock

EMAIL Jingram@Golder.com

NATURE AND EXTENT INVESTIGATION, MERAMEC ENERGY CENTER, ST. LOUIS COUNTY, MISSOURI

Dear Mr. Kutosky,

Golder Associates Inc. (Golder) is pleased to submit this Technical Memorandum summarizing recent groundwater sampling and groundwater level measurements near the Ameren Missouri (Ameren) Meramec Energy Center (MEC) in St. Louis County, Missouri. This Technical Memorandum provides the groundwater sampling results and groundwater level measurement results from this ongoing investigation of Coal Combustion Residual (CCR) impacts from the MEC Surface Impoundments to groundwater. A figure displaying the locations of the monitoring wells used for this investigation is provided as **Figure 1**.

1.0 PROJECT SCOPE OF WORK

The scope of work for this investigation included the following:

- Collect multiple samples in the nature and extent monitoring network for CCR Rule constituents
- Complete multiple rounds of groundwater elevation measurements to produce potentiometric surface maps
- Tabulate sampling results and prepare a Technical Memorandum

2.0 GROUNDWATER SAMPLING

Groundwater sampling was completed in November 2018 and August 2019. Sampling was completed using low flow sampling techniques and guidelines as provided in the MEC Groundwater Monitoring Plan. Tables summarizing the analytical results are provided in **Tables 1** and **2**. Laboratory data report packets and data validation memos are included in the 2019 MEC Annual Report.

Samples were collected from four (4) piezometers that were previously installed onsite and were selected for nature and extent purposes. Well construction diagrams for these monitoring wells are provided in the 2018 Annual Report.

3.0 GROUNDWATER LEVEL MONITORING

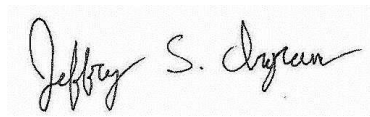
Multiple rounds of water level measurements were collected from available monitoring wells. A table displaying the groundwater level monitoring results is provided in **Table 3**. Measurements were used to create site-wide

potentiometric surface maps for evaluating groundwater flow direction. Potentiometric surface maps are provided in the 2018 and 2019 Annual Reports for the MEC.

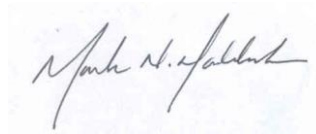
4.0 CLOSING

Golder appreciates the opportunity to serve as your consultant on this project. If you have any questions concerning this letter report or need additional information, please contact the undersigned at 314-984-8800.

GOLDER ASSOCIATES INC.



Jeffrey Ingram, R.G.
Project Geologist



Mark Haddock, P.E., R.G.
Principal, Practice Leader

JSI/MNH

Attachments or Enclosures:

Tables

Table 1 – Nature and Extent Groundwater Sampling Analytical Results – November 2018

Table 2 – Nature and Extent Groundwater Sampling Analytical Results – August 2019

Table 3 – Summary of Groundwater Elevation Monitoring Results

Figures

Figure 1 – Site Location Aerial Map and Monitoring Well and Piezometer Location Map

Tables

Table 1
Nature and Extent Groundwater Sampling Analytical Results - November 2018
Meramec Energy Center, St. Louis County, MO

Analyte	Units	Nature and Extent Piezometers			
		MW-9 (AMW-1)	MW-10 (AMW-2)	TP-1	TP-2
Field Parameters					
DATE	NA	11/20/2018	11/19/2018	11/20/2018	11/19/2018
DISSOLVED OXYGEN	mg/L	0.61	0.17	0.13	0.12
pH	SU	6.85	6.72	7.56	6.91
REDOX POTENTIAL	mV	137.8	32.9	-65.6	-77.6
SPECIFIC CONDUCTIVITY	mS/cm	1.04	1.04	0.59	1.55
TURBIDITY	NTU	1.26	4.42	4.05	3.52
Appendix III Parameters					
BORON, TOTAL	µg/L	7,690	1,980	640	2,550
CALCIUM, TOTAL	µg/L	170,000	190,000	77,100	217,000
CHLORIDE, TOTAL	mg/L	38.4	63.1	21.3	242
FLUORIDE, TOTAL	mg/L	0.19 J	0.30	0.30	0.36
SULFATE, TOTAL	mg/L	344	200	ND	475
TOTAL DISSOLVED SOLIDS	mg/L	319	941	404	1,450
Appendix IV Parameters					
ANTIMONY, TOTAL	µg/L	ND	ND	ND	ND
ARSENIC, TOTAL	µg/L	18.0	11.7	1.9	3.8
BARIUM, TOTAL	µg/L	325	147	386	58.8
BERYLLIUM, TOTAL	µg/L	ND	ND	ND	ND
CADMIUM, TOTAL	µg/L	ND	ND	0.039 J	ND
CHROMIUM, TOTAL	µg/L	0.19 J	0.23 J	0.17 J	ND
COBALT, TOTAL	µg/L	ND	ND	ND	ND
LEAD, TOTAL	µg/L	ND	ND	4.1 J	ND
LITHIUM, TOTAL	µg/L	16.4	36.0	17.2	42.7
MERCURY, TOTAL	µg/L	ND	ND	ND	ND
MOLYBDENUM, TOTAL	µg/L	39.1	4.3 J	3.1 J	6.2 J
RADIUM [226 + 228]	pCi/L	ND	1.488	-	-
SELENIUM, TOTAL	µg/L	ND	ND	ND	ND
THALLIUM, TOTAL	µg/L	ND	ND	ND	ND
Additional Parameters					
ALKALINITY	mg/L	365	525	387	403
IRON, FERRIC, TOTAL	mg/L	14.7	13.9	6.5 J	13.8
IRON, FERROUS, TOTAL	mg/L	4.7 J	2.4 J	1.9 J	2.1 J
IRON, TOTAL	µg/L	19,400	16,300	8,420	15,900
MAGNESIUM, TOTAL	µg/L	56,900	47,700	31,300	56,200
MANGANESE, TOTAL	µg/L	513	704	110	578
PHOSPHORUS, TOTAL	mg/L	1.1	0.69	0.58	0.68
POTASSIUM, TOTAL	µg/L	5,340	7,780	3,160	7,890
SODIUM, TOTAL	µg/L	45,400	49,000	44,900	167,000

Notes:

- 1) Unit Abbreviations: µg/L - micrograms per liter, mg/L - milligrams per liter, SU - Standard Units, mV - millivolts
mS/cm - millisiemens per centimeter, NTU - nephelometric turbidity unit, pCi/L - picoCuries per liter.
- 2) " - " Not sampled.
- 3) J - Result is an estimated value.
- 4) ND - Constituent was analyzed for, but was not detected above the Method Detection Limit (MDL)
and is considered a non-detect.
- 5) NA - Not Applicable.
- 6) Radium [226 + 228] is reported as the sum of Radium 226 and Radium 228 activity concentrations unless the sum of
Radium 226 and Radium 228 Minimum Detectable Concentrations (MDC) is higher in which case it is displayed as ND.

Table 2
Nature and Extent Groundwater Sampling Analytical Results - August 2019
Meramec Energy Center, St. Louis County, MO

Analyte	Units	Nature and Extent	
		TP-1	TP-2
Field Parameters			
DATE	NA	8/14/2019	8/13/2019
DISSOLVED OXYGEN	mg/L	0.21	0.13
pH	SU	7.31	7.01
REDOX POTENTIAL	mV	-179.0	-99.5
SPECIFIC CONDUCTIVITY	mS/cm	0.760	2.156
TURBIDITY	NTU	4.94	3.35
Appendix III Parameters			
BORON, TOTAL	µg/L	558	2,410
CALCIUM, TOTAL	µg/L	69,800	221,000 J
CHLORIDE, TOTAL	mg/L	20.2	271
FLUORIDE, TOTAL	mg/L	0.25	0.47
SULFATE, TOTAL	mg/L	ND	456
TOTAL DISSOLVED SOLIDS	mg/L	440	1,630
Appendix IV Parameters			
ANTIMONY, TOTAL	µg/L	ND	ND
ARSENIC, TOTAL	µg/L	14.3	4.0
BARIUM, TOTAL	µg/L	346	64.6
BERYLLIUM, TOTAL	µg/L	ND	ND
CADMIUM, TOTAL	µg/L	ND	ND
CHROMIUM, TOTAL	µg/L	4.2	0.084 J
COBALT, TOTAL	µg/L	ND	ND
LEAD, TOTAL	µg/L	ND	ND
LITHIUM, TOTAL	µg/L	10.5	43.3
MERCURY, TOTAL	µg/L	ND	ND
MOLYBDENUM, TOTAL	µg/L	ND	107
RADIUM [226 + 228]	pCi/L	ND	ND
SELENIUM, TOTAL	µg/L	ND	ND
THALLIUM, TOTAL	µg/L	ND	ND
Additional Parameters			
ALKALINITY	mg/L	386	392
IRON, TOTAL	µg/L	4,930	15,900
MAGNESIUM, TOTAL	µg/L	30,400	62,400
MANGANESE, TOTAL	µg/L	71.8	584
POTASSIUM, TOTAL	µg/L	2,940	8,230
SODIUM, TOTAL	µg/L	40,000	196,000 J

Notes:

- 1) Unit Abbreviations: µg/L - micrograms per liter, mg/L - milligrams per liter, SU - Standard Units, mV - millivolts
mS/cm - millisiemens per centimeter, NTU - nephelometric turbidity unit, pCi/L - picoCuries per liter.
- 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.
- 4) NA - Not Applicable.
- 5) Radium [226 + 228] is reported as the sum of Radium 226 and Radium 228 activity concentrations unless the sum of
Radium 226 and Radium 228 Minimum Detectable Concentrations (MDC) is higher in which case it is displayed as ND.

Created By: EMS
Checked By: KAB
Reviewed By: CMR

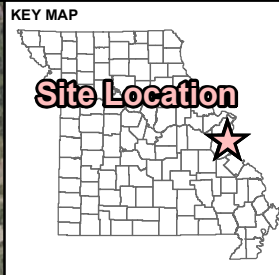
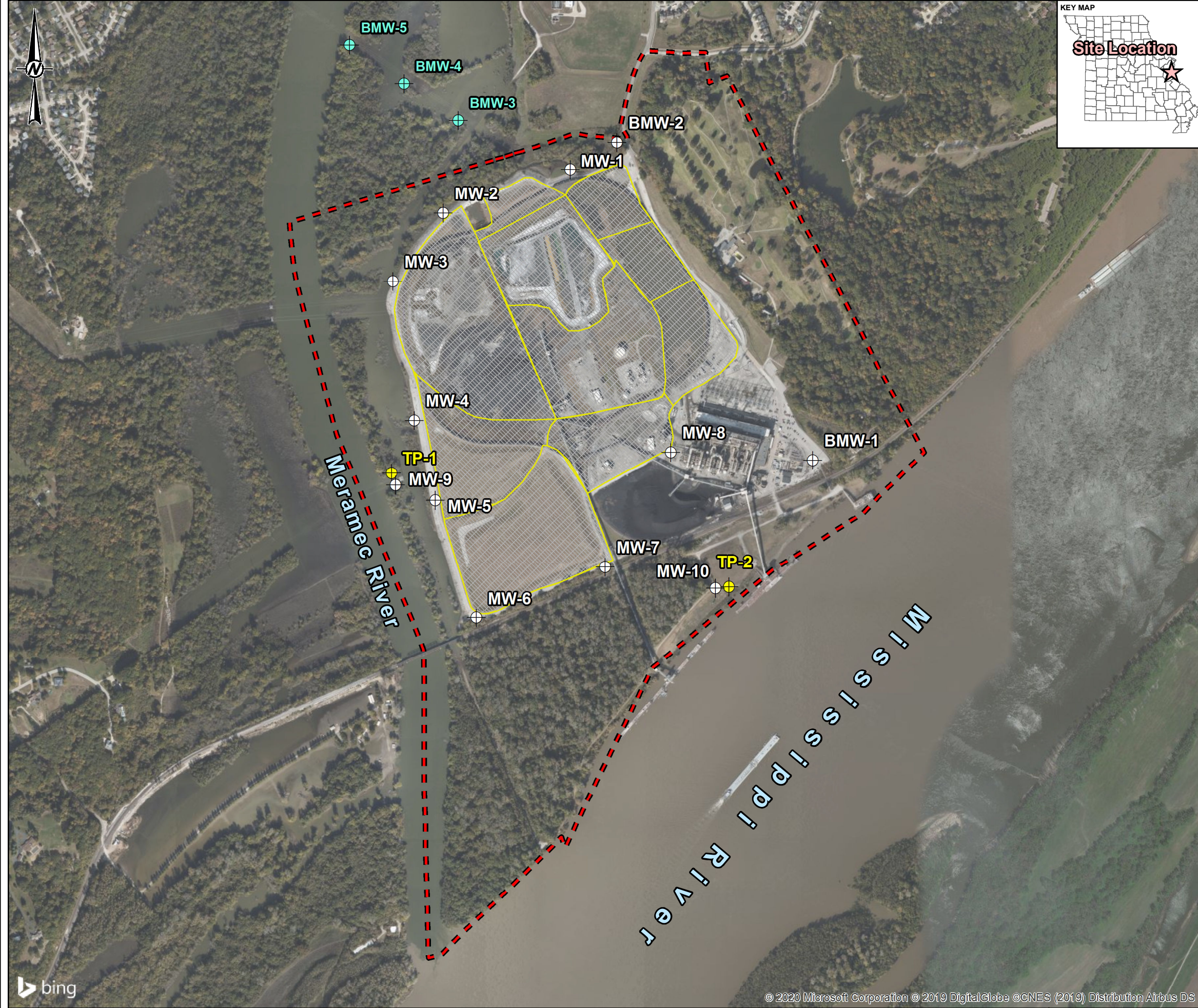
Table 3
Summary of Groundwater Elevation Monitoring Results
Meramec Energy Center, St. Louis County, MO

	Well ID	Location		Top of Casing	Ground Surface	Groundwater Elevation Measurements 11/19/2018		Groundwater Elevation Measurements 1/9/2019		Groundwater Elevation Measurements 1/28/2019		Groundwater Elevation Measurements 2/26/2019		Groundwater Elevation Measurements 8/12/2019		Groundwater Elevation Measurements 10/3/2019	
		Northing	Easting	FT MSL ⁴	FT MSL ⁴	DTW ²	GWE ³	DTW ²	GWE ³	DTW ²	GWE ³	DTW ²	GWE ³	DTW ²	GWE ³	DTW ²	GWE ³
CCR Rule Groundwater Monitoring Wells	MW-1	937676.9	865954.1	406.43	404.10	3.96	402.47	3.66	402.77	3.72	402.71	3.59	402.84	2.54	403.89	1.18	405.25
	MW-2	937325.1	864864.5	398.62	396.13	9.54	389.08	10.97	387.65	16.71	381.91	6.86	391.76	9.65	388.97	NC	NC
	MW-3	936750.8	864447.2	397.12	394.63	8.03	389.09	9.44	387.68	15.18	381.94	5.45	391.67	8.02	389.10	NC	NC
	MW-4	935618.0	864629.8	404.10	402.03	14.87	389.23	16.23	387.87	21.70	382.40	12.64	391.46	14.80	389.30	5.54	398.56
	MW-5	934874.4	864781.0	402.93	400.83	13.54	389.39	14.82	388.11	20.17	382.76	11.50	391.43	13.44	389.49	4.55	398.38
	MW-6	933905.2	865153.5	418.12	415.84	28.52	389.60	29.56	388.56	34.59	383.53	27.23	390.89	28.47	389.65	20.22	397.90
	MW-7	934334.4	866242.5	417.94	415.67	28.53	389.41	29.55	388.39	34.24	383.70	27.01	390.93	28.41	389.53	20.17	397.77
	MW-8	935303.6	866797.8	423.37	421.03	33.37	390.00	34.46	388.91	39.42	383.95	31.71	391.66	33.04	390.33	24.80	398.57
	BMW-1	935220.4	867989.4	419.08	416.79	24.64	394.44	25.72	393.36	28.90	390.18	24.21	394.87	24.71	394.37	20.64	398.44
	BMW-2	937927.1	866342.2	409.02	406.80	12.82	396.20	12.11	396.91	12.44	396.58	12.34	396.68	11.52	397.50	10.30	398.72
	MW-9 (AMW-1)	935106.5	864425.3	393.71	391.12	4.40	389.31	5.75	387.96	11.32	382.39	NC	NC	4.01	389.70	NC	NC
	MW-10 (AMW-2)	934137.4	867158.9	405.62	402.83	16.49	389.13	17.93	387.69	23.53	382.09	13.94	391.68	16.00	389.62	6.83	398.79
Nature and Extent Wells	TP-1	935109.7	864437.0	393.71	390.68	4.14	389.57	5.28	388.43	10.40	383.31	NC	NC	3.90	389.81	NC	NC
	TP-2	934151.5	867171.1	405.22	402.35	16.03	389.19	17.47	387.75	23.07	382.15	13.57	391.65	15.53	389.69	6.47	398.75
Groundwater Elevation Piezometers	BMW-3	938110.9	865000.6	396.16	393.45	NA	NA	NA	NA	14.26	381.90	4.44	391.72	7.10	389.06	NC	NC
	BMW-4	938425.9	864543.5	396.34	393.52	NA	NA	NA	NA	14.52	381.82	4.02	392.32	7.27	389.07	NC	NC
	BMW-5	938750.3	864082.0	402.05	399.53	NA	NA	NA	NA	20.37	381.68	9.61	392.44	13.00	389.05	NC	NC
River Level	Mississippi	934893.5	868520.6	NA	NA	NA	389.35	NA	388.04	NA	381.93	NA	392.75	NA	389.88	NC	399.62

Notes:

- 1.) Mississippi River Level is provided by Ameren.
- 2.) DTW - Depth to water measured in feet below top of casing.
- 3.) GWE - Groundwater elevation measured in feet above mean sea level.
- 4.) MSL - Feet above mean sea level.
- 5.) Horizontal Datum: State Plane Coordinates NAD83 (2000) Missouri East Zone feet.
- 6.) Vertical Datum: NAVD88 feet.
- 7.) NA - Not Applicable.
- 8.) NC - Not collected due to flooding conditions.

Figures

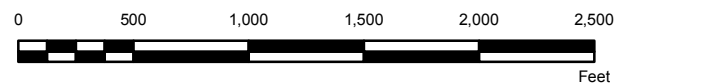


LEGEND

- Meramec Energy Center Property Boundary
- Meramec Surface Impoundments

Monitoring Well/Piezometer Locations

- CCR Rule Monitoring Well
- Nature and Extent Piezometer
- Groundwater Elevation Piezometer



NOTE(S)
1.) ALL BOUNDARIES AND LOCATIONS ARE APPROXIMATE.

REFERENCE(S)
1.) AMEREN MISSOURI MERAMEC ENERGY CENTER, MERAMEC PROPERTY CONTROL MAP, FEBRUARY 2011.
2.) COORDINATE SYSTEM: NAD 1983 STATE PLANE MISSOURI EAST FIPS 2,401 FEET.

CLIENT
**AMEREN MISSOURI
MERAMEC ENERGY CENTER**

PROJECT
GROUNDWATER MONITORING PROGRAM



TITLE
**SITE LOCATION AERIAL MAP AND MONITORING WELL AND
PIEZOMETER LOCATION MAP**

CONSULTANT	YYYY-MM-DD	2020-01-22
DESIGNED	JSI	
PREPARED	EMS	
REVIEWED	TJG	
APPROVED	CMR	

PROJECT NO. 153140601 REV. 0 FIGURE 1

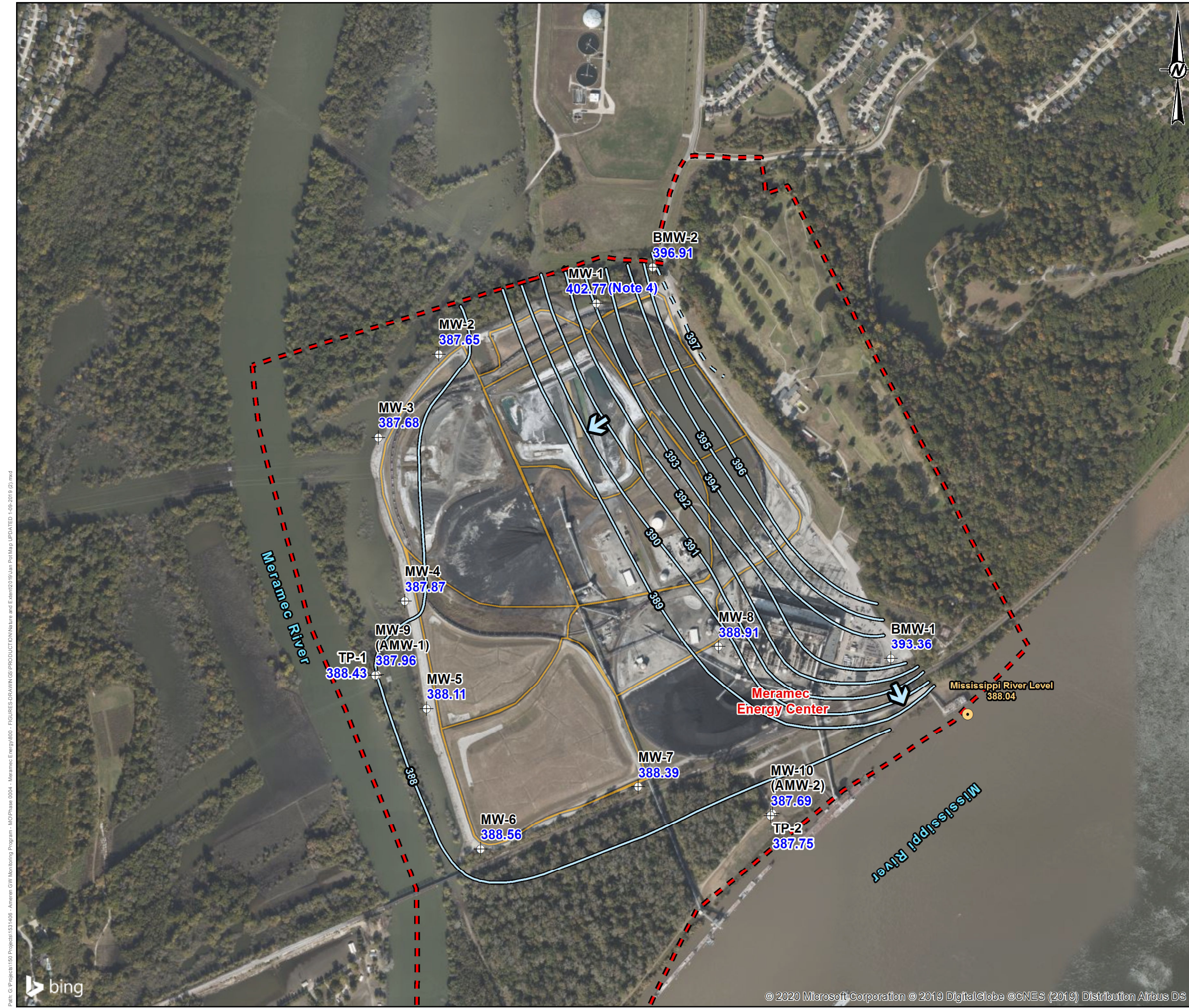
PATH: G:\Projects\150 Projects\1531406 - Ameren GW Monitoring Program - ICD Phase 004 - Meramec Energy\000 - FIGURES-DRAWINGS\PRODUCTION\2019 Annual Report\Figure 1 - Monitoring Well Location Map_NE.mxd PRINTED ON: 2020-01-29 AM: 10:24:46 AM



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

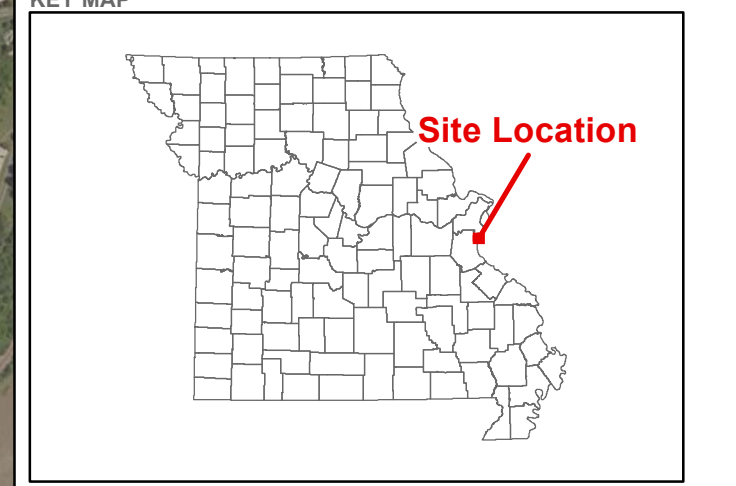
APPENDIX F

**2019 Potentiometric
Surface Maps**



LEGEND

- Meramec Energy Center Property Boundary
- All Surface Impoundments
- Groundwater Elevation Contours**
- Groundwater Elevation Contour (FT MSL)
- Inferred Groundwater Elevation Contour (FT MSL)
- Ground/Surface Water Measurement Locations**
- Groundwater Monitoring Well
- Mississippi River Gauge
- Groundwater Flow Direction



- NOTES**
1. ALL LOCATIONS AND BOUNDARIES ARE APPROXIMATE.
 2. GROUNDWATER ELEVATION MEASUREMENTS OBTAINED BY GOLDER.
 3. GROUNDWATER MONITORING WELLS SURVEYED BY ZAHNER AND ASSOCIATES, INC.
 4. WELL MW-1 NOT USED FOR POTENTIOMETRIC SURFACE MAP CONTOURING.
 5. GROUNDWATER ELEVATIONS DISPLAYED IN FT MSL (FEET ABOVE MEAN SEA LEVEL).
 6. MISSISSIPPI RIVER LEVEL PROVIDED BY AMEREN.

REFERENCES

- 1.) AMEREN MISSOURI MERAMEC ENERGY CENTER, MERAMEC PROPERTY CONTROL MAP, FEBRUARY 2011.
- 2.) COORDINATE SYSTEM: NAD 1983 STATEPLANE MISSOURI EAST FIPS 2401 FEET.

0 500 1,000 Feet

CLIENT
 AMEREN MISSOURI
 MERAMEC ENERGY CENTER



PROJECT
 CCR GROUNDWATER MONITORING PROGRAM

TITLE
POTENTIOMETRIC SURFACE MAP - JANUARY 9, 2019

CONSULTANT	DATE	REVISION
	YYYY-MM-DD	2018-12-21
	PREPARED	RJF
	DESIGN	JSI
	REVIEW	KAB
	APPROVED	MNH

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



LEGEND

- Meramec Energy Center Property Boundary
- All Surface Impoundments
- Groundwater Elevation Contours**
- Groundwater Elevation Contour (FT MSL)
- Ground/Surface Water Measurement Locations**
- Groundwater Monitoring Well
- Mississippi River Gauge
- Groundwater Flow Direction



- NOTES**
1. ALL LOCATIONS AND BOUNDARIES ARE APPROXIMATE.
 2. GROUNDWATER ELEVATION MEASUREMENTS OBTAINED BY GOLDR.
 3. GROUNDWATER MONITORING WELLS SURVEYED BY ZAHNER AND ASSOCIATES, INC.
 4. WELL MW-1 NOT USED FOR POTENTIOMETRIC SURFACE MAP CONTOURING.
 5. GROUNDWATER ELEVATIONS DISPLAYED IN FT MSL (FEET ABOVE MEAN SEA LEVEL).
 6. MISSISSIPPI RIVER LEVEL PROVIDED BY AMEREN.
 7. MW-9 (AMW-1) AND TP-1 ACCESS BLOCKED DUE TO HIGH WATER, NO GROUNDWATER ELEVATION DATA RECORDED.

REFERENCES

- 1.) AMEREN MISSOURI MERAMEC ENERGY CENTER, MERAMEC PROPERTY CONTROL MAP, FEBRUARY 2011.
- 2.) COORDINATE SYSTEM: NAD 1983 STATEPLANE MISSOURI EAST FIPS 2401 FEET.

0 500 1,000
 Feet

CLIENT
 AMEREN MISSOURI
 MERAMEC ENERGY CENTER



PROJECT
 CCR GROUNDWATER MONITORING PROGRAM

TITLE
POTENTIOMETRIC SURFACE MAP - FEBRUARY 26, 2019

CONSULTANT	DATE	REVISION
	YYYY-MM-DD	2020-01-29
	PREPARED	EMS
	DESIGN	JSI
	REVIEW	RJF/JSI
	APPROVED	MNH

PROJECT No. 153-140601 PHASE 0004 Rev. 0.0 FIGURE P3

Path: G:\Projects\153-1406 - Ameren - GW Monitoring Program - MOPPhase 0004 - Meramec Energy Center - FIGURES\DRAWINGS\PRODUCT\CONTOUR\03-19-Map for XDD2019-02-28 Plot Map Plot Map Draft MEC 2019-02-26 (1).mxd

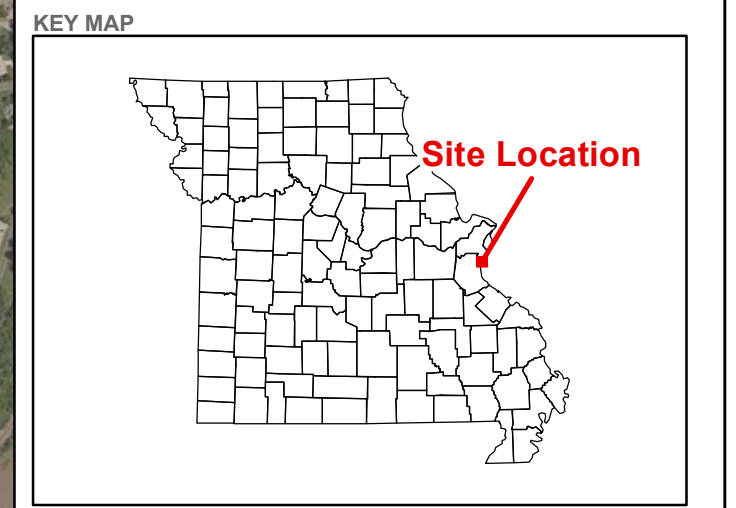


IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: 11in



LEGEND

- Meramec Energy Center Property Boundary
- All Surface Impoundments
- Groundwater Elevation Contours**
- Groundwater Elevation Contour (FT MSL)
- Ground/Surface Water Measurement Locations**
- Groundwater Monitoring Well
- Mississippi River Gauge
- Groundwater Flow Direction



- NOTES**
1. ALL LOCATIONS AND BOUNDARIES ARE APPROXIMATE.
 2. GROUNDWATER ELEVATION MEASUREMENTS OBTAINED BY GOLDR.
 3. GROUNDWATER MONITORING WELLS SURVEYED BY ZAHNER AND ASSOCIATES, INC.
 4. WELL MW-1 NOT USED FOR POTENTIOMETRIC SURFACE MAP CONTOURING.
 5. GROUNDWATER ELEVATIONS DISPLAYED IN FT MSL (FEET ABOVE MEAN SEA LEVEL).
 6. MISSISSIPPI RIVER LEVEL PROVIDED BY AMEREN.

REFERENCES

- 1.) AMEREN MISSOURI MERAMEC ENERGY CENTER, MERAMEC PROPERTY CONTROL MAP, FEBRUARY 2011.
- 2.) COORDINATE SYSTEM: NAD 1983 STATEPLANE MISSOURI EAST FIPS 2401 FEET.

0 500 1,000
 Feet

CLIENT
 AMEREN MISSOURI
 MERAMEC ENERGY CENTER



PROJECT
 CCR GROUNDWATER MONITORING PROGRAM

TITLE
POTENTIOMETRIC SURFACE MAP - AUGUST 12, 2019

CONSULTANT	YYYY-MM-DD	2019-08-29
	PREPARED	JSI
	DESIGN	JSI
	REVIEW	KAB/EMS
	APPROVED	MNH

PROJECT No. 153-140601	PHASE 0004	Rev. 0.0	FIGURE P4
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Path: G:\Projects\153-1406 - Ameren GW Monitoring Program - MOP\Phase 0004 - Meramec Energy\000 - Meramec Energy\000 - PRODUCT\CON\Nature and E\2019\08\19_04 - Pot Map.mxd

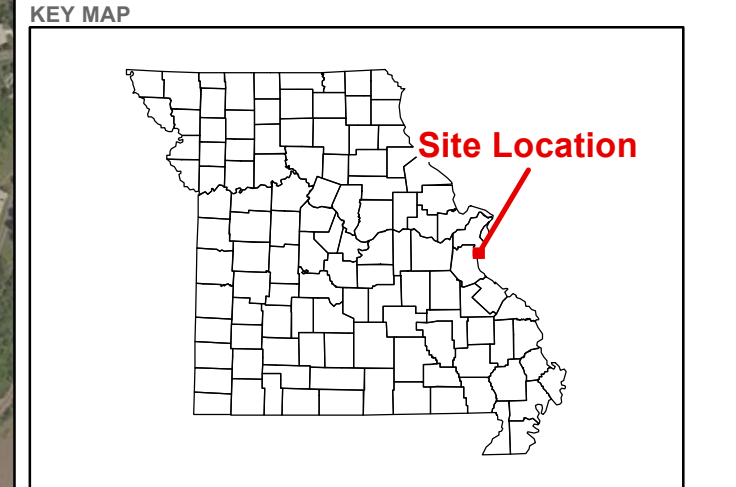


IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: 11x17



LEGEND

- Meramec Energy Center Property Boundary
- All Surface Impoundments
- Groundwater Elevation Contours**
 - Groundwater Elevation Contour (FT MSL)
 - Inferred Groundwater Elevation Contour (FT MSL)
- Ground/Surface Water Measurement Locations**
 - Groundwater Monitoring Well
 - Mississippi River Gauge
 - Groundwater Flow Direction



- NOTES**
1. ALL LOCATIONS AND BOUNDARIES ARE APPROXIMATE.
 2. GROUNDWATER ELEVATION MEASUREMENTS OBTAINED BY GOLDR.
 3. GROUNDWATER MONITORING WELLS SURVEYED BY ZAHNER AND ASSOCIATES, INC.
 4. WELL MW-1 NOT USED FOR POTENTIOMETRIC SURFACE MAP CONTOURING.
 4. GROUNDWATER ELEVATION MEASUREMENTS COULD NOT BE COLLECTED AT MW-2, MW-3, MW-9 (AMW-1), BMW-3, BMW-4, AND BMW-5 DUE TO FLOODING.
 6. GROUNDWATER ELEVATIONS DISPLAYED IN FT MSL (FEET ABOVE MEAN SEA LEVEL).
 7. MISSISSIPPI RIVER LEVEL PROVIDED BY AMEREN.

REFERENCES

- 1.) AMEREN MISSOURI MERAMEC ENERGY CENTER, MERAMEC PROPERTY CONTROL MAP, FEBRUARY 2011.
- 2.) COORDINATE SYSTEM: NAD 1983 STATEPLANE MISSOURI EAST FIPS 2401 FEET.

0 500 1,000
 Feet

CLIENT
 AMEREN MISSOURI
 MERAMEC ENERGY CENTER

PROJECT
 CCR GROUNDWATER MONITORING PROGRAM



TITLE
POTENTIOMETRIC SURFACE MAP - OCTOBER 3, 2019

CONSULTANT	YYYY-MM-DD	2019-10-18
	PREPARED	AMM
	DESIGN	JSI
	REVIEW	RJF
	APPROVED	MNH

Path: G:\Projects\153-1406 - Ameren GW Monitoring Program - MCHPhase 0004 - Meramec Energy\000 - PRODUCT\CON\Natura and E\mer20191018_10-03_Pot Map.mxd

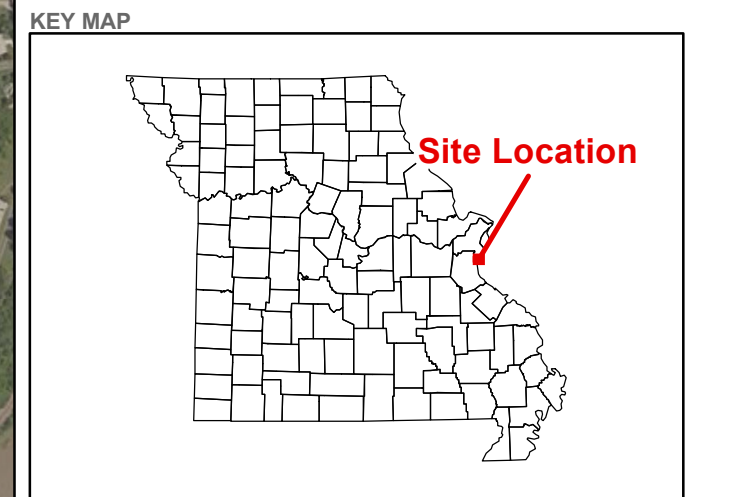


IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: 11in



LEGEND

- Meramec Energy Center Property Boundary
- All Surface Impoundments
- Groundwater Elevation Contours**
- Groundwater Elevation Contour (FT MSL)
- Inferred Groundwater Elevation Contour (FT MSL)
- Ground/Surface Water Measurement Locations**
- Groundwater Monitoring Well
- Mississippi River Gauge
- Groundwater Flow Direction



- NOTES**
1. ALL LOCATIONS AND BOUNDARIES ARE APPROXIMATE.
 2. GROUNDWATER ELEVATION MEASUREMENTS OBTAINED BY GOLDER.
 3. GROUNDWATER MONITORING WELLS SURVEYED BY ZAHNER AND ASSOCIATES, INC.
 4. WELL MW-1 NOT USED FOR POTENTIOMETRIC SURFACE MAP CONTOURING.
 5. GROUNDWATER ELEVATIONS DISPLAYED IN FT MSL (FEET ABOVE MEAN SEA LEVEL).
 6. MISSISSIPPI RIVER LEVEL PROVIDED BY AMEREN.
 7. MW-9 (AMW-1) ACCESS BLOCKED DUE TO HIGH WATER, NO GROUNDWATER ELEVATION DATA RECORDED.

REFERENCES

- 1.) AMEREN MISSOURI MERAMEC ENERGY CENTER, MERAMEC PROPERTY CONTROL MAP, FEBRUARY 2011.
- 2.) COORDINATE SYSTEM: NAD 1983 STATEPLANE MISSOURI EAST FIPS 2401 FEET.

0 500 1,000 1,500 2,000 Feet

CLIENT
 AMEREN MISSOURI
 MERAMEC ENERGY CENTER



PROJECT
 CCR GROUNDWATER MONITORING PROGRAM

TITLE
POTENTIOMETRIC SURFACE MAP - NOVEMBER 18, 2019

CONSULTANT	DATE	BY
	YYYY-MM-DD	2019-11-22
	PREPARED	AMM
	DESIGN	JSI
	REVIEW	BTT
	APPROVED	CMR

Path: G:\Projects\153-1406 - Ameren GW Monitoring Program - MO\Phase 0004 - Meramec Energy\B00 - FIGURES\DRAWING\CS\PRODUCT\CON\Water and E\Entire\2019\Figure P - 2019-11-18 - Pot Map.mxd



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



golder.com