2019 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT

UPPER AQC IMPOUNDMENT
LA CYGNE GENERATING STATION
LA CYGNE, KANSAS

Presented To:
Evergy Metro, Inc. (f/k/a Kansas City Power & Light Co.)

SCS ENGINEERS

27217233.19 | January 2020

8575 W 110th Street, Suite 100
Overland Park, Kansas 66210
913-681-0030

CERTIFICATIONS

I, John R. Rockhold, being a qualified groundwater scientist and Professional Geologist in the State of Kansas, do hereby certify that the 2019 Annual Groundwater Monitoring and Corrective Action Report for the Upper AQC Impoundment at the La Cygne Generating Station was prepared by me or under my direct supervision and fulfills the requirements of 40 CFR 257.90(e).

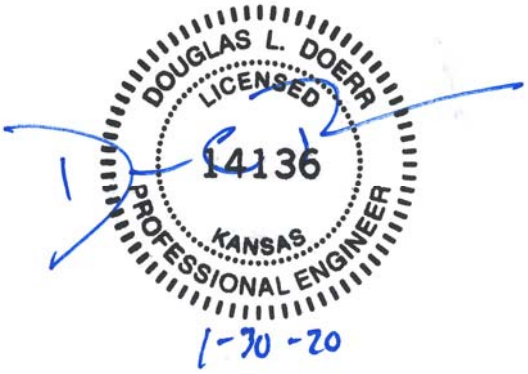
John R. Rockhold, P.G.

SCS Engineers

I, Douglas L. Doerr, being a qualified licensed Professional Engineer in the State of Kansas, do hereby certify that the 2019 Annual Groundwater Monitoring and Corrective Action Report for the Upper AQC Impoundment at the La Cygne Generating Station was prepared by me or under my direct supervision and fulfills the requirements of 40 CFR 257.90(e).

Douglas L. Doerr

Digitally signed by Douglas L. Doerr
Date: 2020.01.30 13:38:14 -06'00'



Douglas L. Doerr, P.E.

SCS Engineers

Revision Number	Revision Date	Revision Section	Summary of Revisions

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1 INTRODUCTION

This 2019 Annual Groundwater Monitoring and Corrective Action Report was prepared to support compliance with the groundwater monitoring requirements of the "Coal Combustion Residuals (CCR) Final Rule" (Rule) published by the United States Environmental Protection Agency (USEPA) in the *Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule*, dated April 17, 2015 (USEPA, 2015). Specifically, this report was prepared for Evergy Metro, Inc. (f/k/a Kansas City Power & Light Company) to fulfill the requirements of 40 CFR 257.90 (e). The applicable sections of the Rule are provided below in *italics*, followed by applicable information relative to the 2019 Annual Groundwater Monitoring and Corrective Action Report for the Upper AQC Impoundment at the La Cygne Generating Station.

2 § 257.90(E) ANNUAL REPORT REQUIREMENTS

Annual groundwater monitoring and corrective action report. *For existing CCR landfills and existing CCR surface impoundments, no later than January 31, 2018, and annually thereafter, the owner or operator must prepare an annual groundwater monitoring and corrective action report. For new CCR landfills, new CCR surface impoundments, and all lateral expansions of CCR units, the owner or operator must prepare the initial annual groundwater monitoring and corrective action report no later than January 31 of the year following the calendar year a groundwater monitoring system has been established for such CCR unit as required by this subpart, and annually thereafter. For the preceding calendar year, the annual report must document the status of the groundwater monitoring and corrective action program for the CCR unit, summarize key actions completed, describe any problems encountered, discuss actions to resolve the problems, and project key activities for the upcoming year. For purposes of this section, the owner or operator has prepared the annual report when the report is placed in the facility's operating record as required by § 257.105(h)(1). At a minimum, the annual groundwater monitoring and corrective action report must contain the following information, to the extent available:*

2.1 § 257.90(E)(1) SITE MAP

A map, aerial image, or diagram showing the CCR unit and all background (or upgradient) and downgradient monitoring wells, to include the well identification numbers, that are part of the groundwater monitoring program for the CCR unit;

A site map with an aerial image showing the Upper AQC Impoundment and all background (or upgradient) and downgradient monitoring wells with identification numbers for the Upper AQC Impoundment groundwater monitoring program is provided as **Figure 1** in **Appendix A**.

2.2 § 257.90(E)(2) MONITORING SYSTEM CHANGES

Identification of any monitoring wells that were installed or decommissioned during the preceding year, along with a narrative description of why those actions were taken;

No new monitoring wells were installed and no wells were decommissioned as part of the CCR groundwater monitoring program for the Upper AQC Impoundment in 2019.

2.3 § 257.90(E)(3) SUMMARY OF SAMPLING EVENTS

In addition to all the monitoring data obtained under §§ 257.90 through 257.98, a summary including the number of groundwater samples that were collected for analysis for each background and downgradient well, the dates the samples were collected, and whether the sample was required by the detection monitoring or assessment monitoring programs;

Only detection monitoring was conducted during the reporting period (2019). Samples collected in 2019 were collected and analyzed for Appendix III detection monitoring constituents as indicated in **Appendix B**, **Table 1** (Appendix III Detection Monitoring Results, and **Table 2** (Detection Monitoring Field Measurements). The dates of sample collection, the monitoring program requiring the sample, and the results of the analyses are also provided in these tables. These tables include Fall 2018 semiannual detection monitoring event verification data taken in 2019; Spring 2019 semiannual detection monitoring data; and the initial Fall 2019 semiannual detection monitoring data.

2.4 § 257.90(E)(4) MONITORING TRANSITION NARRATIVE

A narrative discussion of any transition between monitoring programs (e.g., the date and circumstances for transitioning from detection monitoring to assessment monitoring in addition to identifying the constituent(s) detected at a statistically significant increase over background levels); and

There was no transition between monitoring programs in 2019. Only detection monitoring was conducted in 2019.

2.5 § 257.90(e)(5) OTHER REQUIREMENTS

Other information required to be included in the annual report as specified in §§ 257.90 through 257.98.

A summary of potentially required information and the corresponding section of the Rule is provided in the following sections. In addition, the information, if applicable, is provided.

2.5.1 § 257.90(e) Program Status

Status of Groundwater Monitoring and Corrective Action Program.

The groundwater monitoring and corrective action program is in detection monitoring.

Summary of Key Actions Completed.

a. completion of the Fall 2018 verification sampling and analyses per the certified statistical method,

b. completion of the statistical evaluation of the Fall 2018 semiannual detection monitoring sampling and analysis event per the certified statistical method,

c. completion of the 2018 Annual Groundwater Monitoring and Corrective Action Report,

d. completion of a successful alternative source demonstration for the Fall 2018 semiannual detection monitoring sampling and analysis event,

e. completion of the Spring 2019 semiannual detection monitoring sampling and analysis event, and subsequent verification sampling per the certified statistical method,

f. completion of the statistical evaluation of the Spring 2019 semiannual detection monitoring sampling and analysis event per the certified statistical method,

g. completion of a successful alternative source demonstration for the Spring 2019 semiannual detection monitoring sampling and analysis event, and

h. initiation of the Fall 2019 semiannual detection monitoring sampling and analysis event.

Description of Any Problems Encountered.

No noteworthy problems were encountered.

Discussion of Actions to Resolve the Problems.

Not applicable because no noteworthy problems were encountered.

Projection of Key Activities for the Upcoming Year (2020).

Completion of verification sampling and data analysis, and the statistical evaluation of Fall 2019 detection monitoring sampling and analysis event. Semiannual Spring and Fall 2020 groundwater sampling and analysis. Completion of the statistical evaluation of the Spring 2020 detection monitoring sampling and analysis event, and, if required, alternative source demonstration(s).

2.5.2 § 257.94(d)(3) Demonstration for Alternative Detection Monitoring Frequency

The owner or operator must obtain a certification from a qualified professional engineer or approval from the Participating State Director or approval from EPA where EPA is the permitting authority stating that the demonstration for an alternative groundwater sampling and analysis frequency meets the requirements of this section. The owner or operator must include the demonstration providing the basis for the alternative monitoring frequency and the certification by a qualified professional engineer or the approval from the Participating State Director or approval from EPA where EPA is the permitting authority in the annual groundwater monitoring and corrective action report required by § 257.90(e).

Not applicable because no alternative monitoring frequency for detection monitoring and certification was pursued.

2.5.3 § 257.94(e)(2) Detection Monitoring Alternate Source Demonstration

Demonstration that a source other than the CCR unit caused the statistically significant increase (SSI) over background levels for a constituent or that the SSI resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality. In addition, certification of the demonstration is to be included in the annual report.

The following demonstration reports are included as **Appendix C**:

C1 CCR Groundwater Monitoring Alternative Source Demonstration Report November 2018 Groundwater Monitoring Event, Upper AQC Impoundment, La Cygne Generating Station (June 2019)

C2 CCR Groundwater Monitoring Alternative Source Demonstration Report May 2019 Groundwater Monitoring Event, Upper AQC Impoundment, La Cygne Generating Station (December 2019)

2.5.4 § 257.95(c)(3) Demonstration for Alternative Assessment Monitoring Frequency

The owner or operator must obtain a certification from a qualified professional engineer or approval from the Participating State Director or approval from EPA where EPA is the permitting authority stating that the demonstration for an alternative groundwater sampling and analysis frequency meets the requirements of this section. The owner or operator must include the demonstration providing the basis for the alternative monitoring frequency and the certification by a qualified professional engineer or the approval from the Participating State Director or the approval from EPA where EPA is the permitting authority in the annual groundwater monitoring and corrective action report required by § 257.90(e).

Not applicable because there was no assessment monitoring conducted.

2.5.5 § 257.95(d)(3) Assessment Monitoring Concentrations and Groundwater Protection Standards

Include the concentrations of Appendix III and detected Appendix IV constituents from the assessment monitoring, the established background concentrations, and the established groundwater protection standards.

Not applicable because there was no assessment monitoring conducted.

2.5.6 § 257.95(g)(3)(ii) Assessment Monitoring Alternate Source Demonstration

Demonstrate that a source other than the CCR unit caused the contamination, or that the statistically significant increase resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality. Any such demonstration must be supported by a report that includes the factual or evidentiary basis for any conclusions and must be certified to be accurate by a qualified professional engineer. If a successful demonstration is made, the owner or operator must continue monitoring in accordance with the assessment monitoring program pursuant to this section, and may return to detection monitoring if the constituents in appendices III and IV to this part are at or below background as specified in paragraph (e) of this section. The owner or operator must also include the demonstration in the annual groundwater monitoring and corrective action report required by § 257.90(e), in addition to the certification by a qualified professional engineer or the approval from the Participating State Director or approval from EPA where EPA is the permitting authority.

Not applicable because there was no assessment monitoring conducted.

2.5.7 § 257.96(a) Demonstration for Additional Time for Assessment of Corrective Measures

Within 90 days of finding that any constituent listed in appendix IV to this part has been detected at a statistically significant level exceeding the groundwater protection standard defined under § 257.95(h), or immediately upon detection of a release from a CCR unit, the owner or operator must initiate an assessment of corrective measures to prevent further releases, to remediate any releases and to restore affected area to original conditions. The assessment of corrective measures must be completed within 90 days, unless the owner or operator demonstrates the need for additional time to complete the assessment of corrective measures due to site-specific conditions or circumstances. The owner or operator must obtain a certification from a qualified professional engineer attesting that the demonstration is accurate. The 90-day deadline to complete the assessment of corrective measures may be extended for no longer than 60 days. The owner or operator must also include the demonstration in the annual groundwater monitoring and corrective action report required by § 257.90(e), in addition to the certification by a qualified professional engineer or the approval from the Participating State Director or approval from EPA where EPA is the permitting authority.

Not applicable because there was no assessment monitoring conducted.

3 GENERAL COMMENTS

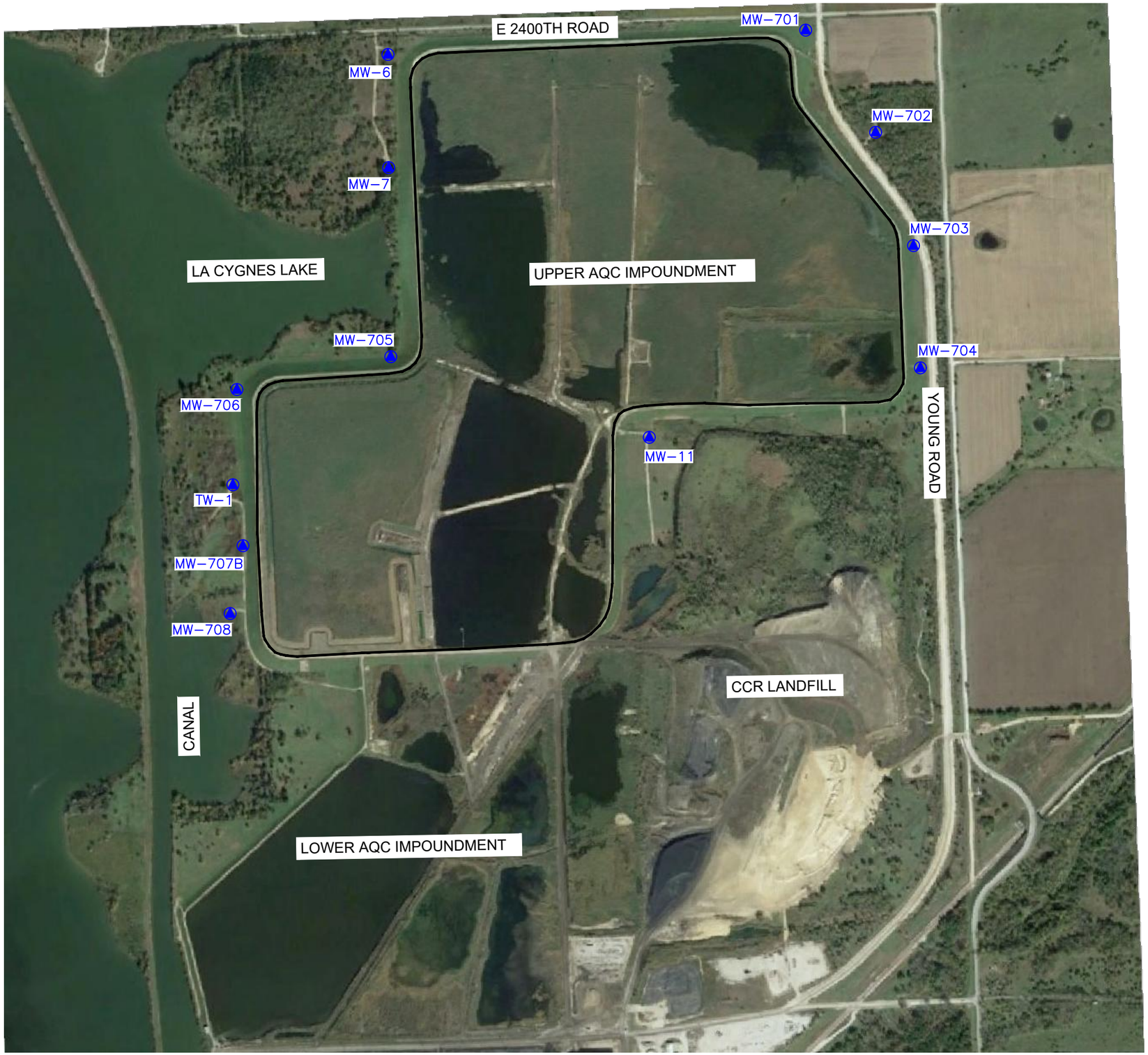
This report has been prepared and reviewed under the direction of a qualified groundwater scientist and qualified professional engineer. The information contained in this report is a reflection of the conditions encountered at the La Cygne Generating Station at the time of fieldwork. This report includes a review and compilation of the required information and does not reflect any variations of the subsurface, which may occur between sampling locations. Actual subsurface conditions may vary and the extent of such variations may not become evident without further investigation.

Conclusions drawn by others from the result of this work should recognize the limitation of the methods used. Please note that SCS Engineers does not warrant the work of regulatory agencies or other third parties supplying information used in the assimilation of this report. This report is prepared in accordance with generally accepted environmental engineering and geological practices, within the constraints of the client's directives. It is intended for the exclusive use of Evergy Metro, Inc. for specific application to the La Cygne Generating Station Upper AQC Impoundment. No warranties, express or implied, are intended or made.

APPENDIX A

FIGURES

Figure 1: Site Map



LEGEND

CCR UNIT BOUNDARY (APPROXIMATE LIMITS OF UPPER AQC IMPOUNDMENT)

MW–702 CCR GROUNDWATER MONITORING SYSTEM WELLS

NOTES:

1. KDHE FACILITY PERMIT AREA BOUNDARY VARIES FROM THAT SHOWN.
2. GOOGLE EARTH IMAGE DATED OCTOBER 2014. BOUNDARY AND MONITOR WELL LOCATIONS ARE APPROXIMATE.
3. BOUNDARY AND MONITOR WELL LOCATIONS ARE PROVIDED BY AECOM.

800 0 800 1600

SCALE FEET

REV.	DATE	CK. BY
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SHEET TITLE
SITE MAP
UPPER AQC IMPOUNDMENT
CCR GROUNDWATER MONITORING SYSTEM

PROJECT TITLE
2019 CCR GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT

CLIENT
EVERGY METRO, INC
LA CYGNE GENERATING STATION
LA CYGNE, KANSAS

SCS ENGINEERS
8575 W. 110th St, Ste. 100
Overland Park, Kansas 66210
PH. (913) 681-0030 FAX. (913) 681-0012

PROJ NO.	DWN. BY:	O/A RVW BY:
27217233.19	TGW	JRR
DSN. BY:	CHK. BY:	PROJ MGR
TGW	JRR	JRR

CADD FILE:
FIG 1 – LA CYGNE UAQC IMP.DWG

DATE:
1/07/20

FIGURE NO.
1

N:\KCPL\Projects\Groundwater\DWG\La Cygne\CCR Annual Report\2018\Fig 1 - La Cygne UAQC Imp.dwg Jan 08, 2020 - 10:57am Layout Name: Fig 1 By: 4648jdj

APPENDIX B

TABLES

Table 1: Appendix III Detection Monitoring Results

Table 2: Detection Monitoring Field Measurements

Table 1
Upper AQC Impoundment
Appendix III Detection Monitoring Results
Evergy LaCygne Generating Station

Well Number	Sample Date	Appendix III Constituents						
		Boron (mg/L)	Calcium (mg/L)	Chloride (mg/L)	Fluoride (mg/L)	pH (S.U.)	Sulfate (mg/L)	Total Dissolved Solids (mg/L)
MW-6	5/23/2019	1.19	83.7	204	0.467	7.17	154	1210
MW-6	11/7/2019	1.15	79.7	197	0.615	7.45	136	1090
MW-7	5/23/2019	1.60	22.1	96.5	1.09	7.75	<5.00	936
MW-7	11/7/2019	1.59	20.0	96.2	1.34	7.92	<5.00	848
MW-11	5/23/2019	0.819	65.4	121	0.454	7.52	142	1000
MW-11	11/7/2019	0.846	58.2	122	0.561	7.26	191	908
MW-701	1/15/2019	---	*40.2	---	---	**7.95	---	---
MW-701	3/11/2019	---	*44.2	---	---	**7.61	---	---
MW-701	5/23/2019	0.992	41.6	48.6	0.603	7.12	78.8	582
MW-701	7/17/2019	---	*45.0	---	---	**7.80	---	---
MW-701	8/23/2019	---	*39.9	---	---	**7.54	---	---
MW-701	11/7/2019	0.952	40.4	46.2	0.703	7.45	83.7	521
MW-702	1/14/2019	---	---	---	*1.20	**7.95	---	---
MW-702	5/23/2019	1.55	5.70	41.8	1.21	8.82	<5.00	530
MW-702	11/7/2019	1.41	2.73	40.7	1.58	8.75	<5.00	193
MW-703	5/23/2019	1.86	19.3	109	1.34	7.50	<5.00	910
MW-703	11/7/2019	1.82	17.6	111	1.56	7.63	<5.00	866

* Verification Sample obtained per certified statistical method and Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance, March 2009.

**Extra Sample for Quality Control Validation or per Standard Sampling Procedure

mg/L - miligrams per liter

pCi/L - picocuries per liter

S.U. - Standard Units

--- Not Sampled

Table 1
Upper AQC Impoundment
Appendix III Detection Monitoring Results
Evergy LaCygne Generating Station

Well Number	Sample Date	Appendix III Constituents						
		Boron (mg/L)	Calcium (mg/L)	Chloride (mg/L)	Fluoride (mg/L)	pH (S.U.)	Sulfate (mg/L)	Total Dissolved Solids (mg/L)
MW-704	5/23/2019	2.03	21.9	87.2	0.828	7.53	153	1230
MW-704	7/17/2019	---	---	*89.7	---	**7.78	---	---
MW-704	8/23/2019	---	---	*89.2	---	**7.54	---	---
MW-704	11/7/2019	1.97	21.0	84.5	0.953	7.45	163	1110
MW-705	5/23/2019	2.18	28.5	135	0.852	7.33	37.0	980
MW-705	11/7/2019	2.11	26.7	134	1.05	7.38	37.9	914
MW-706	1/15/2019	---	---	---	---	**7.49	*7.73	---
MW-706	3/11/2019	---	---	---	---	**7.55	*6.96	---
MW-706	5/23/2019	2.09	23.2	253	0.985	7.61	5.78	1230
MW-706	7/17/2019	---	---	---	---	**7.58	*8.27	---
MW-706	8/23/2019	---	---	---	---	**7.48	*8.79	---
MW-706	11/7/2019	2.09	22.5	240	1.18	7.72	9.68	1160
MW-707B	5/23/2019	1.96	418	194	0.276	6.83	5530	8310
MW-707B	7/17/2019	---	---	---	---	**6.80	*4920	---
MW-707B	11/7/2019	1.86	386	169	0.442	7.14	5330	7920
MW-708	5/23/2019	1.31	28.6	43.4	0.495	7.36	9.18	651
MW-708	11/7/2019	1.34	27.7	45.0	0.601	7.53	10.1	607
TW-1	5/23/2019	1.47	24.1	41.8	0.365	7.72	62.9	1050
TW-1	11/7/2019	1.42	23.3	40.1	0.411	7.71	61.9	956

* Verification Sample obtained per certified statistical method and Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance, March 2009.

**Extra Sample for Quality Control Validation or per Standard Sampling Procedure

mg/L - miligrams per liter

pCi/L - picocuries per liter

S.U. - Standard Units

--- Not Sampled

Table 2
Upper AQC Impoundment
Detection Monitoring Field Measurements
Evergy LaCygne Generating Station

Well Number	Sample Date	pH (S.U.)	Specific Conductivity (µS)	Temperature (°C)	Turbidity (NTU)	ORP (mV)	DO (mg/L)	***Water Level (ft btoc)	Groundwater Elevation (ft NGVD)
MW-6	5/23/2019	7.17	2070	12.27	0.00	-91	0.00	8.96	851.72
MW-6	11/7/2019	7.45	1930	13.64	0.00	-124	0.00	8.65	852.03
MW-7	5/23/2019	7.75	1620	12.21	0.00	-189	0.00	6.48	849.18
MW-7	11/7/2019	7.92	1490	12.25	0.00	-143	0.38	6.55	849.11
MW-11	5/23/2019	7.52	1620	24.50	21.00	-40	1.56	2.35	874.63
MW-11	11/7/2019	7.26	1400	13.17	0.00	-37	0.70	2.86	874.12
MW-701	1/15/2019	**7.95	955	11.35	29.90	-48	0.00	6.91	878.32
MW-701	3/11/2019	**7.61	953	13.81	24.50	18	8.56	6.55	878.68
MW-701	5/23/2019	7.12	1170	17.99	3.50	12	1.15	6.44	878.79
MW-701	7/17/2019	**7.80	907	21.77	0.00	-22	1.05	8.02	877.21
MW-701	8/23/2019	**7.54	938	17.29	3.90	29	0.00	8.99	876.24
MW-701	11/7/2019	7.45	837	13.02	12.50	-79	0.45	7.09	878.14
MW-702	1/14/2019	**7.95	1120	11.08	0.10	-41	1.67	19.90	863.27
MW-702	5/23/2019	8.82	1030	16.45	0.10	145	8.32	18.08	865.09
MW-702	11/7/2019	8.75	926	11.42	6.30	137	2.08	20.02	863.15
MW-703	5/23/2019	7.50	1620	15.20	2.30	97	7.82	6.67	877.17
MW-703	11/7/2019	7.63	1700	12.75	18.80	117	1.20	6.08	877.76
MW-704	5/23/2019	7.53	2060	16.49	0.40	-16	0.00	11.12	872.05
MW-704	7/17/2019	**7.78	1770	23.71	0.00	64	0.90	14.08	869.09
MW-704	8/23/2019	**7.54	1920	17.28	0.00	62	0.00	16.35	866.82
MW-704	11/7/2019	7.45	1690	13.09	3.30	-36	0.72	13.38	869.79

* Verification Sample obtained per certified statistical method and Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance, March 2009.

**Extra Sample for Quality Control Validation or per Standard Sampling Procedure

***Depth to water measured in all monitoring wells within 24 hour period prior to the sampling event

S.U. - Standard Units

µS - microsiemens

°C - Degrees Celsius

ft btoc - Feet Below Top of Casing

ft NGVD - National Geodetic Vertical Datum (NAVD 88)

NTU - Nephelometric Turbidity Unit

Table 2
Upper AQC Impoundment
Detection Monitoring Field Measurements
Evergy LaCygne Generating Station

Well Number	Sample Date	pH (S.U.)	Specific Conductivity (µS)	Temperature (°C)	Turbidity (NTU)	ORP (mV)	DO (mg/L)	***Water Level (ft btoc)	Groundwater Elevation (ft NGVD)
MW-705	5/23/2019	7.33	1770	13.57	0.00	-76	0.00	9.52	846.43
MW-705	11/7/2019	7.38	1640	14.59	0.00	-72	0.00	8.60	847.35
MW-706	1/15/2019	**7.49	2250	12.47	0.00	-79	2.15	8.73	845.55
MW-706	3/11/2019	**7.55	2100	13.95	11.00	-9	1.70	8.01	846.27
MW-706	5/23/2019	7.61	2170	15.02	3.20	-92	0.00	9.29	844.99
MW-706	7/17/2019	**7.58	2070	19.33	0.00	-86	2.00	10.22	844.06
MW-706	8/23/2019	**7.48	1990	19.24	4.30	-14	0.00	10.84	843.44
MW-706	11/7/2019	7.72	2040	13.31	0.00	-68	0.00	10.14	844.14
MW-707B	5/23/2019	6.83	8340	15.26	20.60	-8	0.00	6.22	852.58
MW-707B	7/17/2019	**6.80	7400	22.34	0.00	48	1.00	7.78	851.02
MW-707B	11/7/2019	7.14	8080	13.11	16.10	27	0.00	7.32	851.48
MW-708	5/23/2019	7.36	1190	13.95	0.00	0	0.00	7.53	845.50
MW-708	11/7/2019	7.53	1240	13.84	0.00	74	0.77	7.08	845.95
TW-1	5/23/2019	7.72	1770	13.88	0.00	-14	1.21	18.13	843.97
TW-1	11/7/2019	7.71	1850	13.28	7.90	78	1.23	17.61	844.49

* Verification Sample obtained per certified statistical method and Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance, March 2009.

**Extra Sample for Quality Control Validation or per Standard Sampling Procedure

***Depth to water measured in all monitoring wells within 24 hour period prior to the sampling event

S.U. - Standard Units

µS - microsiemens

°C - Degrees Celsius

ft btoc - Feet Below Top of Casing

ft NGVD - National Geodetic Vertical Datum (NAVD 88)

NTU - Nephelometric Turbidity Unit

APPENDIX C

ALTERNATIVE SOURCE DEMONSTRATIONS

C1 CCR Groundwater Monitoring Alternative Source Demonstration Report November 2018 Groundwater Monitoring Event, Upper AQC Impoundment, La Cygne Generating Station (June 2019)

C2 CCR Groundwater Monitoring Alternative Source Demonstration Report May 2019 Groundwater Monitoring Event, Upper AQC Impoundment, La Cygne Generating Station (December 2019)

C1 CCR Groundwater Monitoring Alternative Source Demonstration Report November 2018 Groundwater Monitoring Event, Upper AQC Impoundment, La Cygne Generating Station (June 2019)

CCR GROUNDWATER MONITORING

ALTERNATIVE SOURCE DEMONSTRATION REPORT

NOVEMBER 2018 GROUNDWATER MONITORING EVENT

UPPER AQC IMPOUNDMENT

LA CYGNE GENERATING STATION

LA CYGNE, KANSAS

Presented To:

Kansas City Power & Light Company

Presented By:

SCS ENGINEERS

8575 West 110th Street, Suite 100

Overland Park, Kansas 66210

(913) 681-0030

June 2019

File No. 27217233.19

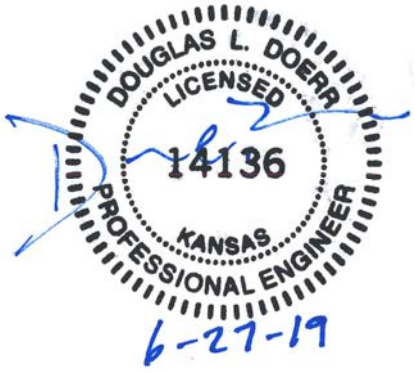
CERTIFICATIONS

I, John R. Rockhold, being a qualified groundwater scientist and licensed Professional Geologist in the State of Kansas, do hereby certify the accuracy of the information in the CCR Groundwater Monitoring Alternative Source Demonstration Report for the Upper AQC Impoundment at the La Cygne Generating Station. The Alternative Source Demonstration was prepared by me or under my direct supervision in accordance with generally accepted hydrogeological practices and the local standard of care.

John R. Rockhold, P.G.

SCS Engineers

I, Douglas L. Doerr, being a qualified licensed Professional Engineer in the State of Kansas, do hereby certify the accuracy of the information in the CCR Groundwater Monitoring Alternative Source Demonstration Report for the Upper AQC Impoundment at the La Cygne Generating Station. The Alternative Source Demonstration was prepared by me or under my direct supervision in accordance with generally accepted engineering practices and the local standard of care.



Douglas L. Doerr, P.E.

SCS Engineers

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Appendices

Appendix A **Figure 1**

Appendix B **Box and Whiskers Plots**

Appendix C **Time Series Plots**

Appendix D **Piper Plots**

1 REGULATORY FRAMEWORK

Certain owners or operators of Coal Combustion Residuals (CCR) units are required to complete groundwater monitoring activities to evaluate whether a release from the unit has occurred. Included in the activities is the completion of a statistical analysis of the groundwater quality data as prescribed in § 257.93(h) of the CCR Final Rule. If the initial analysis indicates a statistically significant increase (SSI) over background levels, the owner or operator may perform an alternative source demonstration (ASD). In accordance with § 257.94(e)(2), the owner or operator of the CCR unit may demonstrate that a source other than the CCR unit caused the SSI over background levels for a constituent, or that the SSI resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality. The owner or operator must complete the written demonstration within 90 days of detecting a SSI over background levels to include obtaining a certification from a qualified professional engineer verifying the accuracy of the information in the report. If a successful demonstration is completed within the 90-day period, the owner or operator of the CCR unit may continue with a detection monitoring program under § 257.94. If a successful demonstration is not completed within the 90-day period, the owner or operator of the CCR unit must initiate an assessment monitoring program as required under § 257.95. The owner or operator must also include the demonstration in the annual groundwater monitoring and corrective action report required by § 257.90(e), in addition to the certification by a qualified professional engineer.

2 STATISTICAL RESULTS

Statistical analysis of monitoring data from the groundwater monitoring system for the Upper AQC Impoundment at the La Cygne Generating Station has been completed in substantial compliance with the "Statistical Method Certification by A Qualified Professional Engineer" dated October 12, 2017. Detection monitoring groundwater samples were collected on December 3 or 4, 2018. Review and validation of the results from the December 2018 Detection Monitoring Event was completed on January 12, 2019, which constitutes completion and finalization of detection monitoring laboratory analyses. A statistical analysis was then conducted to determine whether there was a SSI over background values for each constituent listed in Appendix III to Part 257-Constituents for Detection Monitoring. Two rounds of verification sampling were conducted for certain constituents on January 14 and 15, 2019 and March 11, 2019.

The completed statistical evaluation identified two Appendix III constituents above their respective prediction limit in monitoring wells MW-701 and MW-706.

The prediction limit for calcium in upgradient monitoring well MW-701 is 39.71 mg/L. The detection monitoring sample was reported at 44.8 mg/L. The first verification re-sample was collected on January 15, 2019 with a result of 40.2 mg/L. The second verification re-sample was collected on March 11, 2019 with a result of 44.2 mg/L.

The prediction limit for sulfate in monitoring well MW-706 is 5.00 mg/L. The detection monitoring sample was reported at 7.69 mg/L. The first verification re-sample was collected on January 15, 2019 with a result of 7.73 mg/L. The second verification re-sample was collected on March 11, 2019 with a result of 6.96 mg/L.

Therefore, in accordance with the Statistical Method Certification, the detection monitoring sampling results for calcium from upgradient monitoring well MW-701 and sulfate from monitoring well MW-706 exceed their respective prediction limits and are confirmed SSIs over background.

Determination: A statistical evaluation was completed for all Appendix III detection monitoring constituents in accordance with the certified statistical method. The statistical evaluation identified two SSIs above the background prediction limit for calcium in upgradient monitoring well MW-701, and for sulfate in monitoring well MW-706.

3 ALTERNATIVE SOURCE DEMONSTRATION

An Alternative Source Demonstration is a means to provide supporting lines of evidence that something other than a release from a regulated CCR unit caused an SSI. For the above identified SSIs for the Upper AQC Impoundment at the La Cygne Generating Station, there are multiple lines of supporting evidence to indicate they are not caused by a release from the Upper AQC Impoundment. Select multiple lines of supporting evidence are described as follows.

3.1 UPGRADIENT WELL LOCATION

Figure 1 in **Appendix A** shows a potentiometric surface contour map indicating the direction of groundwater flow at and near the Upper AQC Impoundment at the time of sampling. The groundwater flow directions indicated are for the December 2018 groundwater monitoring event and are typical flow directions for this unit. As seen in the map, monitoring well MW-701 is located upgradient from the Upper AQC Impoundment indicating the SSI for calcium in MW-701 is not caused by a release from the Upper AQC Impoundment. This demonstrates that a source other than the Upper AQC Impoundment caused the SSI above background level for calcium, or that the SSI resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality.

3.2 BOX AND WHISKERS PLOTS

A commonly accepted method to demonstrate and visualize the distribution of data in a given data set is to construct box and whiskers plots. The basic box plotted graphically locates the median, 25th and 75th percentiles of the data set; the "whiskers" extend to the minimum and maximum values of the data set. The range between the ends of a box plot represents the Interquartile Range, which can be used as an estimate of spread or variability. The mean is denoted by a "+".

When comparing multiple wells or well groups, box plots for each well can be lined up on the same axis to roughly compare the variability in each well. This may be used as an exploratory screening for the test of homogeneity of variance across multiple wells.

Box and whiskers plots were prepared for sulfate for upgradient wells MW-701, MW-702, and MW-703 and downgradient well MW-706. Although the sulfate SSI was only identified in downgradient well MW-706 the box and whiskers plots show that it is below the sulfate range for an upgradient well (MW-701). The comparison indicates the sulfate level in upgradient well MW-701 is greater than the sulfate level in MW-706. This demonstrates that a source other than the Upper AQC Impoundment caused the SSI above background levels for sulfate, or that the SSI resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality.

Box and whiskers plots are provided in **Appendix B**.

3.3 TIME SERIES PLOTS

Time series plots provide a graphical method to view changes in data at a particular well (monitoring point) or wells over time. Time series plots display the variability in concentration levels over time and

can be used to indicate possible outliers or data errors. More than one well can be compared on the same plot to look for differences between wells. Non-detect data is plotted as censored data at one-half of the laboratory reporting limit. Time series plots can also be used to examine the data for trends.

Time series plots for sulfate were prepared for the CCR monitoring system upgradient wells MW-701, MW-702, and MW-703 and downgradient well MW-706. Although the sulfate SSI was only identified in downgradient well MW-706, the time series plots show that sulfate in MW-706 is below the sulfate range for an upgradient well (MW-701). The comparison indicates the sulfate level in upgradient well MW-701 is greater than the sulfate level in MW-706. This demonstrates that a source other than the Upper AQC Impoundment caused the sulfate SSI or that the SSI resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality.

Time series plots are provided in **Appendix C**.

3.4 PIPER PLOTS

Piper diagrams are a form of tri-linear diagram, and a widely accepted method to provide a visual representation of the ion concentration of groundwater. Piper diagrams portray water compositions and facilitate the interpretation and presentation of chemical analyses. They may be used to visually compare the chemical composition of water quality across wells, and aid in determining whether the waters are similar or dis-similar, and can over time indicate whether the waters are mixing.

A piper diagram has two triangular plots on the right and left side of a 4-sided center field. The three major cations are plotted in the left triangle and anions in the right. Each of the three cation/anion variables, in milliequivalents, is divided by the sum of the three values, to produce a percent of total cation/anions. These percentages determine the location of the associated symbol. The data points in the center field are located by extending the points in the lower triangles to the point of intersection. In order for a piper diagram to be produced, the selected data file must contain the following constituents: Sodium (Na), Potassium (K), Calcium (Ca), Magnesium (Mg), Chloride (Cl), Sulfate (SO4), Carbonate (CO3), and Bicarbonate (HCO3).

A piper diagram was generated for samples from upgradient wells MW-701 and MW-702 and from downgradient well MW-706. The sample from downgradient well MW-706 plots between the samples from upgradient wells MW-701 and MW-702 indicating similar geochemical characteristics to upgradient wells. Additionally of note, the difference between the upgradient wells indicates that natural variability occurs between relatively close upgradient wells and is likely to occur across the site. This demonstrates that a source other than the Upper AQC Impoundment caused the SSI for sulfate in MW-706, or that the SSI resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality.

The piper diagram plots are provided in **Appendix D**.

4 CONCLUSION

Our opinion is that a sufficient body of evidence is available and presented above to demonstrate that a source other than the Upper AQC Impoundment caused the SSIs for calcium and sulfate, or that the SSIs resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality. Based on the successful ASD, the owner or operator of the Upper AQC Impoundment may continue with the detection monitoring program under § 257.94.

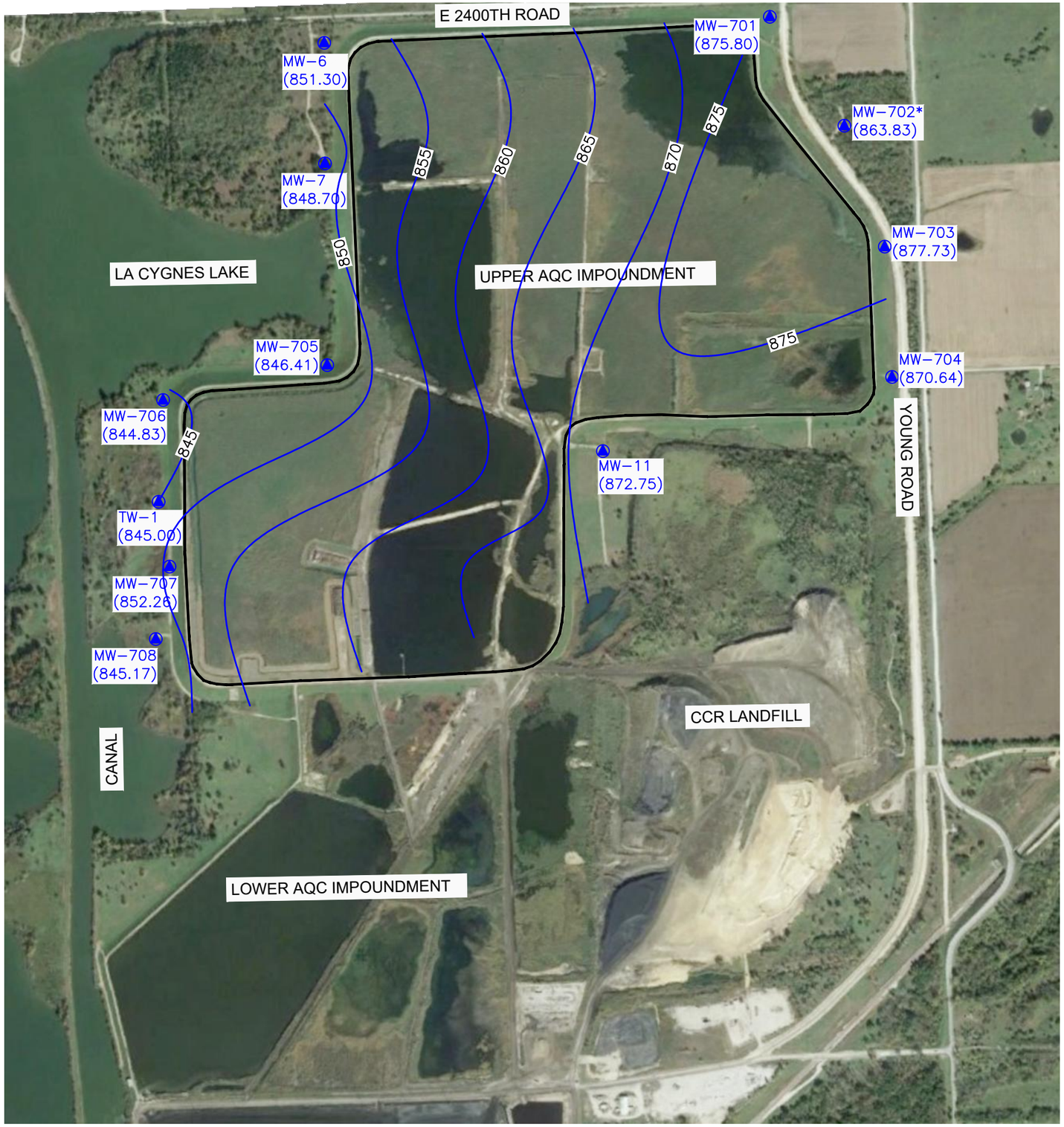
5 GENERAL COMMENTS

This report has been prepared and reviewed under the direction of a qualified groundwater scientist and qualified professional engineer. Please note that SCS Engineers does not warrant the work of regulatory agencies or other third parties supplying information used in the assimilation of this report. This report is prepared in accordance with generally accepted environmental engineering and geological practices, within the constraints of the client's directives. It is intended for the exclusive use of KCP&L for specific application to the La Cygne Generating Station. No warranties, express or implied, are intended or made.

The signatures of the certifying registered geologist and professional engineer on this document represents that to the best of their knowledge, information, and belief in the exercise of their professional judgement in accordance with the standard of practice, it is their professional opinions that the aforementioned information is accurate as of the date of such signatures. Any opinion or decisions by them are made on the basis of their experience, qualifications, and professional judgement and are not to be construed as warranties or guaranties. In addition, opinions relating to regulatory, environmental, geologic, geochemical and geotechnical conditions interpretations or other estimates are based on available data, and actual conditions may vary from those encountered at the times and locations where data are obtained, despite the use of due care.

Appendix A

Figure 1



LEGEND

- CCR UNIT BOUNDARY (APPROXIMATE LIMITS OF UPPER AQC IMPOUNDMENT)
- MW-703 (877.00) CCR GROUNDWATER MONITORING SYSTEM WELLS (GROUNDWATER ELEVATION)
- —875— GROUNDWATER SURFACE ELEVATIONS (REPRESENTATIVE FOR THIS UNIT)
- MW-702* INDICATES WELL NOT USED IN POTENTIOMETRIC SURFACE MAP CREATION

NOTES:

1. KDHE FACILITY PERMIT AND LANDFILL PERMIT BOUNDARIES VARY FROM THAT SHOWN.
2. GOOGLE EARTH IMAGE DATED OCTOBER 2014. BOUNDARY AND MONITOR WELL LOCATIONS ARE APPROXIMATE.
3. BOUNDARY AND MONITOR WELL LOCATIONS ARE PROVIDED BY AECOM.

800 0 800 1600

SCALE FEET

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2	-	-
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4	-	-
5	-	-

SHEET TITLE
POTENTIOMETRIC SURFACE MAP (DECEMBER 2018)
CCR LANDFILL & LOWER AQC IMPOUNDMENT

PROJECT TITLE
ALTERNATIVE SOURCE DEMONSTRATION

CLIENT
KANSAS CITY POWER & LIGHT COMPANY
LA CYGNE GENERATING STATION
LA CYGNE, KANSAS

SCS ENGINEERS
8575 W. 110th St. Ste. 100
Overland Park, Kansas 66210
PH: (913) 681-0030 FAX: (913) 681-0012

PROJ. NO. 27217233.18
DSN. BY: TGW
DRC. BY: JRR
Q/A RVW BY: JRR
PROJ. MGR JRR

CADD FILE:
LA CYGNE LF LAQC IMP & UAQC FIG 1_COMBINED.DWG

DATE: 5/22/19

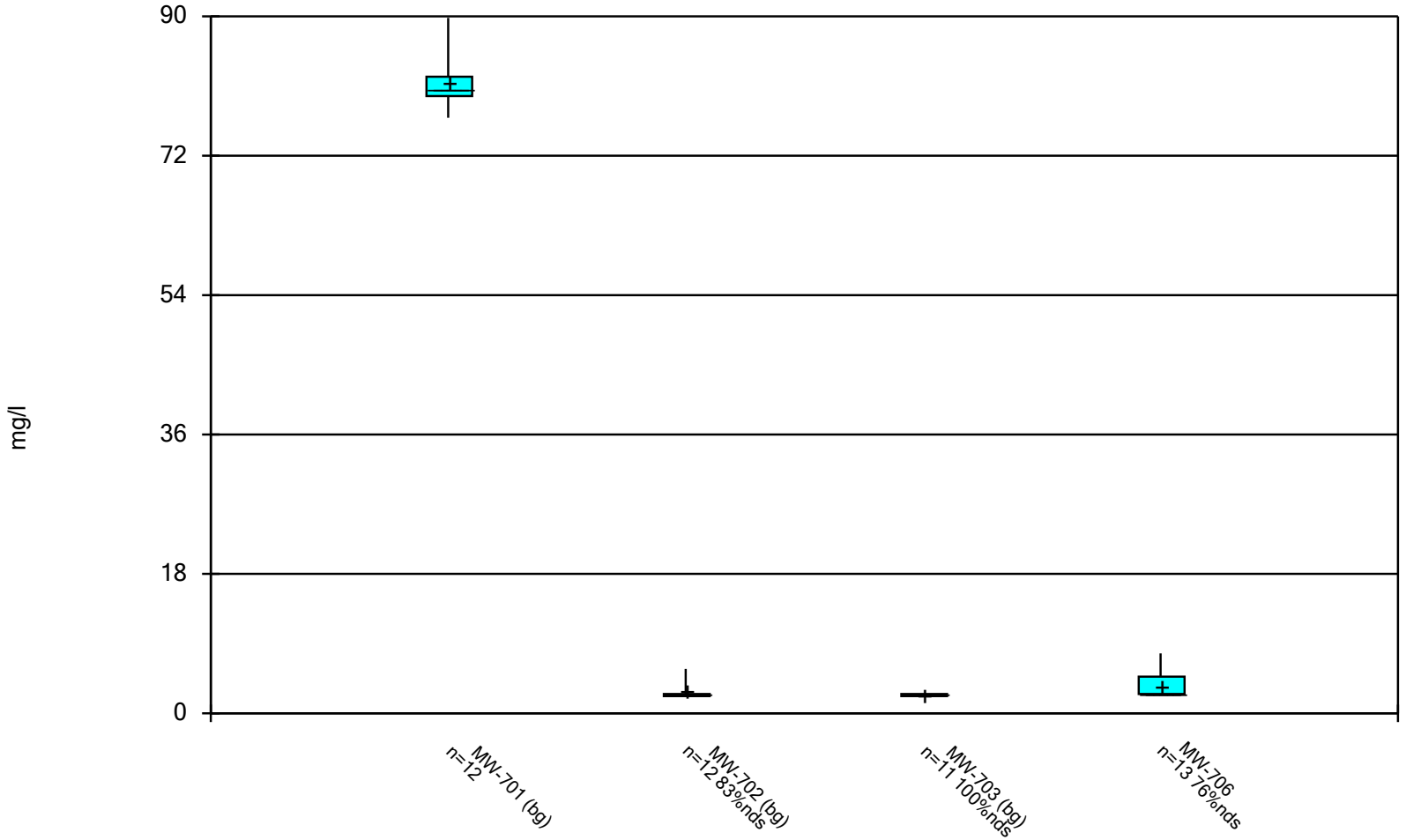
FIGURE NO. 1

N:\KCPL\Projects\Groundwater\DWG\La Cygne\2018\GW\La Cygne LF LAQC Imp & UAQC Fig 1_Combined.dwg May 23, 2019 - 4:24pm Layout Name: Fig 1 UAQC By: 4470daw

Appendix B

Box and Whiskers Plots

Box & Whiskers Plot



Constituent: SULFATE Analysis Run 4/3/2019 10:11 AM View: Upper AQC III

LaCygne Client: SCS Engineers Data: LaC GW Data

Box & Whiskers Plot

Constituent: SULFATE (mg/l) Analysis Run 4/3/2019 10:12 AM View: Upper AQC III

LaCygne Client: SCS Engineers Data: LaC GW Data

	MW-701 (bg)	MW-702 (bg)	MW-703 (bg)	MW-706
6/7/2016	76.9		<5	
6/8/2016		5.73		<5
8/9/2016	81.1	5.46	<5	<5
10/11/2016	80.3	<5	<5	<5
12/6/2016	80.9		<5	<5
12/8/2016		<5		
2/7/2017	89.8		<5	<5
2/8/2017		<5		
4/4/2017	83.8		<5	<5
4/5/2017		<5		
6/13/2017	80.6			<5
6/14/2017			<5	
6/15/2017		<5		
8/8/2017	80.8			
8/9/2017		<5		<5
8/10/2017			<5	
10/3/2017	80.6	<5		
10/4/2017				<5
10/5/2017			<5	
5/24/2018	78.6	<5	<5	<5
12/3/2018	79.1	<5	<5	
12/4/2018				7.69
1/14/2019		<5		
1/15/2019	83.3			7.73
3/11/2019				6.96
Median	80.7	2.5	2.5	2.5
LowerQ.	79.7	2.5	2.5	2.5
UpperQ.	82.2	2.5	2.5	4.73
Min	76.9	2.5	2.5	2.5
Max	89.8	5.73	2.5	7.73
Mean	81.32	3.016	2.5	3.645

Box & Whiskers Plot

LaCygne Client: SCS Engineers Data: LaC GW Data Printed 4/3/2019, 10:12 AM

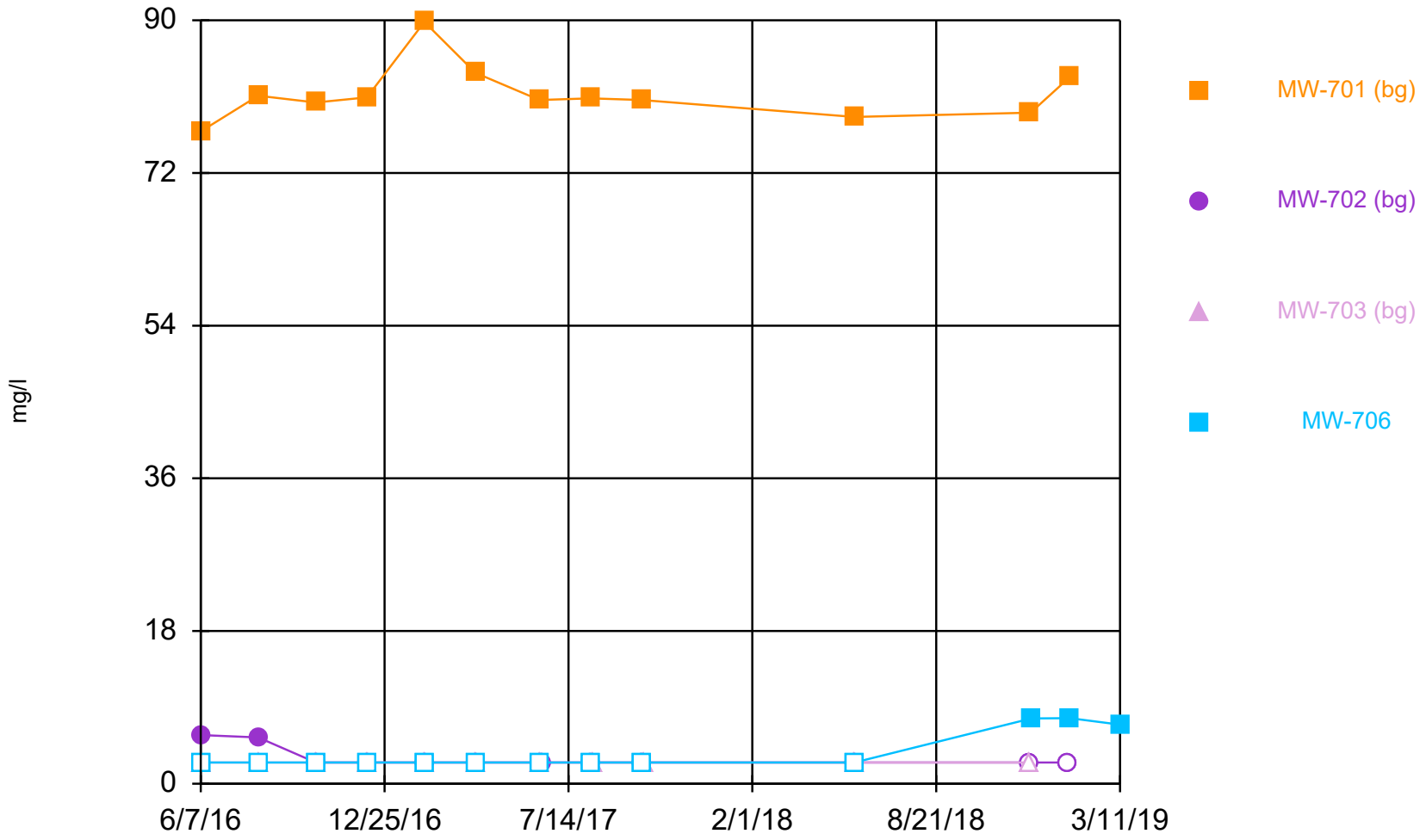
Constituent	Well	N	Mean	Std. Dev.	Std. Err.	Median	Min.	Max.	%NDs
SULFATE (mg/l)	MW-701 (bg)	12	81.32	3.253	0.9391	80.7	76.9	89.8	0
SULFATE (mg/l)	MW-702 (bg)	12	3.016	1.206	0.3482	2.5	2.5	5.73	83.33
SULFATE (mg/l)	MW-703 (bg)	11	2.5	0	0	2.5	2.5	2.5	100
SULFATE (mg/l)	MW-706	13	3.645	2.182	0.6053	2.5	2.5	7.73	76.92

Appendix C

Time Series Plots

Hollow symbols indicate censored values.

Time Series



Constituent: SULFATE Analysis Run 4/3/2019 10:10 AM View: Upper AQC III

LaCygne Client: SCS Engineers Data: LaC GW Data

Time Series

Constituent: SULFATE (mg/l) Analysis Run 4/3/2019 10:10 AM View: Upper AQC III

LaCygne Client: SCS Engineers Data: LaC GW Data

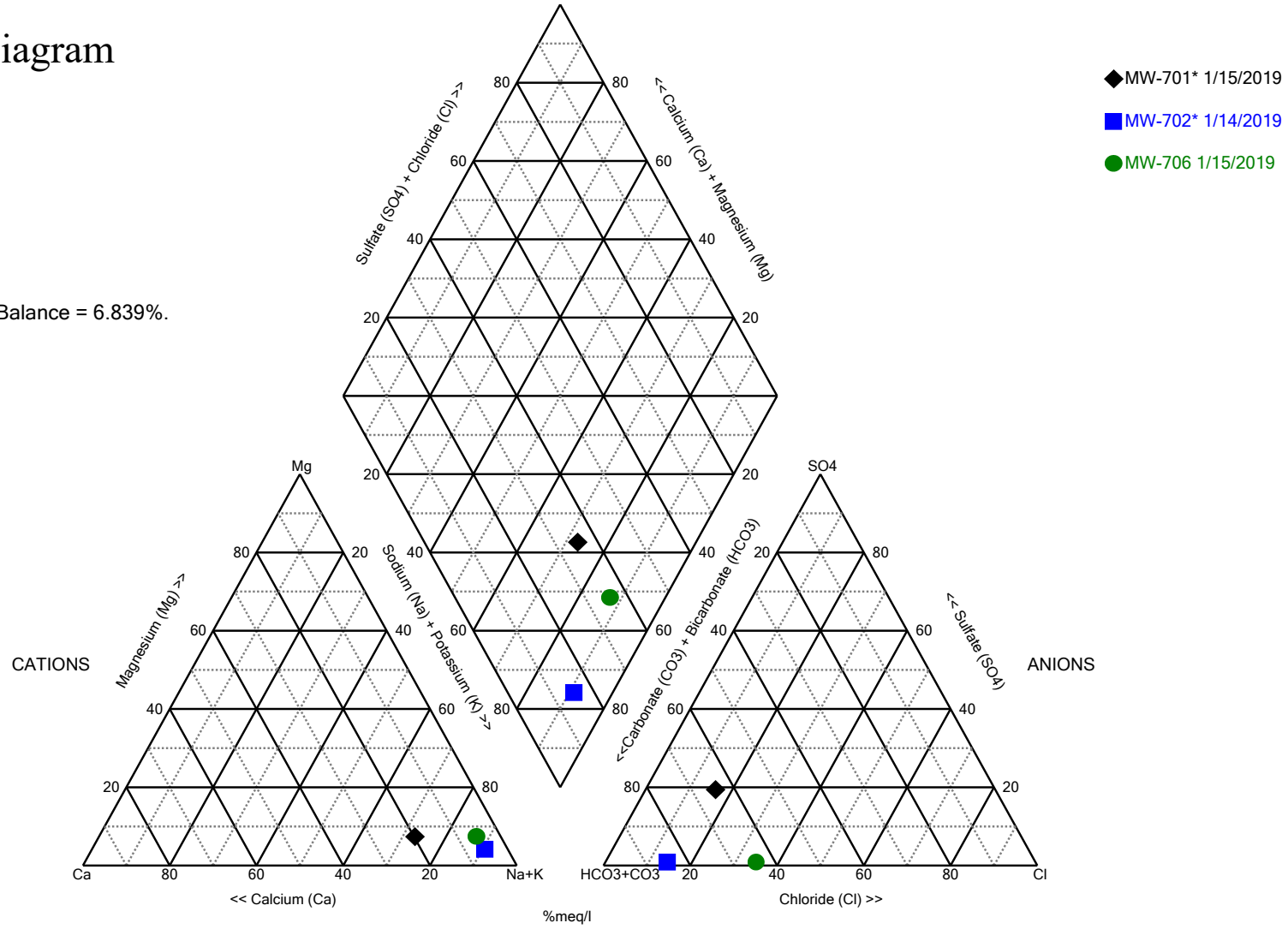
	MW-701 (bg)	MW-702 (bg)	MW-703 (bg)	MW-706
6/7/2016	76.9		<5	
6/8/2016		5.73		<5
8/9/2016	81.1	5.46	<5	<5
10/11/2016	80.3	<5	<5	<5
12/6/2016	80.9		<5	<5
12/8/2016		<5		
2/7/2017	89.8		<5	<5
2/8/2017		<5		
4/4/2017	83.8		<5	<5
4/5/2017		<5		
6/13/2017	80.6			<5
6/14/2017			<5	
6/15/2017		<5		
8/8/2017	80.8			
8/9/2017		<5		<5
8/10/2017			<5	
10/3/2017	80.6	<5		
10/4/2017				<5
10/5/2017			<5	
5/24/2018	78.6	<5	<5	<5
12/3/2018	79.1	<5	<5	
12/4/2018				7.69
1/14/2019		<5		
1/15/2019	83.3			7.73
3/11/2019				6.96

Appendix D

Piper Plots

Piper Diagram

Cation-Anion Balance = 6.839%.



Analysis Run 5/22/2019 4:45 PM View: Upper AQC III

LaCygne Client: SCS Engineers Data: LaC GW Data

Piper Diagram

Analysis Run 5/22/2019 4:46 PM View: Upper AQC III

LaCygne Client: SCS Engineers Data: LaC GW Data

Totals (ppm)	Na	K	Ca	Mg	Cl	SO4	HCO3	CO3
MW-701* 1/15/2019	169	3.11	40.2	8.79	47.9	83.3	336	10
MW-702* 1/14/2019	230	3.14	11.2	5.24	43	2.5	461	10
MW-706 1/15/2019	442	6.52	24.7	19.5	238	7.73	769	10

C2 CCR Groundwater Monitoring Alternative Source Demonstration Report May 2019 Groundwater Monitoring Event, Upper AQC Impoundment, La Cygne Generating Station (December 2019)

CCR GROUNDWATER MONITORING
ALTERNATIVE SOURCE DEMONSTRATION REPORT
MAY 2019 GROUNDWATER MONITORING EVENT

UPPER AQC IMPOUNDMENT
LA CYGNE GENERATING STATION
LA CYGNE, KANSAS

Presented To:

Evergy Metro, Inc.

Presented By:

SCS ENGINEERS

8575 West 110th Street, Suite 100

Overland Park, Kansas 66210

(913) 681-0030

December 2019

File No. 27217233.19

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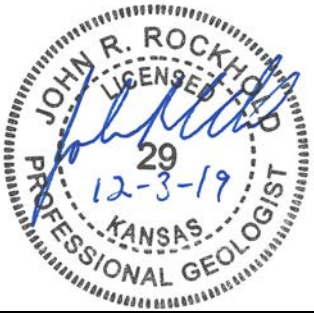

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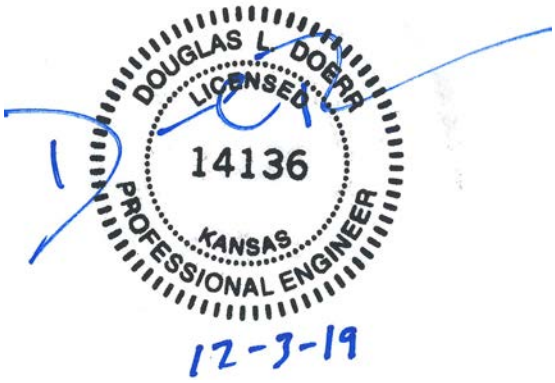

Douglas L. Doerr, P.E.

SCS Engineers

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2 STATISTICAL RESULTS

Statistical analysis of monitoring data from the groundwater monitoring system for the CCR Upper AQC Impoundment at the La Cygne Generating Station has been completed in substantial compliance with the "Statistical Method Certification by A Qualified Professional Engineer" dated October 12, 2017. Detection monitoring groundwater samples were collected on May 23, 2019. Review and validation of the results from the May 2019 Detection Monitoring Event was completed on July 5, 2019, which constitutes completion and finalization of detection monitoring laboratory analyses. A statistical analysis was then conducted to determine whether there was a statistically significant increase (SSI) over background values for each constituent listed in Appendix III to Part 257-Constituents for Detection Monitoring. Two rounds of verification sampling were conducted for certain constituents on July 17, 2019 and August 23, 2019.

The completed statistical evaluation identified three Appendix III constituents above their respective prediction limit in monitoring wells MW-701, MW-704, and MW-706.

Constituent/Monitoring Well	*UPL	Observation May 23, 2019	1st Verification July 17, 2019	2nd Verification August 23, 2019
Calcium				
MW-701	39.71	41.6	45	39.9
Chloride				
MW-704	85.06	87.2	89.7	89.2
Sulfate				
MW-706	5	5.78	8.27	8.79

*UPL – Upper Prediction Limit

Determination: A statistical evaluation was completed for all Appendix III detection monitoring constituents in accordance with the certified statistical method. The statistical evaluation confirmed three SSIs above the background prediction limits. These include calcium in upgradient monitoring well MW-701, chloride in monitoring well MW-704, and sulfate in monitoring well MW-706.

3 ALTERNATIVE SOURCE DEMONSTRATION

An Alternative Source Demonstration is a means to provide supporting lines of evidence that something other than a release from a regulated CCR unit caused an SSI. For the above identified SSIs for the Upper AQC Impoundment at the La Cygne Generating Station, there are multiple lines of supporting evidence to indicate they are not caused by a release from the Upper AQC Impoundment. Select multiple lines of supporting evidence are described as follows.

3.1 UPGRADIENT WELL LOCATION

Figure 1 in **Appendix A** shows a potentiometric surface contour map indicating the direction of groundwater flow at and near the Upper AQC Impoundment at the time of sampling. The groundwater flow directions indicated are for the May 2019 groundwater monitoring event and are typical flow directions for this unit. As seen in the map, monitoring well MW-701 is located upgradient from the Upper AQC Impoundment indicating the SSI for calcium in MW-701 is not caused by a release from the Upper AQC Impoundment. This demonstrates that a source other than the Upper AQC Impoundment caused the SSI above background level for calcium, or that the SSI resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality.

3.2 BOX AND WHISKERS PLOTS

A commonly accepted method to demonstrate and visualize the distribution of data in a given data set is to construct box and whiskers plots. The basic box plotted graphically locates the median, 25th and 75th percentiles of the data set; the "whiskers" extend to the minimum and maximum values of the data set. The range between the ends of a box plot represents the Interquartile Range, which can be used as an estimate of spread or variability. The mean is denoted by a "+".

When comparing multiple wells or well groups, box plots for each well can be lined up on the same axis to roughly compare the variability in each well. This may be used as an exploratory screening for the test of homogeneity of variance across multiple wells.

Box and whiskers plots were prepared for sulfate for upgradient wells MW-701, MW-702, and MW-703 and downgradient well MW-706. Although the sulfate SSI was only identified in downgradient well MW-706 the box and whiskers plots show that it is below the sulfate range for an upgradient well (MW-701). The comparison indicates the sulfate level in upgradient well MW-701 is greater than the sulfate level in MW-706. This demonstrates that a source other than the Upper AQC Impoundment caused the SSI above background levels for sulfate, or that the SSI resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality. Box and whiskers plots are provided in **Appendix B**.

Box and whiskers plots were prepared for chloride for upgradient wells MW-701, MW-702, and MW-703 and downgradient well MW-704. Although the chloride SSI was only identified in downgradient well MW-704 the box and whiskers plots show that it is below the chloride range for an upgradient well (MW-703). The comparison indicates the chloride level in upgradient well MW-703 is greater than the chloride level in MW-704. This demonstrates that a source other than the Upper AQC Impoundment caused the SSI above background levels for chloride, or that the SSI resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality. Box and whiskers plots are provided in **Appendix B**.

3.3 TIME SERIES PLOTS

Time series plots provide a graphical method to view changes in data at a particular well (monitoring point) or wells over time. Time series plots display the variability in concentration levels over time and can be used to indicate possible outliers or data errors. More than one well can be compared on the same plot to look for differences between wells. Non-detect data is plotted as censored data at one-half of the laboratory reporting limit. Time series plots can also be used to examine the data for trends.

Time series plots for sulfate were prepared for the CCR monitoring system upgradient wells MW-701, MW-702, and MW-703 and downgradient well MW-706. Although the sulfate SSI was only identified in downgradient well MW-706, the time series plots show that sulfate in MW-706 is below the sulfate range for an upgradient well (MW-701). The comparison indicates the sulfate level in upgradient well MW-701 is greater than the sulfate level in MW-706. This demonstrates that a source other than the Upper AQC Impoundment caused the sulfate SSI or that the SSI resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality. Time series plots are provided in **Appendix C**.

Time series plots for chloride were prepared for the CCR monitoring system upgradient wells MW-701, MW-702, and MW-703 and downgradient well MW-704. Although the chloride SSI was only identified in downgradient well MW-704, the time series plots show that chloride in MW-704 is below the chloride range for an upgradient well (MW-703). The comparison indicates the chloride level in upgradient well MW-703 is greater than the chloride level in MW-704. This demonstrates that a source other than the Upper AQC Impoundment caused the chloride SSI or that the SSI resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality. Time series plots are provided in **Appendix C**.

3.4 PIPER PLOTS

Piper diagrams are a form of tri-linear diagram, and a widely accepted method to provide a visual representation of the ion concentration of groundwater. Piper diagrams portray water compositions and facilitate the interpretation and presentation of chemical analyses. They may be used to visually compare the chemical composition of water quality across wells, and aid in determining whether the waters are similar or dis-similar, and can over time indicate whether the waters are mixing.

A piper diagram has two triangular plots on the right and left side of a 4-sided center field. The three major cations are plotted in the left triangle and anions in the right. Each of the three cation/anion variables, in milliequivalents, is divided by the sum of the three values, to produce a percent of total cation/anions. These percentages determine the location of the associated symbol. The data points in the center field

are located by extending the points in the lower triangles to the point of intersection. In order for a piper diagram to be produced, the selected data file must contain the following constituents: Sodium (Na), Potassium (K), Calcium (Ca), Magnesium (Mg), Chloride (Cl), Sulfate (SO4), Carbonate (CO3), and Bicarbonate (HCO3).

A piper diagram was generated for samples from upgradient wells MW-701 and MW-702 and from downgradient wells MW-704 and MW-706. The samples from downgradient wells MW-704 and MW-706 plot between the samples from upgradient wells MW-701 and MW-702 indicating similar geochemical characteristics to upgradient wells. Additionally of note, the difference between the upgradient wells indicates that natural variability occurs between relatively close upgradient wells and is likely to occur across the site. This demonstrates that a source other than the Upper AQC Impoundment caused the SSIs for chloride in MW-704 and sulfate in MW-706, or that the SSIs resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality. The piper diagram plots are provided in **Appendix D**.

4 CONCLUSION

Our opinion is that a sufficient body of evidence is available and presented above to demonstrate that a source other than the Upper AQC Impoundment caused the SSIs for calcium, chloride and sulfate, or that the SSIs resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality. Based on the successful ASD, the owner or operator of the Upper AQC Impoundment may continue with the detection monitoring program under § 257.94.

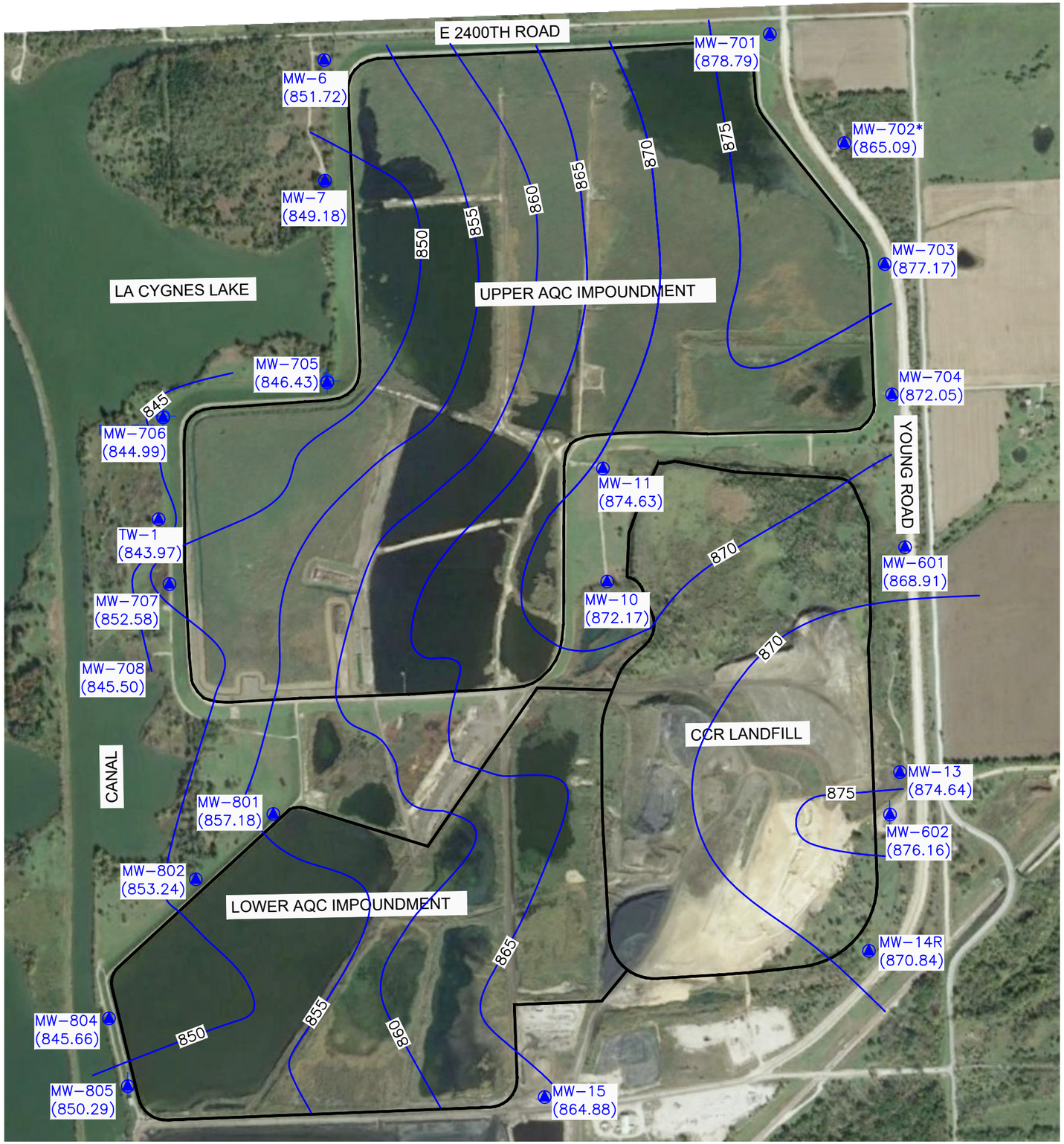
5 GENERAL COMMENTS

This report has been prepared and reviewed under the direction of a qualified groundwater scientist and qualified professional engineer. Please note that SCS Engineers does not warrant the work of regulatory agencies or other third parties supplying information used in the assimilation of this report. This report is prepared in accordance with generally accepted environmental engineering and geological practices, within the constraints of the client's directives. It is intended for the exclusive use of Evergy Metro, Inc. for specific application to the La Cygne Generating Station. No warranties, express or implied, are intended or made.

The signatures of the certifying registered geologist and professional engineer on this document represents that to the best of their knowledge, information, and belief in the exercise of their professional judgement in accordance with the standard of practice, it is their professional opinions that the aforementioned information is accurate as of the date of such signatures. Any opinion or decisions by them are made on the basis of their experience, qualifications, and professional judgement and are not to be construed as warranties or guaranties. In addition, opinions relating to regulatory, environmental, geologic, geochemical and geotechnical conditions interpretations or other estimates are based on available data, and actual conditions may vary from those encountered at the times and locations where data are obtained, despite the use of due care.

Appendix A

Figure 1



LEGEND

- CCR UNIT BOUNDARY (APPROXIMATE LIMITS OF UPPER AQC IMPOUNDMENT)
- MW-703 (877.00) CCR GROUNDWATER MONITORING SYSTEM WELLS (GROUNDWATER ELEVATION)
- —875— GROUNDWATER POTENTIOMETRIC SURFACE ELEVATIONS (REPRESENTATIVE FOR THIS UNIT)
- MW-702* INDICATES WELL NOT USED IN POTENTIOMETRIC SURFACE MAP CREATION

NOTES:

1. KDHE FACILITY PERMIT AND LANDFILL PERMIT BOUNDARIES VARY FROM THAT SHOWN.
2. GOOGLE EARTH IMAGE DATED OCTOBER 2014. BOUNDARY AND MONITOR WELL LOCATIONS ARE APPROXIMATE.
3. BOUNDARY AND MONITOR WELL LOCATIONS ARE PROVIDED BY AECOM.

N

800 0 800 1600

SCALE FEET

REV.	DATE	CK. BY
1	-	-
2	-	-
3	-	-
4	-	-
5	-	-
6	-	-

SHEET TITLE: POTENTIOMETRIC SURFACE MAP (MAY 2019) COMBINED AQC IMPOUNDMENT & LF

PROJECT TITLE: ALTERNATIVE SOURCE DEMONSTRATION

CLIENT: KANSAS CITY POWER & LIGHT COMPANY
LA CYGNE GENERATING STATION
LA CYGNE, KANSAS

SCS ENGINEERS
7311 W. 130th St, Ste. 100
Overland Park, Kansas 66213
PH. (913) 681-0030 FAX. (913) 681-0012

PROJ. NO.	DSN. BY:	CHK. BY:	O/A RVW BY:
27217233.00	DAW	JF	JRR
DSN. BY:			PROJ. MGR
DAW			JRR

CADD FILE: LA CYGNE LF LAQC IMP & UAQC FIG 1_MAY 2019 - COMBINED.DWG

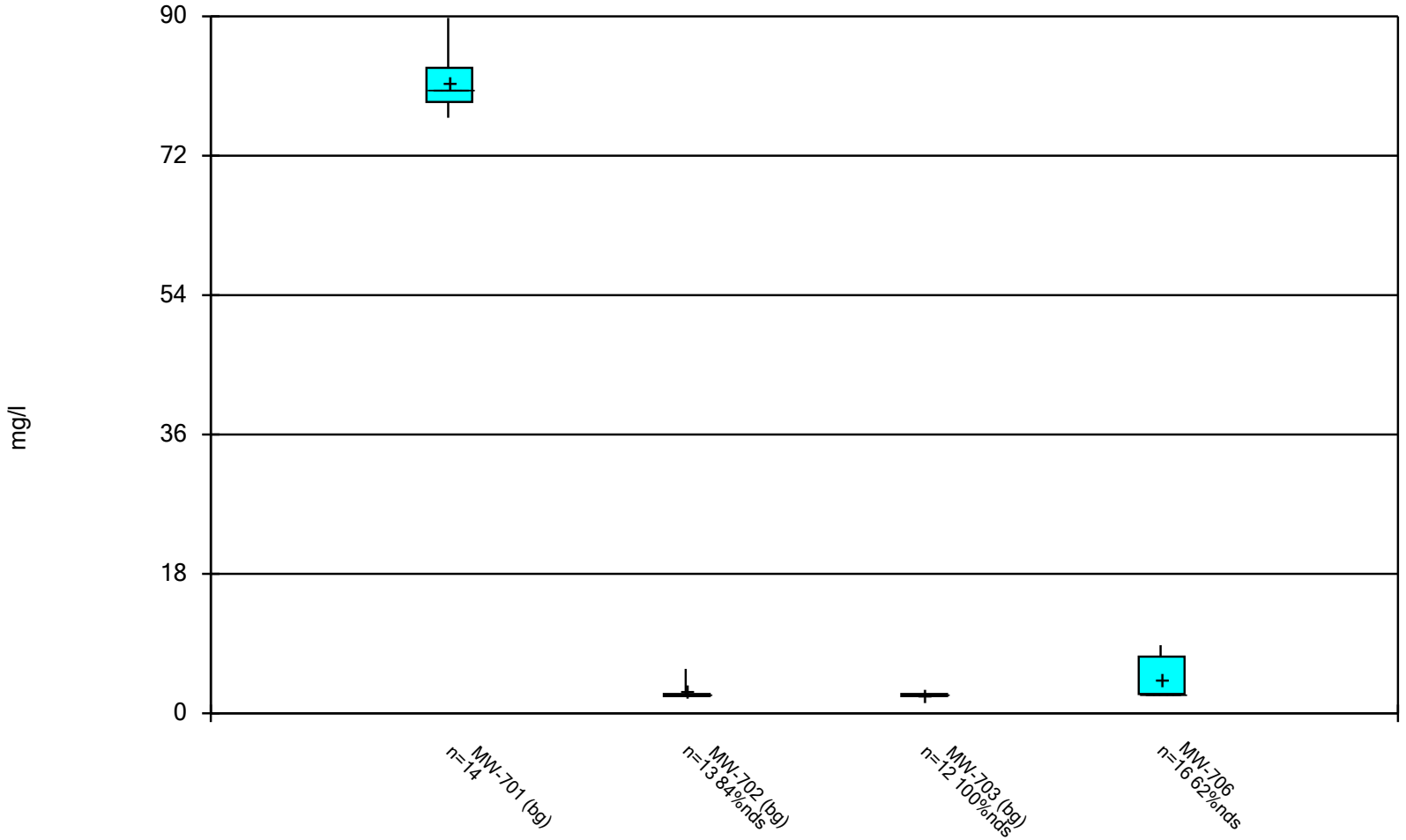
DATE: 11/1/19

FIGURE NO. 1

Appendix B

Box and Whiskers Plots

Box & Whiskers Plot



Constituent: SULFATE Analysis Run 10/30/2019 11:25 AM View: Bottom Ash III

LaCygne Client: SCS Engineers Data: LaC GW Data

Box & Whiskers Plot

Constituent: SULFATE (mg/l) Analysis Run 10/30/2019 11:27 AM View: Bottom Ash III

LaCygne Client: SCS Engineers Data: LaC GW Data

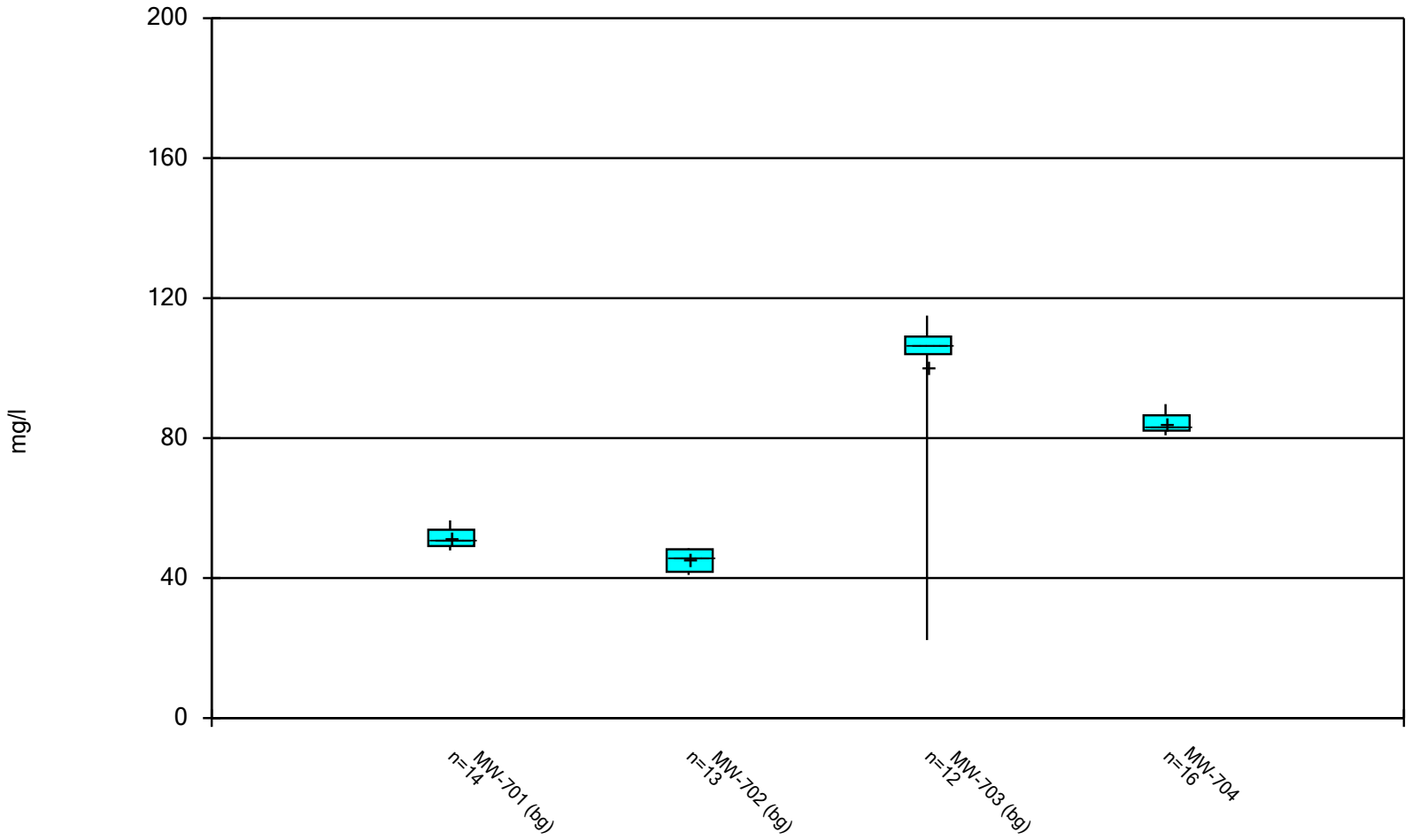
	MW-701 (bg)	MW-702 (bg)	MW-703 (bg)	MW-706
6/7/2016	76.9		<5	
6/8/2016		5.73		<5
8/9/2016	81.1	5.46	<5	<5
10/11/2016	80.3	<5	<5	<5
12/6/2016	80.9		<5	<5
12/8/2016		<5		
2/7/2017	89.8		<5	<5
2/8/2017		<5		
4/4/2017	83.8		<5	<5
4/5/2017		<5		
6/13/2017	80.6			<5
6/14/2017			<5	
6/15/2017		<5		
8/8/2017	80.8			
8/9/2017		<5		<5
8/10/2017			<5	
10/3/2017	80.6	<5		
10/4/2017				<5
10/5/2017			<5	
5/24/2018	78.6	<5	<5	<5
12/3/2018	79.1	<5	<5	
12/4/2018				7.69
1/14/2019		<5		
1/15/2019	83.3			7.73
3/11/2019				6.96
5/23/2019	78.8	<5	<5	5.78
7/17/2019	83.4 (i)			8.27
8/23/2019				8.79
Median	80.7	2.5	2.5	2.5
LowerQ.	78.95	2.5	2.5	2.5
UpperQ.	83.35	2.5	2.5	7.325
Min	76.9	2.5	2.5	2.5
Max	89.8	5.73	2.5	8.79
Mean	81.29	2.976	2.5	4.389

Box & Whiskers Plot

LaCygne Client: SCS Engineers Data: LaC GW Data Printed 10/30/2019, 11:27 AM

Constituent	Well	N	Mean	Std. Dev.	Std. Err.	Median	Min.	Max.	%NDs
SULFATE (mg/l)	MW-701 (bg)	14	81.29	3.127	0.8356	80.7	76.9	89.8	0
SULFATE (mg/l)	MW-702 (bg)	13	2.976	1.164	0.3227	2.5	2.5	5.73	84.62
SULFATE (mg/l)	MW-703 (bg)	12	2.5	0	0	2.5	2.5	2.5	100
SULFATE (mg/l)	MW-706	16	4.389	2.591	0.6478	2.5	2.5	8.79	62.5

Box & Whiskers Plot



Constituent: CHLORIDE Analysis Run 10/30/2019 11:30 AM View: Bottom Ash III

LaCygne Client: SCS Engineers Data: LaC GW Data

Box & Whiskers Plot

Constituent: CHLORIDE (mg/l) Analysis Run 10/30/2019 11:31 AM View: Bottom Ash III

LaCygne Client: SCS Engineers Data: LaC GW Data

	MW-701 (bg)	MW-702 (bg)	MW-703 (bg)	MW-704
6/7/2016	56.5		103	82.5
6/8/2016		44.9		
8/9/2016	50.6	41.7	106	83.4
10/11/2016	49.1	41.8	105	80.8
12/6/2016	52.2		107	82.9
12/8/2016		46.7		
2/7/2017	49.2		109	82
2/8/2017		48.4		
4/4/2017	55.3		115	84.7
4/5/2017		48.4		
6/13/2017	54.1			81.8
6/14/2017			102	
6/15/2017		46.2		
8/8/2017	53.5			82.1
8/9/2017		48.1		
8/10/2017			22.3	
10/3/2017	51.5	48.5		85
10/5/2017			111	
5/24/2018	53	45.8	108	85.9
7/11/2018				87.1
8/16/2018				83.3
12/3/2018	49.4	40.9	106	82.2
1/14/2019		43		
1/15/2019	47.9			
5/23/2019	48.6	41.8	109	87.2
7/17/2019	50.7 (i)			89.7
8/23/2019				89.2
Median	51.1	45.8	106.5	83.35
LowerQ.	49.15	41.8	104	82.15
UpperQ.	53.8	48.25	109	86.5
Min	47.9	40.9	22.3	80.8
Max	56.5	48.5	115	89.7
Mean	51.54	45.09	100.3	84.36

Box & Whiskers Plot

LaCygne Client: SCS Engineers Data: LaC GW Data Printed 10/30/2019, 11:31 AM

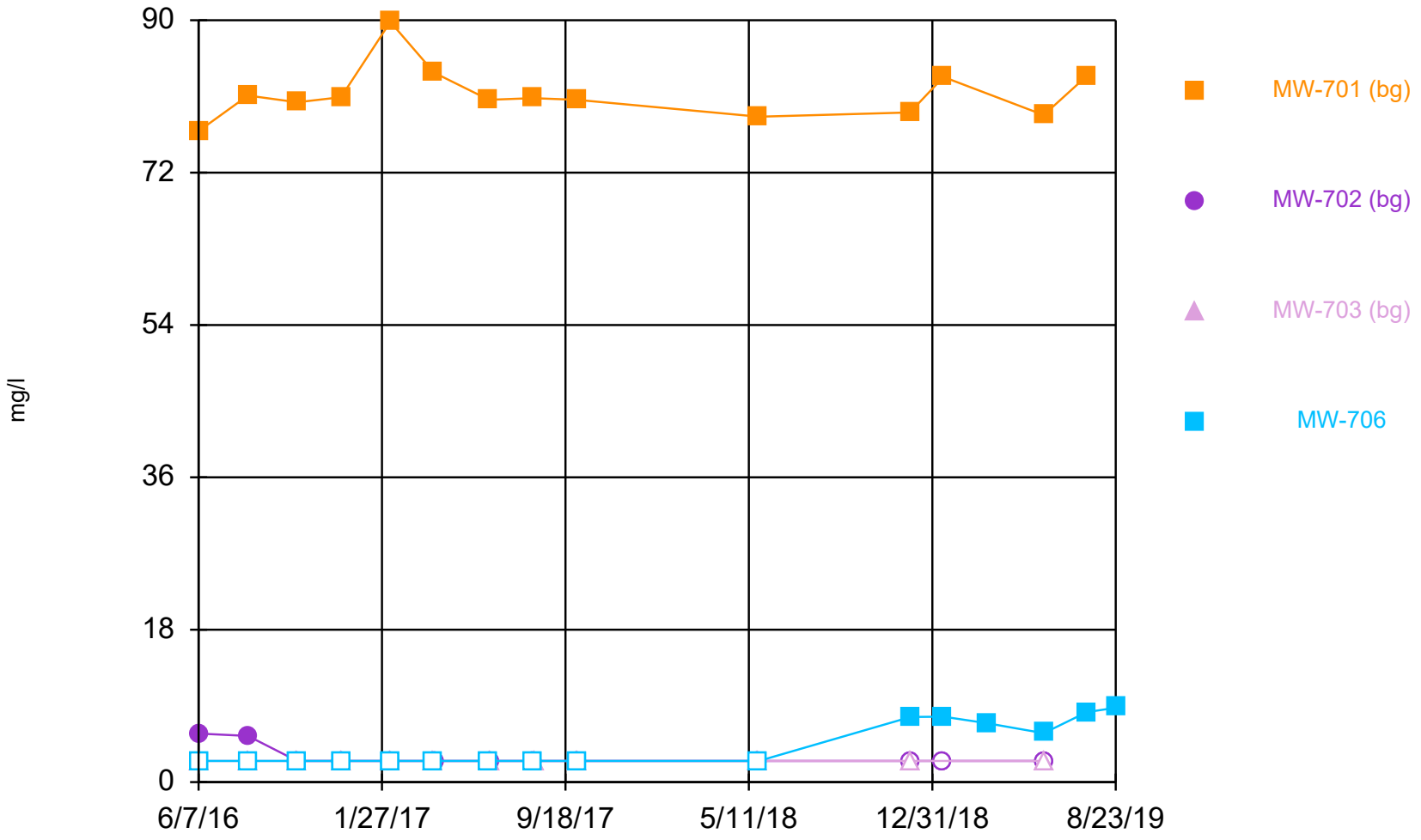
Constituent	Well	N	Mean	Std. Dev.	Std. Err.	Median	Min.	Max.	%NDs
CHLORIDE (mg/l)	MW-701 (bg)	14	51.54	2.649	0.7079	51.1	47.9	56.5	0
CHLORIDE (mg/l)	MW-702 (bg)	13	45.09	2.916	0.8087	45.8	40.9	48.5	0
CHLORIDE (mg/l)	MW-703 (bg)	12	100.3	24.8	7.16	106.5	22.3	115	0
CHLORIDE (mg/l)	MW-704	16	84.36	2.74	0.685	83.35	80.8	89.7	0

Appendix C

Time Series Plots

Hollow symbols indicate censored values.

Time Series



Constituent: SULFATE Analysis Run 10/30/2019 11:28 AM View: Bottom Ash III

LaCygne Client: SCS Engineers Data: LaC GW Data

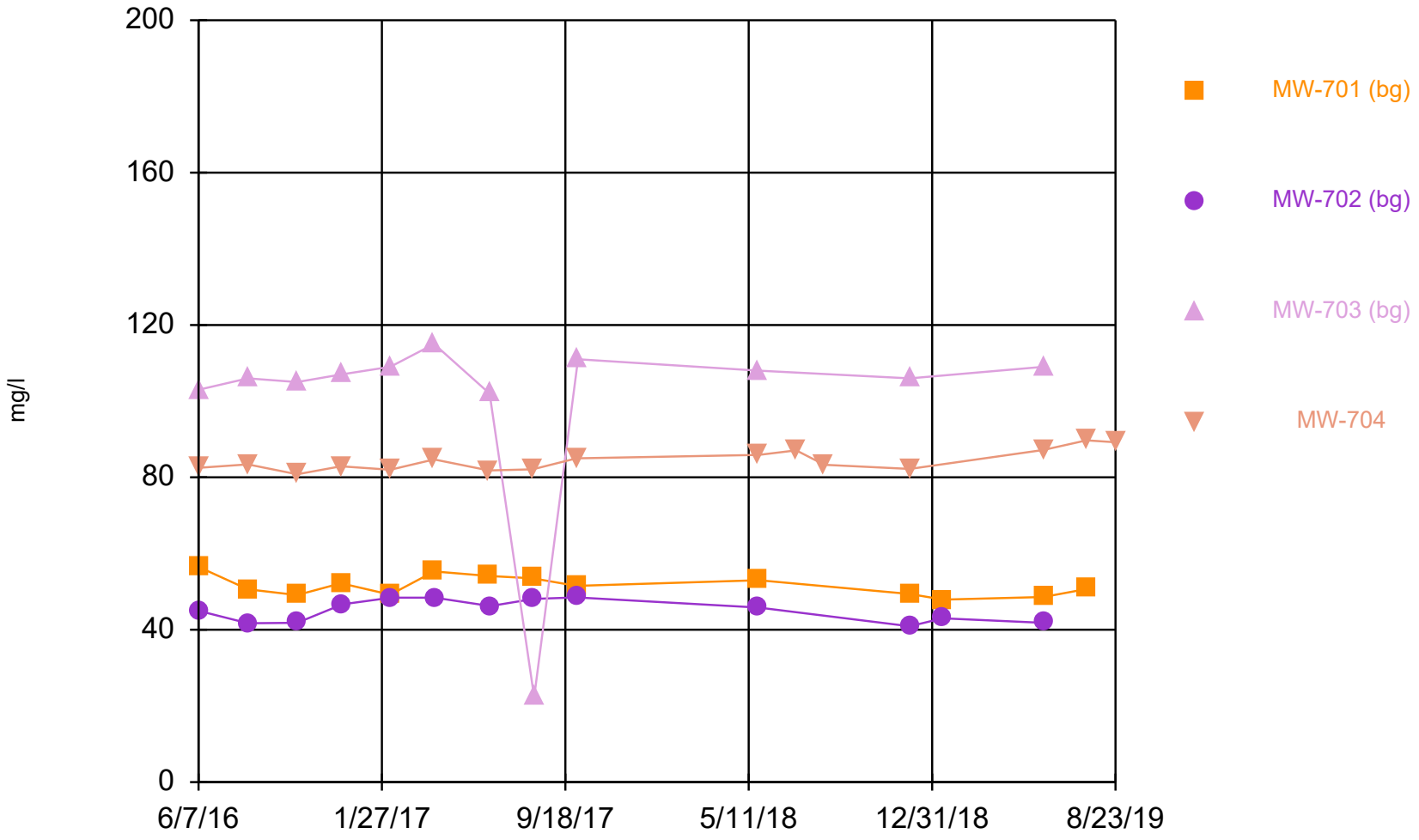
Time Series

Constituent: SULFATE (mg/l) Analysis Run 10/30/2019 11:30 AM View: Bottom Ash III

LaCygne Client: SCS Engineers Data: LaC GW Data

	MW-701 (bg)	MW-702 (bg)	MW-703 (bg)	MW-706
6/7/2016	76.9		<5	
6/8/2016		5.73		<5
8/9/2016	81.1	5.46	<5	<5
10/11/2016	80.3	<5	<5	<5
12/6/2016	80.9		<5	<5
12/8/2016		<5		
2/7/2017	89.8		<5	<5
2/8/2017		<5		
4/4/2017	83.8		<5	<5
4/5/2017		<5		
6/13/2017	80.6			<5
6/14/2017			<5	
6/15/2017		<5		
8/8/2017	80.8			
8/9/2017		<5		<5
8/10/2017			<5	
10/3/2017	80.6	<5		
10/4/2017				<5
10/5/2017			<5	
5/24/2018	78.6	<5	<5	<5
12/3/2018	79.1	<5	<5	
12/4/2018				7.69
1/14/2019		<5		
1/15/2019	83.3			7.73
3/11/2019				6.96
5/23/2019	78.8	<5	<5	5.78
7/17/2019	83.4 (i)			8.27
8/23/2019				8.79

Time Series



Constituent: CHLORIDE Analysis Run 10/30/2019 11:32 AM View: Bottom Ash III

LaCygne Client: SCS Engineers Data: LaC GW Data

Time Series

Constituent: CHLORIDE (mg/l) Analysis Run 10/30/2019 11:34 AM View: Bottom Ash III

LaCygne Client: SCS Engineers Data: LaC GW Data

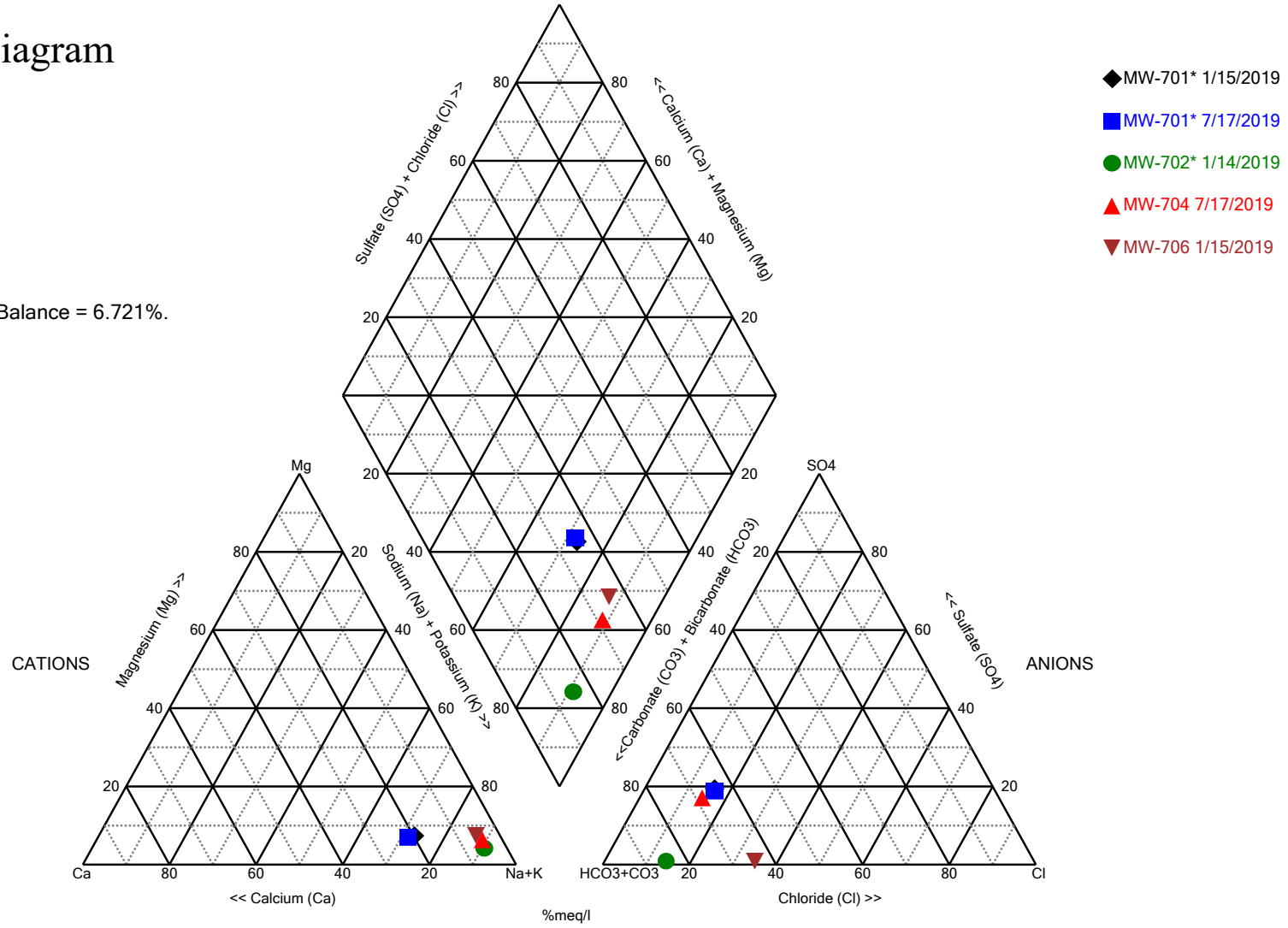
	MW-701 (bg)	MW-702 (bg)	MW-703 (bg)	MW-704
6/7/2016	56.5		103	82.5
6/8/2016		44.9		
8/9/2016	50.6	41.7	106	83.4
10/11/2016	49.1	41.8	105	80.8
12/6/2016	52.2		107	82.9
12/8/2016		46.7		
2/7/2017	49.2		109	82
2/8/2017		48.4		
4/4/2017	55.3		115	84.7
4/5/2017		48.4		
6/13/2017	54.1			81.8
6/14/2017			102	
6/15/2017		46.2		
8/8/2017	53.5			82.1
8/9/2017		48.1		
8/10/2017			22.3	
10/3/2017	51.5	48.5		85
10/5/2017			111	
5/24/2018	53	45.8	108	85.9
7/11/2018				87.1
8/16/2018				83.3
12/3/2018	49.4	40.9	106	82.2
1/14/2019		43		
1/15/2019	47.9			
5/23/2019	48.6	41.8	109	87.2
7/17/2019	50.7 (i)			89.7
8/23/2019				89.2

Appendix D

Piper Plots

Piper Diagram

Cation-Anion Balance = 6.721%.



Analysis Run 10/30/2019 11:45 AM View: Bottom Ash III

LaCygne Client: SCS Engineers Data: LaC GW Data

Piper Diagram

Analysis Run 10/30/2019 12:54 PM View: Bottom Ash III

LaCygne Client: SCS Engineers Data: LaC GW Data

Totals (ppm)	Na	K	Ca	Mg	Cl	SO4	HCO3	CO3
MW-701* 1/15/2019	169	3.11	40.2	8.79	47.9	83.3	336	10
MW-701* 7/17/2019	172	2.91	45	8.71	50.7	83.4	349	10
MW-702* 1/14/2019	230	3.14	11.2	5.24	43	2.5	461	10
MW-704 7/17/2019	442	5.85	21.5	15.8	89.7	156	790	10
MW-706 1/15/2019	442	6.52	24.7	19.5	238	7.73	769	10