2019 Annual Groundwater Monitoring and Corrective Action Report

SCL4A - Utility Waste Landfill Cell 4A, Sioux Energy Center, St. Charles County, Missouri, USA

Submitted to:

Ameren Missouri

1901 Chouteau Avenue, St. Louis, Missouri 63103

Submitted by:

Golder Associates Inc.

13515 Barrett Parkway Drive, Suite 260, Ballwin, Missouri, USA 63021

+1 314 984-8800

Project No. 153-140601

January 31, 2020

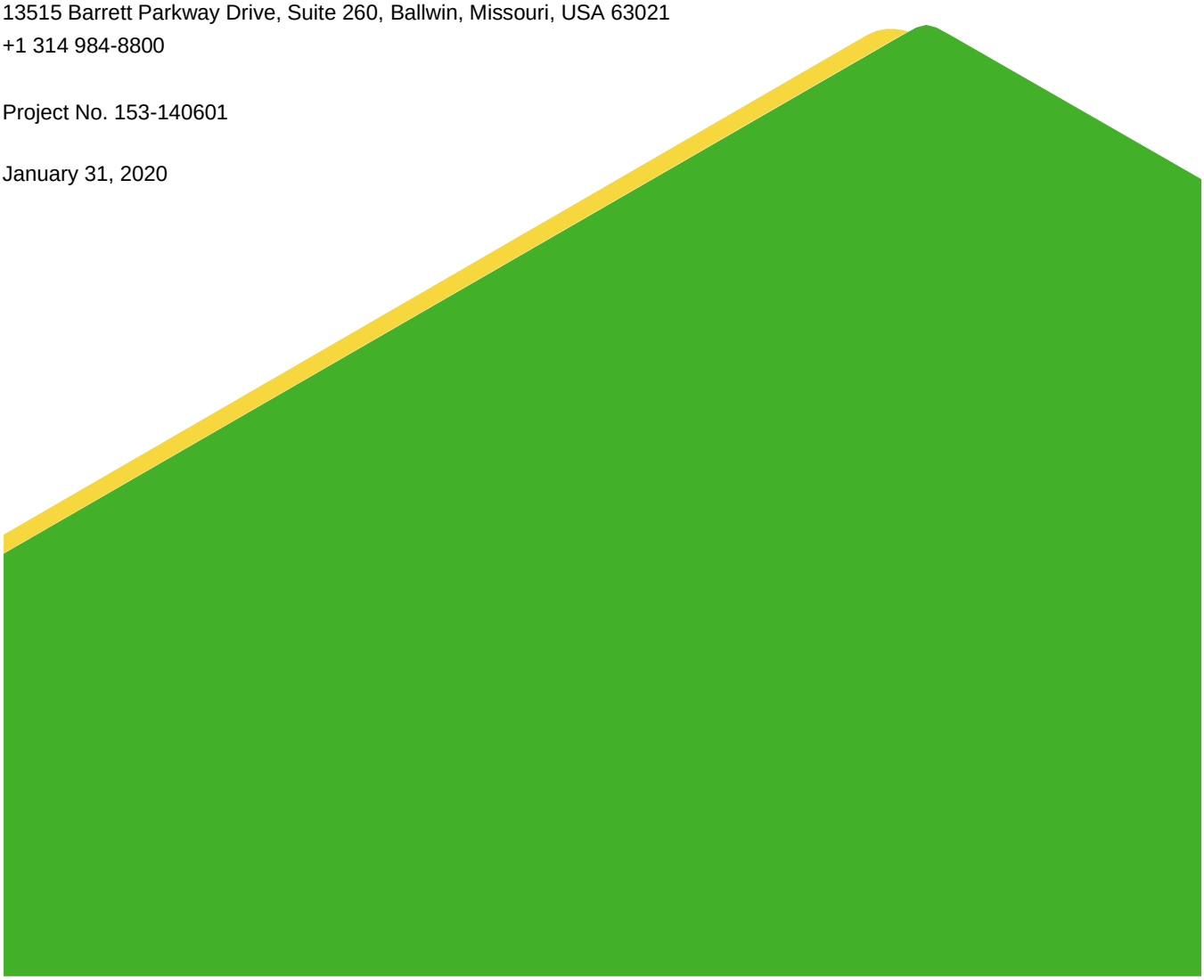


Table of Contents

TABLES

FIGURES

APPENDICES

1.0 INTRODUCTION

This annual report was developed to meet the requirements of United States Environmental Protection Agency (USEPA) 40 CFR Part 257 “Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals From Electric Utilities; Final Rule” (the CCR Rule). The CCR Rule requires owners or operators of existing CCR units to produce an Annual Groundwater Monitoring and Corrective Action Report (Annual Report) each year (§§ 257.90(e)). Ameren Missouri (Ameren) has determined that the Utility Waste Landfill (UWL) Cell 4A (SCL4A) at the Sioux Energy Center (SEC) is subject to the requirements of the CCR Rule. This Annual Report for the SCL4A describes CCR Rule groundwater monitoring activities from January 1, 2019 through December 31, 2019.

2.0 INSTALLATION OR DECOMMISSIONING OF MONITORING WELLS

In accordance with the CCR Rule, a groundwater monitoring system has been installed to monitor the SCL4A. The groundwater monitoring system consists of six (6) groundwater monitoring wells screened in the uppermost aquifer and is displayed in **Figure 1**. No new monitoring wells were installed or decommissioned in 2019 as a part of the CCR Rule monitoring program for the SCL4A. For more information on the groundwater monitoring network, details are provided in the 2017 Annual Groundwater Monitoring Report for the SCL4A.

3.0 GROUNDWATER SAMPLING RESULTS AND DISCUSSION

The following sections review the sampling events completed for the SCL4A CCR Unit in 2019. **Table 1** below provides a summary of the groundwater samples collected in 2019 including the number of samples, the date of sample collection, and the monitoring program.

Table 1 – Summary of Groundwater Sampling Dates

Sampling Event	Groundwater Monitoring Wells						Monitoring Program
	BMW-1S	BMW-3S	UG-3	TMW-1	TMW-2	TMW-3	
	Date of Sample Collection						
January 2019 Verification Sampling	-	-	-	-	1/8/2019	-	Detection
August 2019 Detection Monitoring	8/2/2019	8/2/2019	8/19/2019	8/19/2019	8/19/2019	8/19/2019	Detection
October 2019 Verification Sampling	-	-	10/2/2019	-	10/2/2019	-	Detection
November 2019 Detection Monitoring	11/15/2019	11/15/2019	11/14/2019	11/14/2019	11/14/2019	11/14/2019	Detection
Total Number of Samples Collected	2	2	3	2	4	2	NA

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

3.1 Detection Monitoring Program

A Detection Monitoring event was completed November 12-14, 2018. Verification Sampling and the statistical analysis to evaluate for Statistically Significant Increases (SSIs) for the November 2018 event were not completed until 2019 and are, therefore, included in this report. Detections of Appendix III analytes triggered a Verification Sampling event, which was completed on January 8, 2019 and did not verify any SSIs. **Table 2** summarizes the results of the statistical analysis of the November 2018 Detection Monitoring event and laboratory analytical data are provided in **Appendix A**.

A Detection Monitoring sampling event was scheduled for May 2019, however due to flooding the event was completed August 2-19, 2019, and testing was completed for all Appendix III analytes. Statistical analysis of the data determined that there were SSIs. **Table 3** summarizes the results of the statistical analysis of the August 2019 Detection Monitoring event and laboratory analytical data are provided in **Appendix A**.

As outlined in section 257.94(e)(2) of the CCR Rule, the owner or operator may demonstrate that a source other than the CCR Unit has caused an SSI and that the apparent SSI was the result of an alternative source or resulted from errors in sampling, analysis, statistical evaluation, or natural variation in groundwater quality. An Alternative Source Demonstration (ASD) was completed for these SSIs and is provided in **Appendix B**. This ASD demonstrates that SSIs are not caused by the SCL4A CCR Unit and the SCL4A CCR Unit remains in Detection Monitoring.

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. After 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. These updated limits will be used for November 2019 and subsequent statistical analyses.

A Detection Monitoring event was completed November 14-15, 2019, and testing was performed for all Appendix III analytes. Statistical analyses to evaluate for SSIs in the November 2019 data were not completed in 2019 and the results will be provided in the 2020 annual report. **Table 4** summarizes the results of the November 2019 Detection Monitoring event and laboratory analytical data are provided in **Appendix A**.

3.2 Groundwater Elevation, Flow Rate and Direction

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

Groundwater elevations were used to generate potentiometric surface maps found in **Appendix C**. As shown on the potentiometric surface maps, groundwater flow direction within the uppermost aquifer is dynamic and influenced by seasonal changes in the water level in the adjacent Mississippi and Missouri Rivers, since the alluvial aquifer is hydraulically connected to these water bodies. Groundwater in the alluvial aquifer will generally flow from the higher of the two rivers toward the lower elevation river. The SCPA Surface Impoundment and Poeling Lake also locally affect water levels and flow directions. 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. At this facility, groundwater can flow north and south toward the Mississippi and Missouri Rivers, depending on river levels.

Groundwater flow direction and hydraulic gradient were estimated for the alluvial aquifer wells at the SEC using commercially available software. Results from this assessment indicate that while groundwater flow direction is

variable, the overall net groundwater flow at the SEC was toward the northeast but ranged from north to south. Horizontal gradients calculated by the program range from 0.0001 to 0.001 feet/foot with an estimated net annual groundwater velocity of approximately four (4) feet per year.

4.0 STATUS OF THE GROUNDWATER MONITORING PROGRAM

The SCL4A remains in Detection Monitoring. Section 5.0 provides a discussion of the activities planned for 2020.

4.1 Sampling Issues

Detection Monitoring for the SEC was planned for May 2019. However, from approximately March to July 2019, some of the monitoring wells at the SEC were under water due to the flooding of the Mississippi and Missouri Rivers. This caused a delay in the planned sampling dates for the SCL4A. On July 15-17, 2019, Golder performed post-flood monitoring well inspections at the SEC and found that at the SCL4A; BMW-1S, BMW-3S, TMW-1, TMW-2, and UG-3 had been impacted by the flood. On July 23, 2019, Golder re-developed BMW-1S, BMW-3S, TMW-1, and TMW-2 to remove floodwater impacts to the wells prior to any future groundwater elevation measurements or groundwater samples being collected. After successful re-development, BMW-1S, BMW-3S, TMW-1, and TMW-2 were returned to service. Gredell Engineering Resources re-developed wells used for the UWL permitting at the SEC August 12-16, 2019. After successful re-development UG-3 was returned to service.

No other notable sampling issues were encountered in 2019.

5.0 ACTIVITIES PLANNED FOR 2020

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

Tables

Table 2
November 2018 Detection Monitoring Results
SCL4A - Sioux Landfill Cell 4A
Sioux Energy Center, St. Charles County, MO

ANALYTE	UNITS	BACKGROUND		GROUNDWATER MONITORING WELLS							
		BMW-1S	BMW-3S	Prediction Limit UG-3	UG-3	Prediction Limit TMW-1	TMW-1	Prediction Limit TMW-2	TMW-2	Prediction Limit TMW-3	TMW-3
November 2018 Detection Monitoring Event											
DATE	NA	11/12/2018	11/12/2018	NA	11/14/2018	NA	11/14/2018	NA	11/14/2018	NA	11/14/2018
pH	SU	7.46	7.49	5.901- 7.849	7.10	5.536-7.999	6.51	5.884-7.958	6.97	5.889-7.889	7.03
BORON, TOTAL	µg/L	72.9 J	61.5 J	896.5	425	DQR	69.5 J	DQR	81.4 J	133	87.4 J
CALCIUM, TOTAL	µg/L	157,000	124,000	154,345	129,000	118,318	96,400	135,076	131,000	153,227	137,000
CHLORIDE, TOTAL	mg/L	6.7	10.1	78.76	67.0	5.179	2.9	4.151	2.9	3.1	2.4
FLUORIDE, TOTAL	mg/L	0.34	0.36	0.3771	0.21	0.4047	0.40 J	0.4053	0.36	0.3588	ND
SULFATE, TOTAL	mg/L	28.8	25.6	172.4	63.9	46.3	46.1	37.9	49.8	63.54	51.3
TOTAL DISSOLVED SOLIDS	mg/L	556	436	658.7	575	506.2	334	476.5	414	514.3	457
January 2019 Verification Sampling											
DATE	NA								1/8/2019		
pH	SU								7.17		
BORON, TOTAL	µg/L										
CALCIUM, TOTAL	µg/L										
CHLORIDE, TOTAL	mg/L										
FLUORIDE, TOTAL	mg/L										
SULFATE, TOTAL	mg/L								26.4		
TOTAL DISSOLVED SOLIDS	mg/L										

NOTES:

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

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

Table 3
August 2019 Detection Monitoring Results
SCL4A - Sioux Landfill Cell 4A
Sioux Energy Center, St. Charles County, MO

ANALYTE	UNITS	BACKGROUND		GROUNDWATER MONITORING WELLS							
		BMW-1S	BMW-3S	Prediction Limit UG-3	UG-3	Prediction Limit TMW-1	TMW-1	Prediction Limit TMW-2	TMW-2	Prediction Limit TMW-3	TMW-3
August 2019 Detection Monitoring Event											
DATE	NA	8/2/2019	8/2/2019	NA	8/19/2019	NA	8/19/2019	NA	8/19/2019	NA	8/19/2019
pH	SU	6.90	7.53	5.901- 7.849	6.72	5.536-7.999	6.65	5.884-7.958	6.52	5.889-7.889	6.57
BORON, TOTAL	µg/L	ND	ND	896.5	1040	DQR	66.6 J	DQR	84.6 J	133	86.2 J
CALCIUM, TOTAL	µg/L	149,000	122,000	154,345	159,000	118,318	99,800	135,076	123,000	153,227	123,000 J
CHLORIDE, TOTAL	mg/L	8.8	10.6	78.76	85.0	5.179	2.1	4.151	3.3	3.1	2.6
FLUORIDE, TOTAL	mg/L	0.31	0.35	0.3771	0.33	0.4047	0.35	0.4053	0.32	0.3588	0.29
SULFATE, TOTAL	mg/L	34.1	25.3	172.4	144	46.3	40.2	37.9	52.1	63.54	37.2
TOTAL DISSOLVED SOLIDS	mg/L	548	452	658.7	710 J	506.2	390 J	476.5	481 J	514.3	454 J
October 2019 Verification Sampling Event											
DATE	NA				10/2/2019				10/2/2019		
pH	SU				7.03				6.61		
BORON, TOTAL	µg/L				1120						
CALCIUM, TOTAL	µg/L				163,000						
CHLORIDE, TOTAL	mg/L				81.2						
FLUORIDE, TOTAL	mg/L										
SULFATE, TOTAL	mg/L								75.6		
TOTAL DISSOLVED SOLIDS	mg/L				724				512		

NOTES:

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

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

Table 4
November 2019 Detection Monitoring Results
SCL4A - Sioux Landfill Cell 4A
Sioux Energy Center, St. Charles County, MO

ANALYTE	UNITS	BACKGROUND		GROUNDWATER MONITORING WELLS			
		BMW-1S	BMW-3S	UG-3	TMW-1	TMW-2	TMW-3
November 2019 Detection Monitoring Event							
DATE	NA	11/13/2019	11/13/2019	11/14/2019	11/14/2019	11/14/2019	11/14/2019
pH	SU	6.88	7.13	7.08	6.93	6.90	6.99
BORON, TOTAL	µg/L	118	80.1 J	976	79.7 J	98.1 J	97.6 J
CALCIUM, TOTAL	µg/L	143,000 J	102,000	135,000 J	95,100	120,000	116,000
CHLORIDE, TOTAL	mg/L	6.4	7.6	83.5	1.8	4.5	2.4
FLUORIDE, TOTAL	mg/L	0.28	0.23	0.33	0.34	0.35	0.28
SULFATE, TOTAL	mg/L	26.5	34.4	185 J	36.9	75.1	36.7
TOTAL DISSOLVED SOLIDS	mg/L	551	418	721	387	502	454

NOTES:

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

Prepared By: TJG
Checked By: KAB
Reviewed By: CMR

Figures

KEY MAP

LEGEND

- Sioux Energy Center Property Boundary
- UWL Perimeter Fence
- SCL4A - Landfill Cell 4A
- Water Recycle Pond

Groundwater Monitoring Wells used for SCL4A CCR Rule Monitoring

- SCL4A Monitoring Well
- Background Monitoring Well

0 1,000 2,000 3,000

Feet

NOTE(S)

1.) ALL BOUNDARIES AND LOCATIONS ARE APPROXIMATE.
2.) UWL - UTILITY WASTE LANDFILL.
3.) CCR - COAL COMBUSTION RESIDUAL.

REFERENCE(S)

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

CLIENT
AMEREN MISSOURI
SIOUX ENERGY CENTER

PROJECT
GROUNDWATER MONITORING PROGRAM

TITLE
SITE LOCATION AERIAL MAP AND MONITORING WELL LOCATIONS

CONSULTANT
GOLDER

YYYY-MM-DD	2020-01-15
DESIGNED	JSI
PREPARED	RJF
REVIEWED	EMS
APPROVED	CMR

PROJECT NO.	CONTROL	REV.	FIGURE
153140601	1240	0	1

PATH: G:\Projects\1530 Projects\153140601 - Ameren GW Monitoring Program - MO\Phase 0003 - Sioux Energy\800 - FIGURES-DRAWINGS\PRODUCTION\2019 Annual Report\Figure 1 - SCL4A.mxd PRINTED ON: 2020-01-24 AT: 12:56:41 PM

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

APPENDIX A

Laboratory Analytical Data

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

January 10, 2019

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

RE: Project: SCL4A GW SAMPLING
Pace Project No.: 60291372

Dear Mark Haddock:
Enclosed are the analytical results for sample(s) received by the laboratory on January 09, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

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

Sincerely,

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

Enclosures

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

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

CERTIFICATIONS

Project: SCL4A GW SAMPLING
Pace Project No.: 60291372

Kansas Certification IDs

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

REPORT OF LABORATORY ANALYSIS

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

SAMPLE SUMMARY

Project: SCL4A GW SAMPLING
Pace Project No.: 60291372

Lab ID	Sample ID	Matrix	Date Collected	Date Received
60291372001	**S-TMW-2**	Water	01/08/19 12:20	01/09/19 03:00

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

SAMPLE ANALYTE COUNT

Project: SCL4A GW SAMPLING
Pace Project No.: 60291372

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
60291372001	**S-TMW-2**	EPA 300.0	MGS	1	PASI-K

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

ANALYTICAL RESULTS

Project: SCL4A GW SAMPLING
Pace Project No.: 60291372

Sample: S-TMW-2 **Lab ID: 60291372001** Collected: 01/08/19 12:20 Received: 01/09/19 03:00 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Sulfate	**26.4**	mg/L	5.0	1.2	5		01/10/19 12:13	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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

QUALITY CONTROL DATA

Project: SCL4A GW SAMPLING
Pace Project No.: 60291372

QC Batch: 564071 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 60291372001

METHOD BLANK: 2314235 Matrix: Water
Associated Lab Samples: 60291372001

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Sulfate	mg/L	<0.24	1.0	0.24	01/10/19 09:48	

LABORATORY CONTROL SAMPLE: 2314236

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

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2314237 2314238

Parameter	Units	60291371002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Sulfate	mg/L	29.7	25	25	57.6	53.6	112	96	90-110	7	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

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

QUALIFIERS

Project: SCL4A GW SAMPLING
Pace Project No.: 60291372

DEFINITIONS

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

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

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

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

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

S - Surrogate

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

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

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

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

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

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

TNI - The NELAC Institute.

LABORATORIES

PASI-K	Pace Analytical Services - Kansas City

ANALYTE QUALIFIERS

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

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

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: SCL4A GW SAMPLING
Pace Project No.: 60291372

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
60291372001	**S-TMW-2**	EPA 300.0	564071		

REPORT OF LABORATORY ANALYSIS

Pace Analytical
www.pacelabs.com

Sample Condition Upon Receipt

WO# : 60291372

60291372

Client Name: Golder Associates

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

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

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

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

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

Cooler Temperature (°C): As-read 0.9 Corr. Factor 0.0 Corrected 0.9

Date and initials of person examining contents: 1/9/19 BK

Temperature should be above freezing to 6°C

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

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

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: Jann Church Date: 1/9/19

Pace Analytical
www.pacelabs.com

CHAIN-OF-CUSTODY / Analytical Request Document

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

Page: 1 of 1

Section A Required Client Information:

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

Section B Required Project Information:

Report To:	Mark Haddock (mhaddock@golder.com)
Copy To:	Jeffrey Ingram
Purchase Order No.:	
Project Name:	SCLHA GW Sampling
Project Number:	153140L.0003

Section C Invoice Information:

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

REGULATORY AGENCY

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

Site Location STATE: MO

Section D Required Client Information

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

Valid Matrix Codes

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

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED COMPOSITE START DATE	COLLECTED COMPOSITE START TIME	COLLECTED COMPOSITE END/GRAB DATE	COLLECTED COMPOSITE END/GRAB TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test Y/N	Boron	Calcium	Chloride	Fluoride	Sulfate	TDS							Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
				DATE	TIME	DATE	TIME											Y/N	N	N	N	N	N	N							
1	S-TMW-2	WT	G			1/8/19	1220		2	1		1						✓	BPZN, BPZN										N	6029137 2 001
2		WT	G																											
3		WT	G																											
4		WT	G																											
5		WT	G																											
6		WT	G																											
7		WT	G																											
8		WT	G																											
9		WT	G																											
10		WT	G																											
11		WT	G																											
12		WT	G																											

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS: Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)
	Golder	01/08/19		FedEx	1/9/19	0800	0.9	Y	Y	Y

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Eric Schneider

SIGNATURE of SAMPLER: [signature] DATE Signed (MM/DD/YY): 01/08/19

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

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

MEMORANDUM

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

TO Project File
Golder Associates

CC

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

DATA VALIDATION SUMMARY: AMEREN – SIOUX ENERGY CENTER – VERIFICATION SAMPLING – DATA PACKAGE 60291372

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

- When analytes exceeded the recovery criteria for MS/MSD of a sample, the sample result was not qualified on MS/MSD data alone.

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

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

QA LEVEL II - INORGANIC DATA EVALUATION CHECKLIST

Company Name: Golder Associates
Project Name: Ameren - SCCYA - VS - Jan 2019
Reviewer: T Goodwin

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

Laboratory: Pace Analytical
SDG #: 60291372

Analytical Method (type and no.): ~~Metals (200.7&200.8), Hg (7470), Alk (SM 2320B), TDS (SM 2540C), Fe (SM 3500-Fe B#4), Anions (300.0), P (365.4), Ra (903.1&904.0)~~ (12)
Anions (300.0)

Matrix: ☐ Air ☐ Soil/Sed. ☒ Water ☐ Waste ☐

Sample Names: S-TMW-2

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

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

Note Deficiencies:

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

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

QA LEVEL II - INORGANIC DATA EVALUATION CHECKLIST

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

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

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

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

Matrix Spike/Matrix Spike Duplicate (MS/MSD)	YES	NO	NA	COMMENTS
a) Was MS accuracy criteria met?	☐	☑	☐	SO_4^{2-}
Recovery could not be calculated since sample contained high concentration of analyte?	☐	☐	☒	
b) Was MSD accuracy criteria met?	☑	☐	☐	
Recovery could not be calculated since sample contained high concentration of analyte?	☐	☐	☒	
c) Were MS/MSD precision criteria met?	☑	☐	☐	

Comments/Notes:

QA LEVEL II - INORGANIC DATA EVALUATION CHECKLIST

Data Qualification:

Sample Name	Constituent(s)	Result	Qualifier	Reason
None				

Signature: Tony Woodruff Date: 1/10/19

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

October 17, 2019

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

RE: Project: AMEREN SIOUX ENERGY CTR
Pace Project No.: 60312388

Dear Jeffrey Ingram:
Enclosed are the analytical results for sample(s) received by the laboratory between August 03, 2019 and August 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
Mark Haddock, Golder Associates
Eric Schneider, Golder Associates

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

CERTIFICATIONS

Project: AMEREN SIOUX ENERGY CTR
Pace Project No.: 60312388

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

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

SAMPLE SUMMARY

Project: AMEREN SIOUX ENERGY CTR
Pace Project No.: 60312388

Lab ID	Sample ID	Matrix	Date Collected	Date Received
60312388001	**S-TMW-1**	Water	08/04/19 11:50	08/20/19 02:45
60312388002	**S-TMW-2**	Water	08/04/19 11:10	08/20/19 02:45
60312388003	**S-TMW-3**	Water	08/04/19 10:10	08/20/19 02:45
60312388004	**S-UG-3**	Water	08/04/19 10:15	08/20/19 02:45
60312388005	**S-SCL4A-FB-1**	Water	08/04/19 10:02	08/20/19 02:45
60312388006	**S-SCL4A-DUP-1**	Water	08/04/19 08:00	08/21/19 02:45
60310790002	**S-BMW-1S**	Water	08/01/19 10:55	08/03/19 02:50
60310790003	**S-BMW-3S**	Water	08/01/19 11:45	08/03/19 02:50

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

SAMPLE ANALYTE COUNT

Project: AMEREN SIOUX ENERGY CTR
Pace Project No.: 60312388

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
60312388001	**S-TMW-1**	EPA 200.7	EMR	7	PASI-K
		SM 2320B	AJS2	1	PASI-K
		SM 2540C	LDB	1	PASI-K
		EPA 300.0	MGS	3	PASI-K
60312388002	**S-TMW-2**	EPA 200.7	EMR	7	PASI-K
		SM 2320B	AJS2	1	PASI-K
		SM 2540C	LDB	1	PASI-K
		EPA 300.0	MGS	3	PASI-K
60312388003	**S-TMW-3**	EPA 200.7	EMR	7	PASI-K
		SM 2320B	AJS2	1	PASI-K
		SM 2540C	LDB	1	PASI-K
		EPA 300.0	MGS	3	PASI-K
60312388004	**S-UG-3**	EPA 200.7	EMR	7	PASI-K
		SM 2320B	AJS2	1	PASI-K
		SM 2540C	LDB	1	PASI-K
		EPA 300.0	MGS	3	PASI-K
60312388005	**S-SCL4A-FB-1**	EPA 200.7	EMR	7	PASI-K
		SM 2320B	AJS2	1	PASI-K
		SM 2540C	LDB	1	PASI-K
		EPA 300.0	MGS	3	PASI-K
60312388006	**S-SCL4A-DUP-1**	EPA 200.7	EMR	7	PASI-K
		SM 2320B	AJS2	1	PASI-K
		SM 2540C	LDB	1	PASI-K
		EPA 300.0	MGS	3	PASI-K
60310790002	**S-BMW-1S**	EPA 200.7	HKC	7	PASI-K
		SM 2320B	MJK	1	PASI-K
		SM 2540C	BLA	1	PASI-K
		EPA 300.0	JDS	3	PASI-K
60310790003	**S-BMW-3S**	EPA 200.7	HKC	7	PASI-K
		SM 2320B	MJK	1	PASI-K
		SM 2540C	BLA	1	PASI-K
		EPA 300.0	JDS	3	PASI-K

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

ANALYTICAL RESULTS

Project: AMEREN SIOUX ENERGY CTR
Pace Project No.: 60312388

Sample: S-TMW-1 **Lab ID: 60312388001** Collected: 08/04/19 11:50 Received: 08/20/19 02:45 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.7 Metals, Total	Analytical Method: EPA 200.7 Preparation Method: EPA 200.7								
Boron	**66.6J**	ug/L	100	10.7	1	08/21/19 13:22	08/22/19 18:17	7440-42-8	
Calcium	**99800**	ug/L	200	50.0	1	08/21/19 13:22	08/22/19 18:17	7440-70-2	
Iron	**69.7**	ug/L	50.0	14.0	1	08/21/19 13:22	08/22/19 18:17	7439-89-6	
Magnesium	**18200**	ug/L	50.0	13.0	1	08/21/19 13:22	08/22/19 18:17	7439-95-4	
Manganese	**180**	ug/L	5.0	2.1	1	08/21/19 13:22	08/22/19 18:17	7439-96-5	
Potassium	**4900**	ug/L	500	79.0	1	08/21/19 13:22	08/22/19 18:17	7440-09-7	
Sodium	**2760**	ug/L	500	144	1	08/21/19 13:22	08/22/19 18:17	7440-23-5	
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**269**	mg/L	20.0	6.5	1		08/26/19 14:04		H3
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**390**	mg/L	10.0	10.0	1		08/22/19 18:25		H3
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**2.1**	mg/L	1.0	0.22	1		08/30/19 20:50	16887-00-6	
Fluoride	**0.35**	mg/L	0.20	0.085	1		08/30/19 20:50	16984-48-8	
Sulfate	**40.2**	mg/L	5.0	1.2	5		08/30/19 21:05	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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

ANALYTICAL RESULTS

Project: AMEREN SIOUX ENERGY CTR
Pace Project No.: 60312388

Sample: S-TMW-2 **Lab ID: 60312388002** Collected: 08/04/19 11:10 Received: 08/20/19 02:45 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.7 Metals, Total	Analytical Method: EPA 200.7 Preparation Method: EPA 200.7								
Boron	**84.6J**	ug/L	100	10.7	1	08/21/19 13:22	08/22/19 18:19	7440-42-8	
Calcium	**123000**	ug/L	200	50.0	1	08/21/19 13:22	08/22/19 18:19	7440-70-2	
Iron	**398**	ug/L	50.0	14.0	1	08/21/19 13:22	08/22/19 18:19	7439-89-6	
Magnesium	**23100**	ug/L	50.0	13.0	1	08/21/19 13:22	08/22/19 18:19	7439-95-4	
Manganese	**466**	ug/L	5.0	2.1	1	08/21/19 13:22	08/22/19 18:19	7439-96-5	
Potassium	**5150**	ug/L	500	79.0	1	08/21/19 13:22	08/22/19 18:19	7440-09-7	
Sodium	**3180**	ug/L	500	144	1	08/21/19 13:22	08/22/19 18:19	7440-23-5	
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**361**	mg/L	20.0	6.5	1		08/26/19 14:08		H3
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**481**	mg/L	10.0	10.0	1		08/22/19 18:25		H3
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**3.3**	mg/L	1.0	0.22	1		08/30/19 21:49	16887-00-6	
Fluoride	**0.32**	mg/L	0.20	0.085	1		08/30/19 21:49	16984-48-8	
Sulfate	**52.1**	mg/L	5.0	1.2	5		08/30/19 22:04	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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

ANALYTICAL RESULTS

Project: AMEREN SIOUX ENERGY CTR
Pace Project No.: 60312388

Sample: S-TMW-3 **Lab ID: 60312388003** Collected: 08/04/19 10:10 Received: 08/20/19 02:45 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.7 Metals, Total	Analytical Method: EPA 200.7 Preparation Method: EPA 200.7								
Boron	**86.2J**	ug/L	100	10.7	1	08/21/19 13:22	08/22/19 18:26	7440-42-8	
Calcium	**123000**	ug/L	200	50.0	1	08/21/19 13:22	08/22/19 18:26	7440-70-2	M1
Iron	**1380**	ug/L	50.0	14.0	1	08/21/19 13:22	08/22/19 18:26	7439-89-6	
Magnesium	**23300**	ug/L	50.0	13.0	1	08/21/19 13:22	08/22/19 18:26	7439-95-4	
Manganese	**631**	ug/L	5.0	2.1	1	08/21/19 13:22	08/22/19 18:26	7439-96-5	
Potassium	**5550**	ug/L	500	79.0	1	08/21/19 13:22	08/22/19 18:26	7440-09-7	
Sodium	**4080**	ug/L	500	144	1	08/21/19 13:22	08/22/19 18:26	7440-23-5	
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**369**	mg/L	20.0	6.5	1		08/26/19 14:14		H3
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**454**	mg/L	10.0	10.0	1		08/22/19 18:25		H3
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**2.6**	mg/L	1.0	0.22	1		08/30/19 22:19	16887-00-6	
Fluoride	**0.29**	mg/L	0.20	0.085	1		08/30/19 22:19	16984-48-8	
Sulfate	**37.2**	mg/L	5.0	1.2	5		08/30/19 23:04	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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

ANALYTICAL RESULTS

Project: AMEREN SIOUX ENERGY CTR
Pace Project No.: 60312388

Sample: S-UG-3 **Lab ID: 60312388004** Collected: 08/04/19 10:15 Received: 08/20/19 02:45 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.7 Metals, Total	Analytical Method: EPA 200.7 Preparation Method: EPA 200.7								
Boron	**1040**	ug/L	100	10.7	1	08/21/19 13:22	08/22/19 18:32	7440-42-8	
Calcium	**159000**	ug/L	200	50.0	1	08/21/19 13:22	08/22/19 18:32	7440-70-2	
Iron	**110**	ug/L	50.0	14.0	1	08/21/19 13:22	08/22/19 18:32	7439-89-6	
Magnesium	**32300**	ug/L	50.0	13.0	1	08/21/19 13:22	08/22/19 18:32	7439-95-4	
Manganese	**1030**	ug/L	5.0	2.1	1	08/21/19 13:22	08/22/19 18:32	7439-96-5	
Potassium	**5750**	ug/L	500	79.0	1	08/21/19 13:22	08/22/19 18:32	7440-09-7	
Sodium	**24200**	ug/L	500	144	1	08/21/19 13:22	08/22/19 18:32	7440-23-5	
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**337**	mg/L	20.0	6.5	1		08/26/19 14:24		H3
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**710**	mg/L	10.0	10.0	1		08/22/19 18:25		H3
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**85.0**	mg/L	5.0	1.1	5		08/31/19 00:04	16887-00-6	
Fluoride	**0.33**	mg/L	0.20	0.085	1		08/30/19 23:49	16984-48-8	
Sulfate	**144**	mg/L	5.0	1.2	5		08/31/19 00:04	14808-79-8	E

REPORT OF LABORATORY ANALYSIS

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

ANALYTICAL RESULTS

Project: AMEREN SIOUX ENERGY CTR
Pace Project No.: 60312388

Sample: S-SCL4A-FB-1 **Lab ID: 60312388005** Collected: 08/04/19 10:02 Received: 08/20/19 02:45 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.7 Metals, Total	Analytical Method: EPA 200.7 Preparation Method: EPA 200.7								
Boron	**<10.7**	ug/L	100	10.7	1	08/21/19 13:22	08/22/19 18:34	7440-42-8	
Calcium	**58.2J**	ug/L	200	50.0	1	08/21/19 13:22	08/22/19 18:34	7440-70-2	
Iron	**<14.0**	ug/L	50.0	14.0	1	08/21/19 13:22	08/22/19 18:34	7439-89-6	
Magnesium	**<13.0**	ug/L	50.0	13.0	1	08/21/19 13:22	08/22/19 18:34	7439-95-4	
Manganese	**<2.1**	ug/L	5.0	2.1	1	08/21/19 13:22	08/22/19 18:34	7439-96-5	
Potassium	**<79.0**	ug/L	500	79.0	1	08/21/19 13:22	08/22/19 18:34	7440-09-7	
Sodium	**<144**	ug/L	500	144	1	08/21/19 13:22	08/22/19 18:34	7440-23-5	
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**<6.5**	mg/L	20.0	6.5	1		08/26/19 14:27		H3
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**17.0**	mg/L	5.0	5.0	1		08/22/19 18:25		H3
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**0.46J**	mg/L	1.0	0.22	1		08/31/19 00:49	16887-00-6	
Fluoride	**<0.085**	mg/L	0.20	0.085	1		08/31/19 00:49	16984-48-8	
Sulfate	**<0.23**	mg/L	1.0	0.23	1		08/31/19 00:49	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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

ANALYTICAL RESULTS

Project: AMEREN SIOUX ENERGY CTR
Pace Project No.: 60312388

Sample: S-SCL4A-DUP-1 **Lab ID: 60312388006** Collected: 08/04/19 08:00 Received: 08/21/19 02:45 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.7 Metals, Total	Analytical Method: EPA 200.7 Preparation Method: EPA 200.7								
Boron	**87.1J**	ug/L	100	10.7	1	08/21/19 13:22	08/22/19 18:37	7440-42-8	
Calcium	**125000**	ug/L	200	50.0	1	08/21/19 13:22	08/22/19 18:37	7440-70-2	
Iron	**348**	ug/L	50.0	14.0	1	08/21/19 13:22	08/22/19 18:37	7439-89-6	
Magnesium	**23600**	ug/L	50.0	13.0	1	08/21/19 13:22	08/22/19 18:37	7439-95-4	
Manganese	**476**	ug/L	5.0	2.1	1	08/21/19 13:22	08/22/19 18:37	7439-96-5	
Potassium	**5140**	ug/L	500	79.0	1	08/21/19 13:22	08/22/19 18:37	7440-09-7	
Sodium	**3240**	ug/L	500	144	1	08/21/19 13:22	08/22/19 18:37	7440-23-5	
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**347**	mg/L	20.0	6.5	1		08/26/19 14:33		H3
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**218**	mg/L	10.0	10.0	1		08/22/19 18:25		H3
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**3.3**	mg/L	1.0	0.22	1		08/31/19 01:04	16887-00-6	
Fluoride	**0.32**	mg/L	0.20	0.085	1		08/31/19 01:04	16984-48-8	
Sulfate	**51.9**	mg/L	5.0	1.2	5		08/31/19 01:19	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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

ANALYTICAL RESULTS

Project: AMEREN SIOUX ENERGY CTR
Pace Project No.: 60312388

Sample: S-BMW-1S **Lab ID: 60310790002** Collected: 08/01/19 10:55 Received: 08/03/19 02:50 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.7 Metals, Total	Analytical Method: EPA 200.7 Preparation Method: EPA 200.7								
Boron	**70.8J**	ug/L	100	10.7	1	08/07/19 14:31	08/09/19 12:51	7440-42-8	B
Calcium	**149000**	ug/L	200	50.0	1	08/07/19 14:31	08/08/19 16:36	7440-70-2	
Iron	**<14.0**	ug/L	50.0	14.0	1	08/07/19 14:31	08/08/19 16:36	7439-89-6	
Magnesium	**28400**	ug/L	50.0	13.0	1	08/07/19 14:31	08/08/19 16:36	7439-95-4	
Manganese	**472**	ug/L	5.0	2.1	1	08/07/19 14:31	08/08/19 16:36	7439-96-5	
Potassium	**383J**	ug/L	500	79.0	1	08/07/19 14:31	08/08/19 16:36	7440-09-7	
Sodium	**5350**	ug/L	500	144	1	08/07/19 14:31	08/08/19 16:36	7440-23-5	
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**432**	mg/L	20.0	6.5	1		08/15/19 11:20		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**548**	mg/L	10.0	10.0	1		08/07/19 13:13		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**8.8**	mg/L	1.0	0.22	1		08/15/19 04:53	16887-00-6	
Fluoride	**0.31**	mg/L	0.20	0.085	1		08/15/19 04:53	16984-48-8	
Sulfate	**34.1**	mg/L	2.0	0.46	2		08/15/19 05:44	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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

ANALYTICAL RESULTS

Project: AMEREN SIOUX ENERGY CTR
Pace Project No.: 60312388

Sample: S-BMW-3S **Lab ID: 60310790003** Collected: 08/01/19 11:45 Received: 08/03/19 02:50 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.7 Metals, Total	Analytical Method: EPA 200.7 Preparation Method: EPA 200.7								
Boron	**73.9J**	ug/L	100	10.7	1	08/07/19 14:31	08/09/19 12:53	7440-42-8	B
Calcium	**122000**	ug/L	200	50.0	1	08/07/19 14:31	08/08/19 16:38	7440-70-2	
Iron	**44.3J**	ug/L	50.0	14.0	1	08/07/19 14:31	08/08/19 16:38	7439-89-6	
Magnesium	**22400**	ug/L	50.0	13.0	1	08/07/19 14:31	08/08/19 16:38	7439-95-4	
Manganese	**298**	ug/L	5.0	2.1	1	08/07/19 14:31	08/08/19 16:38	7439-96-5	
Potassium	**648**	ug/L	500	79.0	1	08/07/19 14:31	08/08/19 16:38	7440-09-7	
Sodium	**5280**	ug/L	500	144	1	08/07/19 14:31	08/08/19 16:38	7440-23-5	
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**358**	mg/L	20.0	6.5	1		08/15/19 11:25		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**452**	mg/L	10.0	10.0	1		08/07/19 13:14		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**10.6**	mg/L	1.0	0.22	1		08/15/19 06:01	16887-00-6	
Fluoride	**0.35**	mg/L	0.20	0.085	1		08/15/19 06:01	16984-48-8	
Sulfate	**25.3**	mg/L	2.0	0.46	2		08/15/19 06:17	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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

QUALITY CONTROL DATA

Project: AMEREN SIOUX ENERGY CTR
Pace Project No.: 60312388

QC Batch: 601714 Analysis Method: EPA 200.7
QC Batch Method: EPA 200.7 Analysis Description: 200.7 Metals, Total
Associated Lab Samples: 60310790002, 60310790003

METHOD BLANK: 2461467 Matrix: Water
Associated Lab Samples: 60310790002, 60310790003

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Boron	ug/L	11.8J	100	10.7	08/09/19 12:44	
Calcium	ug/L	<50.0	200	50.0	08/08/19 16:31	
Iron	ug/L	<14.0	50.0	14.0	08/08/19 16:31	
Magnesium	ug/L	<13.0	50.0	13.0	08/08/19 16:31	
Manganese	ug/L	<2.1	5.0	2.1	08/08/19 16:31	
Potassium	ug/L	<79.0	500	79.0	08/08/19 16:31	
Sodium	ug/L	<144	500	144	08/08/19 16:31	

LABORATORY CONTROL SAMPLE: 2461468

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Boron	ug/L	1000	987	99	85-115	
Calcium	ug/L	10000	9780	98	85-115	
Iron	ug/L	10000	9860	99	85-115	
Magnesium	ug/L	10000	9530	95	85-115	
Manganese	ug/L	1000	988	99	85-115	
Potassium	ug/L	10000	9940	99	85-115	
Sodium	ug/L	10000	10300	103	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2461469 2461470

Parameter	Units	60310791001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Boron	ug/L	217	1000	1000	1230	1210	101	100	70-130	1	20	
Calcium	ug/L	58100	10000	10000	70000	68700	119	106	70-130	2	20	
Iron	ug/L	1010	10000	10000	10700	10800	97	97	70-130	1	20	
Magnesium	ug/L	16700	10000	10000	26800	26400	101	97	70-130	1	20	
Manganese	ug/L	113	1000	1000	1100	1100	98	99	70-130	0	20	
Potassium	ug/L	4210	10000	10000	14400	14300	102	101	70-130	0	20	
Sodium	ug/L	14000	10000	10000	24700	24300	107	103	70-130	2	20	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2461471 2461472

Parameter	Units	60310791002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Boron	ug/L	12400	1000	1000	13200	13600	84	116	70-130	2	20	
Calcium	ug/L	171000	10000	10000	180000	184000	94	127	70-130	2	20	

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

REPORT OF LABORATORY ANALYSIS

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

QUALITY CONTROL DATA

Project: AMEREN SIOUX ENERGY CTR
Pace Project No.: 60312388

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2461471 2461472

Parameter	Units	60310791002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Iron	ug/L	416	10000	10000	10100	10200	97	98	70-130	0	20	
Magnesium	ug/L	5320	10000	10000	14500	14700	92	94	70-130	1	20	
Manganese	ug/L	168	1000	1000	1140	1160	97	99	70-130	1	20	
Potassium	ug/L	22900	10000	10000	33000	33600	101	107	70-130	2	20	
Sodium	ug/L	46500	10000	10000	56500	57800	100	113	70-130	2	20	

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

REPORT OF LABORATORY ANALYSIS

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

QUALITY CONTROL DATA

Project: AMEREN SIOUX ENERGY CTR
Pace Project No.: 60312388

QC Batch: 604659 Analysis Method: EPA 200.7
QC Batch Method: EPA 200.7 Analysis Description: 200.7 Metals, Total
Associated Lab Samples: 60312388001, 60312388002, 60312388003, 60312388004, 60312388005, 60312388006

METHOD BLANK: 2471841 Matrix: Water
Associated Lab Samples: 60312388001, 60312388002, 60312388003, 60312388004, 60312388005, 60312388006

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Boron	ug/L	<10.7	100	10.7	08/22/19 18:14	
Calcium	ug/L	<50.0	200	50.0	08/22/19 18:14	
Iron	ug/L	<14.0	50.0	14.0	08/22/19 18:14	
Magnesium	ug/L	<13.0	50.0	13.0	08/22/19 18:14	
Manganese	ug/L	<2.1	5.0	2.1	08/22/19 18:14	
Potassium	ug/L	<79.0	500	79.0	08/22/19 18:14	
Sodium	ug/L	<144	500	144	08/22/19 18:14	

LABORATORY CONTROL SAMPLE: 2471842

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Boron	ug/L	1000	975	98	85-115	
Calcium	ug/L	10000	10200	102	85-115	
Iron	ug/L	10000	10100	101	85-115	
Magnesium	ug/L	10000	10000	100	85-115	
Manganese	ug/L	1000	1010	101	85-115	
Potassium	ug/L	10000	9730	97	85-115	
Sodium	ug/L	10000	9740	97	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2471843 2471844

Parameter	Units	60312388003 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Boron	ug/L	86.2J	1000	1000	1050	987	96	90	70-130	6	20	
Calcium	ug/L	123000	10000	10000	136000	126000	131	24	70-130	8	20	M1
Iron	ug/L	1380	10000	10000	11000	10400	97	90	70-130	6	20	
Magnesium	ug/L	23300	10000	10000	33300	31100	100	78	70-130	7	20	
Manganese	ug/L	631	1000	1000	1620	1510	99	88	70-130	7	20	
Potassium	ug/L	5550	10000	10000	15200	14300	96	87	70-130	6	20	
Sodium	ug/L	4080	10000	10000	13700	12800	96	88	70-130	6	20	

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

REPORT OF LABORATORY ANALYSIS

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

QUALITY CONTROL DATA

Project: AMEREN SIOUX ENERGY CTR
Pace Project No.: 60312388

QC Batch: 603364 Analysis Method: SM 2320B
QC Batch Method: SM 2320B Analysis Description: 2320B Alkalinity
Associated Lab Samples: 60310790002, 60310790003

METHOD BLANK: 2467297 Matrix: Water
Associated Lab Samples: 60310790002, 60310790003

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Alkalinity, Total as CaCO3	mg/L	<6.5	20.0	6.5	08/15/19 10:55	

LABORATORY CONTROL SAMPLE: 2467298

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity, Total as CaCO3	mg/L	500	486	97	90-110	

SAMPLE DUPLICATE: 2467299

Parameter	Units	60310412023 Result	Dup Result	RPD	Max RPD	Qualifiers
Alkalinity, Total as CaCO3	mg/L	277	296	7	10	

SAMPLE DUPLICATE: 2467300

Parameter	Units	60310791002 Result	Dup Result	RPD	Max RPD	Qualifiers
Alkalinity, Total as CaCO3	mg/L	186	187	0	10	

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

REPORT OF LABORATORY ANALYSIS

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

QUALITY CONTROL DATA

Project: AMEREN SIOUX ENERGY CTR
Pace Project No.: 60312388

QC Batch: 605187 Analysis Method: SM 2320B
QC Batch Method: SM 2320B Analysis Description: 2320B Alkalinity
Associated Lab Samples: 60312388001, 60312388002, 60312388003, 60312388004, 60312388005, 60312388006

METHOD BLANK: 2473739 Matrix: Water
Associated Lab Samples: 60312388001, 60312388002, 60312388003, 60312388004, 60312388005, 60312388006

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Alkalinity, Total as CaCO3	mg/L	<6.5	20.0	6.5	08/26/19 13:53	

LABORATORY CONTROL SAMPLE: 2473740

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity, Total as CaCO3	mg/L	500	484	97	90-110	

SAMPLE DUPLICATE: 2473741

Parameter	Units	60312388003 Result	Dup Result	RPD	Max RPD	Qualifiers
Alkalinity, Total as CaCO3	mg/L	369	377	2	10	H3

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

REPORT OF LABORATORY ANALYSIS

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

QUALITY CONTROL DATA

Project: AMEREN SIOUX ENERGY CTR
Pace Project No.: 60312388

QC Batch: 601524 Analysis Method: SM 2540C
QC Batch Method: SM 2540C Analysis Description: 2540C Total Dissolved Solids
Associated Lab Samples: 60310790002, 60310790003

METHOD BLANK: 2460999 Matrix: Water
Associated Lab Samples: 60310790002, 60310790003

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	<5.0	5.0	5.0	08/07/19 13:10	

LABORATORY CONTROL SAMPLE: 2461000

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

SAMPLE DUPLICATE: 2461001

Parameter	Units	60310791002 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	822	809	2	10	

SAMPLE DUPLICATE: 2461002

Parameter	Units	60310412023 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	545	600	10	10	

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

REPORT OF LABORATORY ANALYSIS

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

QUALITY CONTROL DATA

Project: AMEREN SIOUX ENERGY CTR
Pace Project No.: 60312388

QC Batch: 604897 Analysis Method: SM 2540C
QC Batch Method: SM 2540C Analysis Description: 2540C Total Dissolved Solids
Associated Lab Samples: 60312388001, 60312388002, 60312388003, 60312388004, 60312388005, 60312388006

METHOD BLANK: 2472721 Matrix: Water
Associated Lab Samples: 60312388001, 60312388002, 60312388003, 60312388004, 60312388005, 60312388006

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	<5.0	5.0	5.0	08/22/19 18:25	

LABORATORY CONTROL SAMPLE: 2472722

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Dissolved Solids	mg/L	500	502	100	80-120	

SAMPLE DUPLICATE: 2472723

Parameter	Units	60312388003 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	454	463	2	10	H3

SAMPLE DUPLICATE: 2472724

Parameter	Units	60312038003 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	825	847	3	10	

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

REPORT OF LABORATORY ANALYSIS

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

QUALITY CONTROL DATA

Project: AMEREN SIOUX ENERGY CTR
Pace Project No.: 60312388

QC Batch: 603127 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 60310790002, 60310790003

METHOD BLANK: 2466421 Matrix: Water
Associated Lab Samples: 60310790002, 60310790003

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Chloride	mg/L	<0.22	1.0	0.22	08/14/19 11:57	
Fluoride	mg/L	<0.085	0.20	0.085	08/14/19 11:57	
Sulfate	mg/L	<0.23	1.0	0.23	08/14/19 11:57	

LABORATORY CONTROL SAMPLE: 2466422

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	2.4	97	90-110	
Sulfate	mg/L	5	4.7	95	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2466423 2466424

Parameter	Units	60310412023 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	25.5	25	25	50.0	49.4	98	96	80-120	1	15	
Fluoride	mg/L	2.1	2.5	2.5	4.6	4.7	101	102	80-120	1	15	
Sulfate	mg/L	96.6	25	25	122	120	100	94	80-120	1	15	E

MATRIX SPIKE SAMPLE: 2466425

Parameter	Units	60310952001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	46500	50000	99400	106	80-120	
Fluoride	mg/L	ND	25000	24700	99	80-120	
Sulfate	mg/L	21700	50000	73700	104	80-120	

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

REPORT OF LABORATORY ANALYSIS

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

QUALITY CONTROL DATA

Project: AMEREN SIOUX ENERGY CTR
Pace Project No.: 60312388

QC Batch: 606780 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 60312388001, 60312388002, 60312388003, 60312388004, 60312388005, 60312388006

METHOD BLANK: 2479760 Matrix: Water
Associated Lab Samples: 60312388001, 60312388002, 60312388003, 60312388004, 60312388005, 60312388006

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Chloride	mg/L	<0.22	1.0	0.22	08/30/19 20:20	
Fluoride	mg/L	<0.085	0.20	0.085	08/30/19 20:20	
Sulfate	mg/L	<0.23	1.0	0.23	08/30/19 20:20	

LABORATORY CONTROL SAMPLE: 2479761

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	5	4.8	97	90-110	
Fluoride	mg/L	2.5	2.4	96	90-110	
Sulfate	mg/L	5	4.7	93	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2479762 2479763

Parameter	Units	60312388003 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	2.6	5	5	7.5	7.5	96	98	80-120	1	15	
Fluoride	mg/L	0.29	2.5	2.5	2.8	2.8	98	100	80-120	2	15	
Sulfate	mg/L	37.2	25	25	62.7	62.3	102	100	80-120	1	15	

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

REPORT OF LABORATORY ANALYSIS

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

QUALIFIERS

Project: AMEREN SIOUX ENERGY CTR
Pace Project No.: 60312388

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

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

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: AMEREN SIOUX ENERGY CTR
Pace Project No.: 60312388

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
60310790002	**S-BMW-1S**	EPA 200.7	601714	EPA 200.7	601738
60310790003	**S-BMW-3S**	EPA 200.7	601714	EPA 200.7	601738
60312388001	**S-TMW-1**	EPA 200.7	604659	EPA 200.7	604692
60312388002	**S-TMW-2**	EPA 200.7	604659	EPA 200.7	604692
60312388003	**S-TMW-3**	EPA 200.7	604659	EPA 200.7	604692
60312388004	**S-UG-3**	EPA 200.7	604659	EPA 200.7	604692
60312388005	**S-SCL4A-FB-1**	EPA 200.7	604659	EPA 200.7	604692
60312388006	**S-SCL4A-DUP-1**	EPA 200.7	604659	EPA 200.7	604692
60310790002	**S-BMW-1S**	SM 2320B	603364		
60310790003	**S-BMW-3S**	SM 2320B	603364		
60312388001	**S-TMW-1**	SM 2320B	605187		
60312388002	**S-TMW-2**	SM 2320B	605187		
60312388003	**S-TMW-3**	SM 2320B	605187		
60312388004	**S-UG-3**	SM 2320B	605187		
60312388005	**S-SCL4A-FB-1**	SM 2320B	605187		
60312388006	**S-SCL4A-DUP-1**	SM 2320B	605187		
60310790002	**S-BMW-1S**	SM 2540C	601524		
60310790003	**S-BMW-3S**	SM 2540C	601524		
60312388001	**S-TMW-1**	SM 2540C	604897		
60312388002	**S-TMW-2**	SM 2540C	604897		
60312388003	**S-TMW-3**	SM 2540C	604897		
60312388004	**S-UG-3**	SM 2540C	604897		
60312388005	**S-SCL4A-FB-1**	SM 2540C	604897		
60312388006	**S-SCL4A-DUP-1**	SM 2540C	604897		
60310790002	**S-BMW-1S**	EPA 300.0	603127		
60310790003	**S-BMW-3S**	EPA 300.0	603127		
60312388001	**S-TMW-1**	EPA 300.0	606780		
60312388002	**S-TMW-2**	EPA 300.0	606780		
60312388003	**S-TMW-3**	EPA 300.0	606780		
60312388004	**S-UG-3**	EPA 300.0	606780		
60312388005	**S-SCL4A-FB-1**	EPA 300.0	606780		
60312388006	**S-SCL4A-DUP-1**	EPA 300.0	606780		

Pace Analytical
www.pacelabs.com

Sample Condition Upon Receipt

WO# : 60312388

60312388

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: 1295 **Type of Ice:** (Wet) Blue None

Cooler Temperature (°C): As-read 1.4, 0.4, 4.3 Corr. Factor -0.2 Corrected 1.2, 0.2, 4.1

Date and initials of person examining contents: VB 8/20/19

Temperature should be above freezing to 6°C

Chain of Custody present:	☑Yes ☐No ☐N/A	
Chain of Custody relinquished:	☑Yes ☐No ☐N/A	
Samples arrived within holding time:	☑Yes ☐No ☐N/A	
Short Hold Time analyses (<72hr):	☐Yes ☑No ☐N/A	
Rush Turn Around Time requested:	☐Yes ☑No ☐N/A	
Sufficient volume:	☑Yes ☐No ☐N/A	
Correct containers used:	☑Yes ☐No ☐N/A	
Pace containers used:	☑Yes ☐No ☐N/A	
Containers intact:	☑Yes ☐No ☐N/A	
Unpreserved 5035A / TX1005/1006 soils frozen in 48hrs?	☐Yes ☐No ☑N/A	
Filtered volume received for dissolved tests?	☐Yes ☐No ☑N/A	ON COC MS/MSD for S-TMW-3
Sample labels match COC: Date / time / ID / analyses	☑Yes ☑No ☐N/A	IS labeled as S-SCL4A MS/MSD
Samples contain multiple phases? Matrix: Wt	☐Yes ☐No ☐N/A	but Sample ID & Time match S-TMW-3
Containers requiring pH preservation in compliance? (HNO3, H2SO4, HCl<2; NaOH>9 Sulfide, NaOH>10 Cyanide) (Exceptions: VOA, Micro, O&G, KS TPH, OK-DRO)	☑Yes ☐No ☐N/A	List sample IDs, volumes, lot #'s of preservative and the date/time added.
Cyanide water sample checks: Lead acetate strip turns dark? (Record only)	☐Yes ☐No	
Potassium iodide test strip turns blue/purple? (Preserve)	☐Yes ☐No	
Trip Blank present:	☐Yes ☐No ☑N/A	
Headspace in VOA vials (>6mm):	☐Yes ☐No ☑N/A	
Samples from USDA Regulated Area: State:	☐Yes ☐No ☑N/A	
Additional labels attached to 5035A / TX1005 vials in the field?	☐Yes ☐No ☑N/A	

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

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Jasmi Chunk 8/21/19

Project Manager Review: _____ Date: _____

CHAIN-OF-CUSTODY / Analytical Request Document

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

Page: of

Section A Required Client Information:

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

Section B Required Project Information:

Report To:	Mark Haddock (mhaddock@golder.com)
Copy To:	Jeffrey Ingram
Purchase Order No.:	
Project Name:	Ameren Sioux EC SCPA N&E
Project Number:	153-1406.0003L (COC #20)

Section C Invoice Information:

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

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER

UST RCRA OTHER _____

Site Location STATE: MO

Section D Required Client Information

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

Valid Matrix Codes

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

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED COMPOSITE START DATE	COLLECTED COMPOSITE START TIME	COLLECTED COMPOSITE END/GRAB DATE	COLLECTED COMPOSITE END/GRAB TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test Y/N	Metals*	Alkalinity	Total Phosphorus	Ferrous Iron	Ferric Iron	Filtered (Lab/Field)	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
1	S-TMW-1	WT	G	8/4/14	1150				3	2		1						N	1	1			1	Bp2U	Bp3U		Bp3N 03123881 001
2	S-TMW-2	WT	G		1110													N									002
3	S-TMW-3	WT	G		1010													N						3Bp2U	3Bp3U		3Bp3N 003
4	S-UG-3	WT	G		1015													N						Bp2U	Bp3U		Bp3N 004
5	S-SCL4A-DUP-1	WT	G		—													N						Bp2U	Bp3U		Bp3N 006
6	S-SCL4A-FB-1	WT	G		1001													N						Bp2U	Bp3U		Bp3N 005
7	S-SCL4A-MS ~~S-BMW-1S~~	WT	G		1010																						
8	S-SCL4A-MSD ~~S-BMW-3S~~	WT	G		1010																						
9		WT	G																								
10		WT	G																								
11		WT	G																								
12		WT	G																								

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS: Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)
*EPA 200.7: Ba, Li, Mo, Fe, Mg, Mn, K, Na *EPA 200.8: As	Jeff Ingram / Golder	8/4/14	1345	Angie M	8.19.14	13:50				
	Ana	8.19.14	13:55	Victor Brandao	8/20/14	0745	1.2	Y	Y	Y
							0.2			
							4.1			

SAMPLER NAME AND SIGNATURE	
PRINT Name of SAMPLER:	Jeff Ingram
SIGNATURE of SAMPLER:	
DATE Signed (MM/DD/YY):	8/14/14

Pace Analytical®
www.pacelabs.com

Sample Condition Upon Receipt

WO# : 60310790

60310790

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-294 **Type of Ice:** Wet ☑ Blue None

Cooler Temperature (°C): **As-read** 1.5, 2.0 **Corr. Factor** -1.0 **Corrected** 0.5, 1.0

Date and initials of person examining contents: 8/13/19

Temperature should be above freezing to 6°C

Chain of Custody present:	☑Yes ☐No ☐N/A	
Chain of Custody relinquished:	☑Yes ☐No ☐N/A	
Samples arrived within holding time:	☑Yes ☐No ☐N/A	
Short Hold Time analyses (<72hr):	☐Yes ☑No ☐N/A	
Rush Turn Around Time requested:	☐Yes ☑No ☐N/A	
Sufficient volume:	☑Yes ☐No ☐N/A	
Correct containers used:	☑Yes ☐No ☐N/A	
Pace containers used:	☑Yes ☐No ☐N/A	
Containers intact:	☑Yes ☐No ☐N/A	
Unpreserved 5035A / TX1005/1006 soils frozen in 48hrs?	☐Yes ☐No ☑N/A	
Filtered volume received for dissolved tests?	☐Yes ☐No ☑N/A	No volume for analysis
Sample labels match COC: Date / time / ID / analyses	☑Yes ☐No ☐N/A	total phosphorus.
Samples contain multiple phases? Matrix: WT	☐Yes ☑No ☐N/A	
Containers requiring pH preservation in compliance? (HNO3, H2SO4, HCl<2; NaOH>9 Sulfide, NaOH>10 Cyanide) (Exceptions: VOA, Micro, O&G, KS TPH, OK-DRO)	☑Yes ☐No ☐N/A	List sample IDs, volumes, lot #'s of preservative and the date/time added.
Cyanide water sample checks: Lead acetate strip turns dark? (Record only)	☐Yes ☐No	
Potassium iodide test strip turns blue/purple? (Preserve)	☐Yes ☐No	
Trip Blank present:	☐Yes ☐No ☑N/A	
Headspace in VOA vials (>6mm):	☐Yes ☐No ☑N/A	
Samples from USDA Regulated Area: State:	☐Yes ☐No ☑N/A	
Additional labels attached to 5035A / TX1005 vials in the field?	☐Yes ☐No ☑N/A	

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

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: Jasmi Church Date: 8/8/19

CHAIN-OF-CUSTODY / Analytical Request Document

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

Pace Analytical
www.pacelabs.com

Page: 1 of 1

Section A Required Client Information:		Section B Required Project Information:		Section C Invoice Information:	
Company:	Golder Associates	Report To:	Jeffrey Ingram	Attention:	
Address:	13515 Barrett Parkway Drive, Ste 260	Copy To:	Ryan Feldmann/Eric Schneider	Company Name:	
	Ballwin, MO 63021			Address:	
Email To:	jeffrey_ingram@golder.com	Purchase Order No.:		Pace Quote Reference:	
Phone:	636-724-9191 Fax: 636-724-9323	Project Name:	Ameren Sioux Energy Center	Pace Project Manager:	Jamie Church
Requested Due Date/TAT:	Standard	Project Number:	153-1406-01.0003B (COC#6)	Pace Profile #:	9285

REGULATORY AGENCY

NPDES | GROUND WATER | DRINKING WATER

UST | RCRA | OTHER _____

Site Location STATE: MO

Section D Required Client Information

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

Valid Matrix Codes

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

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED COMPOSITE START DATE	COLLECTED COMPOSITE START TIME	COLLECTED COMPOSITE END/GRAB DATE	COLLECTED COMPOSITE END/GRAB TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test Y/N	Metals*	Chloride/Fluoride/Sulfate	TDS	Alkalinity	Total Phosphorus	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
																		Requested Analysis Filtered (Y/N)	N	N	N	N	N		10310790
1	S-LMW-1S	WT	G	8/1/19	1500				5	2		3						1	1	1	1	1			BP3N 001
2	S-LMW-2S	WT	G																						
3	S-LMW-3S	WT	G																						
4	S-LMW-4S	WT	G																						
5	S-LWM-5S	WT	G																						
6	S-LWM-6S	WT	G																						
7	S-LMW-7S	WT	G																						
8	S-LMW-8S	WT	G																						
9	S-LMW-9S	WT	G																						
10	S-BMW-1S	WT	G	8/1/19	1055				5	2		3						1	1	1	1	1			BP3N 002
11	S-BMW-3S	WT	G	↓	1145				5	2		3						1	1	1	1	1			BP3N 003
12	S-LMW-DUP-1	WT	G																						

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS: Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)
*EPA 200.7: B, Ca, Fe, Mg, Mn, K, Na	Golder	8/2/19	1635		8/3/19	0250	1.5 2.0	Y	Y	Y

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Ryan Feldmann

SIGNATURE of SAMPLER: [signature] DATE Signed (MM/DD/YY): 8/2/19

Pace Analytical
www.pacelabs.com

Sample Condition Upon Receipt

WO#: 60310790

60310790

Client Name: Golder Assoc.

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

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

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

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

Thermometer Used: T100 **Type of Ice:** (Wet) Blue None

Cooler Temperature (°C): As-read 0.2 Corr. Factor +0.0 Corrected 0.2,

Date and initials of person examining contents: 8.7.19 ML

Temperature should be above freezing to 6°C 0.6, 1.0, 0.3 0.6, 1.0, 0.3

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

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

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

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

Pace Analytical
www.pacelabs.com

CHAIN-OF-CUSTODY / Analytical Request Document

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

Page: 1 of 2

Section A Required Client Information:		Section B Required Project Information:		Section C Invoice Information:	
Company:	Golder Associates	Report To:	Jeffrey Ingram	Attention:	
Address:	13515 Barrett Parkway Drive, Ste 260	Copy To:	Ryan Feldmann/Eric Schneider	Company Name:	
	Ballwin, MO 63021			Address:	
Email To:	jeffrey_ingram@golder.com	Purchase Order No.:		Pace Quote Reference:	
Phone:	636-724-9191 Fax: 636-724-9323	Project Name:	Ameren Sioux Energy Center	Pace Project Manager:	Jamie Church
Requested Due Date/TAT:	Standard	Project Number:	153-1406-01.0003B (COC#6)	Pace Profile #:	9285

REGULATORY AGENCY

NPDES (GROUND WATER) DRINKING WATER

UST RCRA OTHER _____

Site Location STATE: MO

Section D Required Client Information

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

Valid Matrix Codes

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

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED COMPOSITE START DATE	COMPOSITE START TIME	COMPOSITE END/GRAB DATE	COMPOSITE END/GRAB TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test Y/N	Requested Analysis Filtered (Y/N): Metals*	Chloride/Fluoride/Sulfate	TDS	Alkalinity	~~Total Phosphorus~~	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
																		Y/N	N	N	N	N	N			
1	S-LMW-1S	WT	G																							40310790
2	S-LMW-2S	WT	G			8/6/19	1030		3	2		1							✓	✓	✓	✓	BP2U, BP3N, BP3U			004
3	S-LMW-3S	WT	G			8/5/19	1620		3	2		1							✓	✓	✓	✓				005
4	S-LMW-4S	WT	G			8/5/19	1450		3	2		1							✓	✓	✓	✓				006
5	S-LWM-5S	WT	G			8/5/19	1030		9	2		3							✓	✓	✓	✓	3BP2U, 3BP3N, 3BP3U			007
6	S-LWM-6S	WT	G			8/5/19	1135		3	2		1							✓	✓	✓	✓	BP2U, BP3N, BP3U			008
7	S-LMW-7S	WT	G			8/5/19	1255		3	2		1							✓	✓	✓	✓				009
8	S-LMW-8S	WT	G			8/6/19	0925		3	2		1							✓	✓	✓	✓				010
9	S-LMW-9S	WT	G																							
10	S-BMW-1S	WT	G																							
11	S-BMW-3S	WT	G																							
12	S-LMW-DUP-1	WT	G			8/5/19	—		3	2		1							✓	✓	✓	✓	BP2U, BP3N, BP3U			011

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS: Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)
*EPA 200.7: B, Ca, Fe, Mg, Mn, K, Na	Lucas Swindle/Golder	8/6/19	1700	[illegible] /Ves	8-7-19	0255	0.2	Y	Y	Y
							0.6			
							1.0			
							0.3			

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Lucas Swindle

SIGNATURE of SAMPLER: [signature] DATE Signed (MM/DD/YY): 8/6/19

Pace Analytical
www.pacelabs.com

CHAIN-OF-CUSTODY / Analytical Request Document

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

Page: 2 of 2

Section A — Required Client Information:

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

Section B — Required Project Information:

Report To:	Jeffrey Ingram
Copy To:	Ryan Feldmann/Eric Schneider
Purchase Order No.:	
Project Name:	Ameren Sioux Energy Center
Project Number:	153-1406-01.0003B (COC #6)

Section C — Invoice Information:

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

REGULATORY AGENCY

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

Site Location STATE: MO

Section D — Required Client Information

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

Valid Matrix Codes

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

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED COMPOSITE START DATE	COLLECTED COMPOSITE START TIME	COLLECTED COMPOSITE END/GRAB DATE	COLLECTED COMPOSITE END/GRAB TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test Y/N	Metals*	Chloride/Fluoride/Sulfate	TDS	Alkalinity	Total Phosphorus								Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
																		Y/N	N	N	N	N	N								
1	S-LMW-DUP-2	WT	G			8/6/19	—		3	2		1							/	/	/	/	DP2U, DP3N								60310790 012
2	S-LMW-FB-1	WT	G			8/6/19	1408		3	2		1							/	/	/	/									013
3	S-LMW-FB-2	WT	G			8/6/19	0812		3	2		1							/	/	/	/									014
4		WT	G																											
5		WT	G																											
6		WT	G																											
7		WT	G																											
8		WT	G																											
9		WT	G																											
10		WT	G																											
11		WT	G																											
12		WT	G																											

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
*EPA 200.7: B, Ca, Fe, Mg, Mn, K, Na	Golder	8/6/19	1700	Client/Gas	8.7.19	0255	7.0	Y	Y	Y
							0.6			
							1.0			
							0.3			

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Lucas Swindle

SIGNATURE of SAMPLER: [signature] DATE Signed (MM/DD/YY): 8/6/19

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

Pace Analytical®
www.pacelabs.com

Sample Condition Upon Receipt

WO# : 60310790

60310790

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-294 **Type of Ice:** Wet ☑ Blue None

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

Date and initials of person examining contents: 8/10/19

Temperature should be above freezing to 6°C

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

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

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: Jana Church 8/13/19 Date: _____

Pace Analytical®
www.pacelabs.com

CHAIN-OF-CUSTODY / Analytical Request Document

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

Page: of

2013245

Section A Required Client Information:

Company:	Golder Associates
Address:	13515 Barrett Parkway Dr. 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 Sioux Energy Center
Project Number:	153-140601.0003B

Section C Invoice Information:

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

REGULATORY AGENCY

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

Site Location STATE: _____

Section D Required Client Information

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

Matrix Codes (MATRIX / CODE): Drinking Water DW; Water WT; Waste Water WW; Product P; Soil/Solid SL; Oil OL; Wipe WP; Air AR; Tissue TS; Other OT

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED COMPOSITE START DATE	COLLECTED COMPOSITE START TIME	COLLECTED COMPOSITE END/GRAB DATE	COLLECTED COMPOSITE END/GRAB TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test ↓ Y/N	Metals*	Chloride/Fluoride/Sulfate	TDS	Alkalinity									Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
																			N	N	N	N									
1	S-LMW-95	WT	G			8/9/19	0935		3	2		1							/	/	/	/									60310790
2																															
3																															
4																															
5																															
6																															
7																															
8																															
9																															
10																															
11																															
12																															

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
*EPA 200.7: B, Ca, Fe, Mg,	Golder	8/9/19	1311		8/9/19	1317				
Mn, K, Na		8/9/19	1700		8/10/19	0945	1,2	Y	Y	Y

ORIGINAL

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Lucas Swindle

SIGNATURE of SAMPLER: _____ DATE Signed (MM/DD/YY): 8/9/19

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

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

F-ALL-Q-020rev.07, 15-May-2007

MEMORANDUM

DATE October 17, 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, SIOUX ENERGY CENTER – SCL4A – DATA PACKAGE 60312388A

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 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).
- When an analyte was analyzed outside of EPA hold time, associated detections were qualified as estimates (J).

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

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

QA LEVEL II - INORGANIC DATA EVALUATION CHECKLIST

Company Name: Golder Associates
Project Manager: J Ingram
Project Name: Ameren - Sioux - SCL4A
Project Number: 1531406
Reviewer: T Goodwin
Validation Date: 10/17/2019

Laboratory: Pace Analytical - KS
SDG #: 60312388A
Analytical Method (type and no.): EPA 200.7 (Metals); SM 2320B (Alk); SM 2540C (TDS); EPA 300.0 (Anions)
Matrix: ☐ Air ☐ Soil/Sed. ■ Water ☐ Waste ☐
Sample Names S-TMW-1, S-TMW-2, S-TMW-3, S-UG-3, S-SCL4A-FB-1, S-SCL4A-DUP-1, S-BMW-1S, S-BMW-3S

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?	x			8/1-8/4/2019
b) Sampling team indicated?	x			
c) Sample location noted?	x			
d) Sample depth indicated (Soils)?			x	
e) Sample type indicated (grab/composite)?	x			
f) Field QC noted?	x			
g) Field parameters collected (note types)?	x			pH, Sp.Cond, ORP, Temp, DO, Turb
h) Field Calibration within control limits?	x			
i) Notations of unacceptable field conditions/performances from field logs or field notes?		x		
j) Does the laboratory narrative indicate deficiencies?			x	

Note Deficiencies:

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

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

QA LEVEL II - INORGANIC DATA EVALUATION CHECKLIST

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

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

Duplicates	YES	NO	NA	COMMENTS
a) Were field duplicates collected (note original and duplicate sample names)?				DUP-1 @ S-TMW-2
	[x]	[ ]	[ ]	FB-1 @ S-UG-3
b) Were field dup. precision criteria met (note RPD)?	[ ]	[x]	[ ]	See Notes
c) Were lab duplicates analyzed (note original and duplicate samples)?				
	[x]	[ ]	[ ]	-88003: Alk, TDS
d) Were lab dup. precision criteria met (note RPD)?	[x]	[ ]	[ ]	See Notes

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

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

Comments/Notes:

MB: -90002-03: B (11.8),

FB-1: Ca (58.2), TDS (17.0), Cl (0.46)

MS/MSD: -80003: Ca (MSH,MSDL2),

Hold Time: -80001-6: TDS, Alk

DUP-1: TDS (75)

Max Lab Duplicate RPD: 2% (Limit: 10%)

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

QA LEVEL II - INORGANIC DATA EVALUATION CHECKLIST

Data Qualification:

Sample Name	Constituent(s)	Result	Qualifier	Reason
S-TMW-1	Alkalinity (Alk)	-	J	Analyzed Outside of EPA Hold Time
"	Total Dissolved Solids (TDS)	-	J	"
S-TMW-2	Alk	-	J	"
"	TDS	-	J	Field Duplicate (FD) and Hold Time Exceeded Limits; Result > PQL
S-TMW-3	Alk	-	J	Analyzed Outside of EPA Hold Time
"	TDS	-	J	"
"	Calcium (Ca)	-	J	MS/MSD Exceeded Calibration Range
S-UG-3	Alk	-	J	Analyzed Outside of EPA Hold Time
"	TDS	-	J	"
S-SCL4A-FB-1	TDS	-	J	"
"S-SCL4A-DUP-1	Alk	-	J	"
"	TDS	-	J	FD and Hold Time Exceeded Limits; Result > PQL
S-BMW-1S	Boron (B)	100	U	Analyte Detected in Method Blank (MB); PQL>Result>MDL
S-BMW-3S	"	100	U	"

Signature: Tommy Hood

Date: 10/17/2019

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

October 21, 2019

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

RE: Project: AMEREN SIOUX ENERGY CTR SCL4A
Pace Project No.: 60317030

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

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

CERTIFICATIONS

Project: AMEREN SIOUX ENERGY CTR SCL4A
Pace Project No.: 60317030

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

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

SAMPLE SUMMARY

Project: AMEREN SIOUX ENERGY CTR SCL4A
Pace Project No.: 60317030

Lab ID	Sample ID	Matrix	Date Collected	Date Received
60317030001	**S-UG3**	Water	10/02/19 11:22	10/04/19 02:55
60317030002	**S-SCL4A-DUP-1**	Water	10/02/19 11:22	10/04/19 02:55
60317030003	**S-TMW-2**	Water	10/02/19 09:45	10/04/19 02:55
60317030004	**SCL4A-FB-1**	Water	10/02/19 09:55	10/04/19 02:55

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

SAMPLE ANALYTE COUNT

Project: AMEREN SIOUX ENERGY CTR SCL4A
Pace Project No.: 60317030

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
60317030001	**S-UG3**	EPA 200.7	LRS	2	PASI-K
		SM 2540C	MAP	1	PASI-K
		EPA 300.0	MGS	1	PASI-K
60317030002	**S-SCL4A-DUP-1**	EPA 200.7	LRS	2	PASI-K
		SM 2540C	MAP	1	PASI-K
		EPA 300.0	MGS	1	PASI-K
60317030003	**S-TMW-2**	SM 2540C	MAP	1	PASI-K
		EPA 300.0	MGS	1	PASI-K
60317030004	**SCL4A-FB-1**	EPA 200.7	LRS	2	PASI-K
		SM 2540C	MAP	1	PASI-K
		EPA 300.0	CNB	2	PASI-K

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

ANALYTICAL RESULTS

Project: AMEREN SIOUX ENERGY CTR SCL4A
Pace Project No.: 60317030

Sample: S-UG3 **Lab ID: 60317030001** Collected: 10/02/19 11:22 Received: 10/04/19 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								
Boron	**1120**	ug/L	100	10.7	1	10/11/19 14:00	10/14/19 15:07	7440-42-8	
Calcium	**163000**	ug/L	200	50.0	1	10/11/19 14:00	10/14/19 15:07	7440-70-2	
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**724**	mg/L	10.0	10.0	1		10/08/19 15:20		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**81.2**	mg/L	5.0	1.1	5		10/15/19 19:44	16887-00-6	

REPORT OF LABORATORY ANALYSIS

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

ANALYTICAL RESULTS

Project: AMEREN SIOUX ENERGY CTR SCL4A
Pace Project No.: 60317030

Sample: S-SCL4A-DUP-1 **Lab ID: 60317030002** Collected: 10/02/19 11:22 Received: 10/04/19 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								
Boron	**1080**	ug/L	100	10.7	1	10/11/19 14:00	10/14/19 15:09	7440-42-8	
Calcium	**156000**	ug/L	200	50.0	1	10/11/19 14:00	10/14/19 15:09	7440-70-2	
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**757**	mg/L	10.0	10.0	1		10/08/19 15:20		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**77.6**	mg/L	10.0	2.2	10		10/16/19 11:36	16887-00-6	

REPORT OF LABORATORY ANALYSIS

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

ANALYTICAL RESULTS

Project: AMEREN SIOUX ENERGY CTR SCL4A
Pace Project No.: 60317030

Sample: S-TMW-2 **Lab ID: 60317030003** Collected: 10/02/19 09:45 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	**512**	mg/L	10.0	10.0	1		10/08/19 15:20		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Sulfate	**75.6**	mg/L	10.0	2.3	10		10/16/19 11:53	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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

ANALYTICAL RESULTS

Project: AMEREN SIOUX ENERGY CTR SCL4A
Pace Project No.: 60317030

Sample: SCL4A-FB-1 **Lab ID: 60317030004** Collected: 10/02/19 09:55 Received: 10/04/19 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								
Boron	**<10.7**	ug/L	100	10.7	1	10/11/19 14:00	10/14/19 15:17	7440-42-8	
Calcium	**<50.0**	ug/L	200	50.0	1	10/11/19 14:00	10/14/19 15:17	7440-70-2	
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**<5.0**	mg/L	5.0	5.0	1		10/08/19 15:20		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**<0.22**	mg/L	1.0	0.22	1		10/17/19 14:43	16887-00-6	
Sulfate	**<0.23**	mg/L	1.0	0.23	1		10/17/19 14:43	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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

QUALITY CONTROL DATA

Project: AMEREN SIOUX ENERGY CTR SCL4A
Pace Project No.: 60317030

QC Batch: 615188 Analysis Method: EPA 200.7
QC Batch Method: EPA 200.7 Analysis Description: 200.7 Metals, Total
Associated Lab Samples: 60317030001, 60317030002, 60317030004

METHOD BLANK: 2511571 Matrix: Water
Associated Lab Samples: 60317030001, 60317030002, 60317030004

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Boron	ug/L	<10.7	100	10.7	10/14/19 14:47	
Calcium	ug/L	<50.0	200	50.0	10/14/19 14:47	

LABORATORY CONTROL SAMPLE: 2511572

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Boron	ug/L	1000	988	99	85-115	
Calcium	ug/L	10000	10100	101	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2511573 2511574

Parameter	Units	60317027001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Boron	ug/L	244	1000	1000	1250	1220	101	98	70-130	2	20	
Calcium	ug/L	166000	10000	10000	176000	176000	99	92	70-130	0	20	

MATRIX SPIKE SAMPLE: 2511575

Parameter	Units	60317068001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Boron	ug/L	218	1000	1210	99	70-130	
Calcium	ug/L	138000	10000	145000	69	70-130	M1

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

REPORT OF LABORATORY ANALYSIS

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

QUALITY CONTROL DATA

Project: AMEREN SIOUX ENERGY CTR SCL4A
Pace Project No.: 60317030

QC Batch: 614091 Analysis Method: SM 2540C
QC Batch Method: SM 2540C Analysis Description: 2540C Total Dissolved Solids
Associated Lab Samples: 60317030001, 60317030002, 60317030003, 60317030004

METHOD BLANK: 2507725 Matrix: Water
Associated Lab Samples: 60317030001, 60317030002, 60317030003, 60317030004

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

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

QUALITY CONTROL DATA

Project: AMEREN SIOUX ENERGY CTR SCL4A
Pace Project No.: 60317030

QC Batch: 614196 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 60317030001, 60317030002, 60317030003

METHOD BLANK: 2508100 Matrix: Water
Associated Lab Samples: 60317030001, 60317030002, 60317030003

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Chloride	mg/L	<0.22	1.0	0.22	10/15/19 15:08	
Sulfate	mg/L	<0.23	1.0	0.23	10/15/19 15:08	

LABORATORY CONTROL SAMPLE: 2508101

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	5	4.6	92	90-110	
Sulfate	mg/L	5	4.8	97	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2508102 2508103

Parameter	Units	60317026001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	22.1	10	10	34.2	32.5	121	105	80-120	5	15	M1
Sulfate	mg/L	201	10	10	216	204	150	31	80-120	6	15	E,M1

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

REPORT OF LABORATORY ANALYSIS

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

QUALITY CONTROL DATA

Project: AMEREN SIOUX ENERGY CTR SCL4A
Pace Project No.: 60317030

QC Batch: 616463 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 60317030004

METHOD BLANK: 2516455 Matrix: Water
Associated Lab Samples: 60317030004

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Chloride	mg/L	<0.22	1.0	0.22	10/17/19 12:30	
Sulfate	mg/L	<0.23	1.0	0.23	10/17/19 12:30	

LABORATORY CONTROL SAMPLE: 2516456

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	5	4.7	94	90-110	
Sulfate	mg/L	5	5.3	105	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2516457 2516458

Parameter	Units	60317030004 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	<0.22	5	5	4.8	4.9	95	97	80-120	2	15	
Sulfate	mg/L	<0.23	5	5	5.4	5.5	107	111	80-120	3	15	

MATRIX SPIKE SAMPLE: 2516459

Parameter	Units	60317863001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	0.52J	5	5.0	89	80-120	

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

REPORT OF LABORATORY ANALYSIS

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

QUALIFIERS

Project: AMEREN SIOUX ENERGY CTR SCL4A
Pace Project No.: 60317030

DEFINITIONS

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

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

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

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

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

S - Surrogate

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

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

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

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

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

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

TNI - The NELAC Institute.

LABORATORIES

PASI-K	Pace Analytical Services - Kansas City

ANALYTE QUALIFIERS

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

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

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: AMEREN SIOUX ENERGY CTR SCL4A
Pace Project No.: 60317030

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
60317030001	**S-UG3**	EPA 200.7	615188	EPA 200.7	615295
60317030002	**S-SCL4A-DUP-1**	EPA 200.7	615188	EPA 200.7	615295
60317030004	**SCL4A-FB-1**	EPA 200.7	615188	EPA 200.7	615295
60317030001	**S-UG3**	SM 2540C	614091		
60317030002	**S-SCL4A-DUP-1**	SM 2540C	614091		
60317030003	**S-TMW-2**	SM 2540C	614091		
60317030004	**SCL4A-FB-1**	SM 2540C	614091		
60317030001	**S-UG3**	EPA 300.0	614196		
60317030002	**S-SCL4A-DUP-1**	EPA 300.0	614196		
60317030003	**S-TMW-2**	EPA 300.0	614196		
60317030004	**SCL4A-FB-1**	EPA 300.0	616463		

Pace Analytical
www.pacelabs.com

Sample Condition Upon Receipt

WO# : 60317030

60317030

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 ☑ Zplc

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

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

Date and initials of person examining contents: 10.4.19

Temperature should be above freezing to 6°C

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

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

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: Jami Church Date: 10/8/19

Pace Analytical
www.pacelabs.com

CHAIN-OF-CUSTODY / Analytical Request Document

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

Page: 1 of 1

Section A Required Client Information:		Section B Required Project Information:		Section C Invoice Information:	
Company:	Golder Associates	Report To:	Jeffrey Ingram	Attention:	
Address:	13515 Barrett Parkway Drive, Ste 260	Copy To:	Ryan Feldmann/Eric Schneider	Company Name:	
	Ballwin, MO 63021			Address:	
Email To:	jeffrey_ingram@golder.com	Purchase Order No.:	SCL4A	Pace Quote Reference:	
Phone:	636-724-9191 Fax: 636-724-9323	Project Name:	Ameren	Pace Project Manager:	Jamie Church
Requested Due Date/TAT:	Standard	Project Number:	153140601.0003	Pace Profile #:	9285

REGULATORY AGENCY

NPDES | GROUND WATER | DRINKING WATER

UST | RCRA | OTHER _____

Site Location STATE: MO

Requested Analysis Filtered (Y/N)

ITEM #	Section D Required Client Information — SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED COMPOSITE START DATE	COMPOSITE START TIME	COMPOSITE END/GRAB DATE	COMPOSITE END/GRAB TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test Y/N	200.7 Boron	200.7 Calcium	Chloride	Fluoride	Sulfate	TDS	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
1	S-UG3	WT	G			10/2/19	1122		2	/		/						N	/	/	/			/		60317030 001
2	S-SCL4A-DUP-1	WT	G			"	—		2	/		/						N	/	/	/			/		002
3	S-TMW-2	WT	G			"	0945		1	/								N					/	/		003
4	S-SCL4A-FB-1	WT	G			"	0955		1	/								N	/	/	/		/	/		004
5		WT	G																							
6		WT	G																							
7		WT	G																							
8		WT	G																							
9		WT	G																							
10		WT	G																							
11		WT	G																							
12		WT	G																							

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

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS
	Annie Muehlfarth/Golder	10/2/19	1333	Angela McManus	10/3/19	13:34	
		10/3/19		E Brackett/Pace	10/4/19	0255	0.1
	Angela McManus	10/3/19	13:35				

SAMPLER NAME AND SIGNATURE					
PRINT Name of SAMPLER:	Annie Muehlfarth		Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)
SIGNATURE of SAMPLER:	Annie Muehlfarth	DATE Signed (MM/DD/YY): 10/2/19				

MEMORANDUM

DATE November 5, 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, SIOUX ENERGY CENTER – SCL4A – VERIFICATION SAMPLING - DATA PACKAGE 60317030

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

- None.

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

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

QA LEVEL II - INORGANIC DATA EVALUATION CHECKLIST

Company Name: Golder Associates
Project Name: Ameren - Sioux - SCL4A
Reviewer: T Goodwin

Project Manager: J Ingram
Project Number: 1531406
Validation Date: 11/5/2019

Laboratory: Pace Analytical - KS
SDG #: 60317030
Analytical Method (type and no.): EPA 200.7 (Metals); SM 2540C (TDS); EPA 300.0 (Anions)
Matrix: ☐ Air ☐ Soil/Sed. ■ Water ☐ Waste ☐
Sample Names S-UG-3, S-SCL4A-DUP-1, S-TMW-2, SCL4A-FB-1

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

Field Information	YES	NO	NA	COMMENTS
a) Sampling dates noted?	☒	☐	☐	10/2/2019
b) Sampling team indicated?	☒	☐	☐	
c) Sample location noted?	☒	☐	☐	
d) Sample depth indicated (Soils)?	☐	☐	☒	
e) Sample type indicated (grab/composite)?	☒	☐	☐	
f) Field QC noted?	☒	☐	☐	
g) Field parameters collected (note types)?	☒	☐	☐	pH, Sp.Cond, ORP, Temp, DO, Turb
h) Field Calibration within control limits?	☒	☐	☐	
i) Notations of unacceptable field conditions/performances from field logs or field notes?	☐	☒	☐	
j) Does the laboratory narrative indicate deficiencies?	☐	☐	☒	

Note Deficiencies:

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

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

QA LEVEL II - INORGANIC DATA EVALUATION CHECKLIST

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

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

Duplicates	YES	NO	NA	COMMENTS
a) Were field duplicates collected (note original and duplicate sample names)?				DUP-1 @ S-UG3
	☒	☐	☐	FB-1 @ S-TMW-2
b) Were field dup. precision criteria met (note RPD)?	☒	☐	☐	See Notes
c) Were lab duplicates analyzed (note original and duplicate samples)?				
	☐	☒	☐	
d) Were lab dup. precision criteria met (note RPD)?	☐	☐	☒	

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

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

Comments/Notes:

Max Field RPD: 4.5% (Limit 20%)

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

QA LEVEL II - INORGANIC DATA EVALUATION CHECKLIST

Data Qualification:

Sample Name	Constituent(s)	Result	Qualifier	Reason
None				

Signature: [illegible] Date: 11/5/2019

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

December 09, 2019

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

RE: Project: AMEREN SIOUX ENERGY CTR SCL4A
Pace Project No.: 60321516

Dear Jeffrey Ingram:
Enclosed are the analytical results for sample(s) received by the laboratory on November 16, 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

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

CERTIFICATIONS

Project: AMEREN SIOUX ENERGY CTR SCL4A
Pace Project No.: 60321516

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

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

SAMPLE SUMMARY

Project: AMEREN SIOUX ENERGY CTR SCL4A
Pace Project No.: 60321516

Lab ID	Sample ID	Matrix	Date Collected	Date Received
60321516001	**S-TMW-1**	Water	11/14/19 10:03	11/16/19 02:35
60321516002	**S-TMW-2**	Water	11/14/19 11:14	11/16/19 02:35
60321516003	**S-TMW-3**	Water	11/14/19 12:51	11/16/19 02:35
60321516004	**S-UG-3**	Water	11/14/19 14:49	11/16/19 02:35
60321516005	**S-SCL4A-DUP-1**	Water	11/14/19 14:49	11/16/19 02:35
60321516006	**S-SCL4A-FB-1**	Water	11/14/19 12:13	11/16/19 02:35
60321516007	**MS**	Water	11/14/19 14:54	11/16/19 02:35
60321513010	**S-BMW-1S**	Water	11/15/19 14:43	11/16/19 02:35
60321513011	**S-BMW-3S**	Water	11/15/19 12:18	11/16/19 02:35

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

SAMPLE ANALYTE COUNT

Project: AMEREN SIOUX ENERGY CTR SCL4A
Pace Project No.: 60321516

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
60321516001	**S-TMW-1**	EPA 200.7	HKC	7	PASI-K
		SM 2320B	AJS2	1	PASI-K
		SM 2540C	MAP	1	PASI-K
		EPA 300.0	CNB	3	PASI-K
60321516002	**S-TMW-2**	EPA 200.7	HKC	7	PASI-K
		SM 2320B	AJS2	1	PASI-K
		SM 2540C	MAP	1	PASI-K
		EPA 300.0	CNB	3	PASI-K
60321516003	**S-TMW-3**	EPA 200.7	HKC	7	PASI-K
		SM 2320B	AJS2	1	PASI-K
		SM 2540C	MAP	1	PASI-K
		EPA 300.0	CNB	3	PASI-K
60321516004	**S-UG-3**	EPA 200.7	HKC	7	PASI-K
		SM 2320B	AJS2	1	PASI-K
		SM 2540C	MAP	1	PASI-K
		EPA 300.0	CNB, MGS	3	PASI-K
60321516005	**S-SCL4A-DUP-1**	EPA 200.7	HKC	7	PASI-K
		SM 2320B	AJS2	1	PASI-K
		SM 2540C	MAP	1	PASI-K
		EPA 300.0	CNB	3	PASI-K
60321516006	**S-SCL4A-FB-1**	EPA 200.7	HKC	7	PASI-K
		SM 2320B	AJS2	1	PASI-K
		SM 2540C	MAP	1	PASI-K
		EPA 300.0	CNB	3	PASI-K
60321513010	**S-BMW-1S**	EPA 200.7	HKC	7	PASI-K
		SM 2320B	AJS2	1	PASI-K
		SM 2540C	BLA	1	PASI-K
		EPA 300.0	CNB	3	PASI-K
60321513011	**S-BMW-3S**	EPA 200.7	HKC	7	PASI-K
		SM 2320B	AJS2	1	PASI-K
		SM 2540C	BLA	1	PASI-K
		EPA 300.0	CNB	3	PASI-K

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

ANALYTICAL RESULTS

Project: AMEREN SIOUX ENERGY CTR SCL4A
Pace Project No.: 60321516

Sample: S-TMW-1 **Lab ID: 60321516001** Collected: 11/14/19 10:03 Received: 11/16/19 02:35 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.7 Metals, Total	Analytical Method: EPA 200.7 Preparation Method: EPA 200.7								
Boron	**79.7J**	ug/L	100	10.7	1	11/26/19 08:04	11/26/19 17:16	7440-42-8	
Calcium	**95100**	ug/L	200	50.0	1	11/26/19 08:04	11/26/19 17:16	7440-70-2	
Iron	**40.0J**	ug/L	50.0	14.0	1	11/26/19 08:04	11/26/19 17:16	7439-89-6	
Magnesium	**18000**	ug/L	50.0	13.0	1	11/26/19 08:04	11/26/19 17:16	7439-95-4	
Manganese	**206**	ug/L	5.0	2.1	1	11/26/19 08:04	11/26/19 17:16	7439-96-5	
Potassium	**5390**	ug/L	500	79.0	1	11/26/19 08:04	11/26/19 17:16	7440-09-7	
Sodium	**2820**	ug/L	500	144	1	11/26/19 08:04	11/26/19 17:16	7440-23-5	
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**326**	mg/L	20.0	6.5	1		11/22/19 17:04		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**387**	mg/L	5.0	5.0	1		11/21/19 16:02		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**1.8**	mg/L	1.0	0.22	1		11/27/19 16:54	16887-00-6	
Fluoride	**0.34**	mg/L	0.20	0.085	1		11/27/19 16:54	16984-48-8	
Sulfate	**36.9**	mg/L	5.0	1.2	5		11/27/19 17:10	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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

ANALYTICAL RESULTS

Project: AMEREN SIOUX ENERGY CTR SCL4A
Pace Project No.: 60321516

Sample: S-TMW-2 **Lab ID: 60321516002** Collected: 11/14/19 11:14 Received: 11/16/19 02:35 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.7 Metals, Total	Analytical Method: EPA 200.7 Preparation Method: EPA 200.7								
Boron	**98.1J**	ug/L	100	10.7	1	11/26/19 08:04	11/26/19 17:18	7440-42-8	
Calcium	**120000**	ug/L	200	50.0	1	11/26/19 08:04	11/26/19 17:18	7440-70-2	
Iron	**339**	ug/L	50.0	14.0	1	11/26/19 08:04	11/26/19 17:18	7439-89-6	
Magnesium	**23800**	ug/L	50.0	13.0	1	11/26/19 08:04	11/26/19 17:18	7439-95-4	
Manganese	**416**	ug/L	5.0	2.1	1	11/26/19 08:04	11/26/19 17:18	7439-96-5	
Potassium	**5550**	ug/L	500	79.0	1	11/26/19 08:04	11/26/19 17:18	7440-09-7	
Sodium	**3440**	ug/L	500	144	1	11/26/19 08:04	11/26/19 17:18	7440-23-5	
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**385**	mg/L	20.0	6.5	1		11/22/19 17:11		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**502**	mg/L	10.0	10.0	1		11/21/19 16:02		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**4.5**	mg/L	1.0	0.22	1		11/27/19 17:58	16887-00-6	
Fluoride	**0.35**	mg/L	0.20	0.085	1		11/27/19 17:58	16984-48-8	
Sulfate	**75.1**	mg/L	5.0	1.2	5		11/27/19 18:14	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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

ANALYTICAL RESULTS

Project: AMEREN SIOUX ENERGY CTR SCL4A
Pace Project No.: 60321516

Sample: S-TMW-3 **Lab ID: 60321516003** Collected: 11/14/19 12:51 Received: 11/16/19 02:35 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.7 Metals, Total	Analytical Method: EPA 200.7 Preparation Method: EPA 200.7								
Boron	**97.6J**	ug/L	100	10.7	1	11/26/19 08:04	11/26/19 17:20	7440-42-8	
Calcium	**116000**	ug/L	200	50.0	1	11/26/19 08:04	11/26/19 17:20	7440-70-2	
Iron	**1260**	ug/L	50.0	14.0	1	11/26/19 08:04	11/26/19 17:20	7439-89-6	
Magnesium	**22900**	ug/L	50.0	13.0	1	11/26/19 08:04	11/26/19 17:20	7439-95-4	
Manganese	**520**	ug/L	5.0	2.1	1	11/26/19 08:04	11/26/19 17:20	7439-96-5	
Potassium	**6000**	ug/L	500	79.0	1	11/26/19 08:04	11/26/19 17:20	7440-09-7	
Sodium	**4060**	ug/L	500	144	1	11/26/19 08:04	11/26/19 17:20	7440-23-5	
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**379**	mg/L	20.0	6.5	1		11/22/19 17:16		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**454**	mg/L	5.0	5.0	1		11/21/19 16:02		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**2.4**	mg/L	1.0	0.22	1		11/27/19 18:30	16887-00-6	
Fluoride	**0.28**	mg/L	0.20	0.085	1		11/27/19 18:30	16984-48-8	
Sulfate	**36.7**	mg/L	5.0	1.2	5		11/27/19 18:46	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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

ANALYTICAL RESULTS

Project: AMEREN SIOUX ENERGY CTR SCL4A
Pace Project No.: 60321516

Sample: S-UG-3 **Lab ID: 60321516004** Collected: 11/14/19 14:49 Received: 11/16/19 02:35 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.7 Metals, Total	Analytical Method: EPA 200.7 Preparation Method: EPA 200.7								
Boron	**976**	ug/L	100	10.7	1	11/26/19 08:04	11/26/19 17:22	7440-42-8	
Calcium	**135000**	ug/L	200	50.0	1	11/26/19 08:04	11/26/19 17:22	7440-70-2	M1
Iron	**99.1**	ug/L	50.0	14.0	1	11/26/19 08:04	11/26/19 17:22	7439-89-6	
Magnesium	**28600**	ug/L	50.0	13.0	1	11/26/19 08:04	11/26/19 17:22	7439-95-4	
Manganese	**668**	ug/L	5.0	2.1	1	11/26/19 08:04	11/26/19 17:22	7439-96-5	
Potassium	**5790**	ug/L	500	79.0	1	11/26/19 08:04	11/26/19 17:22	7440-09-7	
Sodium	**26100**	ug/L	500	144	1	11/26/19 08:04	11/26/19 17:22	7440-23-5	
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**360**	mg/L	20.0	6.5	1		11/22/19 17:32		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**721**	mg/L	10.0	10.0	1		11/21/19 16:03		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**83.5**	mg/L	5.0	1.1	5		11/27/19 19:50	16887-00-6	
Fluoride	**0.33**	mg/L	0.20	0.085	1		11/27/19 19:02	16984-48-8	
Sulfate	**185**	mg/L	20.0	4.6	20		12/02/19 10:04	14808-79-8	M1

REPORT OF LABORATORY ANALYSIS

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

ANALYTICAL RESULTS

Project: AMEREN SIOUX ENERGY CTR SCL4A
Pace Project No.: 60321516

Sample: S-SCL4A-DUP-1 **Lab ID: 60321516005** Collected: 11/14/19 14:49 Received: 11/16/19 02:35 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.7 Metals, Total	Analytical Method: EPA 200.7 Preparation Method: EPA 200.7								
Boron	**92.4J**	ug/L	100	10.7	1	11/26/19 08:04	11/26/19 17:33	7440-42-8	
Calcium	**112000**	ug/L	200	50.0	1	11/26/19 08:04	11/26/19 17:33	7440-70-2	
Iron	**318**	ug/L	50.0	14.0	1	11/26/19 08:04	11/26/19 17:33	7439-89-6	
Magnesium	**22100**	ug/L	50.0	13.0	1	11/26/19 08:04	11/26/19 17:33	7439-95-4	
Manganese	**396**	ug/L	5.0	2.1	1	11/26/19 08:04	11/26/19 17:33	7439-96-5	
Potassium	**5180**	ug/L	500	79.0	1	11/26/19 08:04	11/26/19 17:33	7440-09-7	
Sodium	**3240**	ug/L	500	144	1	11/26/19 08:04	11/26/19 17:33	7440-23-5	
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**384**	mg/L	20.0	6.5	1		11/22/19 17:44		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**486**	mg/L	10.0	10.0	1		11/21/19 16:03		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**4.5**	mg/L	1.0	0.22	1		11/27/19 21:11	16887-00-6	
Fluoride	**0.34**	mg/L	0.20	0.085	1		11/27/19 21:11	16984-48-8	
Sulfate	**75.4**	mg/L	5.0	1.2	5		11/27/19 21:27	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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

ANALYTICAL RESULTS

Project: AMEREN SIOUX ENERGY CTR SCL4A
Pace Project No.: 60321516

Sample: S-SCL4A-FB-1 **Lab ID: 60321516006** Collected: 11/14/19 12:13 Received: 11/16/19 02:35 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.7 Metals, Total	Analytical Method: EPA 200.7 Preparation Method: EPA 200.7								
Boron	**<10.7**	ug/L	100	10.7	1	11/26/19 08:04	11/26/19 17:35	7440-42-8	
Calcium	**<50.0**	ug/L	200	50.0	1	11/26/19 08:04	11/26/19 17:35	7440-70-2	
Iron	**<14.0**	ug/L	50.0	14.0	1	11/26/19 08:04	11/26/19 17:35	7439-89-6	
Magnesium	**<13.0**	ug/L	50.0	13.0	1	11/26/19 08:04	11/26/19 17:35	7439-95-4	
Manganese	**<2.1**	ug/L	5.0	2.1	1	11/26/19 08:04	11/26/19 17:35	7439-96-5	
Potassium	**<79.0**	ug/L	500	79.0	1	11/26/19 08:04	11/26/19 17:35	7440-09-7	
Sodium	**<144**	ug/L	500	144	1	11/26/19 08:04	11/26/19 17:35	7440-23-5	
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**<6.5**	mg/L	20.0	6.5	1		11/22/19 17:48		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**10.5**	mg/L	5.0	5.0	1		11/21/19 16:03		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**<0.22**	mg/L	1.0	0.22	1		11/27/19 21:43	16887-00-6	
Fluoride	**<0.085**	mg/L	0.20	0.085	1		11/27/19 21:43	16984-48-8	
Sulfate	**<0.23**	mg/L	1.0	0.23	1		11/27/19 21:43	14808-79-8	

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

ANALYTICAL RESULTS

Project: AMEREN SIOUX ENERGY CTR SCL4A
Pace Project No.: 60321516

Sample: MS **Lab ID: 60321516007** Collected: 11/14/19 14:54 Received: 11/16/19 02:35 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
Analytical Method: SM 3500-Fe B#4									
Iron, Ferrous	**<0.034**	mg/L	0.20	0.034	1		11/19/19 11:39		H3,H6

REPORT OF LABORATORY ANALYSIS

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

ANALYTICAL RESULTS

Project: AMEREN SIOUX ENERGY CTR SCL4A
Pace Project No.: 60321516

Sample: S-BMW-1S **Lab ID: 60321513010** Collected: 11/15/19 14:43 Received: 11/16/19 02:35 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.7 Metals, Total	Analytical Method: EPA 200.7 Preparation Method: EPA 200.7								
Boron	**118**	ug/L	100	10.7	1	11/26/19 09:12	11/26/19 18:13	7440-42-8	
Calcium	**143000**	ug/L	200	50.0	1	11/26/19 09:12	11/26/19 18:13	7440-70-2	M1
Iron	**<14.0**	ug/L	50.0	14.0	1	11/26/19 09:12	11/26/19 18:13	7439-89-6	
Magnesium	**29700**	ug/L	50.0	13.0	1	11/26/19 09:12	11/26/19 18:13	7439-95-4	
Manganese	**426**	ug/L	5.0	2.1	1	11/26/19 09:12	11/26/19 18:13	7439-96-5	
Potassium	**424J**	ug/L	500	79.0	1	11/26/19 09:12	11/26/19 18:13	7440-09-7	
Sodium	**5360**	ug/L	500	144	1	11/26/19 09:12	11/26/19 18:13	7440-23-5	
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**428**	mg/L	20.0	6.5	1		11/25/19 15:41		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**551**	mg/L	10.0	10.0	1		11/22/19 08:54		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**6.4**	mg/L	1.0	0.22	1		11/27/19 19:32	16887-00-6	
Fluoride	**0.28**	mg/L	0.20	0.085	1		11/27/19 19:32	16984-48-8	
Sulfate	**26.5**	mg/L	2.0	0.46	2		11/30/19 01:38	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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

ANALYTICAL RESULTS

Project: AMEREN SIOUX ENERGY CTR SCL4A
Pace Project No.: 60321516

Sample: S-BMW-3S **Lab ID: 60321513011** Collected: 11/15/19 12:18 Received: 11/16/19 02:35 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
200.7 Metals, Total	Analytical Method: EPA 200.7 Preparation Method: EPA 200.7								
Boron	**80.1J**	ug/L	100	10.7	1	11/26/19 09:12	11/26/19 18:17	7440-42-8	
Calcium	**102000**	ug/L	200	50.0	1	11/26/19 09:12	11/26/19 18:17	7440-70-2	
Iron	**6800**	ug/L	50.0	14.0	1	11/26/19 09:12	11/26/19 18:17	7439-89-6	
Magnesium	**25600**	ug/L	50.0	13.0	1	11/26/19 09:12	11/26/19 18:17	7439-95-4	
Manganese	**519**	ug/L	5.0	2.1	1	11/26/19 09:12	11/26/19 18:17	7439-96-5	
Potassium	**3840**	ug/L	500	79.0	1	11/26/19 09:12	11/26/19 18:17	7440-09-7	
Sodium	**6610**	ug/L	500	144	1	11/26/19 09:12	11/26/19 18:17	7440-23-5	
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**342**	mg/L	20.0	6.5	1		11/25/19 15:52		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**418**	mg/L	5.0	5.0	1		11/22/19 08:54		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**7.6**	mg/L	1.0	0.22	1		11/27/19 21:07	16887-00-6	
Fluoride	**0.23**	mg/L	0.20	0.085	1		11/27/19 21:07	16984-48-8	
Sulfate	**34.4**	mg/L	2.0	0.46	2		11/27/19 21:23	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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

QUALITY CONTROL DATA

Project: AMEREN SIOUX ENERGY CTR SCL4A
Pace Project No.: 60321516

QC Batch: 624736 Analysis Method: EPA 200.7
QC Batch Method: EPA 200.7 Analysis Description: 200.7 Metals, Total
Associated Lab Samples: 60321513010, 60321513011

METHOD BLANK: 2547231 Matrix: Water
Associated Lab Samples: 60321513010, 60321513011

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Boron	ug/L	<10.7	100	10.7	11/26/19 17:42	
Calcium	ug/L	<50.0	200	50.0	11/26/19 17:42	
Iron	ug/L	21.5J	50.0	14.0	11/26/19 17:42	
Magnesium	ug/L	<13.0	50.0	13.0	11/26/19 17:42	
Manganese	ug/L	<2.1	5.0	2.1	11/26/19 17:42	
Potassium	ug/L	<79.0	500	79.0	11/26/19 17:42	
Sodium	ug/L	<144	500	144	11/26/19 17:42	

LABORATORY CONTROL SAMPLE: 2547232

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Boron	ug/L	1000	1030	103	85-115	
Calcium	ug/L	10000	9320	93	85-115	
Iron	ug/L	10000	9140	91	85-115	
Magnesium	ug/L	10000	9890	99	85-115	
Manganese	ug/L	1000	1000	100	85-115	
Potassium	ug/L	10000	9900	99	85-115	
Sodium	ug/L	10000	9950	100	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2547233 2547234

Parameter	Units	60321513002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Boron	ug/L	11200	1000	1000	12600	12700	132	144	70-130	1	20	M1
Calcium	ug/L	170000	10000	10000	182000	184000	127	140	70-130	1	20	M1
Iron	ug/L	69.8	10000	10000	9170	9330	91	93	70-130	2	20	
Magnesium	ug/L	29800	10000	10000	40000	40200	102	104	70-130	0	20	
Manganese	ug/L	404	1000	1000	1410	1430	101	102	70-130	1	20	
Potassium	ug/L	7710	10000	10000	17900	18000	102	103	70-130	1	20	
Sodium	ug/L	67100	10000	10000	78300	78700	112	116	70-130	1	20	

MATRIX SPIKE SAMPLE: 2547235

Parameter	Units	60321513010 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Boron	ug/L	118	1000	1140	102	70-130	
Calcium	ug/L	143000	10000	146000	26	70-130	M1
Iron	ug/L	<14.0	10000	8880	89	70-130	

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

REPORT OF LABORATORY ANALYSIS

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

QUALITY CONTROL DATA

Project: AMEREN SIOUX ENERGY CTR SCL4A
Pace Project No.: 60321516

MATRIX SPIKE SAMPLE: 2547235

Parameter	Units	60321513010 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Magnesium	ug/L	29700	10000	38000	83	70-130	
Manganese	ug/L	426	1000	1400	97	70-130	
Potassium	ug/L	424J	10000	10200	98	70-130	
Sodium	ug/L	5360	10000	14900	96	70-130	

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

REPORT OF LABORATORY ANALYSIS

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

QUALITY CONTROL DATA

Project: AMEREN SIOUX ENERGY CTR SCL4A
Pace Project No.: 60321516

QC Batch: 624739 Analysis Method: EPA 200.7
QC Batch Method: EPA 200.7 Analysis Description: 200.7 Metals, Total
Associated Lab Samples: 60321516001, 60321516002, 60321516003, 60321516004, 60321516005, 60321516006

METHOD BLANK: 2547247 Matrix: Water
Associated Lab Samples: 60321516001, 60321516002, 60321516003, 60321516004, 60321516005, 60321516006

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Boron	ug/L	<10.7	100	10.7	11/26/19 17:04	
Calcium	ug/L	<50.0	200	50.0	11/26/19 17:04	
Iron	ug/L	<14.0	50.0	14.0	11/26/19 17:04	
Magnesium	ug/L	<13.0	50.0	13.0	11/26/19 17:04	
Manganese	ug/L	<2.1	5.0	2.1	11/26/19 17:04	
Potassium	ug/L	<79.0	500	79.0	11/26/19 17:04	
Sodium	ug/L	<144	500	144	11/26/19 17:04	

LABORATORY CONTROL SAMPLE: 2547248

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Boron	ug/L	1000	1000	100	85-115	
Calcium	ug/L	10000	9260	93	85-115	
Iron	ug/L	10000	9110	91	85-115	
Magnesium	ug/L	10000	9750	97	85-115	
Manganese	ug/L	1000	985	98	85-115	
Potassium	ug/L	10000	9850	98	85-115	
Sodium	ug/L	10000	9920	99	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2547249 2547250

Parameter	Units	60321516004 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Boron	ug/L	976	1000	1000	2080	2120	110	115	70-130	2	20	
Calcium	ug/L	135000	10000	10000	152000	154000	170	190	70-130	1	20	M1
Iron	ug/L	99.1	10000	10000	9100	9130	90	90	70-130	0	20	
Magnesium	ug/L	28600	10000	10000	40000	40500	114	119	70-130	1	20	
Manganese	ug/L	668	1000	1000	1700	1740	103	107	70-130	3	20	
Potassium	ug/L	5790	10000	10000	16100	16100	103	103	70-130	0	20	
Sodium	ug/L	26100	10000	10000	37400	38100	113	120	70-130	2	20	

MATRIX SPIKE SAMPLE: 2547251

Parameter	Units	60321516006 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Boron	ug/L	<10.7	1000	1030	103	70-130	
Calcium	ug/L	<50.0	10000	9480	95	70-130	
Iron	ug/L	<14.0	10000	9300	93	70-130	

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

REPORT OF LABORATORY ANALYSIS

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

QUALITY CONTROL DATA

Project: AMEREN SIOUX ENERGY CTR SCL4A
Pace Project No.: 60321516

MATRIX SPIKE SAMPLE: 2547251

Parameter	Units	60321516006 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Magnesium	ug/L	<13.0	10000	9910	99	70-130	
Manganese	ug/L	<2.1	1000	1010	101	70-130	
Potassium	ug/L	<79.0	10000	9980	100	70-130	
Sodium	ug/L	<144	10000	10100	100	70-130	

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

REPORT OF LABORATORY ANALYSIS

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

QUALITY CONTROL DATA

Project: AMEREN SIOUX ENERGY CTR SCL4A
Pace Project No.: 60321516

QC Batch: 624293 Analysis Method: SM 2320B
QC Batch Method: SM 2320B Analysis Description: 2320B Alkalinity
Associated Lab Samples: 60321516001, 60321516002, 60321516003, 60321516004, 60321516005, 60321516006

METHOD BLANK: 2545462 Matrix: Water
Associated Lab Samples: 60321516001, 60321516002, 60321516003, 60321516004, 60321516005, 60321516006

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Alkalinity, Total as CaCO3	mg/L	<6.5	20.0	6.5	11/22/19 16:12	

LABORATORY CONTROL SAMPLE: 2545463

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity, Total as CaCO3	mg/L	500	510	102	90-110	

SAMPLE DUPLICATE: 2545464

Parameter	Units	60321303002 Result	Dup Result	RPD	Max RPD	Qualifiers
Alkalinity, Total as CaCO3	mg/L	1500	1510	0	10	

SAMPLE DUPLICATE: 2545466

Parameter	Units	60321516004 Result	Dup Result	RPD	Max RPD	Qualifiers
Alkalinity, Total as CaCO3	mg/L	360	355	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

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

QUALITY CONTROL DATA

Project: AMEREN SIOUX ENERGY CTR SCL4A
Pace Project No.: 60321516

QC Batch: 624580 Analysis Method: SM 2320B
QC Batch Method: SM 2320B Analysis Description: 2320B Alkalinity
Associated Lab Samples: 60321513010, 60321513011

METHOD BLANK: 2546893 Matrix: Water
Associated Lab Samples: 60321513010, 60321513011

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Alkalinity, Total as CaCO3	mg/L	<6.5	20.0	6.5	11/25/19 15:29	

LABORATORY CONTROL SAMPLE: 2546894

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity, Total as CaCO3	mg/L	500	488	98	90-110	

SAMPLE DUPLICATE: 2546895

Parameter	Units	60321513010 Result	Dup Result	RPD	Max RPD	Qualifiers
Alkalinity, Total as CaCO3	mg/L	428	429	0	10	

SAMPLE DUPLICATE: 2546897

Parameter	Units	60321518006 Result	Dup Result	RPD	Max RPD	Qualifiers
Alkalinity, Total as CaCO3	mg/L	381	406	6	10	

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

REPORT OF LABORATORY ANALYSIS

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

QUALITY CONTROL DATA

Project: AMEREN SIOUX ENERGY CTR SCL4A
Pace Project No.: 60321516

QC Batch: 624015 Analysis Method: SM 2540C
QC Batch Method: SM 2540C Analysis Description: 2540C Total Dissolved Solids
Associated Lab Samples: 60321516001, 60321516002, 60321516003, 60321516004, 60321516005, 60321516006

METHOD BLANK: 2544577 Matrix: Water
Associated Lab Samples: 60321516001, 60321516002, 60321516003, 60321516004, 60321516005, 60321516006

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	<5.0	5.0	5.0	11/21/19 16:08	

LABORATORY CONTROL SAMPLE: 2544578

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

SAMPLE DUPLICATE: 2544579

Parameter	Units	60321516004 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	721	724	0	10	

SAMPLE DUPLICATE: 2544580

Parameter	Units	60321518004 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	512	521	2	10	

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

REPORT OF LABORATORY ANALYSIS

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

QUALITY CONTROL DATA

Project: AMEREN SIOUX ENERGY CTR SCL4A
Pace Project No.: 60321516

QC Batch: 624081 Analysis Method: SM 2540C
QC Batch Method: SM 2540C Analysis Description: 2540C Total Dissolved Solids
Associated Lab Samples: 60321513010, 60321513011

METHOD BLANK: 2544812 Matrix: Water
Associated Lab Samples: 60321513010, 60321513011

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	<5.0	5.0	5.0	11/22/19 08:51	

LABORATORY CONTROL SAMPLE: 2544813

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Dissolved Solids	mg/L	1000	990	99	80-120	

SAMPLE DUPLICATE: 2544814

Parameter	Units	60321433002 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	2440	2470	1	10	

SAMPLE DUPLICATE: 2544815

Parameter	Units	60321513002 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	927	959	3	10	

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

REPORT OF LABORATORY ANALYSIS

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

QUALITY CONTROL DATA

Project: AMEREN SIOUX ENERGY CTR SCL4A
Pace Project No.: 60321516

QC Batch: 623168
QC Batch Method: SM 3500-Fe B#4
Analysis Method: SM 3500-Fe B#4
Analysis Description: Iron, Ferrous
Associated Lab Samples: 60321516007

METHOD BLANK: 2541161 Matrix: Water
Associated Lab Samples: 60321516007

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Iron, Ferrous	mg/L	<0.034	0.20	0.034	11/19/19 11:28	H6

LABORATORY CONTROL SAMPLE: 2541162

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Iron, Ferrous	mg/L	2	2.2	110	90-110	H6

SAMPLE DUPLICATE: 2541163

Parameter	Units	60321516007 Result	Dup Result	RPD	Max RPD	Qualifiers
Iron, Ferrous	mg/L	<0.034	<0.034		20	H3,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

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

QUALITY CONTROL DATA

Project: AMEREN SIOUX ENERGY CTR SCL4A
Pace Project No.: 60321516

QC Batch: 625047 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 60321513010, 60321513011

METHOD BLANK: 2548479 Matrix: Water
Associated Lab Samples: 60321513010, 60321513011

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Chloride	mg/L	<0.22	1.0	0.22	11/27/19 10:18	
Fluoride	mg/L	<0.085	0.20	0.085	11/27/19 10:18	
Sulfate	mg/L	<0.23	1.0	0.23	11/27/19 10:18	

METHOD BLANK: 2550027 Matrix: Water
Associated Lab Samples: 60321513010, 60321513011

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Chloride	mg/L	<0.22	1.0	0.22	11/29/19 20:37	
Fluoride	mg/L	<0.085	0.20	0.085	11/29/19 20:37	
Sulfate	mg/L	<0.23	1.0	0.23	11/29/19 20:37	

METHOD BLANK: 2550207 Matrix: Water
Associated Lab Samples: 60321513010, 60321513011

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Chloride	mg/L	<0.22	1.0	0.22	12/02/19 09:31	
Fluoride	mg/L	<0.085	0.20	0.085	12/02/19 09:31	
Sulfate	mg/L	<0.23	1.0	0.23	12/02/19 09:31	

LABORATORY CONTROL SAMPLE: 2548480

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	2.5	99	90-110	
Sulfate	mg/L	5	4.5	90	90-110	

LABORATORY CONTROL SAMPLE: 2550028

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	95	90-110	
Sulfate	mg/L	5	4.9	99	90-110	

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

REPORT OF LABORATORY ANALYSIS

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

QUALITY CONTROL DATA

Project: AMEREN SIOUX ENERGY CTR SCL4A
Pace Project No.: 60321516

LABORATORY CONTROL SAMPLE: 2550208

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	2.5	99	90-110	
Sulfate	mg/L	5	4.9	99	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2548481 2548482

Parameter	Units	60321513002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	102	100	100	218	210	116	108	80-120	4	15	
Fluoride	mg/L	0.31	2.5	2.5	3.1	3.1	110	112	80-120	1	15	
Sulfate	mg/L	317	250	250	568	565	100	99	80-120	0	15	

MATRIX SPIKE SAMPLE: 2548483

Parameter	Units	60321513010 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	6.4	5	11.6	103	80-120	
Fluoride	mg/L	0.28	2.5	3.0	110	80-120	
Sulfate	mg/L	26.5	10	37.2	107	80-120	

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

REPORT OF LABORATORY ANALYSIS

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

QUALITY CONTROL DATA

Project: AMEREN SIOUX ENERGY CTR SCL4A
Pace Project No.: 60321516

QC Batch: 625048 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 60321516001, 60321516002, 60321516003, 60321516004, 60321516005, 60321516006

METHOD BLANK: 2548493 Matrix: Water
Associated Lab Samples: 60321516001, 60321516002, 60321516003, 60321516004, 60321516005, 60321516006

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Chloride	mg/L	<0.22	1.0	0.22	11/27/19 10:45	
Fluoride	mg/L	<0.085	0.20	0.085	11/27/19 10:45	
Sulfate	mg/L	<0.23	1.0	0.23	11/27/19 10:45	

METHOD BLANK: 2550023 Matrix: Water
Associated Lab Samples: 60321516001, 60321516002, 60321516003, 60321516004, 60321516005, 60321516006

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Chloride	mg/L	<0.22	1.0	0.22	12/02/19 09:31	
Fluoride	mg/L	<0.085	0.20	0.085	12/02/19 09:31	
Sulfate	mg/L	<0.23	1.0	0.23	12/02/19 09:31	

METHOD BLANK: 2551117 Matrix: Water
Associated Lab Samples: 60321516001, 60321516002, 60321516003, 60321516004, 60321516005, 60321516006

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Chloride	mg/L	<0.22	1.0	0.22	12/03/19 09:27	
Fluoride	mg/L	<0.085	0.20	0.085	12/03/19 09:27	
Sulfate	mg/L	<0.23	1.0	0.23	12/03/19 09:27	

LABORATORY CONTROL SAMPLE: 2548494

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	2.7	108	90-110	
Sulfate	mg/L	5	4.7	94	90-110	

LABORATORY CONTROL SAMPLE: 2550024

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	2.5	99	90-110	
Sulfate	mg/L	5	4.9	99	90-110	

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

REPORT OF LABORATORY ANALYSIS

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

QUALITY CONTROL DATA

Project: AMEREN SIOUX ENERGY CTR SCL4A
Pace Project No.: 60321516

LABORATORY CONTROL SAMPLE: 2551118

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	5	5.1	101	90-110	
Fluoride	mg/L	2.5	2.6	104	90-110	
Sulfate	mg/L	5	5.0	101	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2548495 2548496

Parameter	Units	60321515006 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	12.5	5	5	17.9	17.8	108	107	80-120	0	15	
Fluoride	mg/L	0.45	2.5	2.5	3.1	3.1	105	104	80-120	0	15	
Sulfate	mg/L	71.8	25	25	102	102	123	119	80-120	1	15	E,M1

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2548497 2548498

Parameter	Units	60321516004 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	83.5	25	25	113	112	117	116	80-120	0	15	E
Fluoride	mg/L	0.33	2.5	2.5	3.0	2.9	105	104	80-120	1	15	
Sulfate	mg/L	185	100	100	229	251	44	65	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

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

QUALIFIERS

Project: AMEREN SIOUX ENERGY CTR SCL4A
Pace Project No.: 60321516

DEFINITIONS

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

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

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

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

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

S - Surrogate

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

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

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

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

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

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

TNI - The NELAC Institute.

LABORATORIES

PASI-K	Pace Analytical Services - Kansas City

ANALYTE QUALIFIERS

E	Analyte concentration exceeded the calibration range. The reported result is estimated.
H3	Sample was received or analysis requested beyond the recognized method holding time.
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.

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

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: AMEREN SIOUX ENERGY CTR SCL4A
Pace Project No.: 60321516

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
60321513010	**S-BMW-1S**	EPA 200.7	624736	EPA 200.7	624858
60321513011	**S-BMW-3S**	EPA 200.7	624736	EPA 200.7	624858
60321516001	**S-TMW-1**	EPA 200.7	624739	EPA 200.7	624870
60321516002	**S-TMW-2**	EPA 200.7	624739	EPA 200.7	624870
60321516003	**S-TMW-3**	EPA 200.7	624739	EPA 200.7	624870
60321516004	**S-UG-3**	EPA 200.7	624739	EPA 200.7	624870
60321516005	**S-SCL4A-DUP-1**	EPA 200.7	624739	EPA 200.7	624870
60321516006	**S-SCL4A-FB-1**	EPA 200.7	624739	EPA 200.7	624870
60321513010	**S-BMW-1S**	SM 2320B	624580		
60321513011	**S-BMW-3S**	SM 2320B	624580		
60321516001	**S-TMW-1**	SM 2320B	624293		
60321516002	**S-TMW-2**	SM 2320B	624293		
60321516003	**S-TMW-3**	SM 2320B	624293		
60321516004	**S-UG-3**	SM 2320B	624293		
60321516005	**S-SCL4A-DUP-1**	SM 2320B	624293		
60321516006	**S-SCL4A-FB-1**	SM 2320B	624293		
60321513010	**S-BMW-1S**	SM 2540C	624081		
60321513011	**S-BMW-3S**	SM 2540C	624081		
60321516001	**S-TMW-1**	SM 2540C	624015		
60321516002	**S-TMW-2**	SM 2540C	624015		
60321516003	**S-TMW-3**	SM 2540C	624015		
60321516004	**S-UG-3**	SM 2540C	624015		
60321516005	**S-SCL4A-DUP-1**	SM 2540C	624015		
60321516006	**S-SCL4A-FB-1**	SM 2540C	624015		
60321513010	**S-BMW-1S**	EPA 300.0	625047		
60321513011	**S-BMW-3S**	EPA 300.0	625047		
60321516001	**S-TMW-1**	EPA 300.0	625048		
60321516002	**S-TMW-2**	EPA 300.0	625048		
60321516003	**S-TMW-3**	EPA 300.0	625048		
60321516004	**S-UG-3**	EPA 300.0	625048		
60321516005	**S-SCL4A-DUP-1**	EPA 300.0	625048		
60321516006	**S-SCL4A-FB-1**	EPA 300.0	625048		

Pace Analytical
www.pacelabs.com

Sample Condition Upon Receipt

WO# : 60321516

60321516

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-299 **Type of Ice:** Wet Blue None

Cooler Temperature (°C): **As-read** 2.2 **Corr. Factor** 0.2 **Corrected** 2.4

Date and initials of person examining contents: 11/18/19

Temperature should be above freezing to 6°C

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

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

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: Jami Church Date: 11/20/19

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

PaceAnalytical
www.pacelabs.com

CHAIN-OF-CUSTODY / Analytical Request Document

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

Page: 1 of 1

Section A — **Required** Client Information:

Company:	Golder Associates
Address:	13515 Barrett Parkway Dr., 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:	
Purchase Order No.:	
Project Name:	Ameren Sioux Energy Center SCL4A
Project Number:	

Section C — Invoice Information:

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

REGULATORY AGENCY

- [ ] NPDES
- [x] GROUND WATER
- [ ] DRINKING WATER
- [ ] UST
- [ ] RCRA
- [ ] OTHER

Site Location STATE: MO

Section D — Required Client Information

Valid Matrix Codes

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

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

Requested Analysis Filtered (Y/N): Metals* N, Chloride/Fluoride/Sulfate N, TDS N, Alkalinity N

Pace Project No./Lab I.D.: L0321512

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COMPOSITE START DATE	COMPOSITE START TIME	COMPOSITE END/GRAB DATE	COMPOSITE END/GRAB TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test	Metals*	Chloride/Fluoride/Sulfate	TDS	Alkalinity	Residual Chlorine (Y/N)
1	S-TMW-1	WT	G			11-18-19	1003		2	1		1							✓	✓	✓	✓	
2	S-TMW-2	WT	G				1114		2	1		1							✓	✓	✓	✓	
3	S-TMW-3	WT	G				1251		2	1		1							✓	✓	✓	✓	
4	S-UG-3	WT	G				1449		2	1		1							✓	✓	✓	✓	
5	S-SCL4A-DUP-1	WT	G				—		2	1		1							✓	✓	✓	✓	
6	S-SCL4A-FB-1	WT	G				1213		2	1		1							✓	✓	✓	✓	
7	MS	WT	G				1459		2	1		1							✓	✓	✓	✓	
8	MSD	WT	G				—		2	1		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	Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)
*EPA 200.7: B, Ca, Fe, Mn, Mg, K, Na	Annie Muehlfarth / Golder	11-15-19	1540	Angela McManus	11/15	1545				
	Angela McManus	11/15	15:45	[illegible]	11/14/19	0235	2.4	Y	Y	Y

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Annie Muehlfarth

SIGNATURE of SAMPLER: [illegible signature]

DATE Signed (MM/DD/YY): 11-14-19

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

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

Pace Analytical
www.pacelabs.com

Sample Condition Upon Receipt

WO# : 60321513

60321513

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-299 **Type of Ice:** Wet Blue None

Cooler Temperature (°C): **As-read** 2.8, 2.3 **Corr. Factor** 0.2 **Corrected** 3.0, 2.5

Date and initials of person examining contents: 11/14/19

Temperature should be above freezing to 6°C

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

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

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: Jami Church Date: 11/20/19

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

CHAIN-OF-CUSTODY / Analytical Request Document

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

Pace Analytical
www.pacelabs.com

Section A Required Client Information:

Company:	Golder Associates
Address:	13515 Barrett Parkway Dr., 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:	
Purchase Order No.:	
Project Name:	Ameren Sioux Energy Center SCPB
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 STATE: MO

Section D Required Client Information

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

Valid Matrix Codes

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

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED COMPOSITE START DATE	COLLECTED COMPOSITE START TIME	COLLECTED COMPOSITE END/GRAB DATE	COLLECTED COMPOSITE END/GRAB TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test Y/N	Metals*	Chloride/Fluoride/Sulfate	TDS	Alkalinity	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
																			N	N	N	N		60321513
1	S-LMW-1S	WT	G			11-15-19	1314		2	1		1							✓	✓	✓	✓		001
2	S-LMW-2S	WT	G				1405		2	1		1							✓	✓	✓	✓		002
3	S-LMW-3S	WT	G				1105		2	1		1							✓	✓	✓	✓		003
4	S-LMW-4S	WT	G				1204		2	1		1							✓	✓	✓	✓		004
5	S-LMW-5S	WT	G				1052		2	1		1							✓	✓	✓	✓		005
6	S-LMW-6S	WT	G				1148		2	1		1							✓	✓	✓	✓		006
7	S-LMW-7S	WT	G				1231		2	1		1							✓	✓	✓	✓		007
8	S-LMW-8S	WT	G				1331		2	1		1							✓	✓	✓	✓		008
9	S-LMW-9S	WT	G				1418		2	1		1							✓	✓	✓	✓		009
10	S-BMW-1S	WT	G			11-13-19	1443		2	1		1								✓	✓	✓		010
11	S-BMW-3S	WT	G			11-13-19	1218		2	1		1							✓	✓	✓	✓		011
12	S-LMW-DUP-1	WT	G			1	—		2	1		1							✓	✓	✓	✓		012

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
*EPA 200.7: B, Ca, Fe, Mn, Mg, K, Na	Annie Muehlfarth / Golder	11-15-19	1540	Angela McMaw	11-15-19	15:45
	Angela McMaw	11-15-19	15:45		11/15/19	0735

SAMPLE CONDITIONS			
Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)
3.0	✓	Y	Y
2.5			

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Annie Muehlfarth

SIGNATURE of SAMPLER: Annie Muehlfarth

DATE Signed (MM/DD/YY): 11-15-19

*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.

Pace Analytical
www.pacelabs.com

CHAIN-OF-CUSTODY / Analytical Request Document

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

Page: 2 of 2

Section A Required Client Information:

Company:	Golder Associates
Address:	13515 Barrett Parkway Dr., 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:	
Purchase Order No.:	
Project Name:	Ameren Sioux Energy Center SCPB
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 STATE: MO

Section D Required Client Information

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

Valid Matrix Codes

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

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED COMPOSITE START DATE	COMPOSITE START TIME	COMPOSITE END/GRAB DATE	COMPOSITE END/GRAB TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test ↓ Y/N	Metals*	Chloride/Fluoride/Sulfate	TDS	Alkalinity	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
																		Requested Analysis Filtered (Y/N)	N	N	N	N		
1	S-LMW-DUP-2	WT	G			11-15-19	—		2	1		1							✓	✓	✓	✓		013
2	S-LMW-FB-1	WT	G			1	1140		3	1		1							✓	✓	✓	✓		014
3	S-LMW-FB-2	WT	G			1	1320		3	1		1							✓	✓	✓	✓		015
4		WT	G																					
5		WT	G																					
6		WT	G																					
7		WT	G																					
8		WT	G																					
9		WT	G																					
10		WT	G																					
11		WT	G																					
12		WT	G																					

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS: Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)
*EPA 200.7: B, Ca, Fe, Mn, Mg, K, Na	Angela Linn	11/15/19	1545		11/15/19	0235	3.6 2.5	Y	Y	Y

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER:

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

MEMORANDUM

DATE January 10, 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, SIOUX ENERGY CENTER – SCL4A – DATA PACKAGE 60321516

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

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

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

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

QA LEVEL II - INORGANIC DATA EVALUATION CHECKLIST

Company Name: Golder Associates
Project Manager: J Ingram
Project Name: Ameren - Sioux - SCL4A
Project Number: 153140601
Reviewer: T Goodwin
Validation Date: 1/9/2020

Laboratory: Pace Analytical - KS
SDG #: 60321516
Analytical Method (type and no.): EPA 200.7 (Metals); SM 2320B (Alk); SM 2540C (TDS); EPA 300.0 (Anions)
Matrix: ☐ Air ☐ Soil/Sed. ■ Water ☐ Waste ☐
Sample Names S-TMW-1, S-TMW-2, S-TMW-3, S-UG-3, S-SCL4A-FB-1, S-SCL4A-DUP-1, S-BMW-1S, S-BMW-3S, 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?	☒	☐	☐	11/14-15/2019
b) Sampling team indicated?	☒	☐	☐	
c) Sample location noted?	☒	☐	☐	
d) Sample depth indicated (Soils)?	☐	☐	☒	
e) Sample type indicated (grab/composite)?	☒	☐	☐	
f) Field QC noted?	☒	☐	☐	
g) Field parameters collected (note types)?	☒	☐	☐	pH, Sp.Cond, ORP, Temp, DO, Turb
h) Field Calibration within control limits?	☒	☐	☐	
i) Notations of unacceptable field conditions/performances from field logs or field notes?	☐	☒	☐	
j) Does the laboratory narrative Indicate deficiencies?	☐	☐	☒	

Note Deficiencies:

Chain-of-Custody (COC)	YES	NO	NA	COMMENTS
a) Was the COC properly completed?	☒	☐	☐	
b) Was the COC signed by both field and laboratory personnel?	☐	☒	☐	Page 2 of COC not completed/signed by field staff
c) Were samples received in good condition?	☒	☐	☐	

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

QA LEVEL II - INORGANIC DATA EVALUATION CHECKLIST

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

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

Duplicates	YES	NO	NA	COMMENTS
a) Were field duplicates collected (note original and duplicate sample names)?				DUP-1 @ S-TMW-2
	☒	☐	☐	FB-1 @ S-TMW-3
b) Were field dup. precision criteria met (note RPD)?	☒	☐	☐	See Notes
c) Were lab duplicates analyzed (note original and duplicate samples)?				
	☒	☐	☐	-16004 (Alk, TDS); -13010 (Alk)
d) Were lab dup. precision criteria met (note RPD)?	☒	☐	☐	See Notes

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

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

Comments/Notes:

FB-1: TDS (10.5)

MB: -13010-11: Fe (21.5)

MS/MSD: -13010: Ca_MS-L (26% of 70-130%); -16004: Ca_MS/MSD-H (170/190% of 70-130%)

-16004: Cl (Exceed MS/MSD Cal Range) no qualification necessary; SO4_MS/MSD-L (44/65% of 80-120%)

Max Field Duplicate RPD: 7.4% (Limit 20%); Max Lab Duplicate RPD: 1% (Limit 10%)

Hold Time: Ferrous Iron (-16007); no qualification necessary (MS sample)

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
S-UG-3	Calcium (Ca)	135,000	J	MS/MSD Exceeded QC Range
"	Sulfate (SO4)	185	J	"
S-BMW-1S	Ca	149,000	J	MS Exceeded QC Range

Signature: Tommy J. Hood Jr. Date: 1/9/2020

APPENDIX B

Alternative Source Demonstration-August 2019 Sampling Event

REPORT

SCL4A - Alternative Source Demonstration

Sioux Energy Center, St. Charles County, Missouri, USA

Submitted to:

Ameren Missouri

1901 Chouteau Avenue, St. Louis, MO 63103

Submitted by:

Golder Associates Inc.

13515 Barrett Parkway Drive, Suite 260, Ballwin, Missouri, USA 63021

+1 314 984-8800

153-140601

January 2020

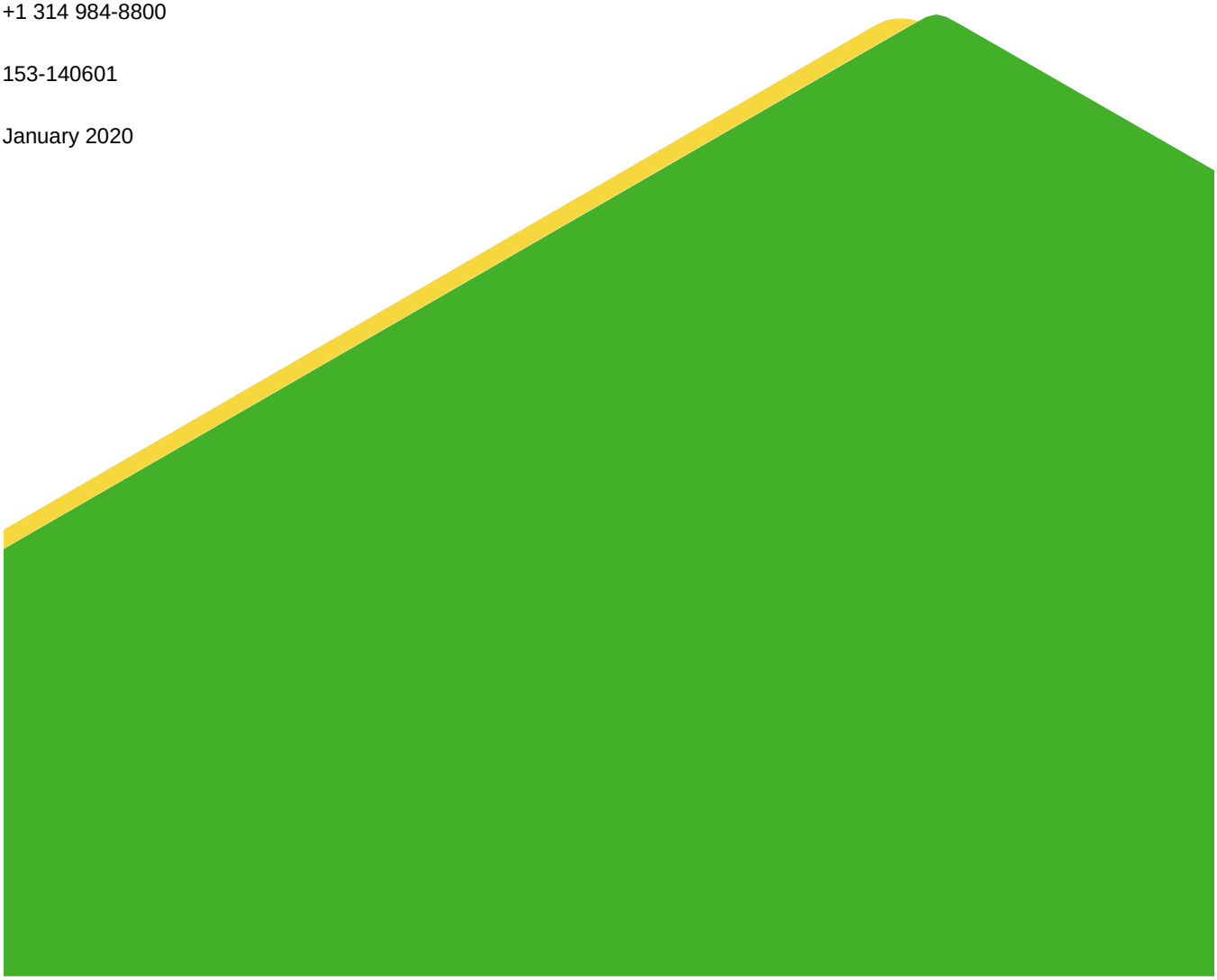


Table of Contents

Tables

Figures

1.0 CERTIFICATION STATEMENT

This *SCL4A – Alternative Source Demonstration, Sioux Energy Center, St. Charles County, Missouri, USA* has been prepared to comply with the United States Environmental Protection Agency (EPA) coal combustion residual (CCR) rule under the direction of a licensed professional engineer with Golder Associates Inc.

I hereby certify that this *SCL4A – Alternative Source Demonstration, Sioux Energy Center, St. Charles County, Missouri, USA* located at 8501 Missouri 94, West Alton, Missouri 63386 has been prepared to meet the requirements of 40 CFR §257.94(e)(2).

GOLDER ASSOCIATES INC.

_____

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

Principal, Practice Leader

2.0 INTRODUCTION

In accordance with the United States Environmental Protection Agency (EPA) coal combustion residual (CCR) rule (CCR Rule or The Rule), this SCL4A – Alternative Source Demonstration has been prepared to document an Alternative Source Demonstration (ASD) for Statistically Significant Increases (SSIs) calculated at Ameren Missouri's (Ameren) Sioux Energy Center (SEC), Utility Waste Landfill (UWL) Cell 4A - SCL4A. This document satisfies the requirements of §257.94(e)(2) which allows the owner or operator to demonstrate that a source other than the CCR Unit has caused the SSIs and that the apparent SSIs were the result of an alternative source or resulted from errors in sampling, analysis, statistical evaluation, or natural variation in groundwater quality.

3.0 SITE DESCRIPTION AND BACKGROUND

Ameren owns and operates the SEC in St. Charles County, Missouri located approximately 12 miles west-northwest of the confluence of the Mississippi and Missouri Rivers. **Figure 1** depicts the site location and layout, including the location of the SCL4A. The SEC is approximately 1,025 acres and is located in the floodplain between the Mississippi and Missouri Rivers. The SEC is bounded to the north by wooded areas associated with the Mississippi River. The property is bounded to the south by a railroad. The SEC is bounded to the east and west by agricultural fields.

3.1 Geological and Hydrogeological Setting

The SCL4A lies between the Mississippi River to the north and the Missouri River to the south. Flow and deposition from these rivers have resulted in thick alluvial deposits which lie unconformably on top of bedrock. These alluvial deposits, which can range from approximately 100 to 130 feet thick, make up the uppermost aquifer called the alluvial aquifer. Overall, this aquifer is described as a fining upwards sequence of stratified sands and gravels with varying amounts of silts and clays. Drilling in the alluvial aquifer identified different sub-units, including floodplain deposits, natural levee deposits, and channel deposits along with volumetrically less important loess deposits. Grain sizes of these alluvial deposits are highly variable.

Beneath the alluvial aquifer lies the bedrock aquifer. Bedrock in this region includes Mississippian-aged rocks of the Meramecian Series. Formations include primarily limestone, dolomite, and shale and are comprised of the Salem Formation overlying the Warsaw Formation and the Burlington-Keokuk Formation.

3.2 Utility Waste Landfill Cell 4A – SCL4A

UWL Cell 4A is referred to by Ameren as the SCL4A, or "Landfill Cell 4A." The SCL4A is approximately 15 acres in size and is located south of the generating plant on the south side of Highway 94 (**Figure 1**). The CCR Unit manages Coal Combustion Residuals (CCR) from the SEC including "fly ash waste, bottom ash waste, slag waste, and flue gas emission control waste generated primarily from the combustion of coal or other fossil fuels" (Gredell and Reitz & Jens, 2014). These wastes are managed using a dry disposal process and are moisture conditioned (30-40% moisture content) to minimize dust and ease in disposal. The CCR waste is trucked across highway 94 from the plant and disposed of in the SCL4A.

The SCL4A was constructed with a composite liner system consisting of two feet of compacted clay soil with a hydraulic conductivity of less than 1 X 10^{-7} centimeters per second (cm/sec) overlain by a 60-mil HDPE

geomembrane liner. Information on the design of the UWL is available in the 2014 Proposed Construction Permit Modification, Construction Permit Number 0918301 (Gredell and Reitz & Jens, 2014).

A groundwater monitoring well network was installed in 2007 and 2008 in order to permit the UWL construction. This monitoring well network was approved by the Missouri Department of Natural Resources (MDNR) and consists of 16 monitoring wells ringing the current and proposed future extents of the UWL (**Figure 1**). These monitoring wells are installed in the uppermost portions of the alluvial aquifer, just below the seasonally low elevation for groundwater. Quarterly groundwater samples have been collected in these monitoring wells since June 2008 for the state required UWL parameters.

The permit for the Sioux UWL was issued July 30, 2010 (permit #0918301) for the SCPC (Cell 1). Nine (9) sampling events were performed prior to July 30, 2010 and represent groundwater quality prior to CCR placement in the SCPC. The SCL4A was the second cell that was constructed at this UWL. The SCL4A construction was not completed until 2014 and no CCR was placed in the unit until after the final revisions to the Proposed Construction Permit Modification on August 16, 2014. The results from these pre-disposal monitoring events are used in conjunction with other site information in the ASD presented below.

3.3 CCR Rule Groundwater Monitoring

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

The groundwater monitoring system for the SCL4A consists of six (6) monitoring wells screened in the uppermost aquifer (alluvial aquifer) as shown on **Figure 1**. One (1) existing monitoring well (UG-3) was installed by Gredell Engineering Resources, Inc., in December 2007 as a part of the state UWL monitoring program. The remaining monitoring wells (TMW-1, TMW-2, TMW-3, BMW-1S, and BMW-3S) were installed by Golder in 2015 and 2016 for CCR Rule groundwater monitoring purposes. More information on the design and installation of the monitoring wells is provided in the SCL4A GMP and the SCL4A 2017 Annual Report.

Between May 2016 and June 2017 eight (8) baseline sampling events were completed for the SCL4A. After baseline sampling, the first Detection Monitoring event was completed in November 2017 and Detection Monitoring has continued on a semi-annual basis thereafter. Laboratory testing was performed for the following Appendix III constituents during Detection Monitoring:

- Boron
- Calcium
- Chloride
- pH
- Sulfate
- Total dissolved solids (TDS)
- Fluoride

In January 2018, background results from the eight (8) baseline sampling events were used to calculate statistical upper prediction limits (UPLs). These UPLs were then compared to the Detection Monitoring results from the November 2017 samples. If results from Detection Monitoring were higher than the calculated UPL, it was considered an initial exceedance, in which case a verification sample was then collected and tested in accordance with the SCL4A Statistical Analysis Plan. During this process, no Statistically Significant Increases (SSIs) were identified.

In May 2018, another Detection Monitoring event was completed, and three (3) initial exceedances were identified including chloride at UG-3; as well as sulfate and TDS at TMW-2. Verification sampling results confirmed all three (3) SSIs. All three (3) SSIs were determined to be from an alternate source. The ASD for the May 2018 sampling event can be found in the 2018 Annual Report for the SCL4A. In November 2018, another Detection Monitoring event was completed, and one (1) initial exceedance was identified, sulfate at TMW-2. Verification sampling did not confirm the SSI and no SSIs were identified for the November 2018 event.

In May 2019, another Detection Monitoring event was completed, and six (6) initial exceedances were identified including boron, calcium, chloride, and TDS at UG-3; as well as sulfate and TDS at TMW-2. Verification sampling results confirmed all six (6) SSIs.

4.0 REVIEW OF THE STATISTICALLY SIGNIFICANT INCREASES

Two (2) monitoring wells had confirmed SSIs during the August 2019 sampling event; boron, calcium, chloride, and TDS at UG-3 and sulfate and TDS at TMW-2. UG-3 and TMW-2 are screened in the upper portion of the alluvial aquifer just below the average seasonal low for groundwater. As shown on **Figure 1**, UG-3 is located north of the SCL4A while TMW-2 is located to the south of the SCL4A. Both monitoring wells are south of Highway 94, the generating plant, and the two (2) surface impoundments near the plant (SCPA and SCPB).

Based on Golder's review of the pre-disposal data discussed in Section 3.2 above and our comparison of those pre-disposal data with the results from the eight (8) CCR-rule baseline events, it was concluded that the groundwater at the SCL4A contained low-level pre-existing impacts from CCR that pre-dated SCL4A operation. As a result of these pre-existing impacts, the SCL4A statistical analysis plan uses intrawell UPLs to determine SSIs. Intrawell UPLs are calculated from historical data within a particular well, and not by pooling data from the background wells, such that individual limits are calculated for each constituent in each well in the monitoring program.

The intrawell UPLs for the SSIs in question are provided below in **Table 1**. This table also displays the range of values obtained during baseline sampling and the values obtained since baseline sampling as a part of the Detection Monitoring program.

Table 1: Review of Statistically Significant Increases

Constituent	Well ID	UPL Based on Baseline Events	August 2019 Updated UPL	Baseline Sampling Event Range	State UWL Program Sampling Events Range	August 2019 Results	October 2019 Results
Boron (µg/L)	UG-3	896.5	1027	218 J - 696	72.5 - 906	1040	1120
Calcium (µg/L)	UG-3	154,345	160,085	103,000 - 144,000	99,500 - 183,000	159,000	163,000
Chloride (mg/L)	UG-3	78.76	102.2	28.9 - 71.9	17 - 98	85.0	81.2
Total Dissolved Solids (mg/L)	UG-3	658.7	698.7	426 - 585	424 - 626	710 J	724
Sulfate (mg/L)	TMW-2	37.9	52.1	30.0 - 35.5	N/A	52.1	75.6
Total Dissolved Solids (mg/L)	TMW-2	476.5	495.8	403 - 450	N/A	481 J	512

Notes:

1) mg/L – milligrams per liter.
2) µg/L – micrograms per liter.
3) UPL – upper prediction limit.
4) UPLs calculated using Sanitas^{tm} software.
5) N/A – Not Applicable.
6) UWL – Utility Waster Landfill.

5.0 EVIDENCE OF SSI FROM ALTERNATIVE SOURCE

Several different lines of evidence indicate that the SSIs at the SCL4A are not caused by a release from the SCL4A, but rather from an alternative source. The following section describes the different lines of evidence, listed below, that demonstrate this position.

- Documentation of pre-existing, low level concentrations of CCR indicators in groundwater that pre-date the SCL4A operation especially on the northern side of the SCL4A.
- Review of concentrations in nearby and background monitoring wells.
- Documentation of the construction of the SCL4A with a 60-mil geomembrane liner and a 2-foot thick clay barrier.
- Preparation of geochemical models displaying groundwater chemisties between the different wells and sources.
- Use of road salt on Highway 94 located near UG-3.

5.1 CCR Indicators

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

Table 2: Types of CCR and Typical Indicator Parameters

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

Notes:

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

As described above, the SCL4A has historically received fly ash. FGD type wastes at the SEC are managed at the SCPC, located to the west of the SCL4A.

5.2 SSIs at UG-3

5.2.1 Boron Concentrations

Boron is a key indicator for fly ash and boiler slag/bottom ash impacts because it is typically present in the leachate from these types of waste, is not a common anthropogenic contaminant, and is non-reactive and mobile in most hydrogeological environments (EPRI 2012). This non-reactive and mobile nature makes boron an early indicator of impacts from a CCR Unit. If groundwater was impacted by the SCL4A, current boron concentrations should be statistically elevated with respect to pre-CCR placement.

Figure 2 displays a plot of boron concentrations over time compared to CCR placement in the SCL4A. Prior to CCR being placed in the unit, boron concentrations began to increase and have continued to be detected since that time. While this does not confirm the source of the impacts, it would be expected that if impacts were from the SCL4A that the increase in boron concentrations would occur after CCR was placed in the unit.

In 2018, an ASD was completed for the SCPB (fly ash pond) unit to the north of the SCL4A and is available in the 2018 Annual Report for the SCPB. In that ASD, pore-water samples were collected from the SCPA and SCPB,

and samples were collected in the shallow, intermediate (middle) and deep zones of the alluvial aquifer just outside of the two units. From this ASD, it was determined that CCR impacts found directly outside of the SCPB are from the SCPA and not the SCPB because impacts were present at their highest concentrations at deeper depths and the groundwater chemistry similarities between the waters of the SCPA and the impacted wells. The SCPB ASD concluded these deeper impacts are from the SCPA because the SCPA is an unlined CCR unit that extends approximately 70 feet below ground surface, while the SCPB is a CCR Unit that has a liner and is much shallower. Therefore, if impacts were from the SCPB, the impacts would be expected to be concentrated in the shallow zone of the alluvial aquifer, whereas impacts from the SCPA would be present across all zones of the alluvial aquifer.

A Piper diagram is a graphical technique used to classify different groundwater chemistry. These ternary diagrams use major cation and anion concentrations to plot the data. In addition to showing instantaneous concentrations, Piper diagrams can be used to determine if groundwater chemistry is changing, either spatially or temporally. **Figure 3** displays a piper diagram from the November 2017 SCPB ASD report that compares the water chemistry of background, SCPA pore-water, and SCPB pore-water. As shown on **Figure 4**, when 2006 results from PZ-36 (a monitoring well near the location of UG-3 installed as part of the DSI prior to any UWL construction, see **Figure 1**) are compared to this chart, they plot in the background area of the diagram. Since 2006, there have only been four (4) samples at UG-3 that have collected all the major cations and anions required to generate a piper diagram. These four (4) samples were collected and tested in 2017 to 2019. When results from these sampling events are plotted on a piper diagram, they display a change from the background groundwater chemistry and have increasing concentrations of pore-water constituents derived from the SCPA. This shift in groundwater chemistry indicates that impacts present in UG-3 are from the SCPA.

In 2018 and 2019, the SCPA moved from Assessment Monitoring into Corrective Action and an investigation into the nature and extent of impacts from the SCPA was completed. As a part of this investigation, samples were collected in the shallow, middle, and deep zones of the alluvial aquifer in multiple locations around the site. One set of piezometers (TP-5) was installed approximately 1,000 feet to the west of UG-3. In the TP-5 piezometers, boron concentrations ranged from 211-263 µg/L in the shallow zone of the alluvial aquifer, 3,120-3,190 µg/L in the intermediate zone and 5,460-5,780 µg/L in the deep zone of the alluvial aquifer.

This increase in boron concentration with depth at TP-5 is indicative of impacts from the SCPA rather than the SCPB, SCPC or SCL4A because the SCPA is unlined and extends downward 70 feet below ground surface, whereas the SCPB, SCPC and SCL4A are constructed with a liner system with a base elevation above the natural groundwater table. If impacts were from the SCL4A, the greatest impacts would be expected in the shallow zone of the alluvial aquifer and would dilute and be expected to decrease with depth. Results from the nature and extent investigation further indicate that impacts in the alluvial aquifer at the SEC are from the SCPA and not the other lined units. Additionally, as displayed in **Figure 5**, when monitoring wells between the SCPA and UG-3 (TP-5S, TP-5M, TP-5D, LMW-5S, LMW-6S and LMW-2S) are plotted on a piper diagram, their trends are similar to UG-3 over time.

Based on the historical trend of boron increasing prior to CCR being placed in the unit and the investigation of impacts from the SCPA, the evidence suggests that the SSI for boron at UG-3 is from CCR impacts from the SCPA and not from the SCL4A.

5.2.2 Calcium Concentrations

Calcium is not known to be a key indicator of fly ash or boiler slag/bottom ash (EPRI 2012, EPRI 2017), but can be an indicator for FGD type wastes. At the SEC, FGD waste is managed in the nearby SCPC unit to the west of the SCL4A, therefore, elevated concentrations in calcium alone are not a good indicator of CCR impacts from the SCL4A.

During the August 2019 Detection Monitoring event, the calcium concentration for UG-3 was 159,000 µg/L, which was confirmed by a value of 163,000 µg/L during the verification sampling. As displayed on **Figure 6**, the initial intrawell UPL for calcium at UG-3 is 154,345 µg/L and was calculated using the results of the eight initial CCR Rule baseline sampling events that ranged from 103,000 to 144,000 µg/L. The UPLs were updated after the August 2019 sampling event as outlined by the Statistical Analysis Plan. The updated UPL value that will be used for UG-3, starting with the November 2019 sampling event, is 160,085 µg/L.

Figure 6 shows a time series plot of calcium at UG-3 and compares data from historic State UWL sampling and CCR Rule sampling. Current calcium concentrations in monitoring well UG-3 are similar to or lower than those reported prior to the operation of the SCL4A. If only the data collected in the state program prior to the receipt of CCR was used to calculate the prediction limit, the resulting limit would be 188,523 µg/L, which is well above the August value of 159,000 µg/L.

Based on these data, the variability in calcium concentrations over time is not a result of CCR influence on the groundwater from the SCL4A. The SSI is likely a result of geochemical variability of the aquifer and the limited sample set used for UPL calculation.

5.2.3 Chloride Concentrations

Chloride is not known to be a key indicator of fly ash or boiler slag/bottom ash (EPRI 2012), but can be an indicator for FGD type wastes and is commonly found near salt and brine treated roadways. At the SEC, FGD wastes are managed in the SCPC, located west of the SCL4A. Concentrations for the August 2019 sampling event and subsequent verification sampling event are 85.0 and 81.2 milligrams per liter (mg/L), respectively. These values are just above the original calculated UPL of 78.76 mg/L for chloride concentrations at UG-3. This UPL was calculated based on eight baseline sampling events collected in 2016 and 2017 during which time chloride concentrations ranged from 28.9 to 71.9 mg/L. Historically, including state sampling results dating back to June 2008, chloride concentrations have ranged from 17 to 98 mg/L at UG-3. This range during baseline and state sampling events demonstrates that the variability of chloride concentrations at UG-3 is large and the SSI sampled in August 2019 is not out of the typical range for chloride values at this well.

Road salt (NaCl) applied to roadways for ice control is a common alternative source for elevated chloride concentrations. UG-3 is located within 200 feet to the south (downgradient) of Highway 94. **Figure 7** displays a multi-constituent time series plot comparing chloride and sodium values which are the common constituents in road salt. The results from this plot display a good correlation between sodium and chloride and show that these results typically spike and decline together, indicating that these two constituents are moving together through the aquifer. The correlation and seasonal spikes associated with this data are a very clear indication that elevated chloride levels in UG-3 are caused by the road salt application on nearby Highway 94, which subsequently dissolves and infiltrates into the shallow alluvial aquifer. SCL4A is not the source for chloride concentrations in UG-3.

Additionally, as displayed in **Figure 4** and **Table 3**, as impacts from the SCPA have migrated toward UG-3, the groundwater chemistry in UG-3 has increasingly shown signature of that of the SCPA pore-water. As a part of this shift, sulfate, chloride, calcium and magnesium concentrations are becoming a higher percentage of the cation and anion balance for the water and may result in higher concentrations of chloride.

5.2.4 Total Dissolved Solids (TDS) Concentrations

TDS alone is not known to be a CCR or FGD indicator (EPRI 2017, EPRI 2012). The concentration of TDS is largely based on the concentration of major ions in groundwater (calcium, magnesium, sodium, potassium, carbonates, chloride, sulfate, etc.). Although TDS alone is not a key indicator of CCR impacts, an increase in some of the major ions can represent CCR impacts.

During baseline sampling at UG-3, TDS results ranged from 426-585 mg/L. During the August 2019 sampling event, TDS was higher at 710 mg/L and 724 mg/L during the subsequent verification sample. Results from the State UWL sampling ranged from 430-626 mg/L prior to the receipt of CCR at the SCL4A.

A review of the major cations and anions (**Table 3**) shows increases in calcium, magnesium, chloride, and sulfate and decreases in alkalinity, potassium and sodium between the November 2018 and August 2019 sampling events. As displayed on **Figure 4,** as groundwater chemistry shifts from background concentrations toward that of the SCPA, an increase in sulfate, chloride, calcium and magnesium would be expected. As discussed above in section 5.2.1, nature and extent investigation results display impacts from the SCPA in monitoring well UG-3. Based on this information, the increase in TDS is not from impacts from the SCL4A, but rather from migrating impacts from the SCPA.

5.3 SSIs at TMW-2

5.3.1 Sulfate Concentrations

Sulfate, much like boron, is a key indicator for potential CCR impacts because sulfate is highly mobile in most hydrogeological environments, except where conditions are strongly reducing. The groundwater around the SCL4A does not demonstrate strongly reducing conditions, such as negative oxidation reduction potential (ORP) and dissolved iron concentrations above 1 mg/L. No hydrogen sulfide odors have been reported at the SCL4A. Therefore, if the SSI was caused by impacts from the SCL4A, it would be expected that sulfate values would increase following placement of CCR. Additionally, if sulfate values were to increase, it would be expected that boron values would increase as these two are typically the first indicators of any CCR impacts. **Figure 8** displays that boron concentrations have remained relatively constant throughout the sampling period at TMW-2 and are in the same range as those from the background monitoring wells.

As displayed on **Figure 9**, during baseline sampling at TMW-2, sulfate ranged from 30.0-35.5 mg/L. During the August 2019 sampling event, sulfate was higher at 52.1 mg/L and 75.6 mg/L during the subsequent verification sampling. There are two monitoring wells located with 350 feet to the east and west of TMW-2 as displayed in **Figure 1**; TMW-1 (west) and TMW-3 (east). In these monitoring wells, sulfate concentrations ranged from 23.2 to 60.9 mg/L during the baseline sampling event, and UPLs for these monitoring wells are 46.3 mg/L at TMW-1 and 63.5 mg/L at TMW-3. Based on the sulfate concentration range of the nearby wells, the concentration of the August 2019 SSI at 52.1 mg/L is within the range of results from the adjacent wells. Based on this information, the SSI is likely caused by a limited dataset that didn't capture the geochemical variability within the shallow zone of the alluvial aquifer during the baseline sampling or migration of nearby concentrations.

To further investigate the geochemical variability of sulfate in this area, a review of the data in the state UWL wells located on the south side of the UWL (DG wells, outside of impact from the SCPA) prior to the receipt of CCR at the SCL4A was completed. These monitoring wells are screened at approximately the same depth as TMW-2 in the shallow zone of the alluvial aquifer. **Figure 10** displays a box and whisker plot of the natural variability of sulfate concentrations within the alluvial aquifer prior to the receipt of CCR in the SCL4A for these wells. Additionally, when just the results prior to the receipt of CCR are used to calculate a UPL from the DG wells, the calculated UPL is 83 mg/L. Based on these results, the sampling results from TMW-2 are within these limits prior to the receipt of CCR.

All of the above, indicates that the higher concentration in TMW-2 in August 2019 was not caused by a release from the SCL4A, but instead can be attributed to variability in the alluvial aquifer during the August 2019 sampling event and the use of a limited dataset for calculation of the initial UPL.

5.3.2 Total Dissolved Solids (TDS) Concentrations

As stated above, TDS alone is not a key indicator of CCR or WFGD impacts (EPRI 2017, EPRI 2012). As displayed on **Figure 11**, concentrations for the August 2019 sampling event and subsequent verification sampling event are 481 and 512 mg/L respectively. These results are lower than the previous result in May 2018 of 721 mg/L, which was flagged as an outlier. Furthermore, these values are just above the original calculated UPL used for TDS concentrations at TMW-2 of 476.5 mg/L. This UPL is calculated based on eight baseline sampling events collected in 2016 and 2017 during which time TDS concentrations ranged from 403 to 450 mg/L. TMW-2 is not sampled as part of the state UWL sampling program, therefore no historical data prior to the receipt of CCR in the SCL4A is available from this well. However, TMW-1 and TMW-3, which are located within 350 feet to the east and west, ranged from 339-493 mg/L during baseline sampling. The initial UPLs for these wells are 506.2 mg/L (TMW-1) and 514.3 mg/L (TMW-3). As shown in **Figure 11** and described above, results from TMW-2 are within the normal range of TDS concentrations for the area south of the SCL4A. Therefore, the SSI for TDS is not caused by impacts from the SCL4A, but rather a low initial UPL for TMW-2 due to a limited dataset used for the calculation.

In addition, **Figure 11** displays the TDS concentrations of the background monitoring wells BMW-1S and BMW-3S compared to those of TMW-1, TMW-2 and TMW-3. Background TDS results at monitoring wells BMW-1S and BMW-3S ranged between 409-565 mg/L during baseline sampling and a calculated prediction limit of 565 mg/L was calculated as the statistical limit for shallow wells using interwell statistical methods (SCPB). This further demonstrates that the SSI for TDS at TMW-2 was not caused by impacts from the SCL4A, but instead can be attributed to variability in the alluvial aquifer during the August 2019 sampling event, low initial UPL for TMW-2 due to a limited dataset used for the calculation, or possibly laboratory testing variability.

6.0 DEMONSTRATION THAT SSIS WERE NOT CAUSED BY SCL4A IMPACT

Based on the information presented in Section 5 above, the SSIs at UG-3 and TMW-2 were not caused by impacts from the SCL4A. These SSIs appear to be caused by the following:

- Pre-existing low-level impacts from the upgradient SCPA unit. Geochemical diagrams display the shift over time in groundwater chemistry that trends toward the signature of SCPA pore-water.

- The use of road salt (NaCL) on Highway 94. This causes increases in chloride concentrations in monitoring wells located near the highway such as UG-3. Additionally, UG-3 is located south of Highway 94, which is typically the downgradient direction of groundwater flow in that localized area.
- Relatively low calculated UPLs that do not reflect the full variability within the alluvial aquifer. This is caused because only eight (8) baseline samples were collected and used for the calculation of the UPL prior to Detection Monitoring being initiated.
- The construction of the SCL4A, with 2-feet of compacted clay overlain by a 60-mil HDPE liner, limits the likelihood that the SSI is a result of impact from SCL4A.

As required by the CCR Rule, eight (8) baseline samples were collected prior to the October 2017 deadline which were used to calculate the UPL at each compliance well around the SCL4A. According to the *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance* (USEPA 2009), eight (8) samples is the minimum number of samples recommended in order to complete statistical tests and future data will be used to enlarge the dataset for UPL calculation. As shown throughout this ASD, the minimum 8 (eight) baseline samples has not been able to capture the full extent of the spatial and temporal variability of groundwater chemistry. Starting with the November 2019 statistical analysis, the baseline data set will be enlarged to a minimum of 12 samples. At the SCL4A, previous data from State UWL monitoring show pre-existing low-level CCR impacts and put the SSI in context relative to historical groundwater conditions at the site.

In summary, there are no indications to support migration of CCR contaminants from the SCL4A. Instead, the data indicate that the cause for the SSIs is due to alluvial aquifer variability, laboratory method accuracy, limited baseline data available for the calculation of the UPL, the use of road salt on Highway 94, and impacts from the SCPA CCR Unit.

7.0 REFERENCES

Ameren Missouri. 2016. Structural Integrity Criteria & Hydrologic/Hydraulic Capacity Assessment, Sioux Energy Center.

Electric Power Research Institute (EPRI). 1998, Field Evaluation of the Comanagement of Utility Low-Volume Wastes With High-Volume Coal Combustion By-Products: SX Site. Report TRACE-108409. September 1998.

Electric Power Research Institute (EPRI). 2011, Composition and Leaching of FGD Gypsum and Mined Gypsum, Report 1022146. November 2011.

Electric Power Research Institute (EPRI). 2012, Groundwater Quality Signatures for Assessing Potential Impacts from Coal Combustion Product Leachate, Report 1017923. October 2012.

Electric Power Research Institute (EPRI). 2017, Guidelines for Development of Alternative Source Demonstrations at Coal Combustion Residual Sites, Report 3002010920, October 2017

Golder Associates Inc., 2017, 40 CFR Part 257 Groundwater Monitoring Plan, SCL4A – Sioux Energy Center – St. Charles County, Missouri, USA.

Golder Associates Inc., 2018, 2017 Annual Groundwater Monitoring Report, SCL4A - Utility Waste Landfill Cell 4A, Sioux Energy Center - St. Charles County, Missouri, USA

Golder Associates Inc., 2019a, 2018 Annual Groundwater Monitoring Report, SCL4A - Utility Waste Landfill Cell 4A, Sioux Energy Center - St. Charles County, Missouri, USA

Golder Associates Inc., 2019b, 2018 Annual Groundwater Monitoring Report, SCPB Surface Impoundment, Sioux Energy Center - St. Charles County, Missouri, USA

Golder Associates Inc., 2019b, Updated Statistical Limits With Additional Background Data – SCL4A.

Golder Associates Inc., 2019c, Updated Statistical Limits With Additional Background Data – SCPB.

GREDELL Engineering Resources, Inc. 2006. Detailed Geologic and Hydrologic Site Investigation Report. AmerenUE Sioux Power Plant Proposed Utility Waste Disposal Area. St. Charles County, Missouri. August 2006.

GREDELL Engineering Resources, Inc. 2009. Background Groundwater Monitoring Report. AmerenUE Sioux Power Plant. St. Charles County, Missouri. June 2009.

Johnson, A.I. 1967. Specific Yield – Compilation of Specific Yields for Various Materials: U.S. Geological Survey Water-Supply Paper 1662-D. Available at: https://pubs.er.usgs.gov/publication/wsp1662D

MDNR. 2011. Missouri Well Construction Rules. Missouri Department of Natural Resources Division of Geology and Land Survey. Rolla, MO. August 2011.

Reitz & Jens, Inc., and GREDELL Engineering Resources, Inc. 2014. Ameren Missouri Sioux Power Plant – Utility Waste Landfill – Proposed Construction Permit Modification – Construction Permit Number 0918301 – St. Charles County, Missouri, revised August 2014.

USEPA. 2009. Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance. Office of Resource Conservation and Recovery – Program Implementation and Information Division. March

USEPA. 2015. Federal Register. Volume 80. No. 74. Friday April 17, 2015. Part II. Environmental Protection Agency. 40 CFR Parts 257 and 261. Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule/ [EPA-HQ-RCRA-2009-0640; FRL-9919-44-OSWER].

Tables

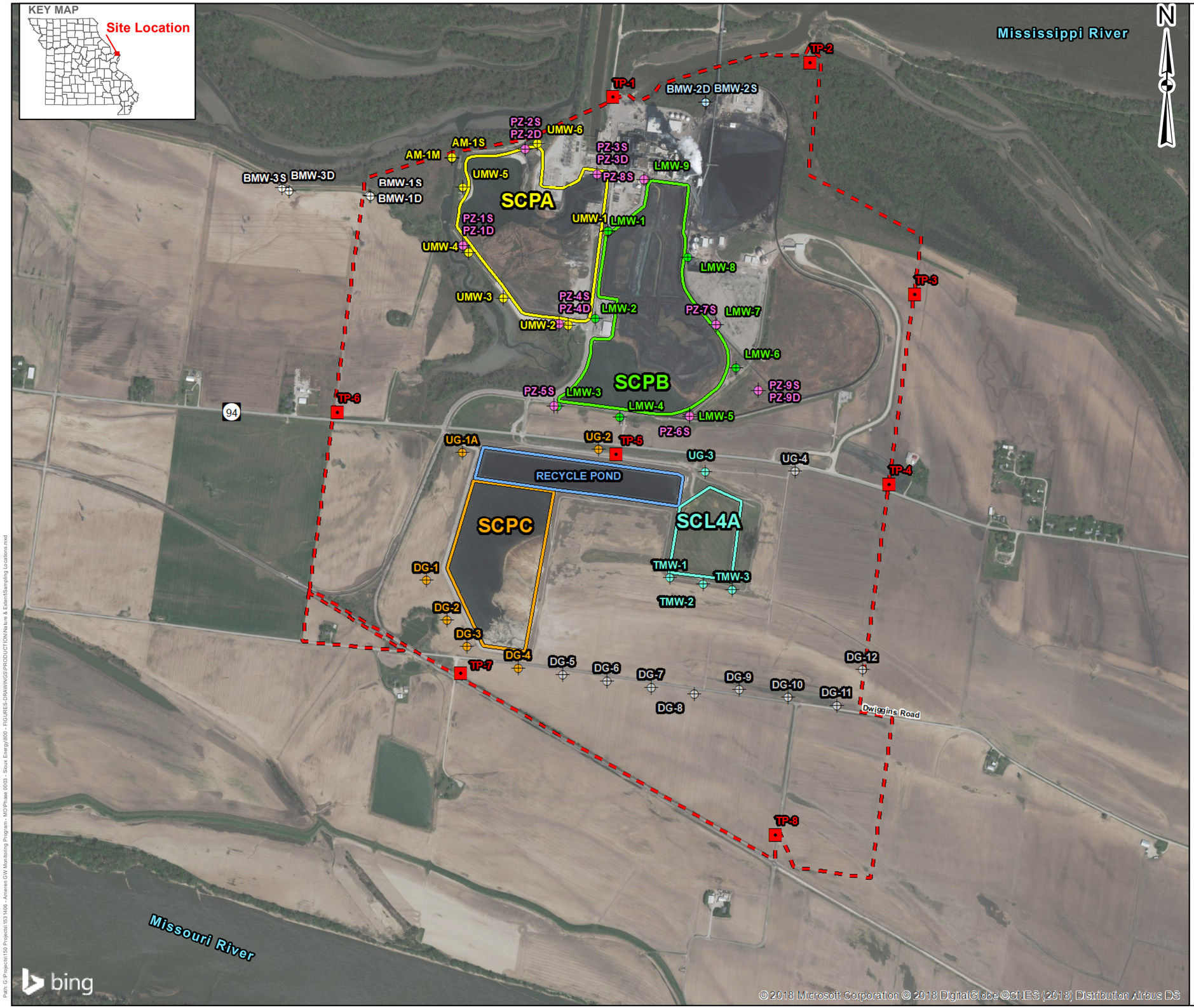
Table 3
Major Cation and Anion Concentrations
SCL4A - Alternative Source Demonstration
Sioux Energy Center, St. Charles County, MO

Monitoring Well ID	Total Sodium (mg/L)	Total Potassium (mg/L)	Total Calcium (mg/L)	Total Magnesium (mg/L)	Total Chloride (mg/L)	Total Sulfate (mg/L)	Total Alkalinity [(2)] (mg/L)
Detection Monitoring - August 2019							
S-BMW-1S	5.35	0.383	149	28.4	8.8	34.1	432
S-BMW-3S	5.28	0.648	122	22.4	10.6	25.3	358
S-DG-1	4.23	4.01	135	32.3	6.2	41.7	411
S-DG-2	4.76	5.14	133	33.3	8.2	37.1	425
S-DG-3	4.68	6.47	148	39.1	4.8	49.5	450
S-DG-4	44.6	7.57	136	39.5	103	31.5	403
S-TMW-1	2.76	4.90	99.8	18.2	2.1	40.2	269 J
S-TMW-2	3.18	5.15	123	23.1	3.3	52.1	361 J
S-TMW-3	4.08	5.55	123 J	23.3	2.6	37.2	369 J
S-UG-1A	39.1	9.53	177	42.0	145	57.7	437
S-UG-2	30.4	4.70	116	24.6	30	45.2	362
S-UG-3	24.2	5.75	159	32.3	85	144	337 J
Historical Data - June 2006							
PZ-1	5.2	4.1	140	38	11	69	480
PZ-2	3.8	2.8	120	32	36	6.6	420
PZ-3	5.4	5.2	140	27	12	53	440
PZ-4	16	4.5	140	35	13	220	320
PZ-10	3.4	3.9	99	31	4.6	43	370
PZ-21	8.0	2.9	130	26	25	100	350
PZ-25	4.2	4.9	120	38	19	29	470
PZ-36	7.2	4.2	110	22	21	34	310
PZ-40	3.2	4.0	120	21	1.7	33	370
PZ-50	3.4	3.8	97	24	18	43	290
PZ-55	3.9	4.5	120	24	6.1	52	370
PZ-56	4.4	4.5	110	22	25	49	340
PZ-57	4.8	4.4	120	24	4.0	42	370
Historical UG-3 Samples							
S-UG-3 - 11/15/2017	32.4	5.82	126	23.0	70.0	45.6	334
S-UG-3 - 5/15/2018	36.0	5.75	130	24.5	84.8	45.3	354
S-UG-3 - 11/14/2018	40.8	6.30	129	23.3	67.0	63.9	365
S-UG-3 - 8/19/2019	24.2	5.75	159	32.3	85.0	144	337 J
S-UG-3 - 11/14/2019	26.1	5.79	135 J	28.6	83.5	185 J	360
Nearby Monitoring Wells							
S-LMW-2S - 8/6/2019	75.4	8.03	150	25.2	76.9	339	248
S-LMW-2S - 11/15/2019	67.1	7.71	170 J	29.8	102	317	277
S-LMW-5S - 8/5/2019	148	5.05	277	56.5	36.6	930	310
S-LMW-5S - 11/15/2019	142	4.76	266	56.0	31.0	852	342
S-LMW-6S - 8/5/2019	102	5.39	268	66.9	3.6	787	377
S-LMW-6S - 11/15/2019	110	5.22	292	72.5	4.1	917	368
S-TP-5D - 8/2/2019	5.63	1.15	30.4	36.0	27.0	223	285
S-TP-5M - 8/2/2019	16.8	5.30	147	27.2	20.6	171	316 J
S-TP-5S - 8/2/2019	39.6	4.50	135	29.9	35.4 J	7.4 J	438
Porewater Samples From SCPA and SCPB							
S-LB-2 - 1/25/2018	108	24.9	112	122	25.7	451	133
S-LB4 - 1/24/2018	76.1	25.2	94.1	108	38.2	318	115
S-LB5 - 1/24/2018	267	91.0	40.1	28.4 J	30.5	393	468
S-SCPA-1D - 1/23/2018	27.0	11.8	101	23.9	25.0	200	228
S-SCPA-1S - 1/23/2018	81.4	55.2	825	4.88	26.0	2080	549
S-SCPA-2 - 1/22/2018	13.9	4.35	73.4	20.0	20.5	48.5	219
S-SCPA-3D - 1/24/2018	116	60.3	548	60.2	27.1	1820	185
S-SCPA-3S - 1/22/2018	58.5	40.1	501	9.60	23.1	1290	170
S-SCPB-1 - 1/25/2018	314	74.9	37.2	38.7 J	51.7	630	326

Notes:
1) 2006 Historical Data from Appendix 13 of the Detailed Site Investigation (DSI).
2) Alkalinity is equal to Carbonate + Bicarbonate.
3) mg/L - milligrams per liter.
4) J - Result is an estimated value.

Prepared by: JSI
Checked by: KAB
Reviewed by: MNH

Figures



LEGEND

- Sioux Energy Center Property Boundary

Surface Impoundments

- SCPB - Fly Ash Surface Impoundment
- SCPA - Bottom Ash Surface Impoundment

Utility Waste Landfill (UWL)

- Active Dry CCR Disposal Area
- Active WFGD Disposal Area
- Active Water Recycle Pond

CCR Rule Monitoring Wells

- Background Monitoring Well
- SCPA - Bottom Ash Surface Impoundment Monitoring Well
- SCPB - Fly Ash Surface Impoundment Monitoring Well
- Existing UWL Monitoring Well Currently Used for CCR Monitoring of the SCPC
- Existing UWL Monitoring Well Currently Used for CCR Monitoring of the SCL4A
- Groundwater Elevation Piezometer
- NPDES Monitoring Wells
- Nature and Extent Investigation Triple Nested Temporary Piezometers

NOTES

1.) ALL LOCATIONS AND BOUNDARIES ARE APPROXIMATE.
2.) UWL - UTILITY WASTE LANDFILL.
3.) WFGD - WET FLUE GAS DESULFURIZATION.
4.) CCR - COAL COMBUSTION RESIDUALS.
5.) UWL BOUNDARIES, DESIGNATIONS AND EXISTING MONITORING WELL LOCATIONS BASED ON DRAWINGS IN THE UWL PROPOSED LANDFILL PERMIT (#0918301).
6.) NATURE AND EXTENT INVESTIGATION TEMPORARY PIEZOMETERS HAVE A SHALLOW, MIDDLE, AND DEEP PIEZOMETER AT EACH LOCATION.
7.) NPDES - NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM.

REFERENCES

1.) AMEREN MISSOURI SIOUX ENERGY CENTER, SIOUX PROPERTY CONTROL MAP, FEBRUARY 2011.
2.) COORDINATE SYSTEM: NAD 1983 STATE PLANE MISSOURI EAST FIPS 2401 FEET.
3.) AMEREN MISSOURI SIOUX POWER PLANT UTILITY WASTE LANDFILL PROPOSED CONSTRUCTION PERMIT MODIFICATION (#0918301), AUGUST 2014.

0 500 1,000 1,500 2,000 2,500
Feet

CLIENT
AMEREN MISSOURI
SIOUX ENERGY CENTER

PROJECT
GROUNDWATER MONITORING PROGRAM

TITLE
SITE LOCATION AND MONITORING WELL LOCATION MAP

CONSULTANT
GOLDER

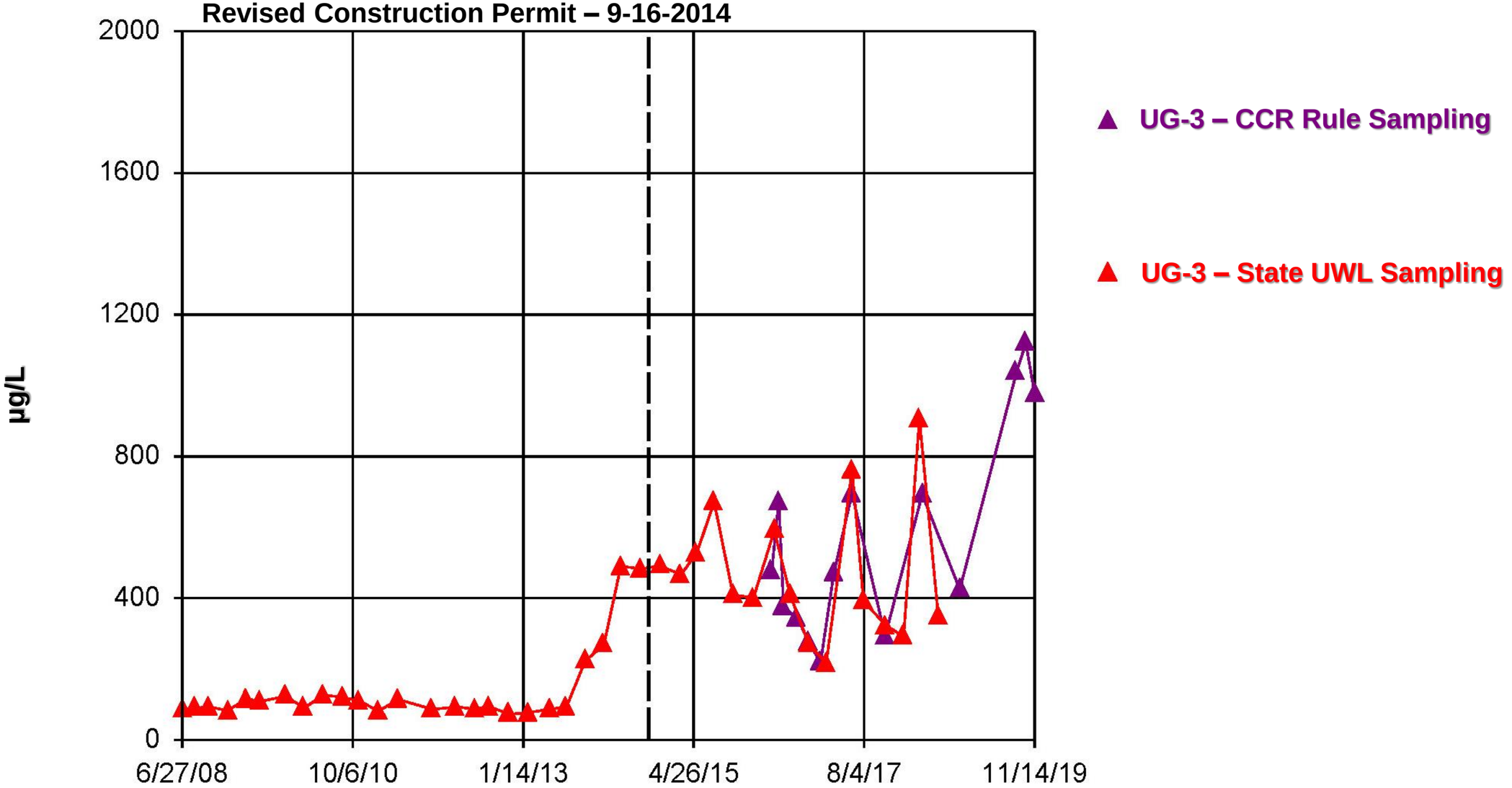
YYYY-MM-DD	2018-10-15
PREPARED	RJF
DESIGN	JSI
REVIEW	EMS
APPROVED	MNH

PROJECT No.
153-1406

FIGURE
1

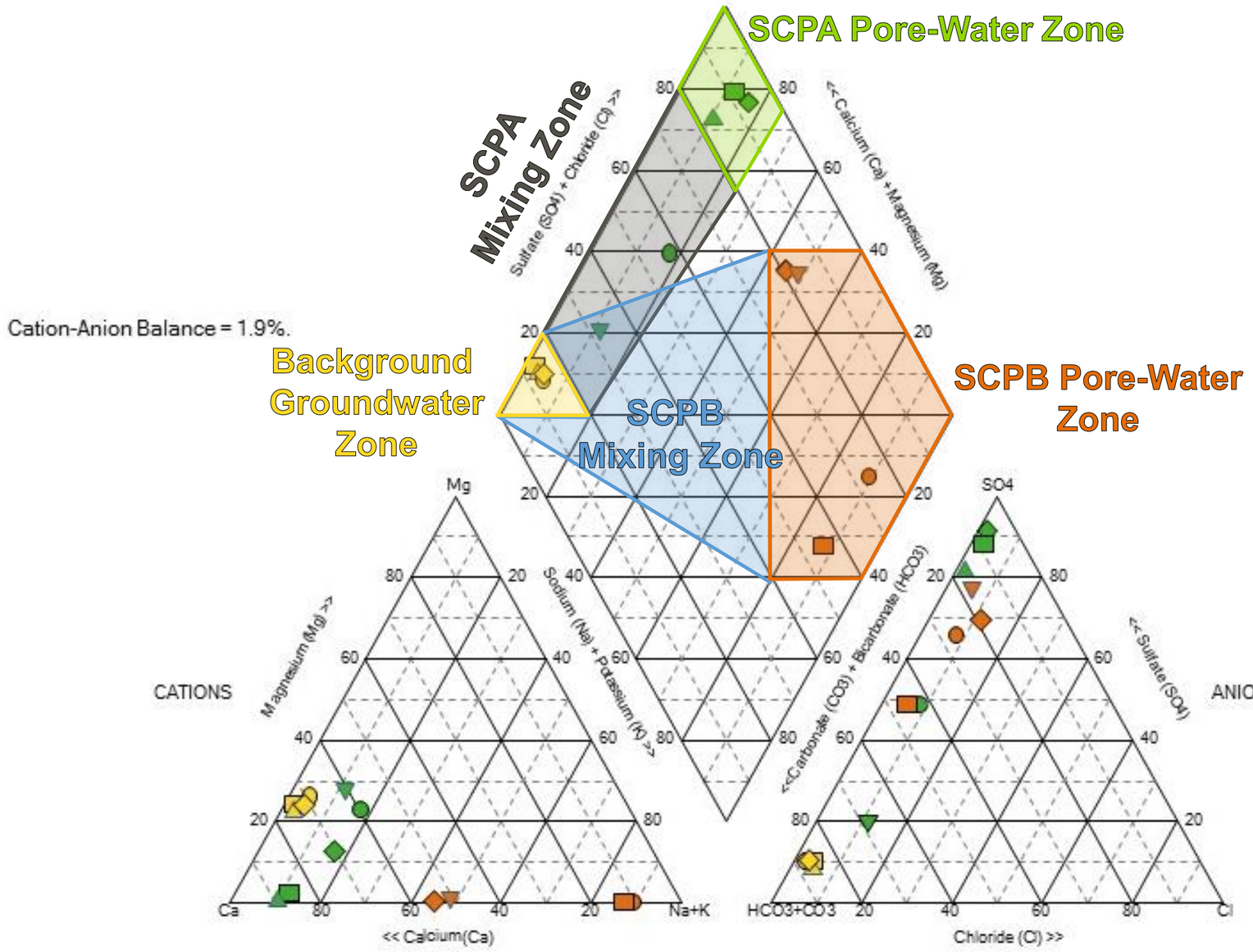
Time Series

Revised Construction Permit – 9-16-2014



Notes
1) µg/L – micrograms per liter.
2) UWL – Utility Waste Landfill.
3) CCR - Coal Combustion Residuals.

CLIENT/PROJECT **AMEREN MISSOURI SIOUX ENERGY CENTER**							TITLE **UG-3 Boron Timeseries Plot**			
DRAWN JSI	CHECKED RJF	REVIEWED MNH	DATE 2020-01-20	SCALE N/A	FILE NO. N/A	JOB NO. 153140601.0003	DWG NO. N/A	SUBTITLE N/A	REV. NO. N/A	FIGURE **2**



Background Groundwater Sample

- S-BMW-1D* 11/13/2017
- S-BMW-1S* 11/13/2017
- S-BMW-3D* 11/13/2017
- S-BMW-3S* 11/13/2017

SCPB Pore-Water Sample

- S-LB-2 1/25/2018
- S-LB-4 1/24/2018
- S-LB-5 1/24/2018
- S-SCPB-1 1/25/2018

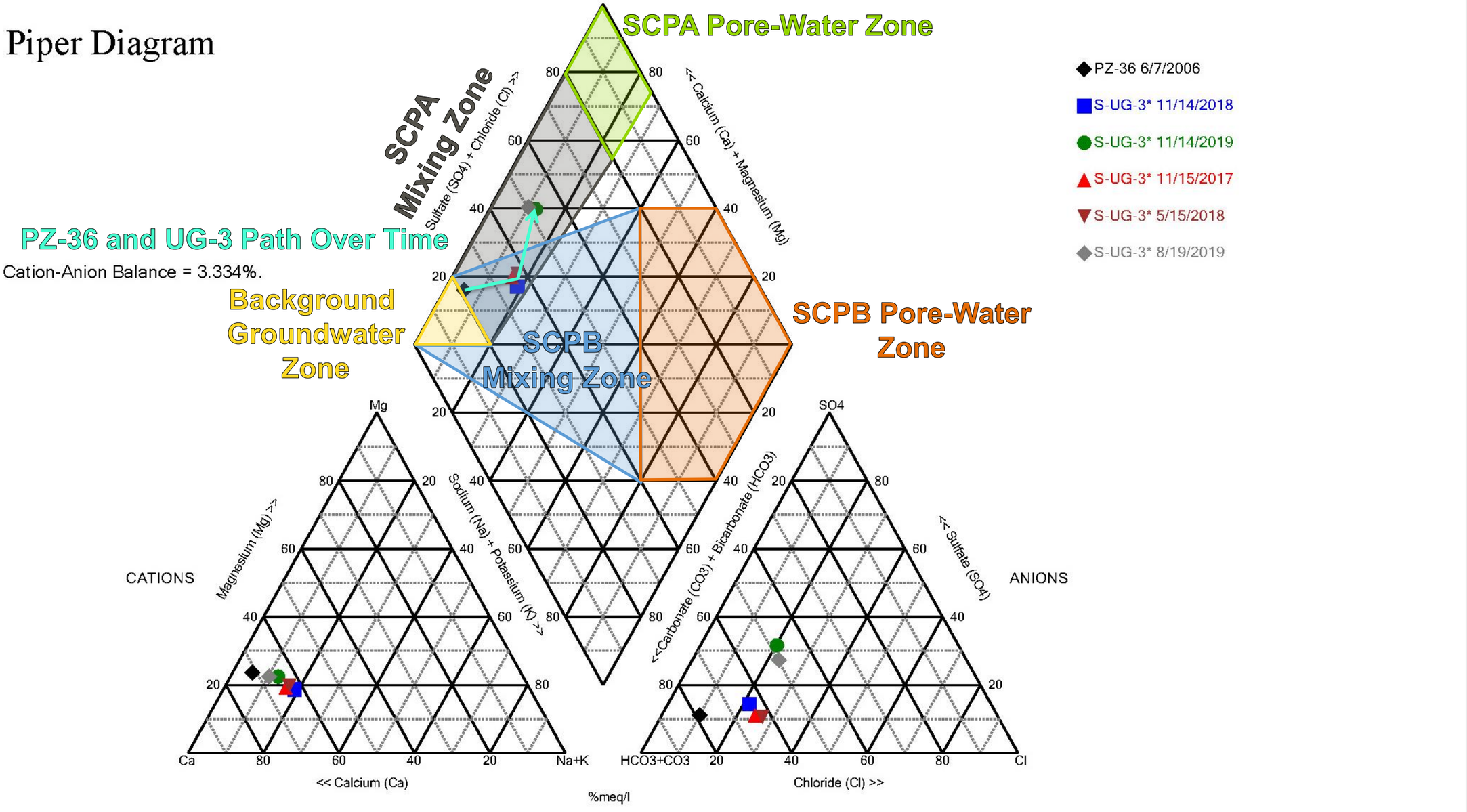
SCPA Pore-Water Sample

- S-SCPA-1D 1/23/2018
- S-SCPA-1S 1/23/2018
- S-SCPA-2 1/22/2018
- S-SCPA-3D 1/24/2018
- S-SCPA-3S 1/22/2018

Notes:
1.) Data used to generate diagram available in Table 3 and in the November 2017 SCPB Alternative Source Demonstration.
2.) Piper diagram generated using Sanitas^{tm} Software.

CLIENT/PROJECT **AMEREN MISSOURI SIOUX ENERGY CENTER**				GOLDER			TITLE **Background Groundwater and Pore-water Piper Diagram**			
DRAWN JSI	CHECKED RJF	REVIEWED MNH	DATE 2020-01-20	SCALE N/A	FILE NO. N/A	JOB NO. 153140601.0003	DWG NO. N/A	SUBTITLE N/A	REV. NO. N/A	FIGURE **3**

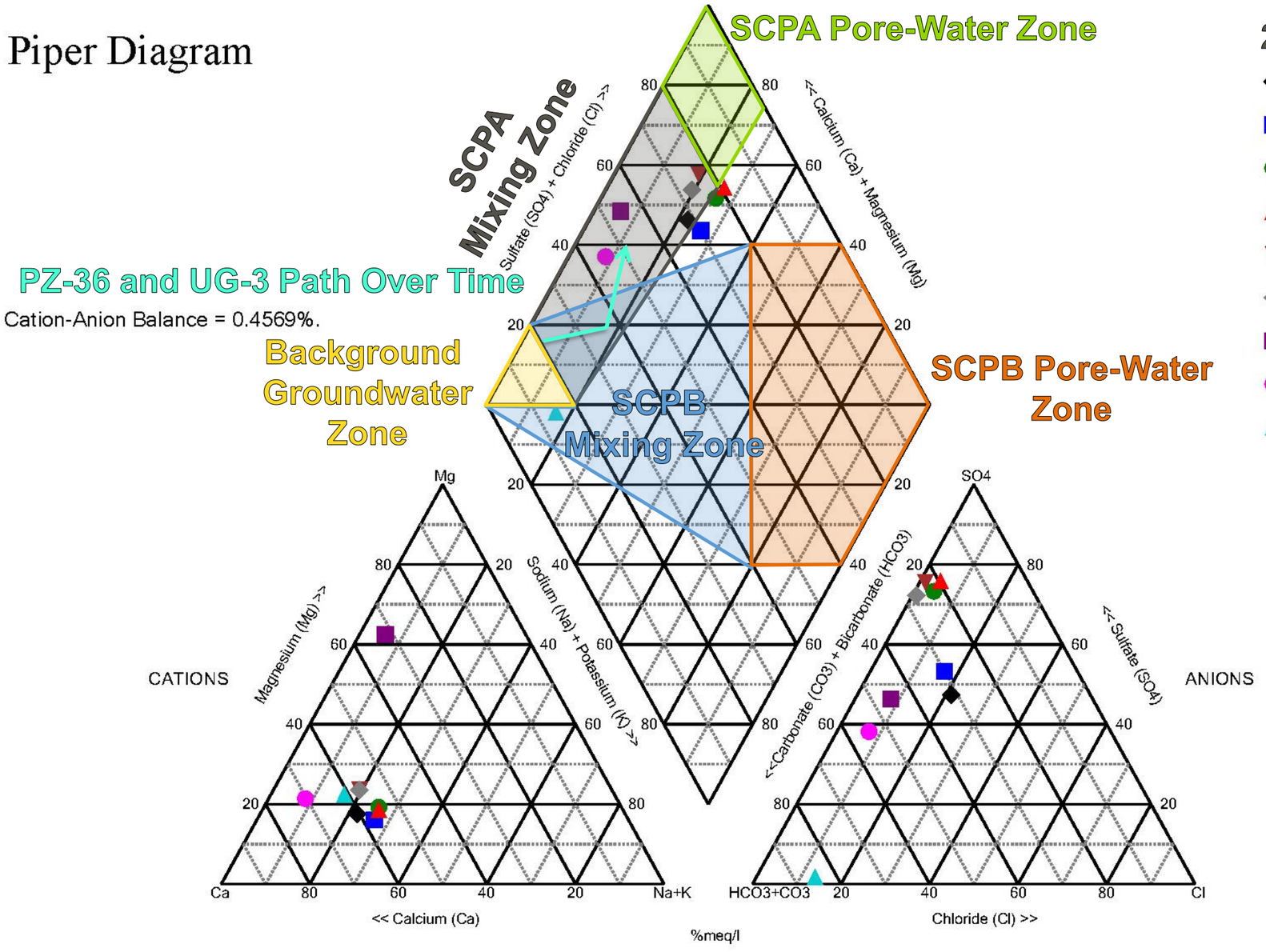
Piper Diagram



Notes:
1.) Data used to generate diagram available in Table 3 and in the November 2017 SCPB Alternative Source Demonstration.
2.) Piper diagram generated using Sanitas^{tm} Software.

CLIENT/PROJECT **AMEREN MISSOURI** **SIOUX ENERGY CENTER**					TITLE	**Comparison on UG-3 Groundwater Chemistry Over Time**				
DRAWN JSI	CHECKED RJF	REVIEWED MNH	DATE 2020-01-20	SCALE N/A	FILE NO. N/A	JOB NO. 153140601.0003	DWG NO. N/A	SUBTITLE N/A	REV. NO. N/A	FIGURE **4**

Piper Diagram



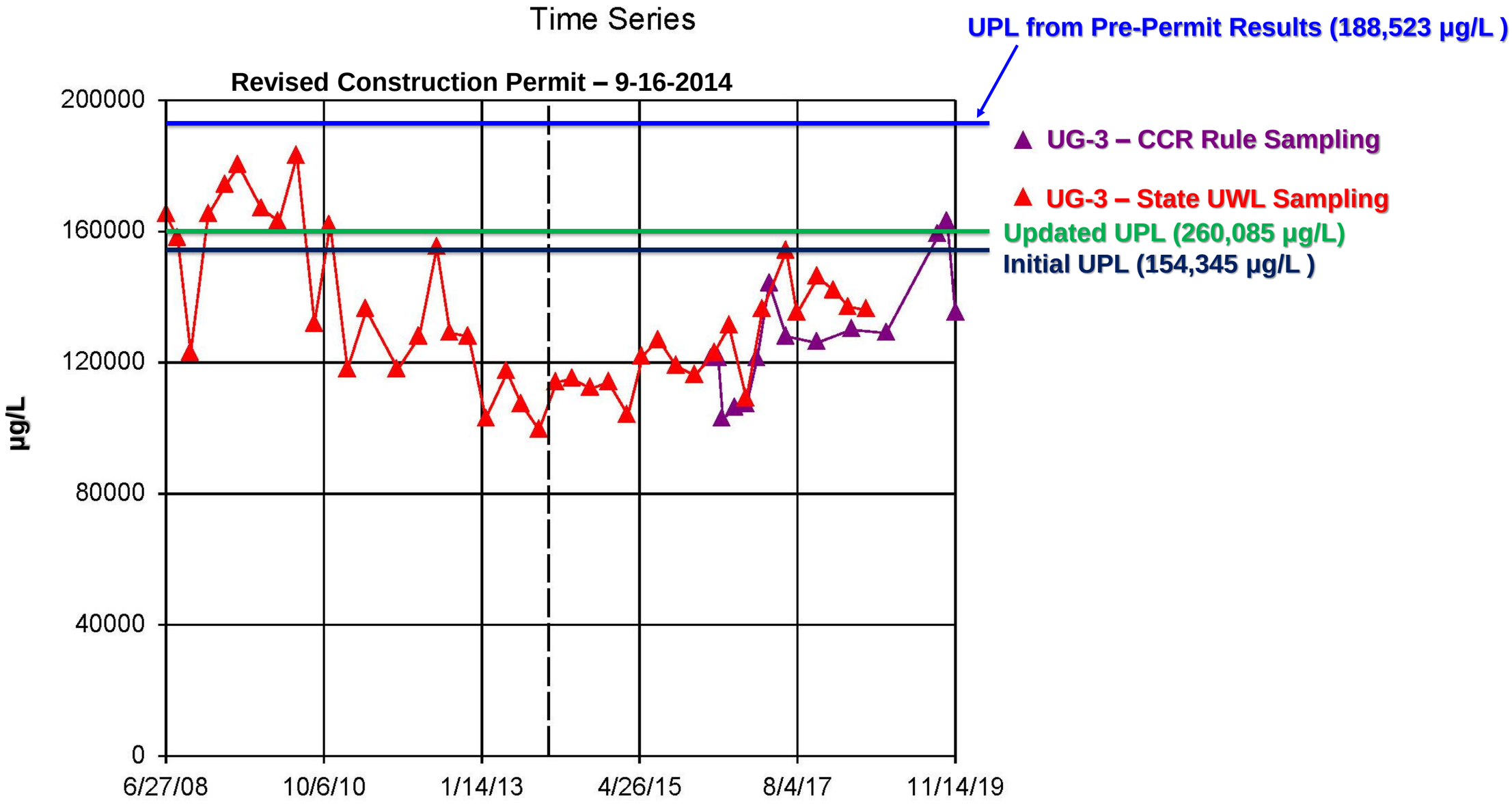
Cation-Anion Balance = 0.4569%.

2019 Samples

- S-LMW-2S 11/15/2019
- S-LMW-2S 8/6/2019
- S-LMW-5S 11/15/2019
- S-LMW-5S 8/5/2019
- S-LMW-6S 11/15/2019
- S-LMW-6S 8/5/2019
- S-TP-5D 8/2/2019
- S-TP-5M 8/2/2019
- S-TP-5S 8/2/2019

Notes:
1.) Data used to generate diagram available in Table 3 and in the November 2017 SCPB Alternative Source Demonstration.
2.) Piper diagram generated using Sanitas[tm] Software.

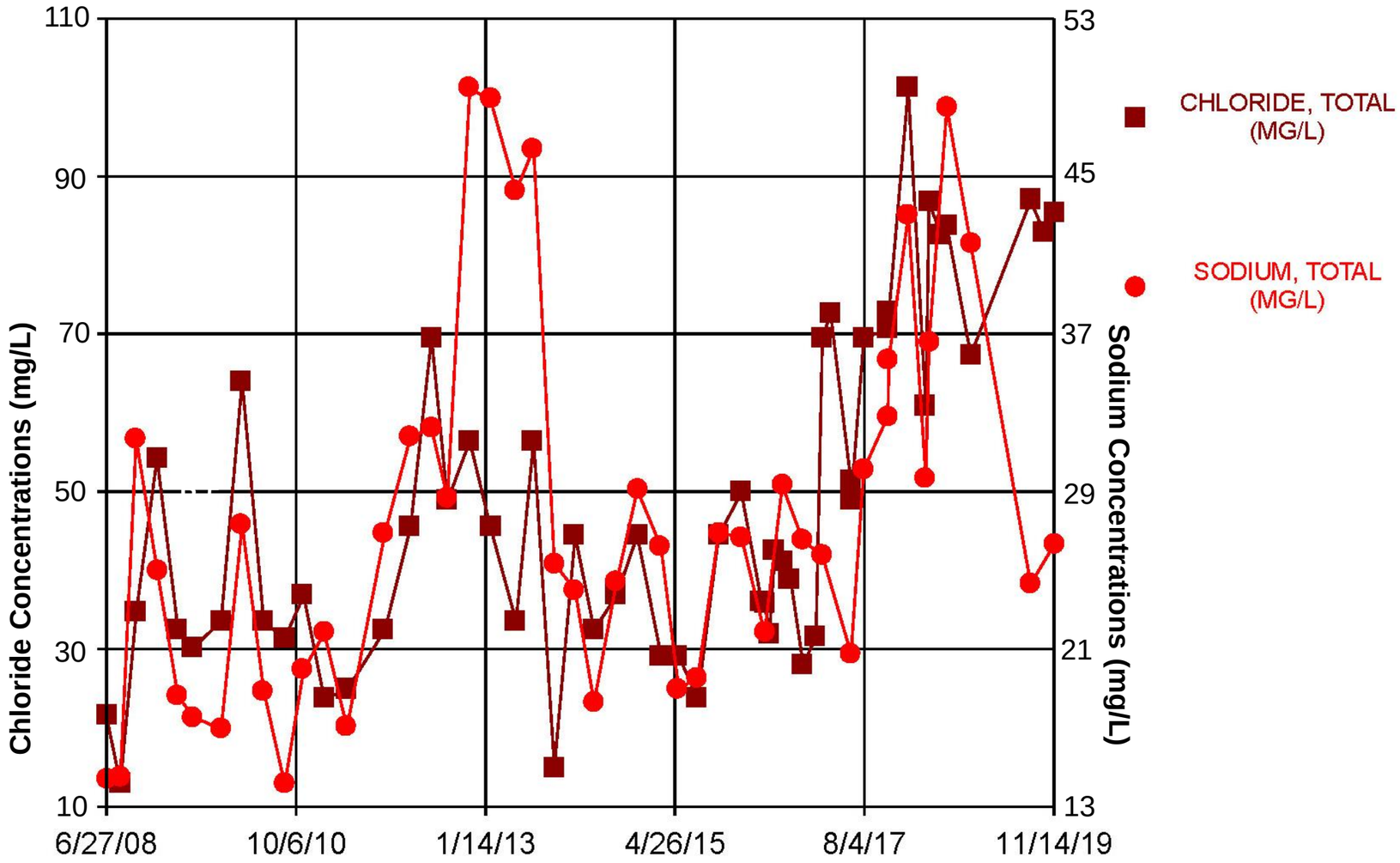
CLIENT/PROJECT **AMEREN MISSOURI SIOUX ENERGY CENTER**							TITLE **Comparison of UG-3 Path and Monitoring Wells Towards the SCPA.**			
DRAWN JSI	CHECKED RJF	REVIEWED MNH	DATE 2020-01-20	SCALE N/A	FILE NO. N/A	JOB NO. 153140601.0003	DWG NO. N/A	SUBTITLE N/A	REV. NO. N/A	FIGURE **5**



Notes
1) µg/L – micrograms per liter.
2) UPL – Upper Prediction Limit.
3) UWL – Utility Waste Landfill.
4) CCR – Coal Combustion Residuals.

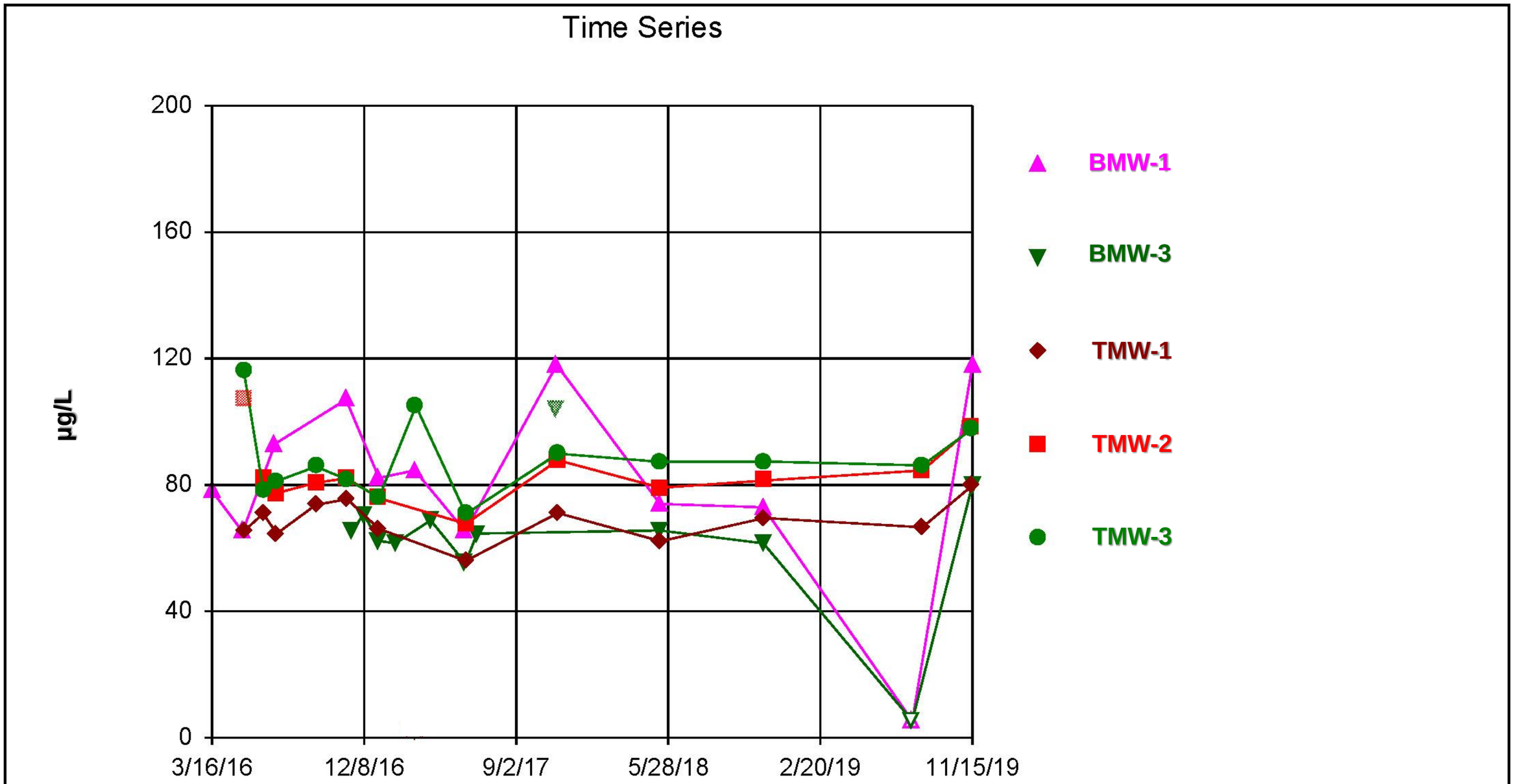
CLIENT/PROJECT							TITLE			
AMEREN MISSOURI **SIOUX ENERGY CENTER**				GOLDER			**UG-3 Time Series Plot for Calcium**			
DRAWN JSI	CHECKED RJF	REVIEWED MNH	DATE 2020-01-20	SCALE N/A	FILE NO. N/A	JOB NO. 153140601.0003	DWG NO. N/A	SUBTITLE N/A	REV. NO. N/A	FIGURE **6**

Time Series



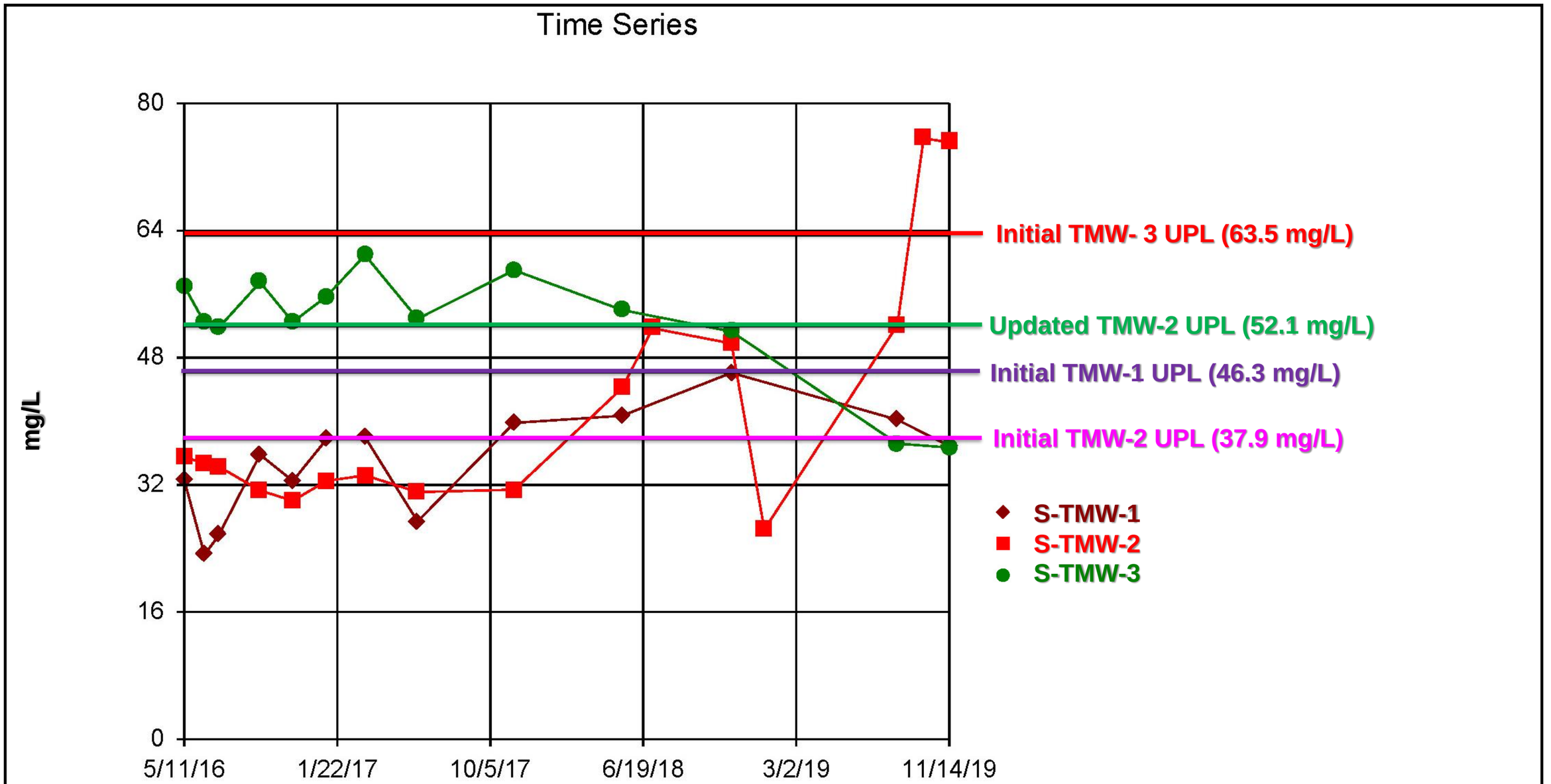
Notes
1) mg/L – milligrams per liter.
2) Time series plot generated using Sanitas[tm] Software.

CLIENT/PROJECT **AMEREN MISSOURI SIOUX ENERGY CENTER**						TITLE **UG-3 Time Series Plot Comparing Chloride and Sodium**				
DRAWN JSI	CHECKED RJF	REVIEWED MNH	DATE 2020/01/22	SCALE N/A	FILE NO. N/A	JOB NO. 153140601.0003	DWG NO. N/A	SUBTITLE N/A	REV. NO. N/A	FIGURE **7**



Notes
1) µg/L – micrograms per liter.

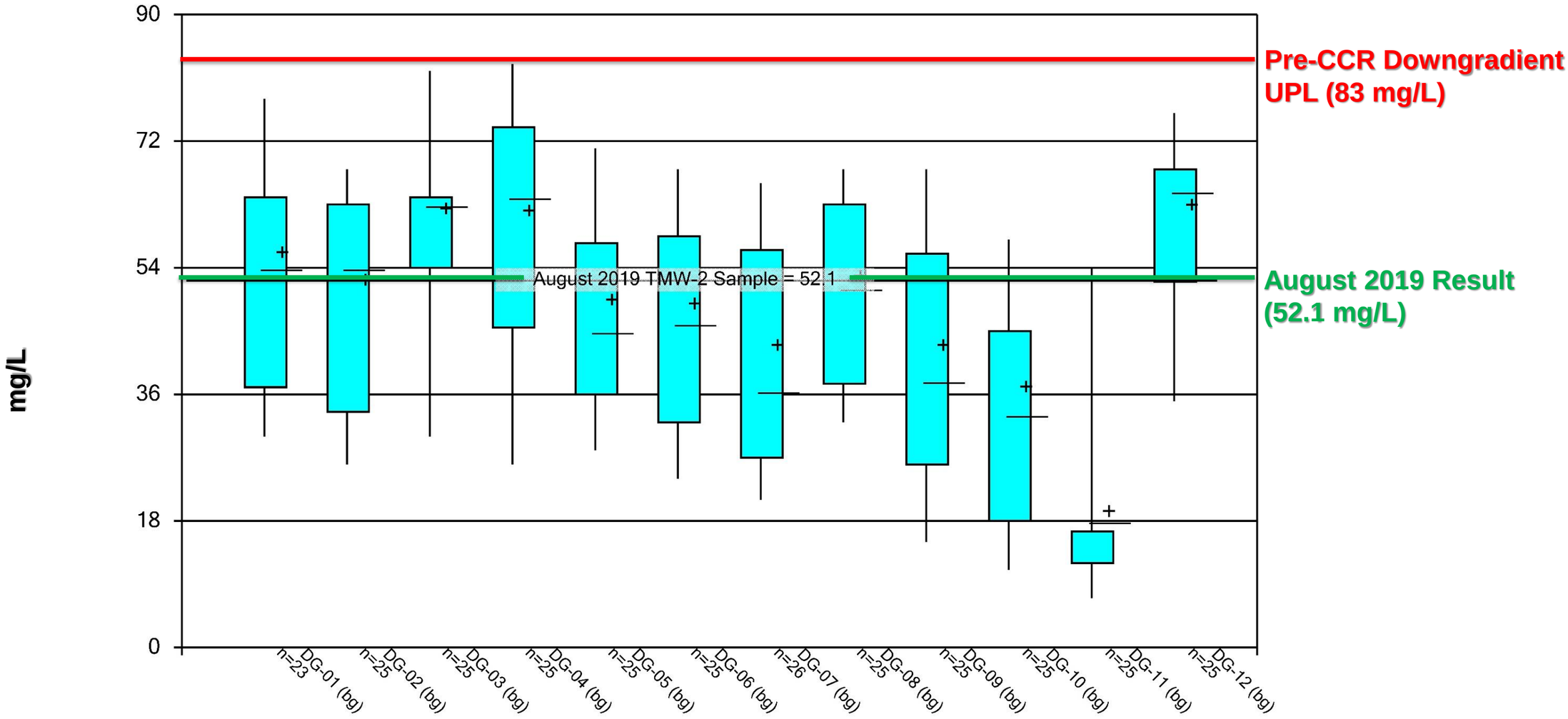
CLIENT/PROJECT **AMEREN MISSOURI** **SIOUX ENERGY CENTER**							TITLE **Time Series Plot for Boron Concentrations**			
DRAWN JSI	CHECKED RJF	REVIEWED MNH	DATE 2020/01/22	SCALE N/A	FILE NO. N/A	JOB NO. 153140601.0003	DWG NO. N/A	SUBTITLE N/A	REV. NO. N/A	FIGURE **8**



Notes
1) mg/L – milligrams per liter.
2) UPL – Upper Prediction Limit.

CLIENT/PROJECT **AMEREN MISSOURI SIOUX ENERGY CENTER**						TITLE **Time Series Plot for Sulfate Concentrations South of SCL4A**				
DRAWN JSI	CHECKED RJF	REVIEWED MNH	DATE 2020-01-24	SCALE N/A	FILE NO. N/A	JOB NO. 153140601.0003	DWG NO. N/A	SUBTITLE N/A	REV. NO. N/A	FIGURE **9**

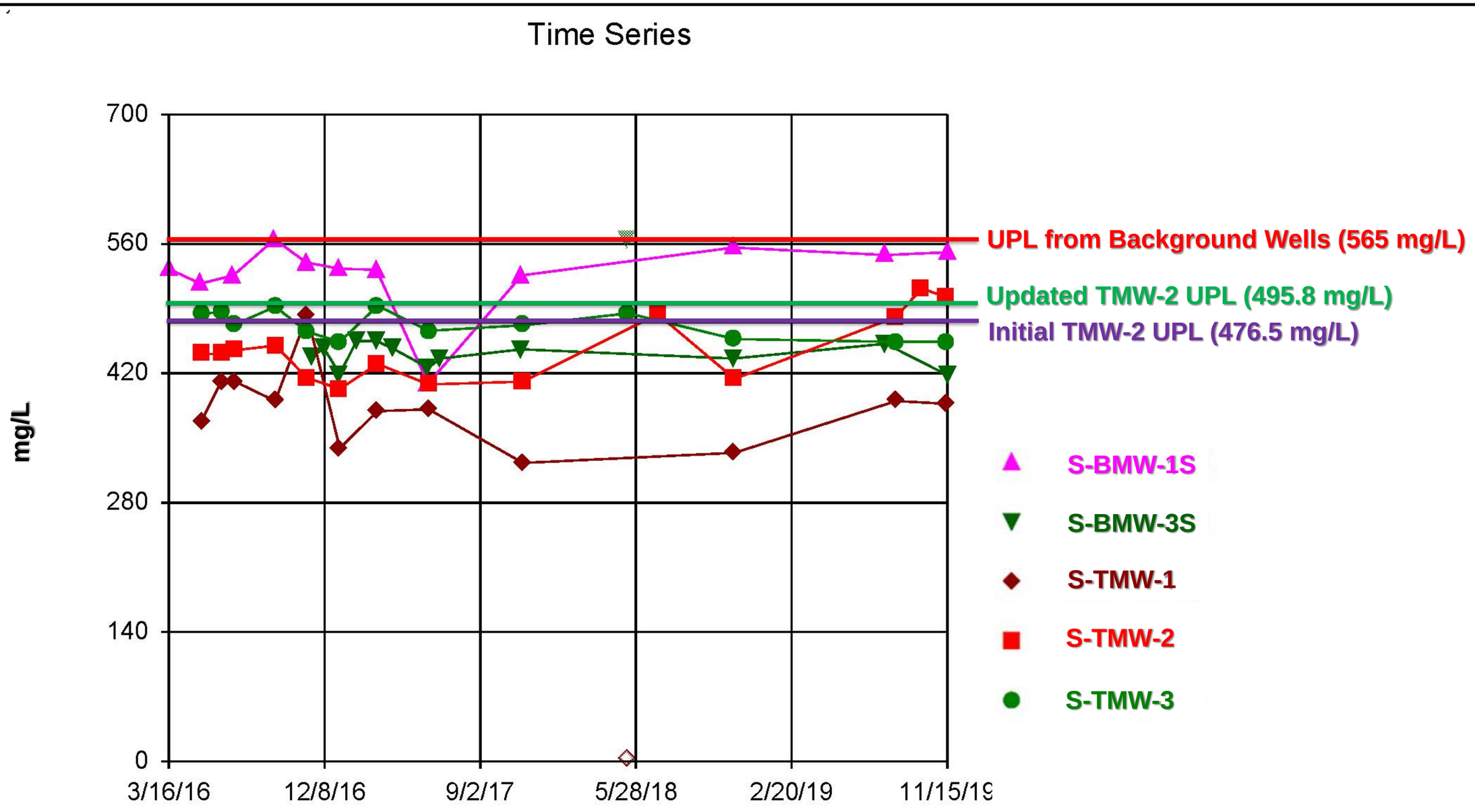
Box & Whiskers Plot



Notes
1) mg/L – milligrams per liter.
2) UPL – Upper Prediction Limit.
3) CCR – Coal Combustion Residuals.

CLIENT/PROJECT **AMEREN MISSOURI SIOUX ENERGY CENTER**				GOLDER			TITLE **Pre-CCR Sulfate Plots – Downgradient Monitoring Wells**			
DRAWN JSI	CHECKED RJF	REVIEWED MNH	DATE 2020-01-24	SCALE N/A	FILE NO. N/A	JOB NO. 153140601.0003	DWG NO. N/A	SUBTITLE N/A	REV. NO. N/A	FIGURE **10**

Time Series



Notes
1) mg/L – Milligrams per liter.
2) UPL – Upper Prediction Limit

CLIENT/PROJECT **AMEREN MISSOURI SIOUX ENERGY CENTER**							TITLE **Time Series Plot for Total Dissolved Solids**			
DRAWN JSI	CHECKED RJF	REVIEWED MNH	DATE 2020-01-20	SCALE N/A	FILE NO. N/A	JOB NO. 153140601.0003	DWG NO. N/A	SUBTITLE N/A	REV. NO. N/A	FIGURE **11**

APPENDIX C

Potentiometric Surface Maps

Path: G:\Projects\150 Projects\1531406 - Ameren GW Monitoring Program - MO\Phase 0003 - Sioux Energy\800 - FIGURES-DRAWINGS\PRODUCTION\NEW_UPDATED_POTMAP_PRODUCTION\20190107_SECPM_153140601.mxd

LEGEND

- Sioux Energy Center Property Boundary

CCR Units

- SCPA - Bottom Ash Surface Impoundment
- SCPB - Fly Ash Surface Impoundment
- SCPC - WFGD Surface Impoundment
- SCL4A - Dry CCR Disposal Area
- Groundwater Flow Direction

Groundwater Elevation Contour (FT MSL)

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

Ground/Surface Water Measurement Locations

- SCPA Surface Impoundment Pond Gauge
- River Gauge Location
- Monitoring Well or Piezometer

NOTES

1.) ALL LOCATIONS AND BOUNDARIES ARE APPROXIMATE.
2.) GROUNDWATER AND SURFACE WATER ELEVATIONS DISPLAYED IN FEET ABOVE MEAN SEA LEVEL (FT MSL).
3.) GROUNDWATER ELEVATION MEASUREMENTS OBTAINED BY GOLDER.
4.) MISSOURI RIVER ELEVATION ESTIMATED BASED ON NEARBY UNITED STATES GEOLOGICAL SURVEY (USGS) RIVER GAUGING LOCATIONS.
5.) MISSISSIPPI RIVER ELEVATION PROVIDED BY AMEREN MISSOURI.
6.) TP-1S, PZ-6S, AND DG-11 WERE NOT USED IN POTENTIOMETRIC CONTOURING.

REFERENCE

1.) AMEREN MISSOURI SIOUX ENERGY CENTER, SIOUX PROPERTY CONTROL MAP, FEBRUARY 2011.
2.) COORDINATE SYSTEM: NAD 1983 STATE PLANE MISSOURI EAST FIPS 2,401 FEET.
3.) USGS NATIONAL WATER INFORMATION SYSTEM, USGS GAUGES 06935965 (ST. CHARLES), 07010000 (ST. LOUIS), 05587498 (ALTON), GRAFTON (05587450).

0 500 1,000 1,500 2,000 Feet

CLIENT
AMEREN MISSOURI
SIOUX ENERGY CENTER

PROJECT
CCR GROUNDWATER MONITORING PROGRAM

TITLE
JANUARY 07, 2019 POTENTIOMETRIC SURFACE MAP

CONSUL˙

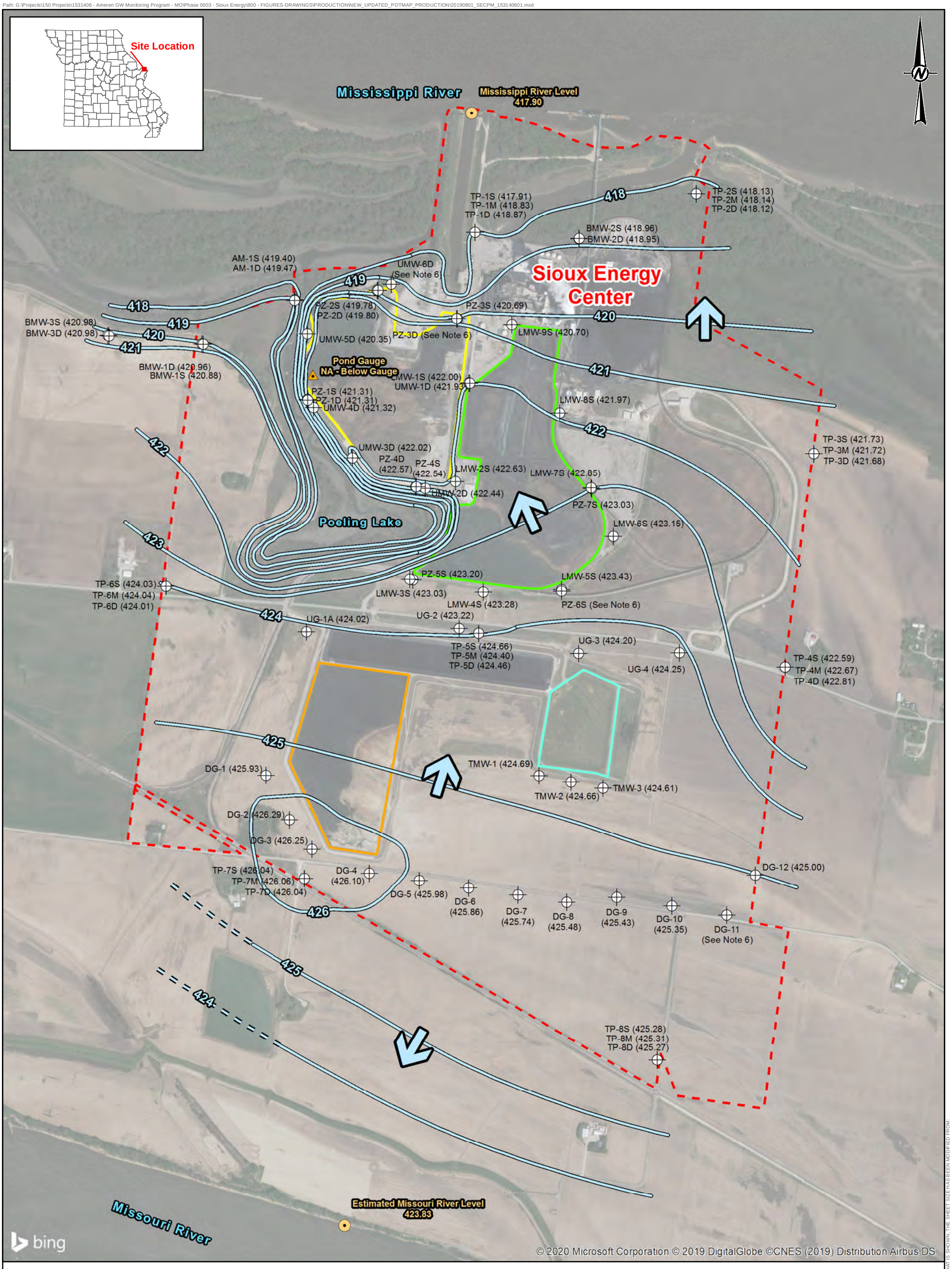
GOLDER

YYYY-MM-DD	2020-01-24
PREPARED	JSI
DESIGN	JSI
REVIEW	AMM
APPROVED	MNH

PROJECT No. 153-1406
PHASE 0003
FIGURE **P1**

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

Path: G:\Projects\150 Projects\1531406 - Ameren GW Monitoring Program - MO\Phase 0003 - Sioux Energy\800 - FIGURES-DRAWINGS\PRODUCTION\NEW_UPDATED_POTMAP_PRODUCTION\20190801_SECPM_153140601.mxd



LEGEND

- Sioux Energy Center Property Boundary

CCR Units

- SCPA - Bottom Ash Surface Impoundment
- SCPB - Fly Ash Surface Impoundment
- SCPC - WFGD Surface Impoundment
- SCL4A - Dry CCR Disposal Area
- Groundwater Flow Direction

Groundwater Elevation Contour (FT MSL)

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

Ground/Surface Water Measurement Locations

- SCPA Surface Impoundment Pond Gauge
- River Gauge Location
- Monitoring Well or Piezometer

NOTES

1.) ALL LOCATIONS AND BOUNDARIES ARE APPROXIMATE.
2.) GROUNDWATER AND SURFACE WATER ELEVATIONS DISPLAYED IN FEET ABOVE MEAN SEA LEVEL (FT MSL).
3.) GROUNDWATER ELEVATION MEASUREMENTS OBTAINED BY GOLDER.
4.) MISSOURI RIVER ELEVATION ESTIMATED BASED ON NEARBY UNITED STATES GEOLOGICAL SURVEY (USGS) RIVER GAUGING LOCATIONS.
5.) MISSISSIPPI RIVER ELEVATION PROVIDED BY AMEREN MISSOURI.
6.) DG-11, PZ-3D, PZ-6S, AND UMW-6D WERE NOT USED IN POTENTIOMETRIC CONTOURING.

REFERENCE

1.) AMEREN MISSOURI SIOUX ENERGY CENTER, SIOUX PROPERTY CONTROL MAP, FEBRUARY 2011.
2.) COORDINATE SYSTEM: NAD 1983 STATE PLANE MISSOURI EAST FIPS 2,401 FEET.
3.) USGS NATIONAL WATER INFORMATION SYSTEM, USGS GAUGES 06935965 (ST. CHARLES), 07010000 (ST. LOUIS), 05587498 (ALTON), GRAFTON (05587450).

0 500 1,000 1,500 2,000 Feet

CLIENT
AMEREN MISSOURI
SIOUX ENERGY CENTER

PROJECT
CCR GROUNDWATER MONITORING PROGRAM

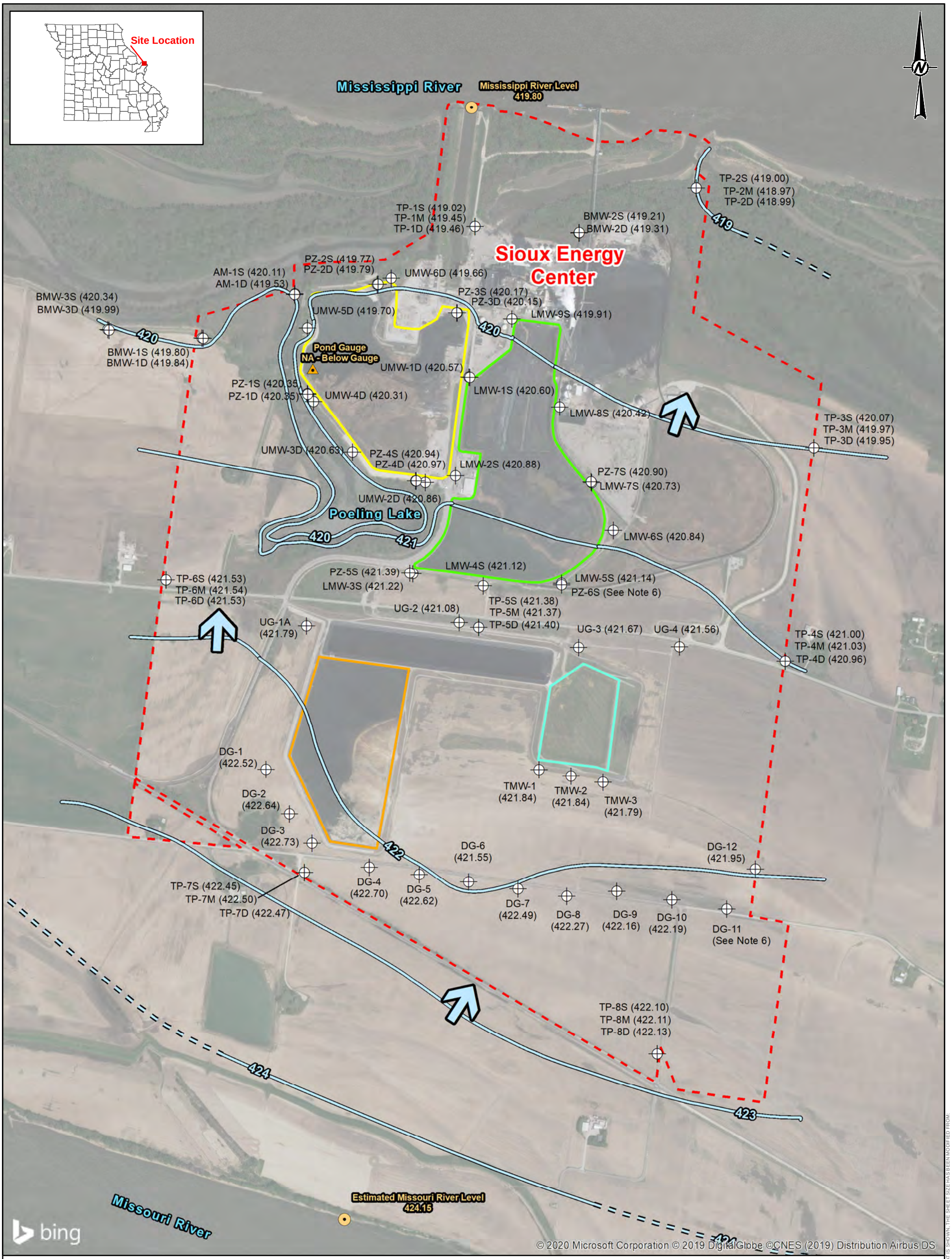
TITLE
AUGUST 1, 2019 POTENTIOMETRIC SURFACE MAP

CONSULTANT
GOLDER

YYYY-MM-DD	2019-10-09
PREPARED	EMS
DESIGN	JSI
REVIEW	AMM
APPROVED	MNH

PROJECT No. 153-1406
PHASE 0003
FIGURE **P2**

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



LEGEND

- Sioux Energy Center Property Boundary

CCR Units

- SCPA - Bottom Ash Surface Impoundment
- SCPB - Fly Ash Surface Impoundment
- SCPC - WFGD Surface Impoundment
- SCL4A - Dry CCR Disposal Area
- Groundwater Flow Direction

Groundwater Elevation Contour (FT MSL)

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

Ground/Surface Water Measurement Locations

- SCPA Surface Impoundment Pond Gauge
- River Gauge Location
- Monitoring Well or Piezometer

0 500 1,000 1,500 2,000 Feet

NOTES

1.) ALL LOCATIONS AND BOUNDARIES ARE APPROXIMATE.
2.) GROUNDWATER AND SURFACE WATER ELEVATIONS DISPLAYED IN FEET ABOVE MEAN SEA LEVEL (FT MSL).
3.) GROUNDWATER ELEVATION MEASUREMENTS OBTAINED BY GOLDER.
4.) MISSOURI RIVER ELEVATION ESTIMATED BASED ON NEARBY UNITED STATES GEOLOGICAL SURVEY (USGS) RIVER GAUGING LOCATIONS.
5.) MISSISSIPPI RIVER ELEVATION PROVIDED BY AMEREN MISSOURI.
6.) DG-11 AND PZ-6S WERE NOT USED IN POTENTIOMETRIC CONTOURING.

REFERENCE

1.) AMEREN MISSOURI SIOUX ENERGY CENTER, SIOUX PROPERTY CONTROL MAP, FEBRUARY 2011.
2.) COORDINATE SYSTEM: NAD 1983 STATE PLANE MISSOURI EAST FIPS 2,401 FEET.
3.) USGS NATIONAL WATER INFORMATION SYSTEM, USGS GAUGES 06935965 (ST. CHARLES), 07010000 (ST. LOUIS), 05587498 (ALTON), GRAFTON (05587450).

CLIENT
AMEREN MISSOURI
SIOUX ENERGY CENTER

PROJECT
CCR GROUNDWATER MONITORING PROGRAM

TITLE
OCTOBER 1, 2019 POTENTIOMETRIC SURFACE MAP

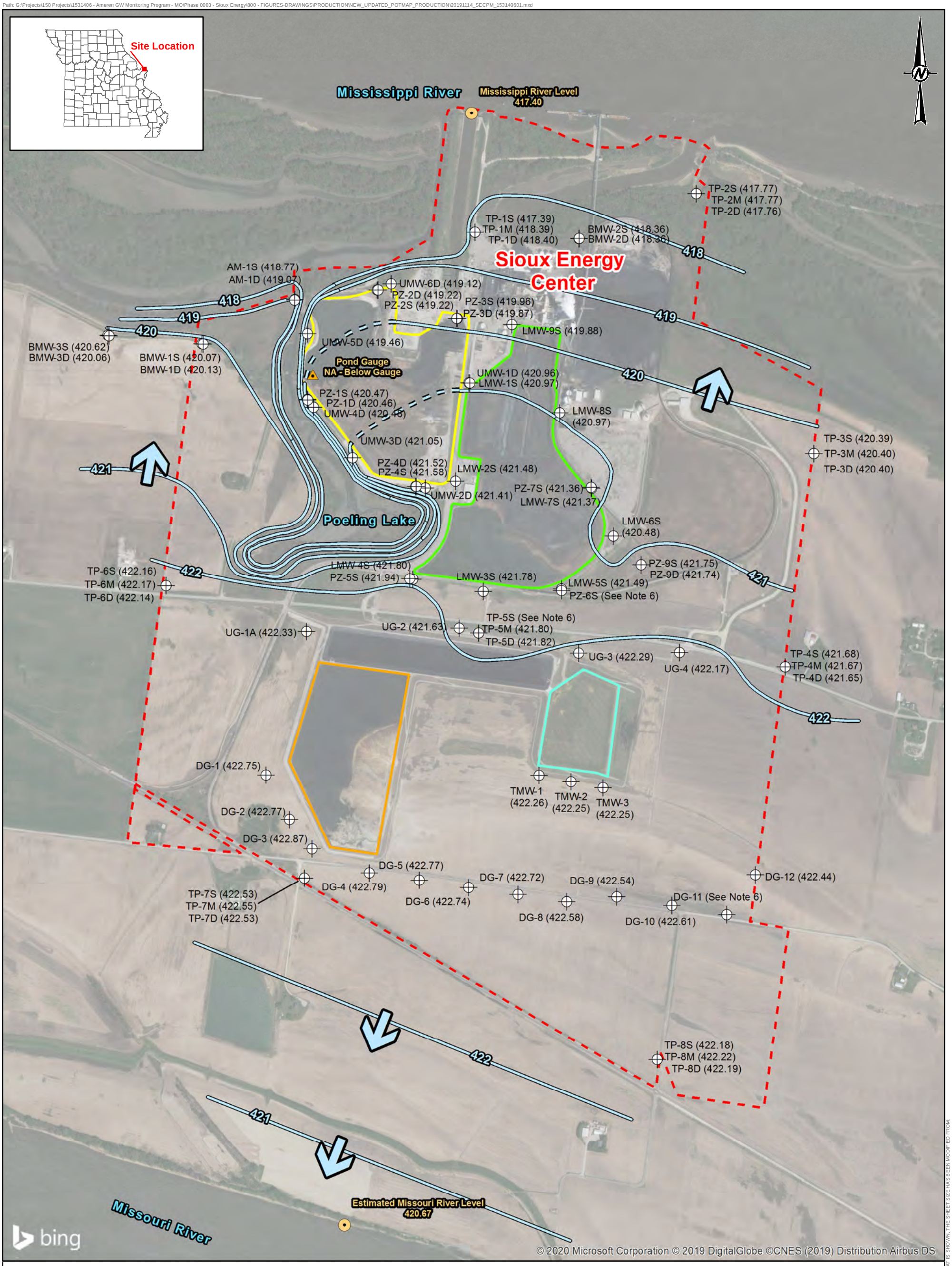
CONSULTANT
GOLDER

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

PROJECT No. 153-1406
PHASE 0003
FIGURE **P3**

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

Path: G:\Projects\150 Projects\1531406 - Ameren GW Monitoring Program - MO\Phase 0003 - Sioux Energy\800 - FIGURES-DRAWINGS\PRODUCTION\NEW_UPDATED_POTMAP_PRODUCTION\20191114_SECPM_153140601.mxd



LEGEND

- Sioux Energy Center Property Boundary

CCR Units

- SCPA - Bottom Ash Surface Impoundment
- SCPB - Fly Ash Surface Impoundment
- SCPC - WFGD Surface Impoundment
- SCL4A - Dry CCR Disposal Area
- Groundwater Flow Direction

Groundwater Elevation Contour (FT MSL)

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

Ground/Surface Water Measurement Locations

- SCPA Surface Impoundment Pond Gauge
- River Gauge Location
- Monitoring Well or Piezometer

NOTES

1.) ALL LOCATIONS AND BOUNDARIES ARE APPROXIMATE.
2.) GROUNDWATER AND SURFACE WATER ELEVATIONS DISPLAYED IN FEET ABOVE MEAN SEA LEVEL (FT MSL).
3.) GROUNDWATER ELEVATION MEASUREMENTS OBTAINED BY GOLDER.
4.) MISSOURI RIVER ELEVATION ESTIMATED BASED ON NEARBY UNITED STATES GEOLOGICAL SURVEY (USGS) RIVER GAUGING LOCATIONS.
5.) MISSISSIPPI RIVER ELEVATION PROVIDED BY AMEREN MISSOURI.
6.) DG-11, PZ-6S AND TP-5S WERE NOT USED IN POTENTIOMETRIC CONTOURING.

REFERENCE

1.) AMEREN MISSOURI SIOUX ENERGY CENTER, SIOUX PROPERTY CONTROL MAP, FEBRUARY 2011.
2.) COORDINATE SYSTEM: NAD 1983 STATE PLANE MISSOURI EAST FIPS 2,401 FEET.
3.) USGS NATIONAL WATER INFORMATION SYSTEM, USGS GAUGES 06935965 (ST. CHARLES), 07010000 (ST. LOUIS), 05587498 (ALTON), GRAFTON (05587450).

0 500 1,000 1,500 2,000 Feet

CLIENT
AMEREN MISSOURI
SIOUX ENERGY CENTER

PROJECT
CCR GROUNDWATER MONITORING PROGRAM

TITLE
NOVEMBER 13, 2019 POTENTIOMETRIC SURFACE MAP

CONSULTANT
GOLDER

YYYY-MM-DD	2020-01-07
PREPARED	EMS
DESIGN	JSI
REVIEW	TJG
APPROVED	CMR

PROJECT No. 153-140601
PHASE 0003
FIGURE **P4**

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

golder.com