2018 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT

UPPER AQC IMPOUNDMENT
LA CYGNE GENERATING STATION
LA CYGNE, KANSAS

Presented To:
Kansas City Power & Light Company

SCS ENGINEERS

27217233.18 | January 2019

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

CERTIFICATIONS

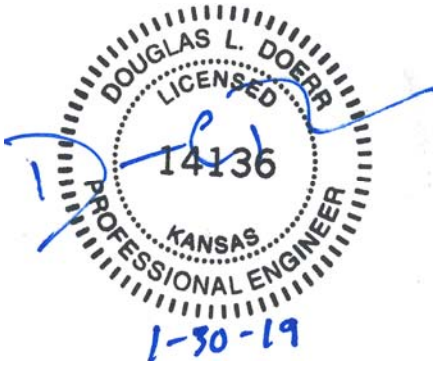
I, John R. Rockhold, being a qualified groundwater scientist and Professional Geologist in the State of Kansas, do hereby certify that the 2018 Annual Groundwater Monitoring and Corrective Action Report for the Upper AQC Impoundment at the La Cygne Generating Station was prepared by me or under my direct 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 2018 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: 2019.01.30 16:03:15 -06'00'



Douglas L. Doerr, P.E.

SCS Engineers

Revision Number	Revision Date	Revision Section	Summary of Revisions

Table of Contents

Section **Page**

Appendices

1 INTRODUCTION

This 2018 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 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 2018 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 2018.

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 (2018). Samples collected in 2018 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 both the Spring 2018 semiannual detection monitoring data and the Fall 2018 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 2018. Only detection monitoring was conducted in 2018.

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 statistical evaluation of the initial Fall 2017 semiannual detection monitoring event per the certified statistical method,

b. completion of the 2017 Annual Groundwater Monitoring and Corrective Action Report,

c. completion of a successful alternative source demonstration for the Fall 2017 semiannual detection monitoring event,

d. completion of the Spring 2018 semiannual detection monitoring sampling and analysis event, and subsequent verification sampling per the certified statistical method,

e. completion of the statistical evaluation of the Spring 2018 semiannual detection monitoring

event per the certified statistical method, and

f. initiation of the Fall 2018 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 (2019).

Semiannual Spring and Fall 2019 groundwater sampling and analysis. Completion of verification sampling and analyses and statistical evaluation of Fall 2018 and Spring 2019 detection monitoring data 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 report is included as **Appendix C**:

- CCR Groundwater Monitoring Alternative Source Demonstration Report, October 2017 Groundwater Monitoring Event, Upper AQC Impoundment, La Cygne Generating Station (April 2018).

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

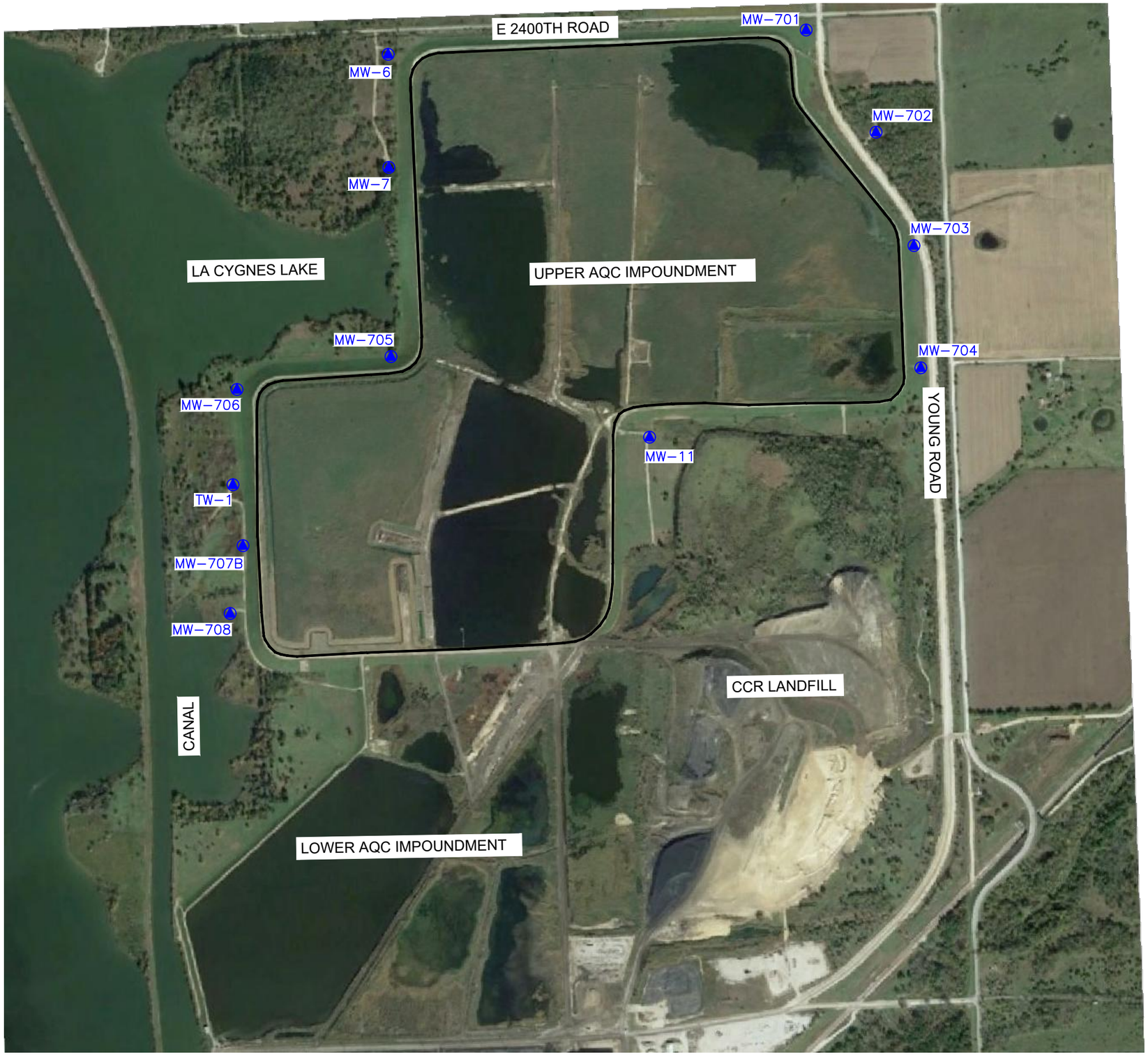
This report has been prepared and reviewed under the direction of a qualified groundwater scientist and qualified professional engineer. The information contained in this report is a reflection of the conditions encountered at the La Cygne Generating Station at the time of fieldwork. This report includes 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 Kansas City Power & Light Company 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.

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SCALE FEET

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SHEET TITLE
SITE MAP
UPPER AQC IMPOUNDMENT
CCR GROUNDWATER MONITORING SYSTEM

PROJECT TITLE
2018 CCR GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT

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.	DWN. BY:	O/A RVW BY:
27217233.18	TGW	JRR
DSN. BY:	CHK. BY:	PROJ. MGR
TGW	JRR	JRR

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FIG 1 – LA CYGNE UAQC IMP.DWG

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1/21/19

FIGURE NO.
1

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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
KCP&L 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	5/23/2018	1.23	85.6	197	0.595	7.26	151	1160
MW-6	12/4/2018	1.18	86.3	193	0.612	7.13	142	1150
MW-7	5/23/2018	1.65	22.6	96.9	1.29	7.83	<5.00	868
MW-7	12/4/2018	1.62	20.5	94.6	1.32	7.85	<5.00	890
MW-11	5/23/2018	1.26	53.4	80.2	0.637	7.35	167	902
MW-11	7/11/2018	*1.17	---	---	*0.532	**7.37	---	---
MW-11	12/3/2018	1.13	60.4	72.6	0.529	7.42	215	1030
MW-701	5/24/2018	1.06	39.5	53.0	0.785	7.60	78.6	599
MW-701	12/3/2018	0.979	44.8	49.4	0.642	7.52	79.1	569
MW-702	5/24/2018	1.74	7.13	45.8	1.50	8.26	<5.00	590
MW-702	12/3/2018	1.47	3.24	40.9	1.63	8.49	<5.00	423
MW-703	5/24/2018	1.90	21.8	108	1.49	7.60	<5.00	918
MW-703	12/3/2018	1.87	17.7	106	1.52	7.46	<5.00	892
MW-704	5/24/2018	2.14	22.7	85.9	0.943	7.74	166	1230
MW-704	7/11/2018	---	---	*87.1	---	**7.53	---	---
MW-704	8/16/2018	---	---	*83.3	---	**7.54	---	---
MW-704	12/3/2018	2.02	24.0	82.2	0.918	7.46	168	1130
MW-705	5/24/2018	2.30	28.9	135	1.07	7.29	41.0	912
MW-705	12/4/2018	2.19	30.3	132	1.07	7.32	38.9	994
MW-706	1/9/2018	---	---	---	---	*7.14	---	---
MW-706	5/24/2018	2.18	23.8	252	1.20	7.44	<5.00	1170
MW-706	12/4/2018	2.09	24.7	241	1.15	7.42	7.69	1200
MW-707B	5/24/2018	2.04	396	197	0.392	6.92	4650	7260
MW-707B	12/4/2018	1.95	381	205	0.328	6.84	4490	8080
MW-708	5/23/2018	1.45	29.2	46.3	0.653	7.39	9.25	639
MW-708	12/4/2018	1.41	30.1	46.0	0.618	7.31	9.24	633
TW-1	5/24/2018	1.67	25.7	44.5	0.463	7.60	61.1	1000
TW-1	12/4/2018	1.48	26.8	41.4	0.39	7.45	66.4	962

* 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

S.U. - Standard Units

--- Not Sampled

Table 2
Upper AQC Impoundment
Detection Monitoring Field Measurements
KCP&L 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	5/23/2018	7.26	1890	19.96	0.00	-62	1.13	9.39	851.29
MW-6	12/4/2018	7.13	2050	11.60	7.40	-125	0.00	9.38	851.30
MW-7	5/23/2018	7.83	1530	18.26	0.00	-158	1.39	5.76	849.90
MW-7	12/4/2018	7.85	1620	12.63	6.90	-184	0.84	6.96	848.70
MW-11	5/23/2018	7.35	1410	28.84	0.00	-23	1.27	3.47	873.51
MW-11	7/11/2018	**7.37	1660	17.48	0.00	-22	5.50	4.14	872.84
MW-11	12/3/2018	7.42	1700	13.04	10.90	-69	0.39	4.23	872.75
MW-701	5/24/2018	7.60	991	21.52	0.00	6	2.22	8.35	876.88
MW-701	12/3/2018	7.52	1040	12.83	21.20	-98	0.59	9.43	875.80
MW-702	5/24/2018	8.26	1130	21.55	0.00	-7	2.49	17.74	865.43
MW-702	12/3/2018	8.49	797	13.31	5.40	-73	2.36	19.34	863.83
MW-703	5/24/2018	7.60	1600	21.33	0.00	-59	2.08	6.84	877.00
MW-703	12/3/2018	7.46	1630	13.74	3.60	-52	0.45	6.11	877.73
MW-704	5/24/2018	7.74	1970	19.71	0.00	66	2.77	11.09	872.08
MW-704	7/11/2018	**7.53	2110	18.59	0.00	52	1.27	14.47	868.70
MW-704	8/16/2018	**7.54	1970	21.90	0.40	-35	4.78	15.74	867.43
MW-704	12/3/2018	7.46	2110	13.33	10.60	-25	0.42	12.53	870.64
MW-705	5/24/2018	7.29	1690	17.97	0.00	-63	1.16	9.65	846.30
MW-705	12/4/2018	7.32	1840	6.62	7.60	-29	0.00	9.54	846.41
MW-706	1/9/2018	*7.14	1641	14.37	0.88	NA	NA	8.71	845.57
MW-706	5/24/2018	7.44	2130	18.83	0.00	-69	2.12	8.42	845.86
MW-706	12/4/2018	7.42	2250	12.94	9.80	-50	0.66	9.45	844.83
MW-707B	5/24/2018	6.92	7530	18.17	4.70	80	0.97	5.79	853.01
MW-707B	12/4/2018	6.84	8070	13.18	22.40	50	0.45	6.54	852.26
MW-708	5/23/2018	7.39	1120	18.37	0.00	91	1.03	7.94	845.09
MW-708	12/4/2018	7.31	1220	13.46	10.10	22	0.72	7.86	845.17
TW-1	5/24/2018	7.60	1740	18.24	0.00	64	3.04	17.15	844.95
TW-1	12/4/2018	7.45	1780	12.57	6.10	10	0.00	17.10	845.00

* 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

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 DEMONSTRATION

GROUNDWATER MONITORING ALTERNATIVE SOURCE DEMONSTRATION REPORT OCTOBER 2017 GROUNDWATER MONITORING EVENT

CCR GROUNDWATER MONITORING
ALTERNATIVE SOURCE DEMONSTRATION REPORT
OCTOBER 2017 GROUNDWATER MONITORING EVENT

UPPER AQC IMPOUNDMENT
LA CYGNE GENERATING STATION
LA CYGNE, KANSAS

Presented To:

Kansas City Power & Light Company

Presented By:

SCS ENGINEERS
7311 West 130th Street, Suite 100
Overland Park, Kansas 66213
(913) 681-0030

April 2018
File No. 27217233.00

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

Table of Contents

Section **Page**

Appendices

1 REGULATORY FRAMEWORK

In accordance with the Coal Combustion Residuals (CCR) Final Rule § 257.94(e)(2), the owner or operator of the CCR unit may demonstrate 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. 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 Kansas City Power & Light Company's (KCP&L) La Cygne Generating Station has been completed in substantial compliance with the "Statistical Method Certification by a Qualified Professional Engineer" document dated October 12, 2017. Groundwater samples were collected and analyzed by October 17, 2017. A statistical analysis was conducted to determine whether there is a SSI over background values for each constituent listed in Appendix III to Part 257-Constituents for Detection Monitoring.

If an SSI is preliminarily identified by the prediction limit analysis, verification retesting will be performed in accordance with the certified statistical method and the resampling plan to verify the result is not due to an error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality. Up to two rounds of verification sampling and retesting may be conducted. Verification retesting with a "1 of 2" or "1 of 3" resampling plan is performed by collecting a verification sample(s) and comparing it to the calculated prediction limit. If the resulting concentration of any verification sample is not an SSI, then an SSI has not occurred.

Determinations of SSIs for the Upper AQC Impoundment at the La Cygne Generating Station were completed no later than January 15, 2018 and placed into the CCR Operating Record.

The completed statistical evaluation identified one Appendix III constituent, pH, below its lower prediction limit in monitoring well MW-706. The lower prediction limit for pH in monitoring well MW-706 is 7.14 standard units (S.U.). The detection monitoring sample was reported at 7. 05 S.U. The first verification sample was collected on January 9, 2018 with a result of 7.14 S.U., which is equal to the lower prediction limit. However the, Sanitas™ Output identified the 7.14 S.U. pH value in MW-706 as a confirmed statistically significant decrease (SSD) below background, due to numerical rounding. Therefore, in accordance with the Statistical Method Certification, the detection monitoring sample for pH from monitoring well MW-706 exceeds its prediction limit and is a confirmed SSD below background. An SSD is similar to an SSI in that it

indicates a statistically significant difference from background (i.e., potential impact) when a bracketed (upper and lower) prediction limit is computed such as is done for pH.

3 ALTERNATIVE SOURCE DEMONSTRATION

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

3.1 GROUNDWATER FLOW DIRECTION AND DATA SUMMARY

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. Although the groundwater flow directions indicated are for the October 2017 groundwater monitoring event, the flow directions shown are typical. As can be seen in the map, monitoring well MW-706 is located downgradient from the Upper AQC Impoundment indicating the SSD could potentially be caused by a release from the Upper AQC Impoundment. However, if this were the case, one would expect the pH value for MW-706 to be significantly different than that from other wells both upgradient and downgradient. The mean and median pH values for MW-706 (7.54 S.U. and 7.55 S.U., respectively) are nearly the same as the mean and median pH values for the 109 pH observations from across the groundwater monitoring system (7.52 S.U. and 7.54 S.U., respectively). Additionally the 7.05 S.U. value for the detection monitoring sample and the 7.14 S.U. value for the first verification sample is well above the minimum pH observed across the monitoring system of 6.5 S.U. This demonstrates that a source other than the Upper AQC Impoundment caused the SSD below background levels for pH in MW-706, or that the SSD resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality. A Summary Report for pH for all of the wells and data for the Upper AQC Impoundment is provided in **Appendix B**.

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 axes 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.

Although an SSD was only identified in well MW-706, the box and whiskers plot for pH in MW-706 was compared to box and whisker plots for pH in the other groundwater monitoring system wells for the Upper AQC Impoundment. The comparison indicates the pH levels in well

MW-706 are within the range of pH levels in both upgradient and downgradient wells across the site. This demonstrates that a source other than the Upper AQC Impoundment caused the SSD below background levels for pH, or that the SSD resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality. Box and whisker plots are provided in **Appendix C**.

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 the CCR monitoring system wells indicate pH levels for both upgradient and downgradient wells in the monitoring system. The pH level in well MW-706 is within the range of pH levels in both upgradient and downgradient wells across the site. This demonstrates that a source other than the Upper AQC Impoundment caused the SSD below background levels for pH, or that the SSD resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality. Time series plots are provided in **Appendix C**.

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 SSD below background levels, or that the SSD 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

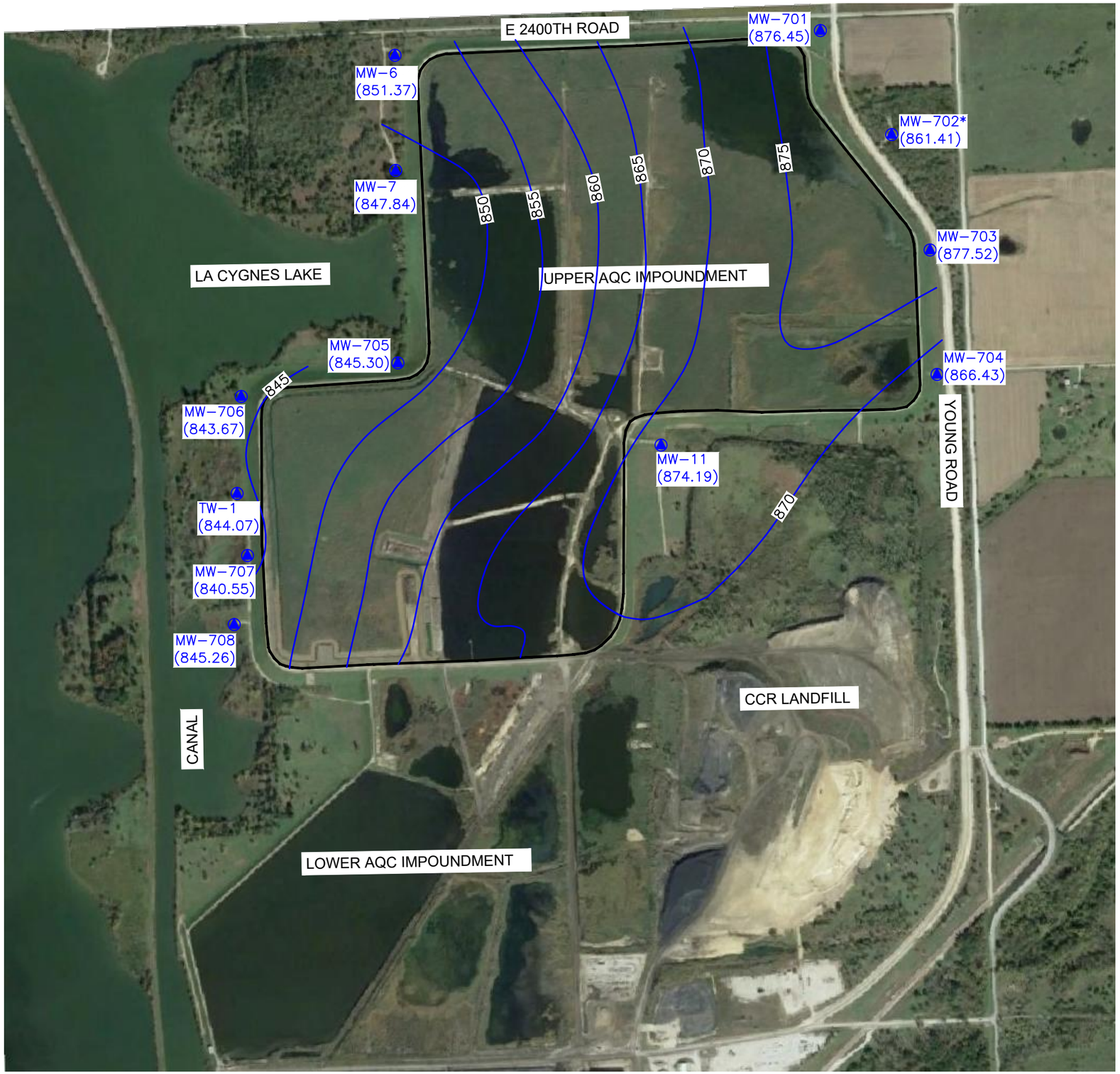
This report has been prepared and reviewed under the direction of a qualified groundwater scientist and qualified professional engineer. Please note that SCS Engineers does not warrant the work of regulatory agencies or other third parties supplying information used in the assimilation of this report. 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 signature of the certifying registered geologist and professional engineer on this document represents that to the best of his knowledge, information, and belief in the exercise of his professional judgement in accordance with the standard of practice, it is his professional opinion that the aforementioned information is accurate as of the date of such signature. Any opinion or decisions by him are made on the basis of his 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 (877.52) CCR GROUNDWATER MONITORING SYSTEM WELLS (GROUNDWATER ELEVATION)
- —875— GROUNDWATER SURFACE ELEVATIONS (REPRESENTATIVE FOR THIS UNIT)
- MW–702* INDICATES WELL NOT USE IN POTENTIOMETRIC SURFACE MAP CREATION

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
0	-	-
1	-	-
2	-	-
3	-	-
4	-	-
5	-	-

SHEET TITLE
POTENTIOMETRIC SURFACE MAP (OCT 2017)
UPPER AQC IMPOUNDMENT

PROJECT TITLE
CCR 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. 27217233.00
DSN. BY: RCW
DWN. BY: RCW
CHK. BY: JRR
O/A RVW BY: JRR
PROJ. MGR: JRR

CADD FILE:
LA CYGNE UAQC_CCR ASD_FIG 1.DWG

DATE:
4/16/18

FIGURE NO.
1

N:\KCPL\Projects\Groundwater\DWG\La Cygne\2018\CCR ASD\La Cygne UAQC_CCR ASD_Fig 1.dwg Apr 16, 2018 - 10:00am Layout Name: Fig 1 By: 4121rcw

Appendix B

Summary Report for pH

Summary Report

Constituent: pH Analysis Run 4/11/2018 11:58 AM View: Upper AQC III
LaCygne Client: SCS Engineers Data: LaC GW Data

For observations made between 6/6/2016 and 1/9/2018, a summary of the selected data set:

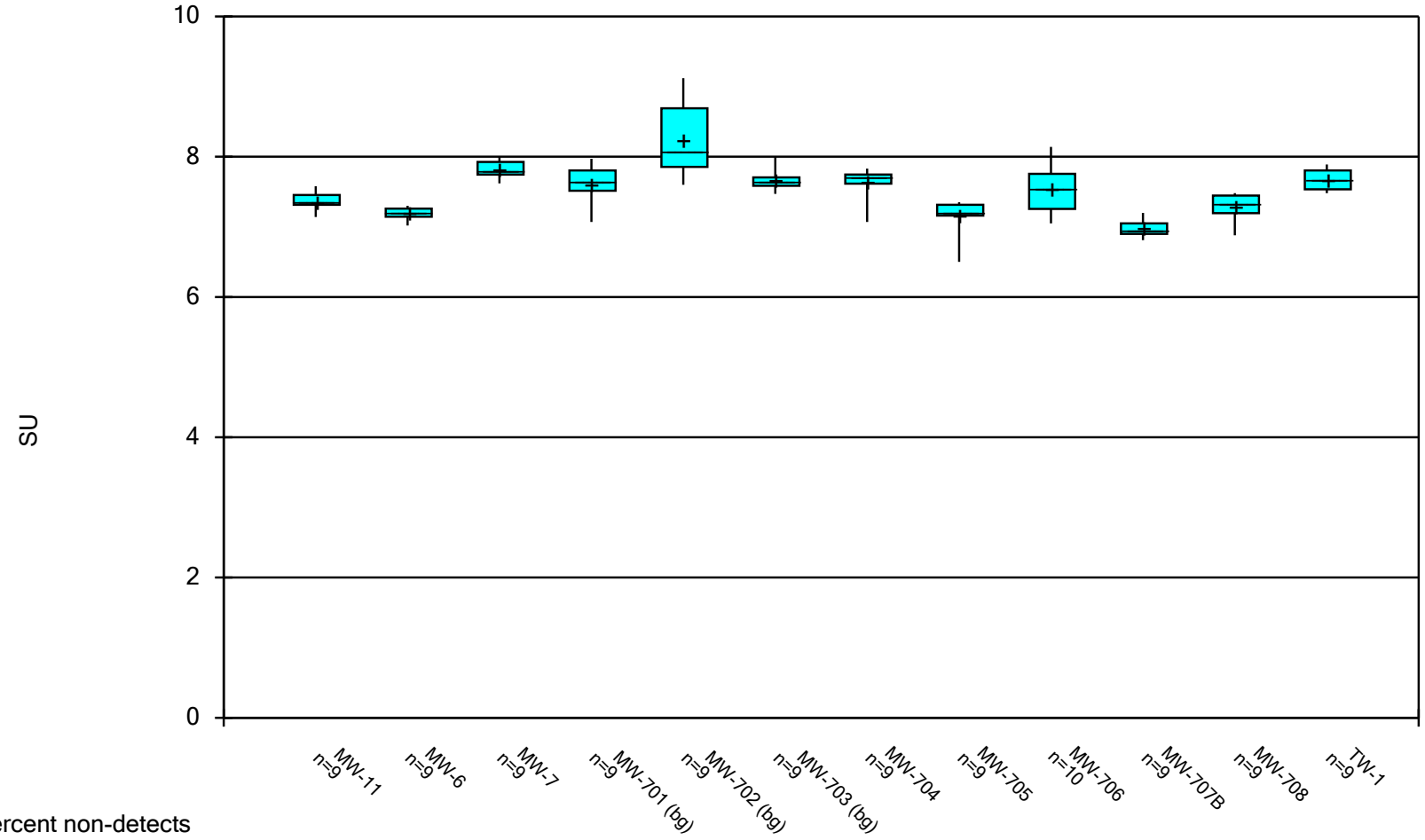
Observations = 109
ND/Trace = 0
Wells = 12
Minimum Value = 6.5
Maximum Value = 9.12
Mean Value = 7.52
Median Value = 7.54
Standard Deviation = 0.396
Coefficient of Variation = 0.0526
Skewness = 0.843

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
MW-11	9	0	7.14	7.58	7.37	7.36	0.124	0.0169	-0.0486
MW-6	9	0	7.02	7.3	7.2	7.2	0.0865	0.012	-0.869
MW-7	9	0	7.62	8	7.82	7.79	0.118	0.0151	0.0828
MW-701 (bg)	9	0	7.07	7.97	7.62	7.63	0.263	0.0345	-0.653
MW-702 (bg)	9	0	7.6	9.12	8.25	8.09	0.499	0.0606	0.55
MW-703 (bg)	9	0	7.47	8	7.66	7.63	0.148	0.0194	1.32
MW-704	9	0	7.07	7.83	7.63	7.71	0.223	0.0292	-2.01
MW-705	9	0	6.5	7.35	7.17	7.21	0.26	0.0363	-2.13
MW-706	10	0	7.05	8.14	7.54	7.55	0.316	0.0419	0.188
MW-707B	9	0	6.81	7.2	6.98	6.95	0.115	0.0164	0.406
MW-708	9	0	6.88	7.48	7.29	7.32	0.189	0.0259	-1.16
TW-1	9	0	7.48	7.89	7.67	7.67	0.141	0.0184	0.126

Appendix C

Box and Whiskers Plots

Box & Whiskers Plot



%nds = percent non-detects
n = number of samples
bg = background/upgradinet data

Constituent: pH Analysis Run 3/7/2018 10:32 AM View: Upper AQC III

LaCygne Client: SCS Engineers Data: LaC GW Data

The basic box plot 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. The mean is denoted by a "+".

Box & Whiskers Plot

Constituent: pH (SU) Analysis Run 3/7/2018 10:35 AM View: Upper AQC III

LaCygne Client: SCS Engineers Data: LaC GW Data

	MW-11	MW-6	MW-7	MW-701 (bg)	MW-702 (bg)	MW-703 (bg)	MW-704	MW-705	MW-706
6/6/2016	7.37								
6/7/2016				7.63		7.63	7.74	7.3	
6/8/2016		7.19	7.77		8.86				7.54
6/9/2016									
6/23/2016									
8/9/2016				7.54	9.12	7.65	7.65	7.35	7.55
8/10/2016		7.18	7.83						
8/11/2016	7.3								
10/11/2016				7.67	8.25	7.59	7.71	7.21	8.14
10/12/2016	7.33								
10/13/2016		7.24	8						
12/6/2016				7.63			7.66		7.6
12/7/2016						8		6.5	
12/8/2016					8.07				
12/9/2016	7.58								
12/12/2016		7.27	7.96						
2/7/2017				7.94		7.76	7.83		7.84
2/8/2017			7.79		8.09				
2/9/2017	7.36	7.25						7.33	
4/4/2017				7.62		7.64	7.75		7.67
4/5/2017		7.3	7.89		8.52				
4/6/2017	7.41							7.14	
6/13/2017				7.07			7.07	7.18	7.53
6/14/2017						7.62			
6/15/2017	7.5	7.2	7.75		7.84				
8/8/2017				7.97			7.71		
8/9/2017		7.02	7.62		7.87			7.29	7.37
8/10/2017	7.14					7.47			
10/3/2017				7.49	7.6		7.58	7.21	
10/4/2017									7.05
10/5/2017	7.33	7.11	7.74			7.58			
1/9/2018									7.14
Median	7.36	7.2	7.79	7.63	8.09	7.63	7.71	7.21	7.55
LowerQ.	7.32	7.15	7.75	7.52	7.86	7.59	7.62	7.16	7.26
UpperQ.	7.46	7.26	7.93	7.81	8.69	7.71	7.75	7.32	7.76
Min	7.14	7.02	7.62	7.07	7.6	7.47	7.07	6.5	7.05
Max	7.58	7.3	8	7.97	9.12	8	7.83	7.35	8.14
Mean	7.37	7.2	7.82	7.62	8.25	7.66	7.63	7.17	7.54

Box & Whiskers Plot

Constituent: pH (SU) Analysis Run 3/7/2018 10:35 AM View: Upper AQC III

LaCygne Client: SCS Engineers Data: LaC GW Data

	MW-707B	MW-708	TW-1
6/6/2016			
6/7/2016		7.43	
6/8/2016			
6/9/2016			7.83
6/23/2016	7.03		
8/9/2016	6.81		7.54
8/10/2016		7.48	
8/11/2016			
10/11/2016	6.95		7.69
10/12/2016		7.46	
10/13/2016			
12/6/2016	6.92		7.53
12/7/2016			
12/8/2016			
12/9/2016		7.32	
12/12/2016			
2/7/2017	6.95		7.89
2/8/2017			
2/9/2017		7.32	
4/4/2017	7.2		7.78
4/5/2017			
4/6/2017		7.12	
6/13/2017	7.06		7.67
6/14/2017		7.33	
6/15/2017			
8/8/2017	7.04	6.88	7.65
8/9/2017			
8/10/2017			
10/3/2017	6.88		7.48
10/4/2017		7.27	
10/5/2017			
1/9/2018			
Median	6.95	7.32	7.67
LowerQ.	6.9	7.2	7.54
UpperQ.	7.05	7.45	7.81
Min	6.81	6.88	7.48
Max	7.2	7.48	7.89
Mean	6.98	7.29	7.67

Box & Whiskers Plot

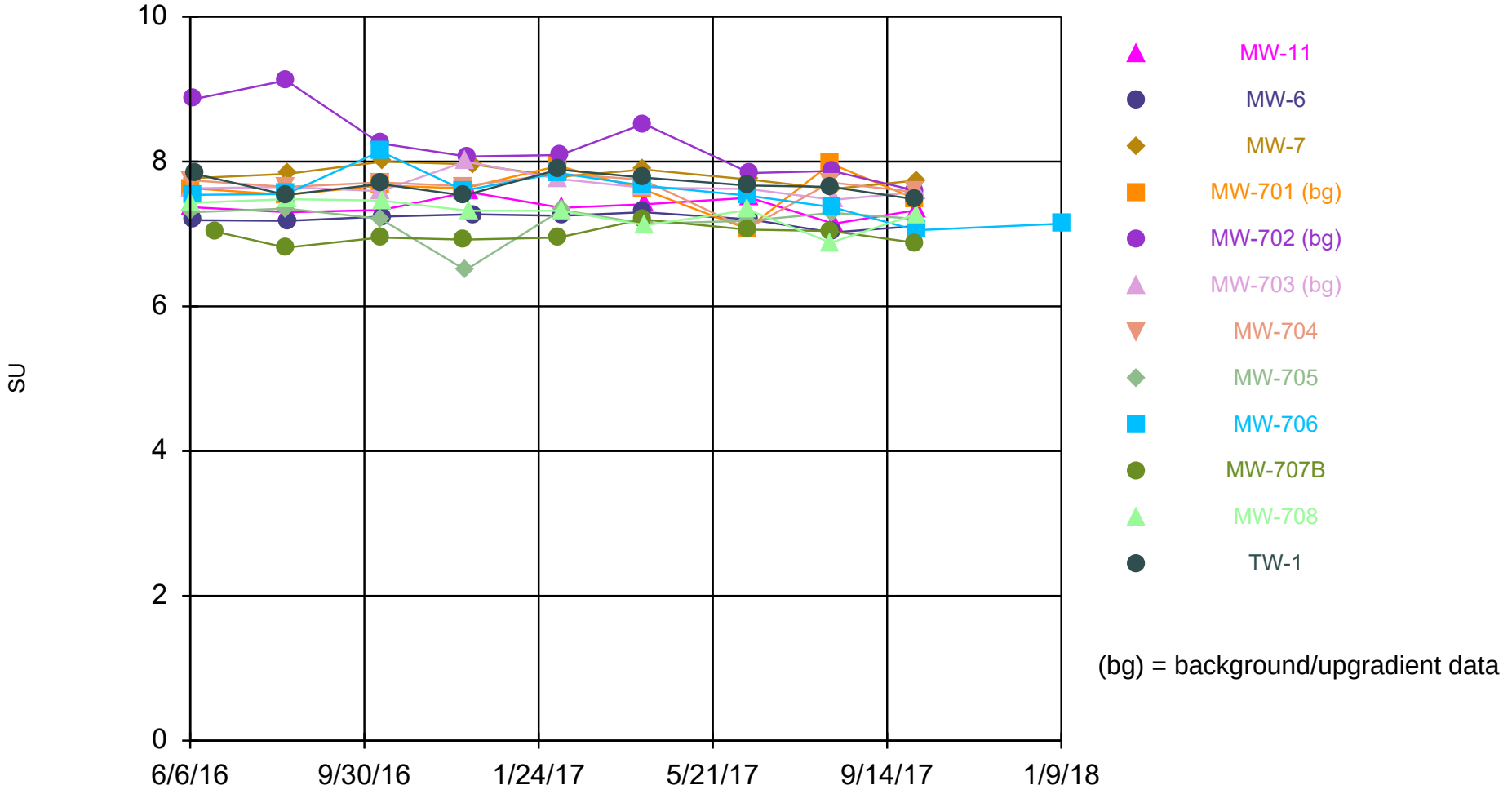
LaCygne Client: SCS Engineers Data: LaC GW Data Printed 3/7/2018, 10:35 AM

Constituent	Well	N	Mean	Std. Dev.	Std. Err.	Median	Min.	Max.	%NDs
pH (SU)	MW-11	9	7.37	0.124	0.0414	7.36	7.14	7.58	0
pH (SU)	MW-6	9	7.2	0.0865	0.0288	7.2	7.02	7.3	0
pH (SU)	MW-7	9	7.82	0.118	0.0394	7.79	7.62	8	0
pH (SU)	MW-701 (bg)	9	7.62	0.263	0.0877	7.63	7.07	7.97	0
pH (SU)	MW-702 (bg)	9	8.25	0.499	0.166	8.09	7.6	9.12	0
pH (SU)	MW-703 (bg)	9	7.66	0.148	0.0494	7.63	7.47	8	0
pH (SU)	MW-704	9	7.63	0.223	0.0742	7.71	7.07	7.83	0
pH (SU)	MW-705	9	7.17	0.26	0.0868	7.21	6.5	7.35	0
pH (SU)	MW-706	10	7.54	0.316	0.1	7.55	7.05	8.14	0
pH (SU)	MW-707B	9	6.98	0.115	0.0382	6.95	6.81	7.2	0
pH (SU)	MW-708	9	7.29	0.189	0.063	7.32	6.88	7.48	0
pH (SU)	TW-1	9	7.67	0.141	0.0471	7.67	7.48	7.89	0

Appendix D

Time Series Plots

Time Series



Constituent: pH Analysis Run 3/7/2018 10:41 AM View: Upper AQC III

LaCygne Client: SCS Engineers Data: LaC GW Data

Time Series

Constituent: pH (SU) Analysis Run 3/7/2018 10:43 AM View: Upper AQC III

LaCygne Client: SCS Engineers Data: LaC GW Data

	MW-11	MW-6	MW-7	MW-701 (bg)	MW-702 (bg)	MW-703 (bg)	MW-704	MW-705	MW-706
6/6/2016	7.37								
6/7/2016				7.63		7.63	7.74	7.3	
6/8/2016		7.19	7.77		8.86				7.54
6/9/2016									
6/23/2016									
8/9/2016				7.54	9.12	7.65	7.65	7.35	7.55
8/10/2016		7.18	7.83						
8/11/2016	7.3								
10/11/2016				7.67	8.25	7.59	7.71	7.21	8.14
10/12/2016	7.33								
10/13/2016		7.24	8						
12/6/2016				7.63			7.66		7.6
12/7/2016						8		6.5	
12/8/2016					8.07				
12/9/2016	7.58								
12/12/2016		7.27	7.96						
2/7/2017				7.94		7.76	7.83		7.84
2/8/2017			7.79		8.09				
2/9/2017	7.36	7.25						7.33	
4/4/2017				7.62		7.64	7.75		7.67
4/5/2017		7.3	7.89		8.52				
4/6/2017	7.41							7.14	
6/13/2017				7.07			7.07	7.18	7.53
6/14/2017						7.62			
6/15/2017	7.5	7.2	7.75		7.84				
8/8/2017				7.97			7.71		
8/9/2017		7.02	7.62		7.87			7.29	7.37
8/10/2017	7.14					7.47			
10/3/2017				7.49	7.6		7.58	7.21	
10/4/2017									7.05
10/5/2017	7.33	7.11	7.74			7.58			
1/9/2018									7.14

Time Series

Constituent: pH (SU) Analysis Run 3/7/2018 10:43 AM View: Upper AQC III

LaCygne Client: SCS Engineers Data: LaC GW Data

	MW-707B	MW-708	TW-1
6/6/2016			
6/7/2016		7.43	
6/8/2016			
6/9/2016			7.83
6/23/2016	7.03		
8/9/2016	6.81		7.54
8/10/2016		7.48	
8/11/2016			
10/11/2016	6.95		7.69
10/12/2016		7.46	
10/13/2016			
12/6/2016	6.92		7.53
12/7/2016			
12/8/2016			
12/9/2016		7.32	
12/12/2016			
2/7/2017	6.95		7.89
2/8/2017			
2/9/2017		7.32	
4/4/2017	7.2		7.78
4/5/2017			
4/6/2017		7.12	
6/13/2017	7.06		7.67
6/14/2017		7.33	
6/15/2017			
8/8/2017	7.04	6.88	7.65
8/9/2017			
8/10/2017			
10/3/2017	6.88		7.48
10/4/2017		7.27	
10/5/2017			
1/9/2018			