2021 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT

CCR LANDFILL
SIBLEY GENERATING STATION
SIBLEY, MISSOURI

Presented To:
Evergy Missouri West, Inc.

SCS ENGINEERS

27213169.21 | January 2022

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

CERTIFICATIONS

I, John R. Rockhold, being a qualified groundwater scientist and Registered Geologist in the State of Missouri, do hereby certify that the 2021 Annual Groundwater Monitoring and Corrective Action Report for the CCR Landfill at the Sibley Generating Station was prepared by me or under my direct supervision and fulfills the requirements of 40 CFR 257.90(e).

John R. Rockhold, R.G.

SCS Engineers

I, Douglas L. Doerr, being a qualified licensed Professional Engineer in the State of Missouri, do hereby certify that the 2021 Annual Groundwater Monitoring and Corrective Action Report for the CCR Landfill at the Sibley Generating Station was prepared by me or under my direct supervision and fulfills the requirements of 40 CFR 257.90(e).

Douglas L. Doerr, P.E.

SCS Engineers

Revision Number	Revision Date	Revision Sections	Summary of Revisions

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Section **Page**

Appendices

1 INTRODUCTION

This 2021 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), and subsequent revisions. Specifically, this report was prepared for Evergy Missouri West, Inc. (Evergy) 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 2021 Annual Groundwater Monitoring and Corrective Action Report for the CCR Landfill at the Sibley Generating Station.

1.1 § 257.90(e)(6) SUMMARY

A section at the beginning of the annual report that provides an overview of the current status of groundwater monitoring and corrective action programs for the CCR unit. At a minimum, the summary must specify all of the following:

1.1.1 § 257.90(e)(6)(i) Initial Monitoring Program

At the start of the current annual reporting period, whether the CCR unit was operating under the detection monitoring program in § 257.94 or the assessment monitoring program in § 257.95;

At the start of the current annual reporting period, (January 1, 2021), the CCR Landfill was operating under a detection monitoring program in compliance with § 257.94.

1.1.2 § 257.90(e)(6)(ii) Final Monitoring Program

At the end of the current annual reporting period, whether the CCR unit was operating under the detection monitoring program in § 257.94 or the assessment monitoring program in § 257.95;

At the end of the current annual reporting period, (December 31, 2021), the CCR Landfill was operating under a detection monitoring program in compliance with § 257.94.

1.1.3 § 257.90(e)(6)(iii) Statistically Significant Increases

If it was determined that there was a statistically significant increase over background for one or more constituents listed in Appendix III to this part pursuant to § 257.94(e):

(A) Identify those constituents listed in Appendix III to this part and the names of the monitoring wells associated with such an increase; and

Monitoring Event	Monitoring Well	Constituent	ASD
Fall 2020	MW-506	Sulfate	Successful
Fall 2020	MW-512	Calcium	Successful
Fall 2020	MW-512	Chloride	Successful
Fall 2020	MW-512	Sulfate	Successful
Fall 2020	MW-512	Total Dissolved Solids	Successful

Monitoring Event	Monitoring Well	Constituent	ASD
Spring 2021	MW-505	Calcium	Successful
Spring 2021	MW-505	Total Dissolved Solids	Successful
Spring 2021	MW-506	Chloride	Successful
Spring 2021	MW-506	Sulfate	Successful
Spring 2021	MW-512	Calcium	Successful
Spring 2021	MW-512	Chloride	Successful
Spring 2021	MW-512	Sulfate	Successful
Spring 2021	MW-512	Total Dissolved Solids	Successful

(B) Provide the date when the assessment monitoring program was initiated for the CCR unit.

Not applicable because an assessment monitoring program was not initiated.

1.1.4 § 257.90(e)(6)(iv) Statistically Significant Levels

If it was determined that there was a statistically significant level above the groundwater protection standard for one or more constituents listed in Appendix IV to this part pursuant to § 257.95(g) include all of the following:

(A) Identify those constituents listed in Appendix IV to this part and the names of the monitoring wells associated with such an increase;

Not applicable because there was no assessment monitoring conducted.

(B) Provide the date when the assessment of corrective measures was initiated for the CCR unit;

Not applicable because there was no assessment of corrective measures initiated for the CCR Unit.

(C) Provide the date when the public meeting was held for the assessment of corrective measures for the CCR unit*; and*

Not applicable because there was no assessment of corrective measures initiated for the CCR Unit.

(D) Provide the date when the assessment of corrective measures was completed for the CCR unit.

Not applicable because there was no assessment of corrective measures initiated for the CCR Unit.

1.1.5 § 257.90(e)(6)(v) Selection of Remedy

Whether a remedy was selected pursuant to § 257.97 during the current annual reporting period, and if so, the date of remedy selection; and

Not applicable because corrective measures are not required.

1.1.6 § 257.90(e)(6)(vi) Remedial Activities

Whether remedial activities were initiated or are ongoing pursuant to § 257.98 during the current annual reporting period.

Not applicable because corrective measures are not required.

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 CCR Landfill and all background (or upgradient) and downgradient monitoring wells with identification numbers for the CCR Landfill 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 CCR Landfill in 2021.

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 required to be conducted during the reporting period (2021). Samples collected in 2021 were collected and analyzed for Appendix III detection monitoring constituents. Results of the sampling events are provided in **Appendix B**, **Table 1** (Appendix III Detection Monitoring Results), and **Table 2** (Detection Monitoring Field Measurements). These tables include Fall 2020 semiannual detection monitoring event verification sample data collected and analyzed in 2021; Spring 2021 semiannual detection monitoring data, and verification sample data; and, the initial Fall 2021 semiannual detection monitoring data. The dates of sample collection and the monitoring program requiring the sample are also provided in these tables.

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 2021. Only detection monitoring was conducted in 2021.

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 2020 verification sampling and analyses per the certified statistical method,

b. completion of the statistical evaluation of the Fall 2020 semiannual detection monitoring sampling and analysis event per the certified statistical method,

c. completion of the 2020 Annual Groundwater Monitoring and Corrective Action Report,

d. completion of a successful alternative source demonstration for the Fall 2020 semiannual detection monitoring sampling and analysis event,

e. completion of the Spring 2021 semiannual detection monitoring sampling and analysis event with subsequent verification sampling per the certified statistical method,

f. completion of the statistical evaluation of the Spring 2021 semiannual detection monitoring sampling and analysis event per the certified statistical method,

g. completion of a successful alternative source demonstration for the Spring 2021 semiannual detection monitoring sampling and analysis event, and

h. initiation of the Fall 2021 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 (2022).

Completion of verification sampling and data analysis, and the statistical evaluation of Fall 2021 detection monitoring sampling and analysis event, and, if required, alternative source demonstration(s). Semiannual Spring and Fall 2022 groundwater sampling and analysis. Completion of the statistical evaluation of the Spring 2022 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 in **Appendix C**:

C.1 CCR Groundwater Monitoring Alternative Source Demonstration Report November 2020 Groundwater Monitoring Event, CCR Landfill, Sibley Generating Station (May 2021).

C.2 CCR Groundwater Monitoring Alternative Source Demonstration Report May 2021 Groundwater Monitoring Event, CCR Landfill, Sibley Generating Station (January 2022).

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.

2.6 § 257.90(e)(6) OVERVIEW SUMMARY

A section at the beginning of the annual report that provides an overview of the current status of groundwater monitoring and corrective action programs for the CCR unit.

§ 257.90(e)(6) is addressed in Section 1.1 of this report.

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 Sibley 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 Missouri West, Inc., for specific application to the Sibley Generating Station CCR Landfill. No warranties, express or implied, are intended or made.

APPENDIX A

FIGURES

Figure 1: Site Map

Figure 2: Potentiometric Surface Map (May 2021)

Figure 3: Potentiometric Surface Map (November 2021)

LEGEND:

● 601 GROUNDWATER MONITORING SYSTEM WELLS (GROUNDWATER ELEVATION)

UTILITY WASTE LANDFILL UNIT BOUNDARY

PERMITTED LANDFILL EXPANSION AREA

NOTES:

1. HORIZONTAL & VERTICAL DATUM: URS PLANS FOR CONSTRUCTION, KCP&L SIBLEY GENERATING STATION, DESIGN FILE 16530511.00001, DATED JANUARY 2010
2. AERIAL IMAGE BY TUKUH TECHNOLOGIES ON DECEMBER 10, 2021.
3. BOUNDARY AND MONITORING WELL WELL LOCATIONS SHOWN ARE APPROXIMATE.

200 0 200 400

SCALE FEET

REV.	DATE
–	–

SHEET TITLE
SITE MAP
CCR LANDFILL
CCR GROUNDWATER MONITORING SYSTEM

PROJECT TITLE
2021 GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT

CLIENT
EVERGY MISSOURI WEST, INC.
SIBLEY GENERATING STATION
SIBLEY, MISSOURI

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

PROJ. NO. 27213167.20 | DWN. BY: ALR | Q/A RVW BY: JRR
DSN. BY: ALR | CHK. BY: JRR | PROJ. MGR: JRF

CADD FILE: 20 – NOVEMBER_GW V2.DWG

DATE: 1/26/22

FIGURE NO. 1

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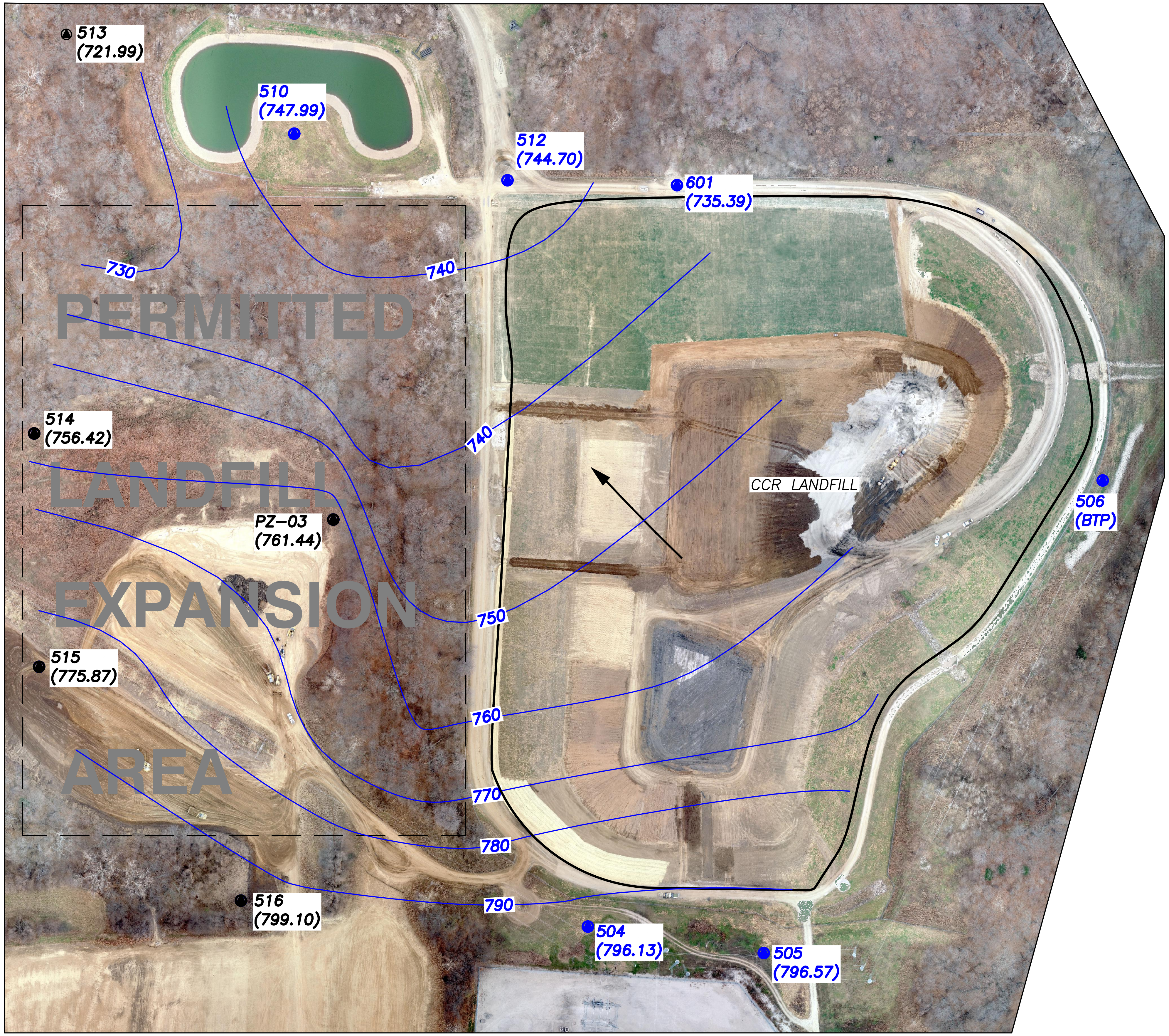

LEGEND:

760	GROUNDWATER POTENTIOMETRIC SURFACE ELEVATIONS (REPRESENTATIVE OF THIS UNIT)
601 (738.07)	GROUNDWATER MONITORING SYSTEM WELLS (GROUNDWATER ELEVATION)
514 (756.42)	LANDFILL EXPANSION WELLS
	CCR LANDFILL UNIT BOUNDARY
	GROUNDWATER FLOW DIRECTION
BTP	BELOW TOP OF PUMP

NOTES:

1. HORIZONTAL & VERTICAL DATUM: URS PLANS FOR CONSTRUCTION, KCP&L SIBLEY GENERATING STATION, DESIGN FILE 16530511.00001, DATED JANUARY 2010
2. AERIAL IMAGE BY TUKUH TECHNOLOGIES ON DECEMBER 10, 2021.
3. BOUNDARY AND MONITORING WELL LOCATIONS SHOWN ARE APPROXIMATE.

200 0 200 400

SCALE FEET

REV.	DATE
–	–

SHEET TITLE
POTENTIOMETRIC SURFACE MAP
(MAY 2021)

PROJECT TITLE
SIBLEY GROUNDWATER 2021

CLIENT
EVERGY MISSOURI WEST, INC.
SIBLEY GENERATING STATION
SIBLEY, MISSOURI

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

PROJ. NO. 27213167.20
DSN. BY: ALR
DWN. BY: ALR
CHK. BY: JRR
Q/A RVW BY: JRR
PROJ. MGR: JRF

CADD FILE: FIG 2 - MAY 2021 V2.DWG

DATE: 1/27/22

FIGURE NO. 2

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LEGEND:

- 760 — GROUNDWATER POTENTIOMETRIC SURFACE ELEVATIONS (REPRESENTATIVE OF THIS UNIT)
- 601 (738.07) — GROUNDWATER MONITORING SYSTEM WELLS (GROUNDWATER ELEVATION)
- 514 (756.04) — LANDFILL EXPANSION WELLS
- CCR LANDFILL UNIT BOUNDARY
- GROUNDWATER FLOW DIRECTION
- BTP — BELOW TOP OF PUMP

NOTES:

1. HORIZONTAL & VERTICAL DATUM: URS PLANS FOR CONSTRUCTION, KCP&L SIBLEY GENERATING STATION, DESIGN FILE 16530511.00001, DATED JANUARY 2010
2. AERIAL IMAGE BY TUKUH TECHNOLOGIES ON DECEMBER 10, 2021.
3. BOUNDARY AND MONITORING WELL LOCATIONS SHOWN ARE APPROXIMATE.
4. WATER LEVEL MEASUREMENTS COLLECTED ON NOVEMBER 15, 2021.

200 0 200 400

SCALE FEET

REV.	DATE
–	–

SHEET TITLE: POTENTIOMETRIC SURFACE MAP (NOVEMBER 2021)

PROJECT TITLE: SIBLEY GROUNDWATER 2021

CLIENT: EVERGY MISSOURI WEST, INC. SIBLEY GENERATING STATION SIBLEY, MISSOURI

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

PROJ. NO. 27213167.20 | DSN. BY: ALR | DWN. BY: ALR | CHK. BY: JRR | Q/A RVW BY: JRR | PROJ. MGR: JRF

CADD FILE: FIG 3 - NOVEMBER 2021 V2.DWG

DATE: 1/27/22

FIGURE NO. 3

APPENDIX B

TABLES

Table 1: Appendix III Detection Monitoring Results

Table 2: Detection Monitoring Field Measurements

Table 1
CCR Landfill
Appendix III Detection Monitoring Results
Evergy Sibley 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-504	5/24/2021	<0.200	34.1	<1.00	0.201	7.29	32.4	174
MW-504	11/15/2021	<0.200	35.3	<1.00	0.178 (B)	6.31	27.9	192
MW-505	5/24/2021	<0.200	34.4	1.11	0.180	5.91	32.6	181
MW-505	7/19/2021	---	*34.8	---	---	*6.65	*14.4	*184
MW-505	9/2/2021	---	*34.1	---	---	**6.97	---	*188
MW-505	11/15/2021	<0.200	27.7	1.13	0.181 (B)	6.37	20.4	181
MW-506	2/3/2021	---	---	---	---	**7.32	*87.3	---
MW-506	3/1/2021	---	---	---	---	**7.21	*88.9	---
MW-506	5/24/2021	<0.200	91.4	8.09	0.344	6.62	89.1	433
MW-506	7/19/2021	---	---	*8.01	---	*6.86	*89.1	---
MW-506	9/2/2021	---	---	*8.03	---	**6.98	*88.7	---
MW-506	11/15/2021	<0.200	98.8	7.78	0.275 (B)	6.65	89.8	466
MW-510	5/24/2021	<0.200	116	3.53	0.338	6.36	14.5	468
MW-510	7/19/2021	---	---	---	---	*7.36	---	---
MW-510	11/15/2021	<0.200	124	3.33	0.271 (B)	6.94	21.4	486
MW-512	2/3/2021	---	*117	*10.5	---	**7.34	*99.8	*487
MW-512	3/1/2021	---	*117	*10.4	---	**6.86	*99.9	*508
MW-512	5/24/2021	<0.200	114	10.6	0.318	7.17	110	505
MW-512	7/19/2021	---	*120	*10.2	---	**6.78	*104	*524
MW-512	9/2/2021	---	*114	*10.2	---	**7.13	*107	*555
MW-512	11/15/2021	<0.200	121	9.69	0.257 (B)	6.25	93.1	527
MW-601	5/24/2021	<0.200	97.4	3.40	0.278	6.31	9.71	381
MW-601	7/19/2021	---	---	---	---	*7.21	---	---
MW-601	11/15/2021	<0.200	95.6	3.44	0.234 (B)	6.71	9.32	399

* 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
B - Same analyte is found in the associated laboratory blank
--- Not Sampled

Table 2
CCR Landfill
Detection Monitoring Field Measurements
Evergy Sibley 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-504	5/24/2021	7.29	325	16.00	0.0	141	2.54	20.19	796.13
MW-504	11/15/2021	6.31	289	15.46	0.0	-33	2.80	21.79	794.53
MW-505	5/24/2021	5.91	303	17.38	0.0	199	3.21	18.40	796.57
MW-505	7/19/2021	*6.65	264	17.79	0.0	162	9.59	25.38	789.59
MW-505	9/2/2021	**6.97	282	18.28	0.0	162	5.56	27.55	787.42
MW-505	11/15/2021	6.37	282	15.21	0.0	125	4.93	27.57	787.40
MW-506	2/3/2021	**7.32	639	15.19	0.0	144	5.59	BTP	NA
MW-506	3/1/2021	**7.21	736	11.94	0.0	63	3.08	BTP	NA
MW-506	5/24/2021	6.62	707	20.53	0.0	158	4.99	BTP	NA
MW-506	7/19/2021	*6.86	679	21.12	0.0	161	3.13	BTP	NA
MW-506	9/2/2021	**6.98	720	21.43	0.7	127	6.33	BTP	NA
MW-506	11/15/2021	6.65	738	17.75	0.0	117	4.22	BTP	NA
MW-510	5/24/2021	6.36	765	21.23	0.0	111	1.25	37.80	747.99
MW-510	7/19/2021	*7.36	817	17.93	1.3	31	0.83	37.89	747.90
MW-510	11/15/2021	6.94	828	17.03	1.5	75	6.59	42.56	743.23
MW-512	2/3/2021	**7.34	770	13.36	0.0	146	8.98	29.98	740.15
MW-512	3/1/2021	**6.86	836	12.69	0.0	80	5.30	30.48	739.65
MW-512	5/24/2021	7.17	962	15.00	6.7	123	2.73	25.42	744.71
MW-512	7/19/2021	**6.78	778	19.13	0.0	163	3.32	27.11	743.02
MW-512	9/2/2021	**7.13	852	20.93	0.0	168	1.43	29.40	740.73
MW-512	11/15/2021	6.25	865	14.69	0.0	187	8.69	31.75	738.38
MW-601	5/24/2021	6.31	694	18.15	0.0	94	0.00	45.51	735.39
MW-601	7/19/2021	*7.21	702	18.29	0.0	92	0.11	45.73	735.17
MW-601	11/15/2021	6.71	702	15.39	0.0	75	0.00	46.15	734.75

* 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

BTP - Below Top of Pump

APPENDIX C

ALTERNATIVE SOURCE DEMONSTRATIONS

C.1 Groundwater Monitoring Alternative Source Demonstration Report November 2020 Groundwater Monitoring Event, CCR Landfill, Sibley Generating Station (May 2021)

C.2 Groundwater Monitoring Alternative Source Demonstration Report May 2021 Groundwater Monitoring Event, CCR Landfill, Sibley Generating Station (January 2022)

C.1 Groundwater Monitoring Alternative Source Demonstration Report November 2020 Groundwater Monitoring Event, CCR Landfill, Sibley Generating Station (May 2021)

CCR GROUNDWATER MONITORING
ALTERNATIVE SOURCE DEMONSTRATION REPORT
NOVEMBER 2020 GROUNDWATER MONITORING EVENT

CCR LANDFILL

Sibley Generating Station
Evergy Missouri West, Inc.
Sibley, Missouri

SCS ENGINEERS

May 2021
File No. 27213169.20

8575 W. 110th Suite 100
Overland Park, KS 66210
913-749-0700

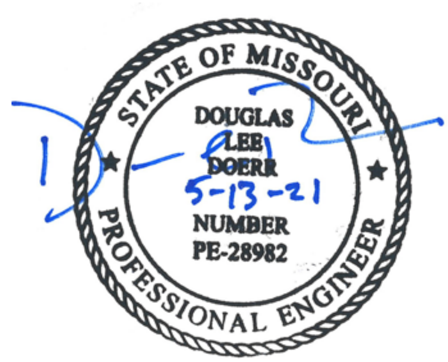
CERTIFICATIONS

I, John R. Rockhold, being a qualified groundwater scientist and Registered Geologist in the State of Missouri, do hereby certify the accuracy of the information in the CCR Groundwater Monitoring Alternative Source Demonstration Report for the CCR Landfill at the Sibley 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, R.G.

SCS Engineers

I, Douglas L. Doerr, being a qualified licensed Professional Engineer in the State of Missouri, do hereby certify the accuracy of the information in the CCR Groundwater Monitoring Alternative Source Demonstration Report for the CCR Landfill at the Sibley 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

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 CCR Landfill at the Sibley 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 November 11, 2020. Review and validation of the results from the November 2020 Detection Monitoring Event was completed on December 24, 2020, 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 February 3, 2021 and March 1, 2021.

The completed statistical evaluation identified one Appendix III constituent above the prediction limit established for monitoring well MW-506 and four Appendix III constituents above the prediction limits established for monitoring well MW-512.

Constituent/Monitoring Well	*UPL	Observation November 11, 2020	1st Verification February 3, 2021	2nd Verification March 1, 2021
Calcium				
MW-512	111.3	115	117	117
Chloride				
MW-512	5.094	9.75	10.5	10.4
Total Dissolved Solids				
MW-512	466.4	508	487	508

Constituent/Monitoring Well	*UPL	Observation November 11, 2020	1st Verification February 3, 2021	2nd Verification March 1, 2021
Sulfate				
MW-506	76.83	87	87.3	88.9
MW-512	44.8	92.6	99.8	99.9

*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 identified five SSIs above the background prediction limits. These include sulfate at monitoring well MW-506 and calcium, chloride, total dissolved solids, and sulfate at monitoring well MW-512.

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. For the above-identified SSIs for the CCR Landfill at the Sibley Generating Station, there are multiple lines of supporting evidence to indicate the above SSIs were not caused by a release from the CCR Landfill. Select multiple lines of supporting evidence are described as follows.

3.1 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 (i.e. “spikes”). 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.

The time series plot for chloride in monitoring well MW-512 was compared to time series plots for chloride in several upgradient and side-gradient non-CCR monitoring system wells installed for future state-permitted landfill expansion purposes. Chloride comparisons indicate the concentrations in MW-512 are near concentration levels for non-impacted groundwater in the vicinity of the CCR Landfill and the non-impacted groundwater can fluctuate naturally within a given non-impacted well such as MW-515 and PZ-03.

The time series plot for TDS in monitoring well MW-512 was compared to time series plots for TDS in several upgradient and side-gradient non-CCR monitoring system wells installed for future state-permitted landfill expansion purposes. TDS comparisons indicate the concentrations in MW-512 are within the range of concentration levels for non-impacted groundwater in the vicinity of the CCR Landfill.

Time series plots for sulfate in monitoring wells MW-506 and MW-512 were compared to time series plots for sulfate in several upgradient and side-gradient non-CCR monitoring system wells installed for future state-permitted landfill expansion purposes. Sulfate comparisons indicate the concentrations in MW-512 are within or very near the range of concentration levels for non-impacted groundwater in the vicinity of the CCR Landfill; specifically MW-515. Additionally, there are increasing concentrations in upgradient well

MW-504 and large variations of concentrations in MW-515, both of which have not been impacted by the landfill.

Figure 1 in **Appendix A** shows these upgradient and non-CCR monitoring system wells and their relationships to groundwater flow near and beneath the CCR Landfill. Because the non-CCR monitoring system wells are located in a nearby area where they could not be impacted by the landfill due to their upgradient and side-gradient locations, and exhibit variability that includes concentrations within the range or similar to those seen in MW-506 and MW-512, the observed concentrations are within the range of expected natural spatial variation within and between wells. This demonstrates that a source other than the CCR Landfill could have caused the SSIs over the background levels, or that the SSIs could have resulted from natural variation in groundwater quality. Time series plots are provided in **Appendix B**.

3.2 TREND ANALYSIS

Trend analysis was performed to evaluate for statistically significant trends utilizing Sen's Slope/Mann-Kendall Statistical Analysis. Sen's Slope/Mann-Kendall statistical analysis is used to determine if the data exhibits an SSI or statistically significant decreasing (SSD) trend. A trend is the general increase or decrease in observed values of a variable over time. A trend analysis can be used to determine the significance of an apparent trend and to estimate the magnitude of that trend. The Mann-Kendall test is nonparametric, meaning that it does not depend on an assumption of a particular underlying distribution. The test uses only the relative magnitude of data rather than actual values. Therefore, missing values are allowed, and values that are recorded as non-detects by the laboratory can still be used in the statistical analysis by assigning values equal to half their detection limits. Sen's Slope is a simple nonparametric procedure developed to estimate the true slope. The advantage of this method over linear regression is that it is not greatly affected by gross data errors or outliers, and can be computed when data are missing.

The Sen's Slope/Mann-Kendall Statistical Analysis was performed at the 98 percent confidence level utilizing the statistical program Sanitas™. Calcium data from December 2015 through the most recent data for upgradient wells MW-504 and MW-505 and downgradient well MW-512 were used to preform trend analysis. The trend analysis for calcium indicates upgradient well MW-505 and downgradient well MW-512 both have increasing trends. Since an upgradient well has an increasing trend due to natural conditions not due to the unit, it is also likely the downgradient wells can increase due to natural conditions not due to the unit.

Sulfate data from December 2015 through the most recent data for upgradient wells MW-504 and MW-505 and downgradient wells MW-506 and MW-512 were used to preform trend analysis. The trend analysis for sulfate indicates upgradient well MW-504 and downgradient wells MW-506 and MW-512 have increasing trends. Since an upgradient well has an increasing trend due to natural conditions not due to the unit, it is also likely the downgradient wells can increase due to natural conditions not due to the unit.

These trend analyses demonstrate that a source other than the CCR Landfill could have caused the SSIs over the background level for calcium and sulfate or that the SSIs resulted from natural variation in groundwater quality. Trend analyses for calcium and sulfate are provided in **Appendix C**.

3.3 PIPER DIAGRAM 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 generated for upgradient wells 504 and MW-505, downgradient wells MW-506 and MW-512, and landfill leachate is provided in **Appendix D** along with analytical results. The piper diagram indicates the groundwater from these four wells have similar geochemical characteristics and do not exhibit the same geochemical characteristics as the leachate. The groundwater and the leachate plot in different hydrochemical facies indicating there is no mixing of the two types of water (groundwater and leachate) and that both upgradient and downgradient groundwater characteristics are different from the leachate. This helps demonstrate that a source other than the CCR Landfill caused the SSIs over the background levels, or that the SSIs resulted from natural variation in groundwater quality.

3.4 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, 25^{th} and 75^{th} 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.

The box and whiskers plot for chloride in monitoring well MW-512 was compared to box and whisker plots for chloride in several upgradient and side-gradient non-CCR monitoring system wells installed for future state-permitted landfill expansion purposes. Chloride comparisons indicate the concentrations in MW-512 are generally within expected concentration levels for non-impacted groundwater in the vicinity of the CCR Landfill.

The box and whiskers plot for sulfate in monitoring well MW-512 was compared to box and whisker plots for sulfate in several upgradient and side-gradient non-CCR monitoring system wells installed for future state-permitted landfill expansion purposes. Sulfate comparisons indicate the concentrations in MW-512 are generally within the range of concentration levels for non-impacted groundwater in the vicinity of the CCR Landfill; specifically MW-515.

Figure 1 in **Appendix A** shows these upgradient and non-CCR monitoring system wells and their relationships to groundwater flow near and beneath the CCR Landfill. Because the non-CCR monitoring system wells are located in a nearby area where they could not be impacted by the landfill due to their upgradient and side-gradient locations, and exhibit variability that includes concentrations similar to those seen in MW-506 and MW-512, the observed concentrations are within the range of expected natural spatial variation within and between wells. This demonstrates that a source other than the CCR Landfill caused the SSIs over the background levels, or that the SSIs resulted from natural variation in groundwater quality. Box and whisker plots are provided in **Appendix E**.

3.5 BINARY PLOTS

Binary plots are another way to visualize data and allow evaluation of mixing of various waters. Binary plots for the monitoring wells and leachate were prepared for pairs of highly mobile constituents. These include chloride - sulfate, boron - sulfate, and boron - chloride. The chloride – sulfate plot identifies the mixing zone between the mean concentrations for upgradient groundwater (MW-504 and MW-505) and leachate. If leachate were mixing with upgradient groundwater, the data for the downgradient wells would fall within the mixing zone on the plot; however, the data for the downgradient wells falls below the mixing zone. The boron – sulfate and boron - chloride plots identify the mixing line between the mean concentrations for upgradient groundwater (MW-504 and MW-505) and leachate. If leachate were mixing with upgradient groundwater, the sulfate – boron and chloride – boron data for MW-506 and MW-512 would fall on the mixing line and the boron concentrations would range from 0.20 mg/L to 1.4 mg/L based on the sulfate mixing line and approximately 0.83 mg/L to 4.2 mg/L based on the chloride mixing line. However, the boron in downgradient wells was not detected at a concentration above the reporting limit of 0.2 mg/L. Therefore, because boron is present in the leachate but is not present in the downgradient wells, leachate is not mixing with groundwater.

These binary plots demonstrate that leachate is not mixing with upgradient groundwater and that a source other than the CCR Landfill caused the SSI over the background level for sulfate or that the SSI resulted from natural variation in groundwater quality. Binary plots are provided in **Appendix F**.

4 CONCLUSION

Our opinion is that a sufficient body of evidence is available and presented above to demonstrate that a source other than the CCR Landfill caused the SSI over the background level, or that the SSI resulted from natural variation in groundwater quality. Based on the successful ASD, the owner or operator of the CCR Landfill may continue with the detection monitoring program under § 257.94.

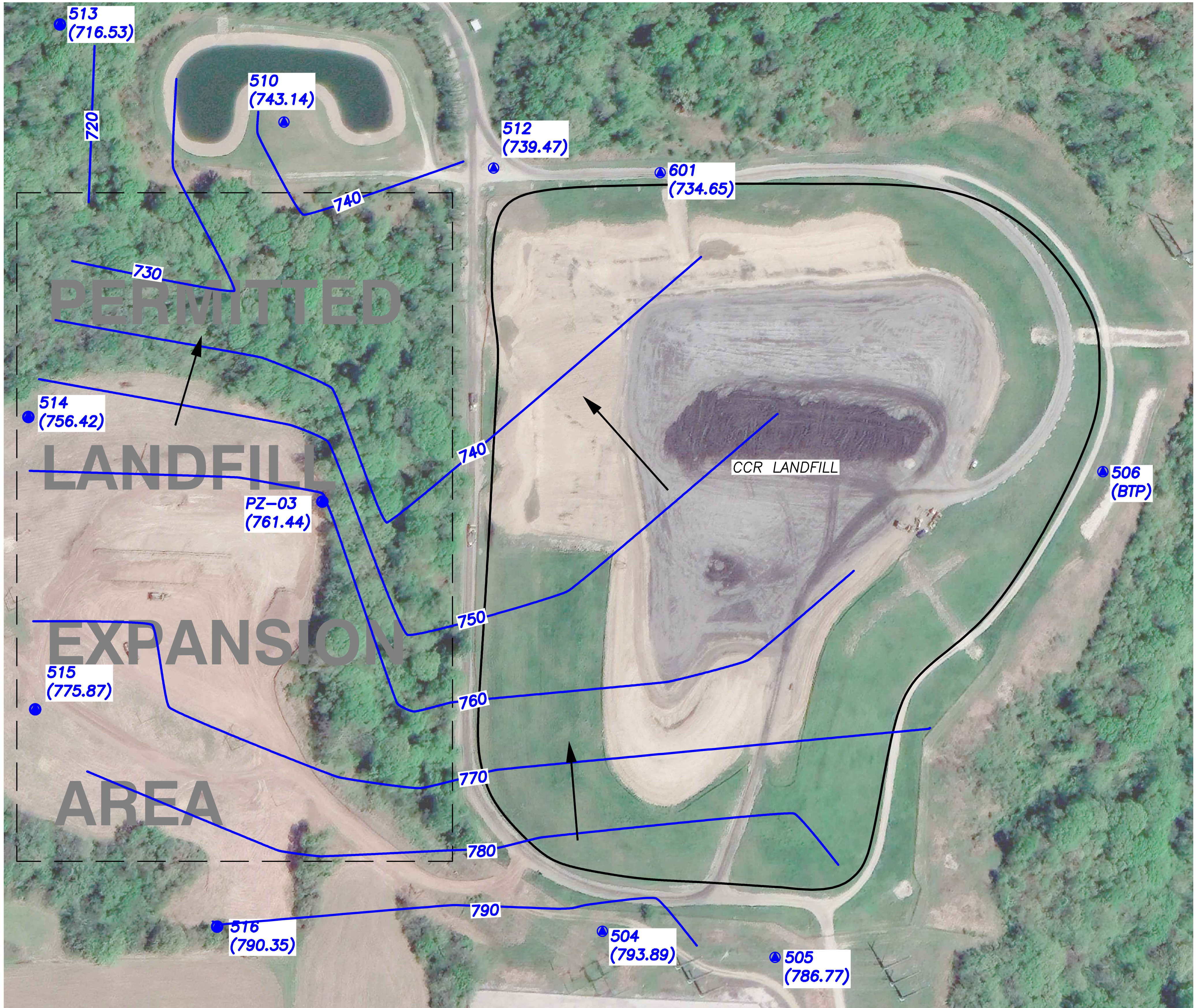
5 GENERAL COMMENTS

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 Missouri West, Inc. for specific application to the Sibley 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 signature. 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:

- 760 — GROUNDWATER POTENTIOMETRIC SURFACE ELEVATIONS (REPRESENTATIVE OF THIS UNIT)
- 601 (738.07) GROUNDWATER MONITORING SYSTEM WELLS (GROUNDWATER ELEVATION)
- CCR LANDFILL UNIT BOUNDARY
- GROUNDWATER FLOW DIRECTION
- BTP BELOW TOP OF PUMP

NOTES:

1. HORIZONTAL & VERTICAL DATUM: URS PLANS FOR CONSTRUCTION, KCP&L SIBLEY GENERATING STATION, DESIGN FILE 16530511.00001, DATED JANUARY 2010
2. GOOGLE EARTH AERIAL IMAGE. APRIL 2020.
3. BOUNDARY AND MONITORING WELL WELL LOCATIONS SHOWN ARE APPROXIMATE.

SCALE 200 0 200 400 FEET

REV.	DATE
-	-

SHEET TITLE: POTENTIOMETRIC SURFACE MAP (NOVEMBER 2020) CCR LANDFILL

PROJECT TITLE: ALTERNATIVE SOURCE DEMONSTRATION (NOVEMBER 2020)

CLIENT: EVERGY MISSOURI WEST, INC. SIBLEY GENERATING STATION SIBLEY, MISSOURI

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

PROJ. NO. 27213169.21 | DSN. BY: ALR | DWN. BY: ALR | CHK. BY: JRR | Q/A RVW BY: JRR | PROJ. MGR: JRF

CADD FILE: 20 - NOVEMBER_GW V1 - ALTERNATIVE SOURCE DEMONSTRATION.DWG

DATE: 4/27/21

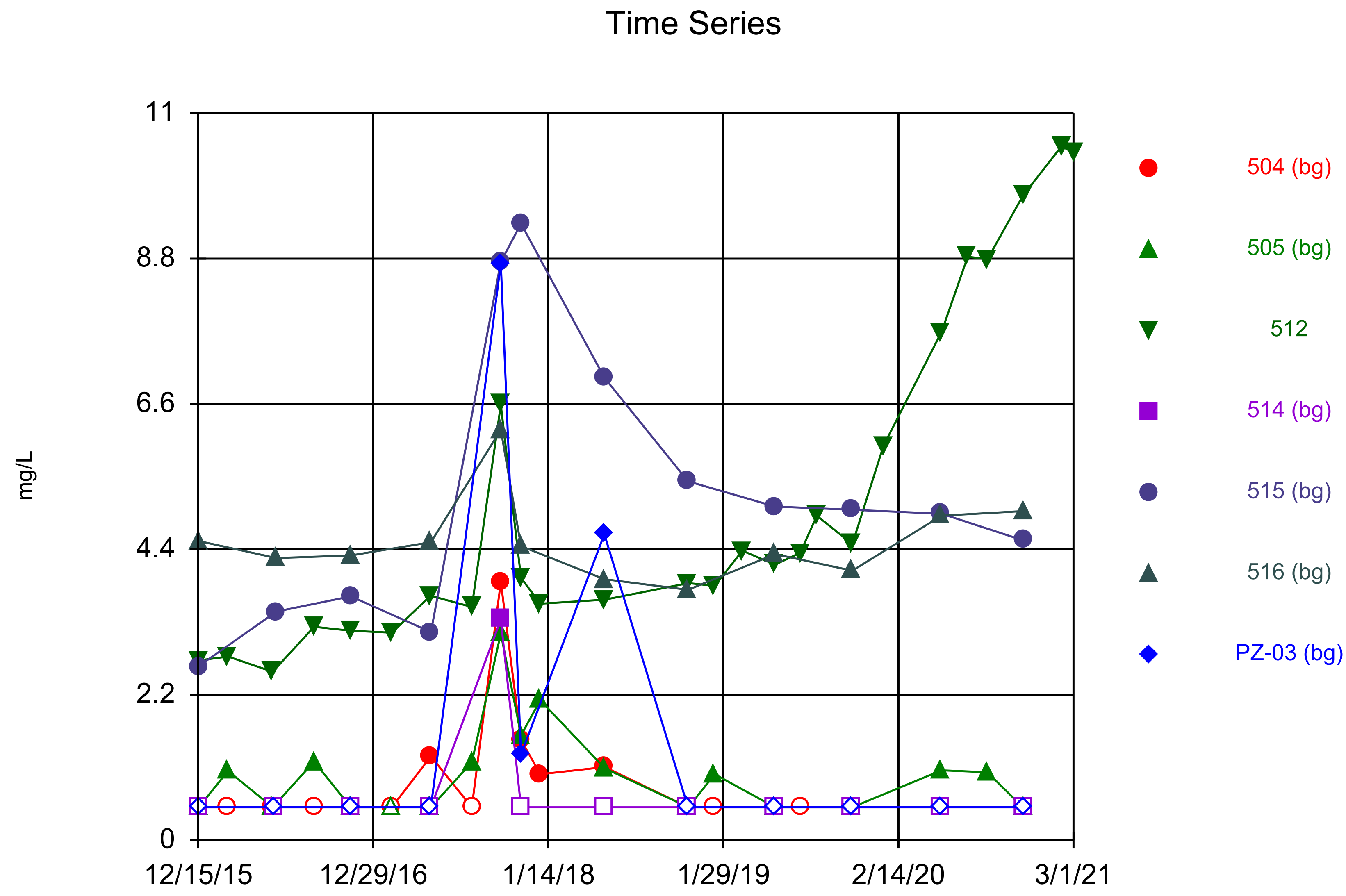
FIGURE NO. 1

N:\KCPL\Projects\Groundwater\DWG\Sibley\2020\GW\NOVEMBER 2020\20 - NOVEMBER_GW v1 - Alternative Source Demonstration.dwg Apr 27, 2021 - 9:44am Layout Name: Fig 2 By: 4415alr

Appendix B

Time Series Plots

Sanitas™ v.9.6.28 Sanitas software licensed to SCS Engineers. UG
Hollow symbols indicate censored values.



Constituent: Chloride Analysis Run 4/14/2021 11:35 AM View: LF III
Sibley Client: SCS Engineers Data: Sibley

Time Series

Constituent: Chloride (mg/L)   Analysis Run 4/14/2021 11:35 AM   View: LF III

Sibley   Client: SCS Engineers   Data: Sibley

	504 (bg)	505 (bg)	512	514 (bg)	515 (bg)	516 (bg)	PZ-03 (bg)
12/15/2015			2.72	<1	2.63	4.53	<1
12/16/2015	<1	<1					
2/18/2016	<1	1.05	2.78				
5/25/2016	<1	<1	2.55				
5/26/2016				<1			<1
6/2/2016					3.46	4.27	
8/23/2016	<1	1.19	3.23				
11/11/2016	<1	<1	3.17	<1	3.69	4.31	<1
2/8/2017	<1	<1	3.14				
5/3/2017			3.7				
5/4/2017	1.27	<1		<1	3.15	4.51	<1
8/1/2017	<1	1.18	3.53				
10/3/2017	3.91	3.13	6.59	3.34	8.75	6.21	8.73
11/16/2017	1.52	1.59	3.97	<1	9.33	4.45	1.3
12/28/2017	1	2.12	3.58				
5/16/2018				<1	7	3.95	4.63
5/17/2018	1.11	1.09	3.64				
11/14/2018				<1	5.43	3.79	<1
11/15/2018	<1	<1	3.89				
1/11/2019	<1	1	3.85				
3/12/2019			4.38				
5/22/2019	<1	<1	4.17	<1	5.05	4.33	<1
7/16/2019	<1		4.35				
8/21/2019			4.91				
11/6/2019	<1	<1	4.48	<1	5	4.08	<1
1/13/2020			5.97 (i)				
5/18/2020	<1	1.06	7.69	<1	4.94	4.91	<1
7/14/2020			8.83				
8/26/2020		1.03 (i)	8.79				
11/11/2020	<1	<1	9.75	<1	4.54	4.98	<1
2/3/2021			10.5				
3/1/2021			10.4				

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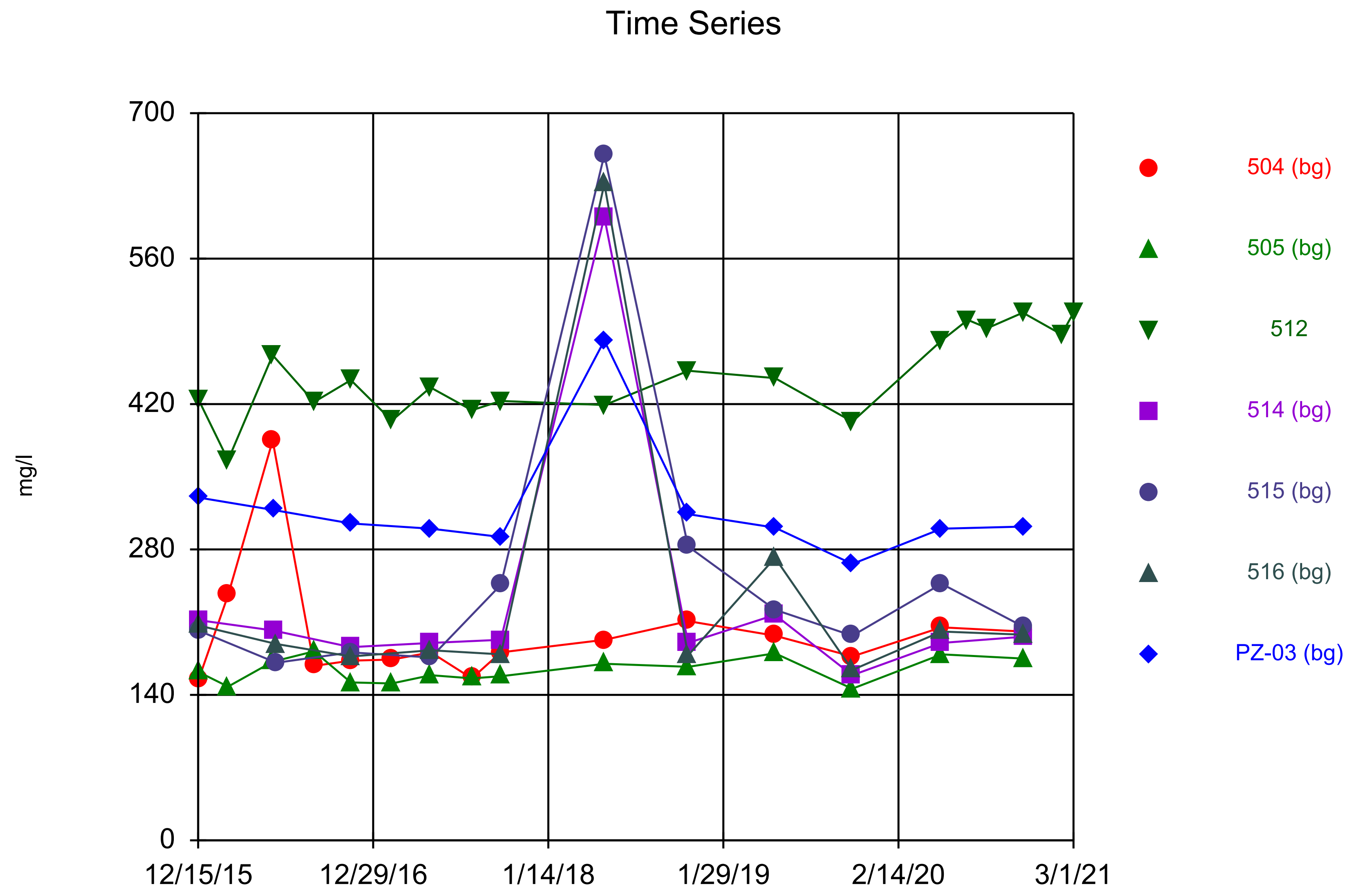


Constituent: Dissolved Solids Analysis Run 4/14/2021 11:33 AM View: LF III

Sibley Client: SCS Engineers Data: Sibley

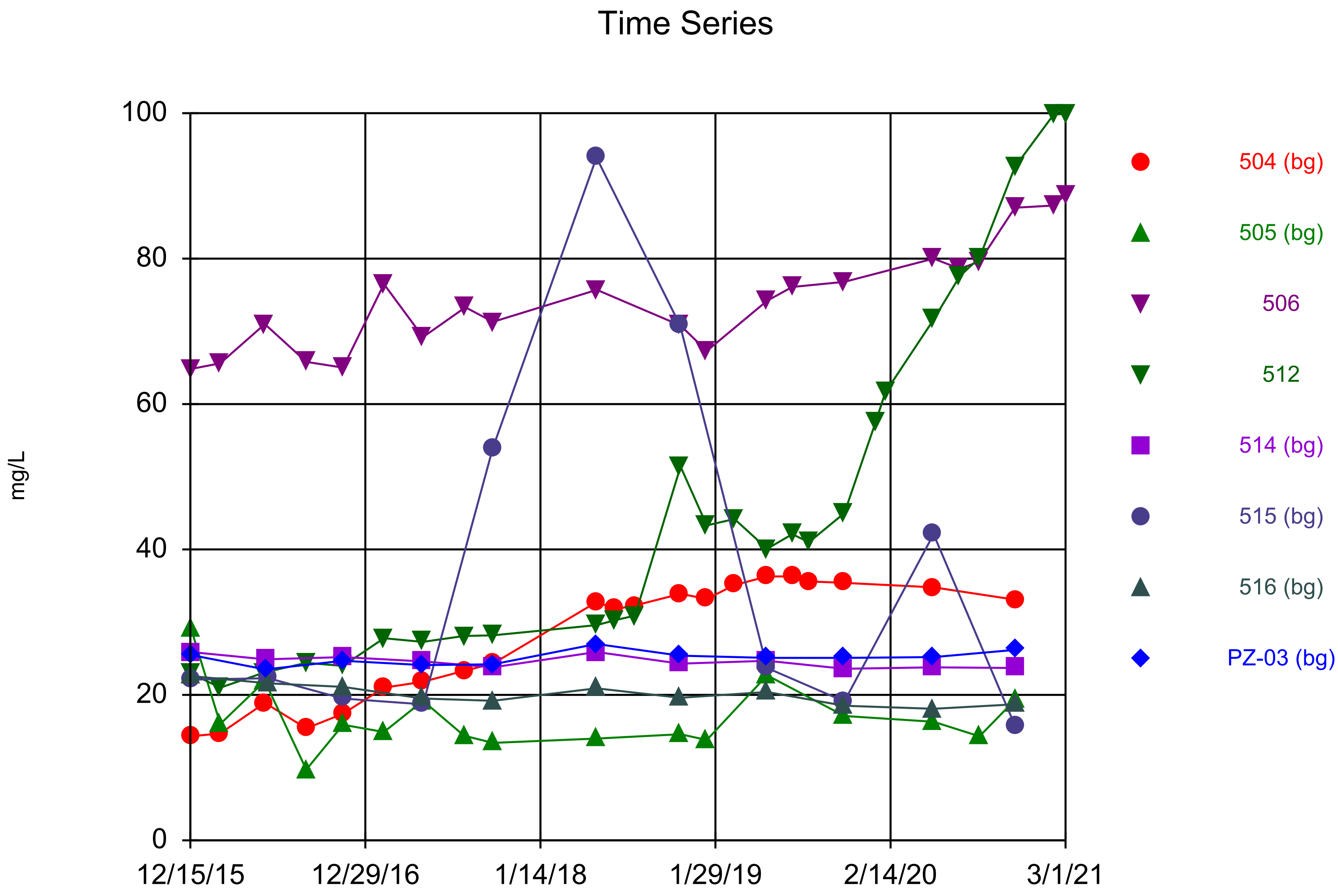
Time Series

Constituent: Dissolved Solids (mg/l)   Analysis Run 4/14/2021 11:34 AM   View: LF III

Sibley   Client: SCS Engineers   Data: Sibley

	504 (bg)	505 (bg)	512	514 (bg)	515 (bg)	516 (bg)	PZ-03 (bg)
12/15/2015			425	212	202	207	330
12/16/2015	155	162					
2/18/2016	236	148	366				
5/25/2016	385	172	467				
5/26/2016				202			318
6/2/2016					171	189	
8/23/2016	168	182	422				
11/11/2016	173	152	443	186	181	177	305
2/8/2017	174	151	404				
5/3/2017			436				
5/4/2017	181	159		190	176	183	300
8/1/2017	156	156	414				
10/3/2017	181	158	423	193	246	179	292
5/16/2018				600	660	632	481
5/17/2018	193	170	419				
11/14/2018				190	283	178	314
11/15/2018	211	167	452				
5/22/2019	197	180	445	217	222	272	301
11/6/2019	177	146	403	159	197	164	266
5/18/2020	205	179	481	190	247	201	300
7/14/2020			501				
8/26/2020			493				
11/11/2020	201	175	508	196	206	198	302
2/3/2021			487				
3/1/2021			508				

Sanitas™ v.9.6.28 Sanitas software licensed to SCS Engineers. UG



Constituent: Sulfate Analysis Run 4/14/2021 11:31 AM View: LF III

Sibley Client: SCS Engineers Data: Sibley

Time Series

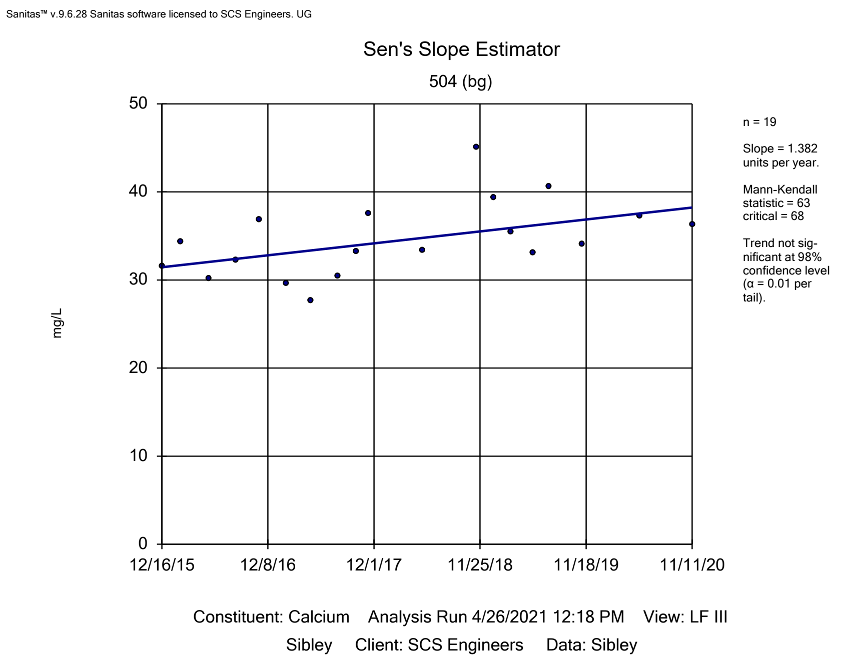
Constituent: Sulfate (mg/L) Analysis Run 4/14/2021 11:32 AM View: LF III

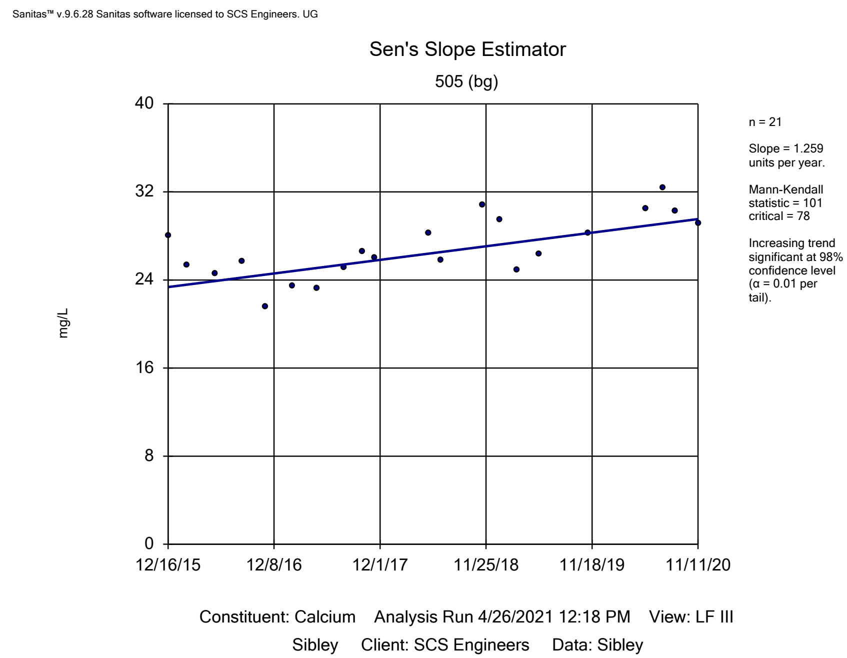
Sibley Client: SCS Engineers Data: Sibley

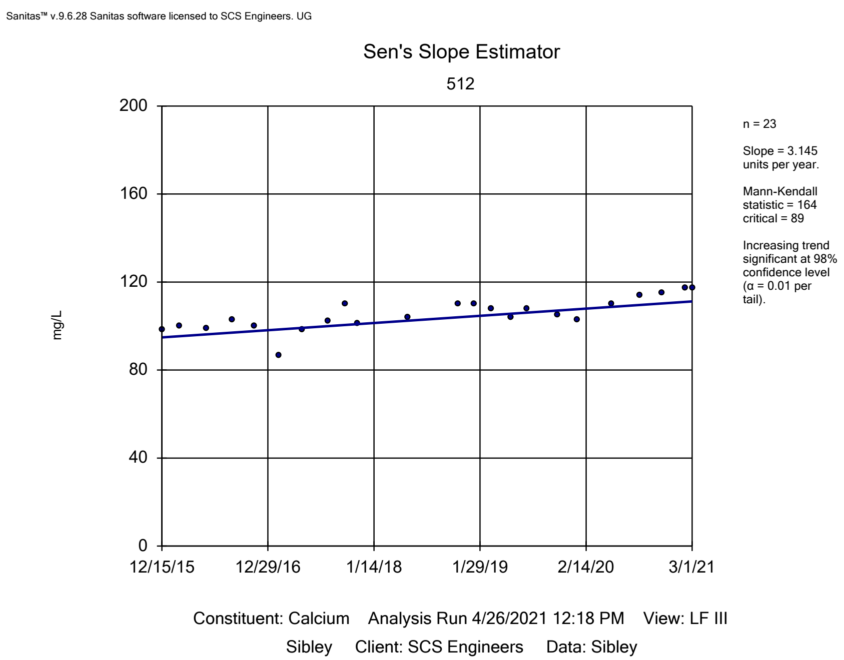
	504 (bg)	505 (bg)	506	512	514 (bg)	515 (bg)	516 (bg)	PZ-03 (bg)
12/15/2015			64.8	23	25.9	22.1	22.6	25.5
12/16/2015	14.3	29.2						
2/18/2016	14.7	16	65.6	21				
5/25/2016	18.9	21.9	71	23.1				
5/26/2016					24.9			23.5
6/2/2016						22.3	21.6	
8/23/2016	15.4	9.73	65.8	24.4				
11/11/2016	17.4	15.9	65	24	25.2	19.5	21.1	24.7
2/8/2017	21	14.9	76.5	27.8				
5/3/2017				27.3				
5/4/2017	21.8	19.2	69.2		24.6	18.7	19.5	24.1
8/1/2017	23.3	14.4		28.1				
8/4/2017			73.3					
10/3/2017	24.3	13.4	71.3	28.2	23.8	54	19.2	24.2
5/16/2018					25.9	93.9	20.9	27
5/17/2018	32.8	14	75.7	29.6				
6/27/2018	31.8			30.3				
8/8/2018	32.3			30.9				
11/14/2018					24.3	70.8	19.6	25.4
11/15/2018	33.9	14.6	70.8	51.4				
1/11/2019	33.2	13.8	67.3	43.3				
3/12/2019	35.1			44.2				
5/22/2019	36.3	22.7	74.2	40.1	24.7	23.7	20.4	25.1
7/16/2019	36.3		76.1	42.1				
8/21/2019	35.6			41				
11/6/2019	35.4	17.1	76.8	45	23.6	19.1	18.5	25.1
1/13/2020				57.5				
2/3/2020				61.6				
5/18/2020	34.8	16.3	80	71.6	23.8	42.1	18.1	25.2
7/14/2020			78.6	77.6				
8/26/2020		14.3 (i)	79.6	80.1				
11/11/2020	33.1	19.3	87	92.6	23.7	15.8	18.7	26.2
2/3/2021			87.3	99.8				
3/1/2021			88.8	99.9				

Appendix C

Trend Analysis


Sanitas™ v.9.6.28 Sanitas software licensed to SCS Engineers. UG
Sen's Slope Estimator
504 (bg)
mg/L
50
40
30
20
10
0
12/16/15
12/8/16
12/1/17
11/25/18
11/18/19
11/11/20
n = 19
Slope = 1.382 units per year.
Mann-Kendall statistic = 63 critical = 68
Trend not significant at 98% confidence level (α = 0.01 per tail).
Constituent: Calcium Analysis Run 4/26/2021 12:18 PM View: LF III
Sibley Client: SCS Engineers Data: Sibley

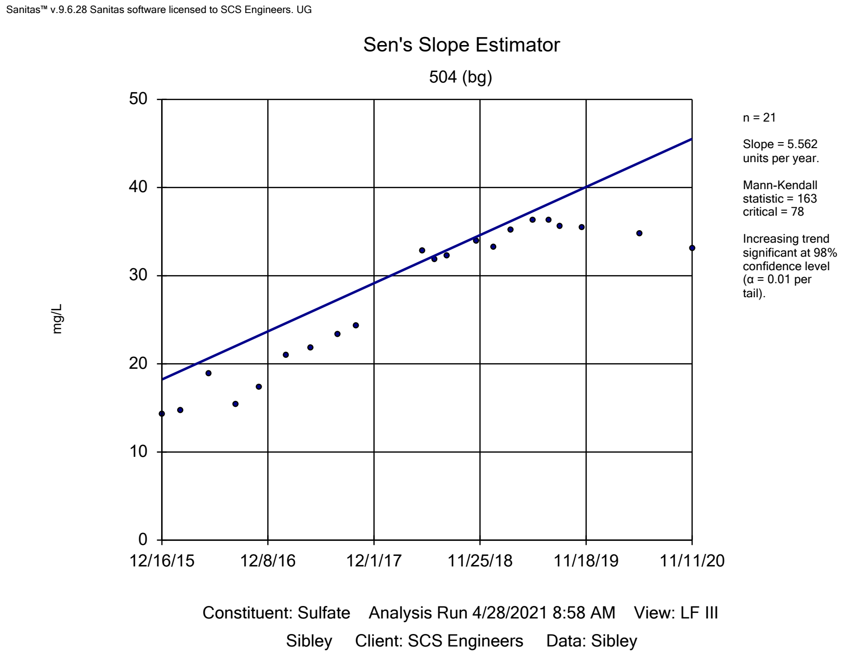

Sanitas™ v.9.6.28 Sanitas software licensed to SCS Engineers. UG
Sen's Slope Estimator
505 (bg)
mg/L
40
32
24
16
8
0
12/16/15
12/8/16
12/1/17
11/25/18
11/18/19
11/11/20
n = 21
Slope = 1.259 units per year.
Mann-Kendall statistic = 101 critical = 78
Increasing trend significant at 98% confidence level (α = 0.01 per tail).
Constituent: Calcium Analysis Run 4/26/2021 12:18 PM View: LF III
Sibley Client: SCS Engineers Data: Sibley

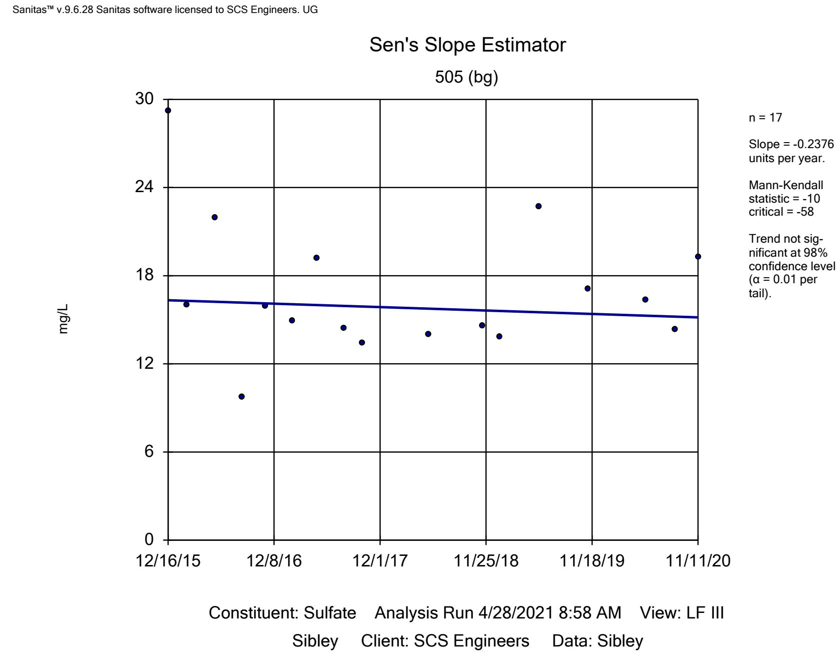

Sanitas™ v.9.6.28 Sanitas software licensed to SCS Engineers. UG
Sen's Slope Estimator
512
mg/L
200
160
120
80
40
0
12/15/15
12/29/16
1/14/18
1/29/19
2/14/20
3/1/21
n = 23
Slope = 3.145 units per year.
Mann-Kendall statistic = 164 critical = 89
Increasing trend significant at 98% confidence level (α = 0.01 per tail).
Constituent: Calcium Analysis Run 4/26/2021 12:18 PM View: LF III
Sibley Client: SCS Engineers Data: Sibley

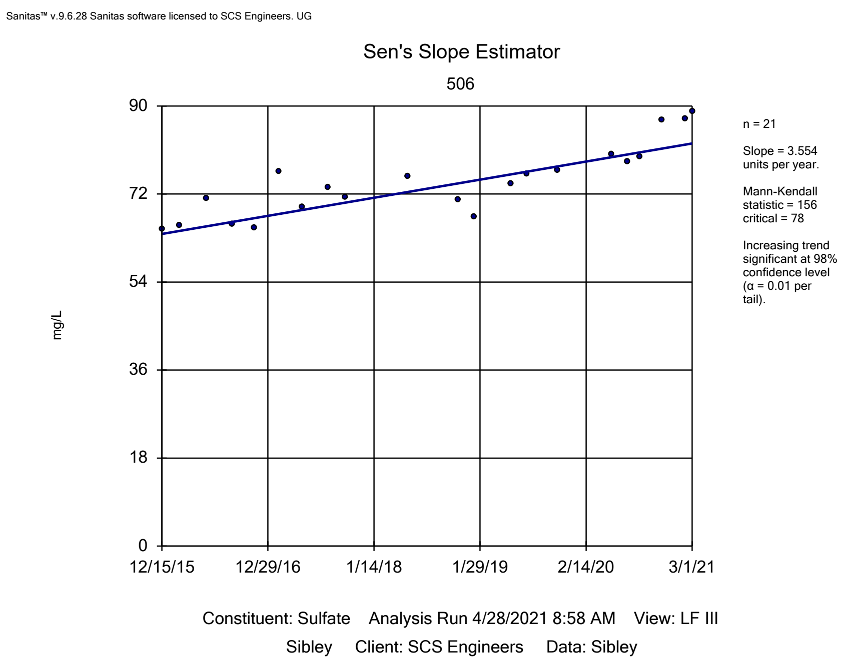
Trend Test

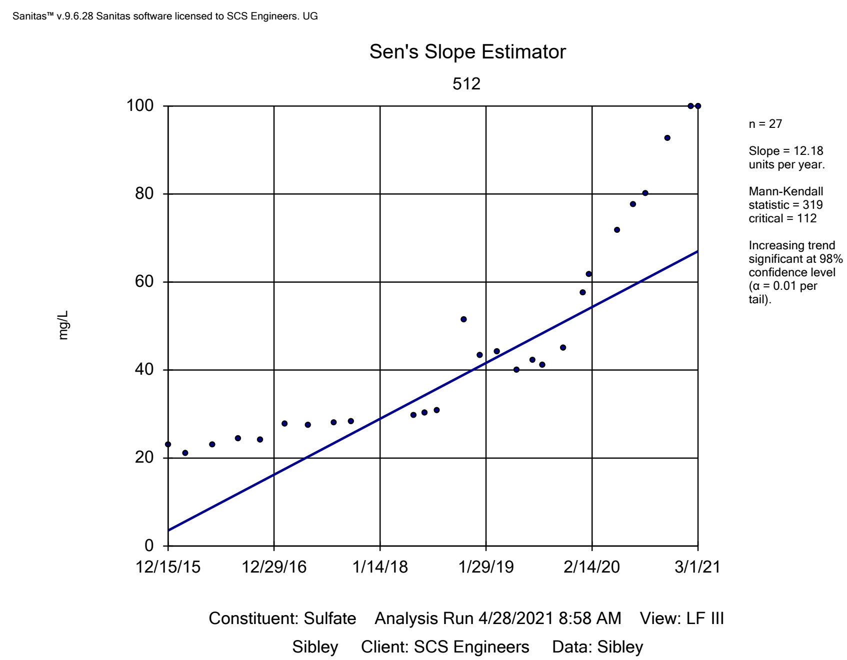
Sibley   Client: SCS Engineers   Data: Sibley   Printed 4/26/2021, 12:22 PM

Constituent	Well	Slope	Calc.	Critical	Sig.	N	%NDs	Normality	Xform	Alpha	Method
Calcium (mg/L)	504 (bg)	1.382	63	68	No	19	0	n/a	n/a	0.02	NP
Calcium (mg/L)	**505 (bg)**	**1.259**	**101**	**78**	**Yes**	**21**	**0**	**n/a**	**n/a**	**0.02**	**NP**
Calcium (mg/L)	**512**	**3.145**	**164**	**89**	**Yes**	**23**	**0**	**n/a**	**n/a**	**0.02**	**NP**


Sanitas™ v.9.6.28 Sanitas software licensed to SCS Engineers. UG
Sen's Slope Estimator
504 (bg)
mg/L
50
40
30
20
10
0
12/16/15
12/8/16
12/1/17
11/25/18
11/18/19
11/11/20
n = 21
Slope = 5.562 units per year.
Mann-Kendall statistic = 163 critical = 78
Increasing trend significant at 98% confidence level (α = 0.01 per tail).
Constituent: Sulfate Analysis Run 4/28/2021 8:58 AM View: LF III
Sibley Client: SCS Engineers Data: Sibley


Sanitas™ v.9.6.28 Sanitas software licensed to SCS Engineers. UG
Sen's Slope Estimator
505 (bg)
mg/L
30
24
18
12
6
0
12/16/15
12/8/16
12/1/17
11/25/18
11/18/19
11/11/20
n = 17
Slope = -0.2376 units per year.
Mann-Kendall statistic = -10 critical = -58
Trend not significant at 98% confidence level (α = 0.01 per tail).
Constituent: Sulfate Analysis Run 4/28/2021 8:58 AM View: LF III
Sibley Client: SCS Engineers Data: Sibley


Sanitas™ v.9.6.28 Sanitas software licensed to SCS Engineers. UG
Sen's Slope Estimator
506
mg/L
90
72
54
36
18
0
12/15/15
12/29/16
1/14/18
1/29/19
2/14/20
3/1/21
n = 21
Slope = 3.554 units per year.
Mann-Kendall statistic = 156 critical = 78
Increasing trend significant at 98% confidence level (α = 0.01 per tail).
Constituent: Sulfate Analysis Run 4/28/2021 8:58 AM View: LF III
Sibley Client: SCS Engineers Data: Sibley


Sanitas™ v.9.6.28 Sanitas software licensed to SCS Engineers. UG
Sen's Slope Estimator
512
mg/L
100
80
60
40
20
0
12/15/15
12/29/16
1/14/18
1/29/19
2/14/20
3/1/21
n = 27
Slope = 12.18 units per year.
Mann-Kendall statistic = 319 critical = 112
Increasing trend significant at 98% confidence level (α = 0.01 per tail).
Constituent: Sulfate Analysis Run 4/28/2021 8:58 AM View: LF III
Sibley Client: SCS Engineers Data: Sibley

Trend Test

Sibley   Client: SCS Engineers   Data: Sibley   Printed 4/28/2021, 9:01 AM

Constituent	Well	Slope	Calc.	Critical	Sig.	N	%NDs	Normality	Xform	Alpha	Method
Sulfate (mg/L)	**504 (bg)**	**5.562**	**163**	**78**	**Yes**	**21**	**0**	**n/a**	**n/a**	**0.02**	**NP**
Sulfate (mg/L)	505 (bg)	-0.2376	-10	-58	No	17	0	n/a	n/a	0.02	NP
Sulfate (mg/L)	**506**	**3.554**	**156**	**78**	**Yes**	**21**	**0**	**n/a**	**n/a**	**0.02**	**NP**
Sulfate (mg/L)	**512**	**12.18**	**319**	**112**	**Yes**	**27**	**0**	**n/a**	**n/a**	**0.02**	**NP**

Appendix D

Piper Diagram Plots and Analytical Results

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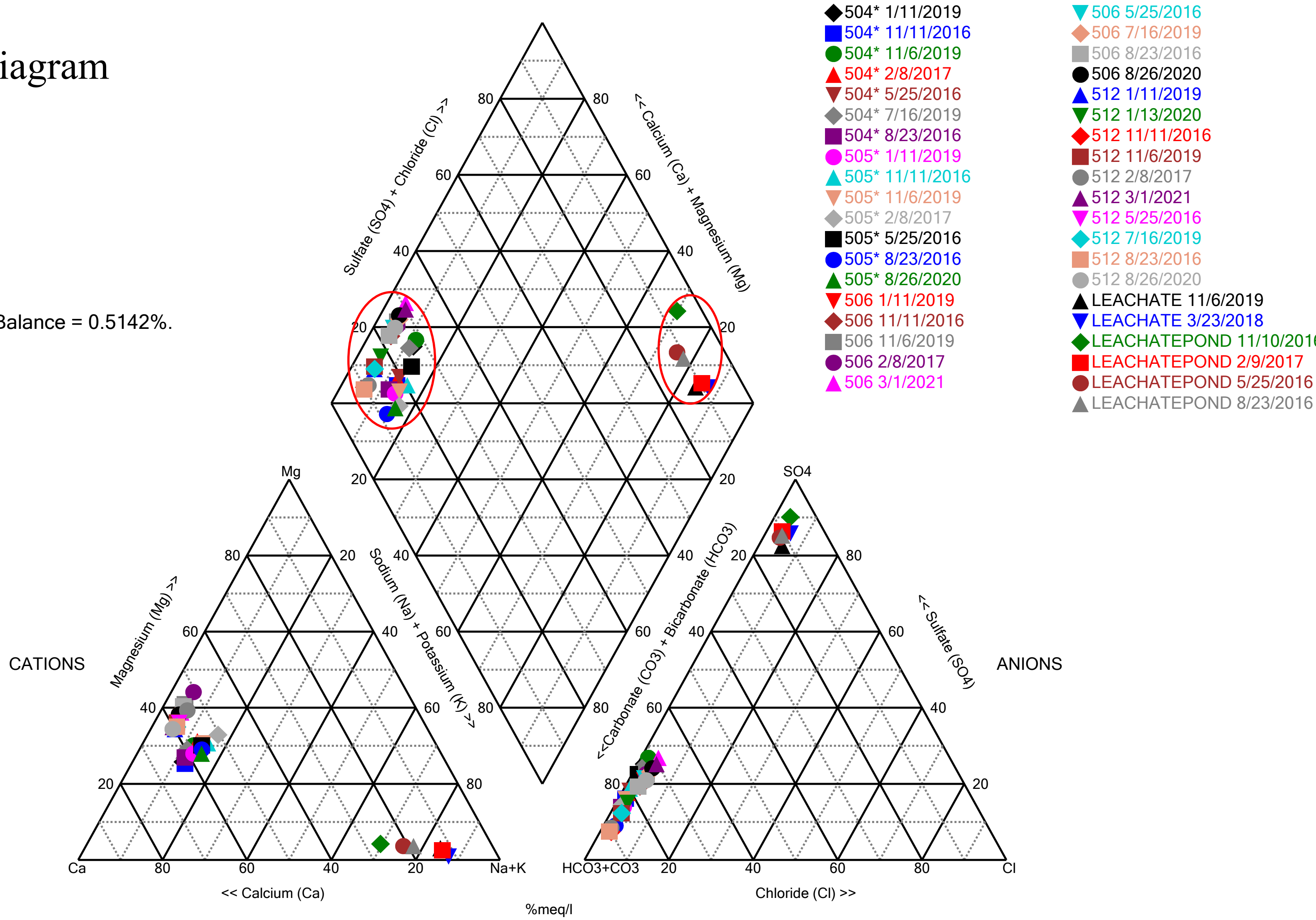
Piper Diagram

Cation-Anion Balance = 0.5142%.



Analysis Run 4/26/2021 8:56 AM View: LF III

Sibley Client: SCS Engineers Data: Sibley

Piper Diagram

Analysis Run 4/26/2021 9:00 AM View: LF III

Sibley Client: SCS Engineers Data: Sibley

Totals (ppm)	Na	K	Ca	Mg	Cl	SO4	HCO3	CO3
504* 5/25/2016	6.54	1.27	30.2	8.36	0.5	18.9	89	10
504* 8/23/2016	6.61	1.15	32.2	8.56	0.5	15.4	99.5	10
504* 11/11/2016	8.17	1.3	36.9	8.97	0.5	17.4	94.7	10
504* 2/8/2017	6.83	1.28	29.6	9.94	0.5	21	105	10
504* 1/11/2019	7.64	1.9	39.3	9.85	0.5	33.2	103	10
504* 7/16/2019	7.92	1.49	40.6	11.8	0.5	36.3	124	10
504* 11/6/2019	7.31	1.33	34.1	10.7	0.5	35.4	101	10
505* 5/25/2016	6.93	0.5	24.6	8.05	0.5	21.9	75.3	10
505* 8/23/2016	7.28	0.5	25.7	7.97	1.19	9.73	101	10
505* 11/11/2016	6.91	0.5	21.6	7.39	0.5	15.9	68.5	10
505* 2/8/2017	8.52	0.5	23.5	9.3	0.5	14.9	94	10
505* 1/11/2019	7.54	0.5	29.5	8.42	1	13.8	87.5	10
505* 11/6/2019	8.24	0.5	28.2	9.54	0.5	17.1	93.6	10
505* 8/26/2020	8.95	1	30.3	8.95	1.03	14.3	110	10
506 5/25/2016	8.51	2.19	98.3	43.6	5.76	71	304	10
506 8/23/2016	8.28	1.79	97.2	42.8	6.16	65.8	326	10
506 11/11/2016	8.44	2.37	96.5	41.2	6.13	65	312	10
506 2/8/2017	8.25	2.04	83.6	43.9	5.89	76.5	307	10
506 1/11/2019	8.21	1.85	93	39.7	6.39	67.3	292	10
506 7/16/2019	8.24	1.89	95.3	40.7	7.33	76.1	291	10
506 11/6/2019	8.1	1.88	93.7	42.2	6.66	76.8	306	10
506 8/26/2020	8.15	1	93.9	38.2	7.31	79.6	289	10
506 3/1/2021	8.14	1	93	38.8	8.05	88.8	277	10
512 5/25/2016	10	2.24	98.9	36.8	2.55	23.1	356	10
512 8/23/2016	10.3	2.13	103	36.9	3.23	24.4	384	10
512 11/11/2016	9.96	2.16	100	35.6	3.17	24	352	10
512 2/8/2017	10	2.35	86.4	37.9	3.14	27.8	358	10
512 1/11/2019	10.6	2.25	110	37.8	3.85	43.3	366	10
512 7/16/2019	10.4	2.33	108	38.6	4.35	42.1	363	10
512 11/6/2019	10	2.21	105	39.4	4.48	45	377	10
512 1/13/2020	9.87	2.18	103	38.4	5.97	57.5	391	10
512 8/26/2020	10.4	2.13	114	38.9	8.79	80.1	349	10
512 3/1/2021	10	2.13	117	40.8	10.4	99.9	340	10
LEACHATEPOND 5/25/2016	499	58.6	129	12.9	44.1	1440	10	119
LEACHATEPOND 8/23/2016	479	56.8	108	12.8	42.8	1320	10	104
LEACHATEPOND 11/10/2016	651	75.3	224	22.5	50.4	1820	30.5	68.3
LEACHATEPOND 2/9/2017	678	66.2	89.4	10.8	64.5	2200	38.9	146
LEACHATE 3/23/2018	741	70.3	88.5	4.66	79.1	1690	10	108
LEACHATE 11/6/2019	732	76.4	101	13.5	74.3	1630	53.3	125

Appendix E

Box and Whiskers Plots

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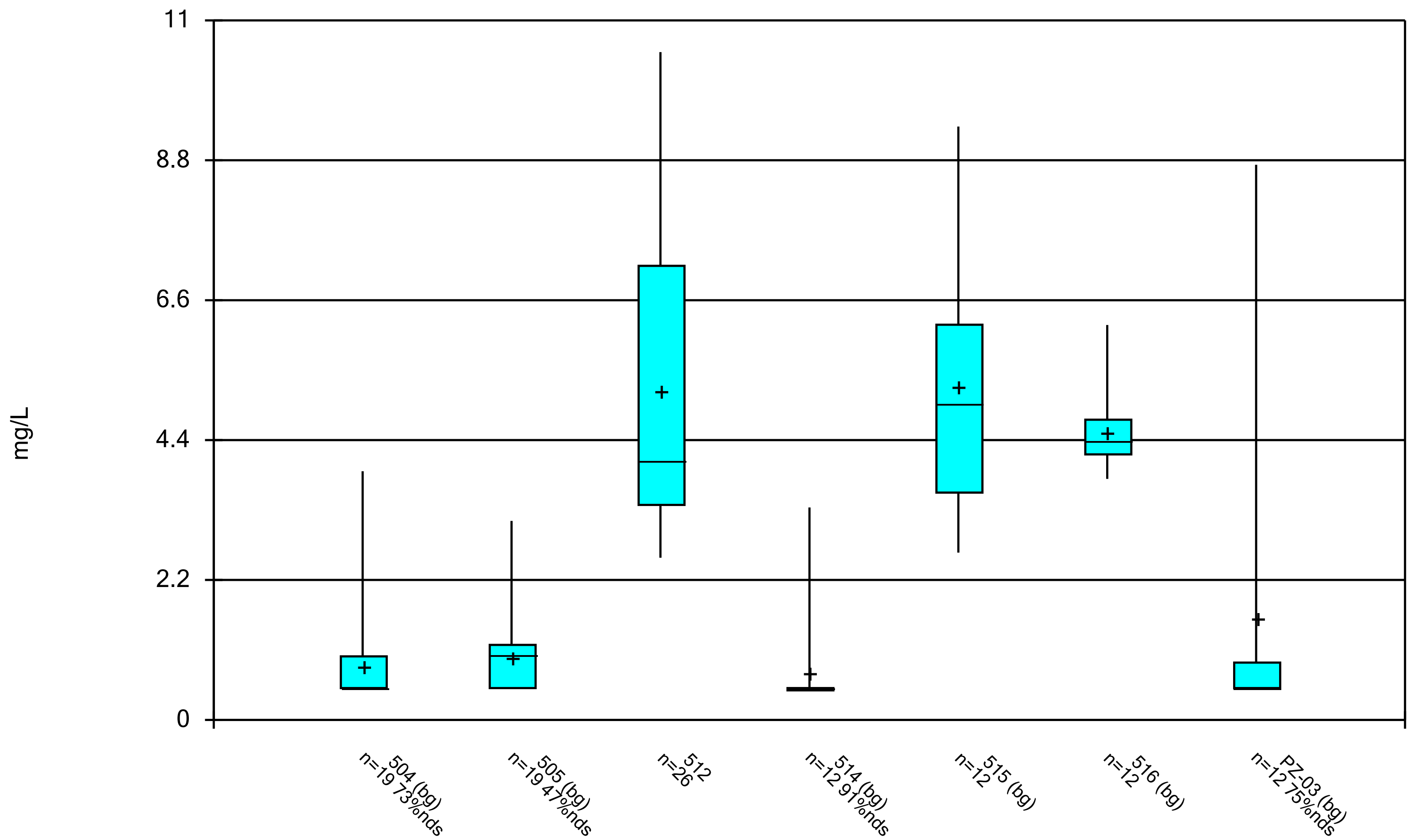
Box & Whiskers Plot



Constituent: Chloride Analysis Run 4/14/2021 11:36 AM View: LF III

Sibley Client: SCS Engineers Data: Sibley

Box & Whiskers Plot

Sibley   Client: SCS Engineers   Data: Sibley   Printed 4/14/2021, 11:38 AM

Constituent	Well	N	Mean	Std. Dev.	Std. Err.	Median	Min.	Max.	%NDs
Chloride (mg/L)	504 (bg)	19	0.8321	0.8092	0.1857	0.5	0.5	3.91	73.68
Chloride (mg/L)	505 (bg)	19	0.9968	0.6861	0.1574	1	0.5	3.13	47.37
Chloride (mg/L)	512	26	5.175	2.531	0.4963	4.07	2.55	10.5	0
Chloride (mg/L)	514 (bg)	12	0.7367	0.8198	0.2367	0.5	0.5	3.34	91.67
Chloride (mg/L)	515 (bg)	12	5.248	2.124	0.613	4.97	2.63	9.33	0
Chloride (mg/L)	516 (bg)	12	4.527	0.6338	0.183	4.39	3.79	6.21	0
Chloride (mg/L)	PZ-03 (bg)	12	1.597	2.541	0.7334	0.5	0.5	8.73	75

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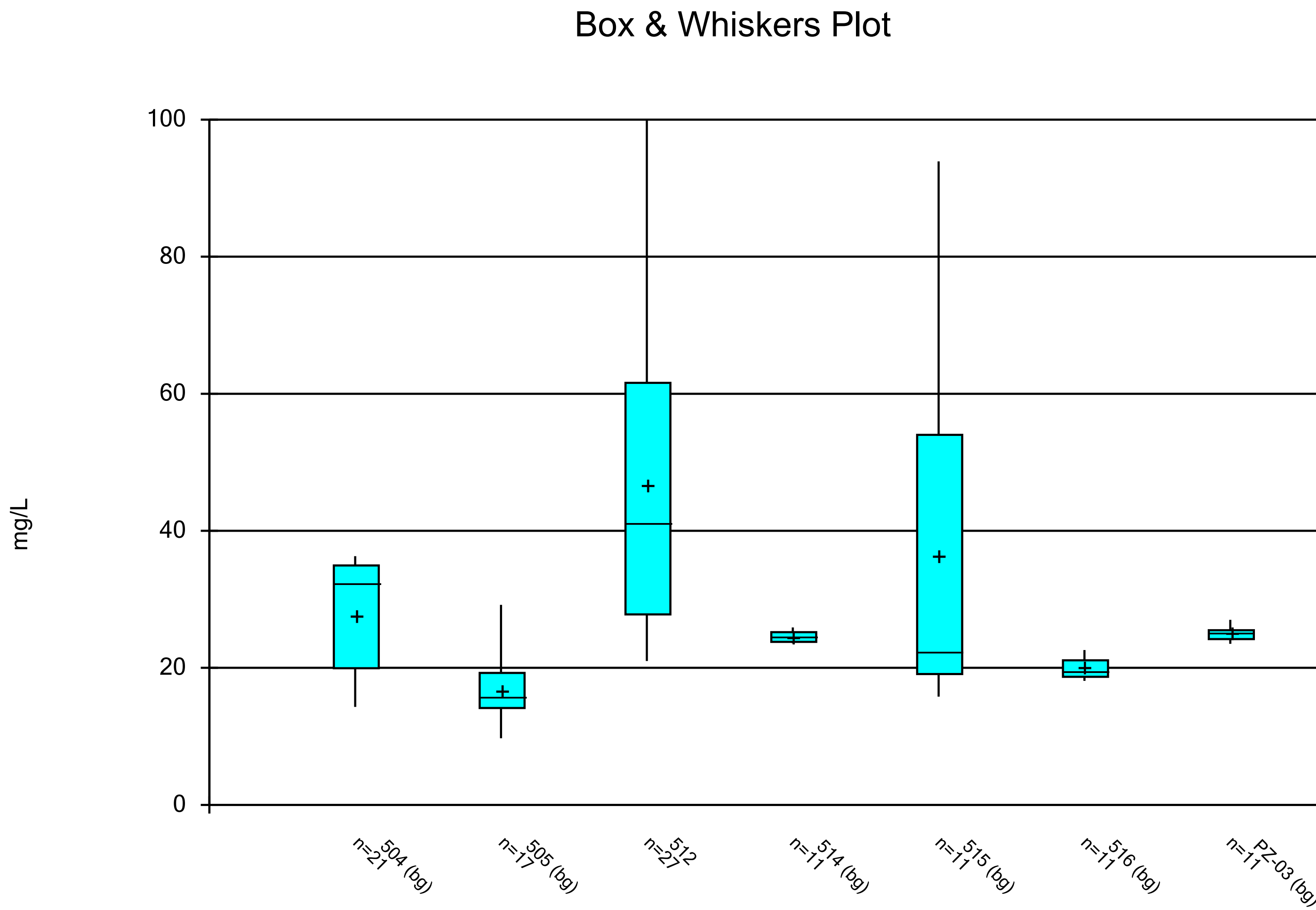


Constituent: Sulfate Analysis Run 4/14/2021 11:43 AM View: LF III

Sibley Client: SCS Engineers Data: Sibley

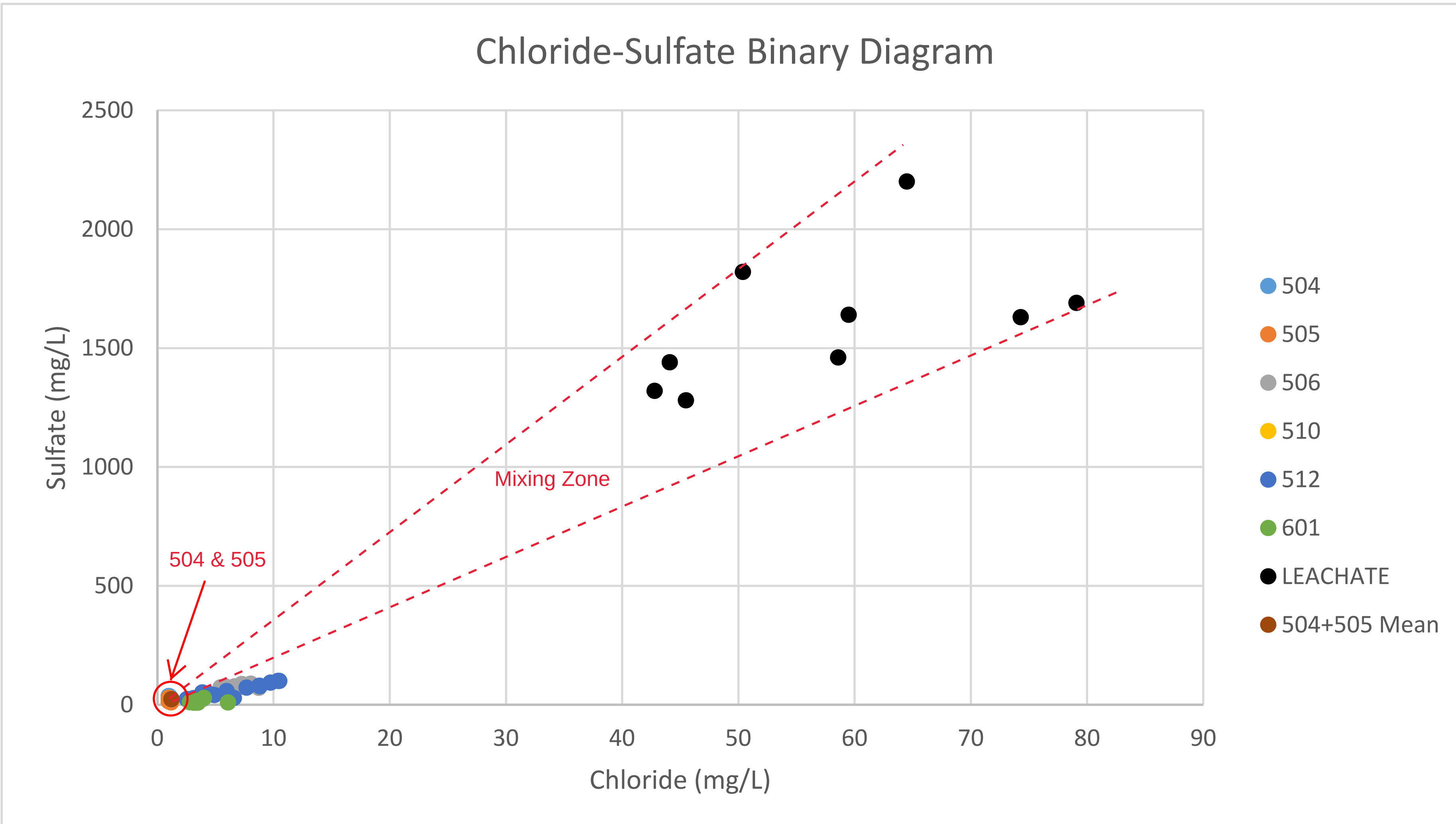
Box & Whiskers Plot

Sibley Client: SCS Engineers Data: Sibley Printed 4/14/2021, 11:44 AM

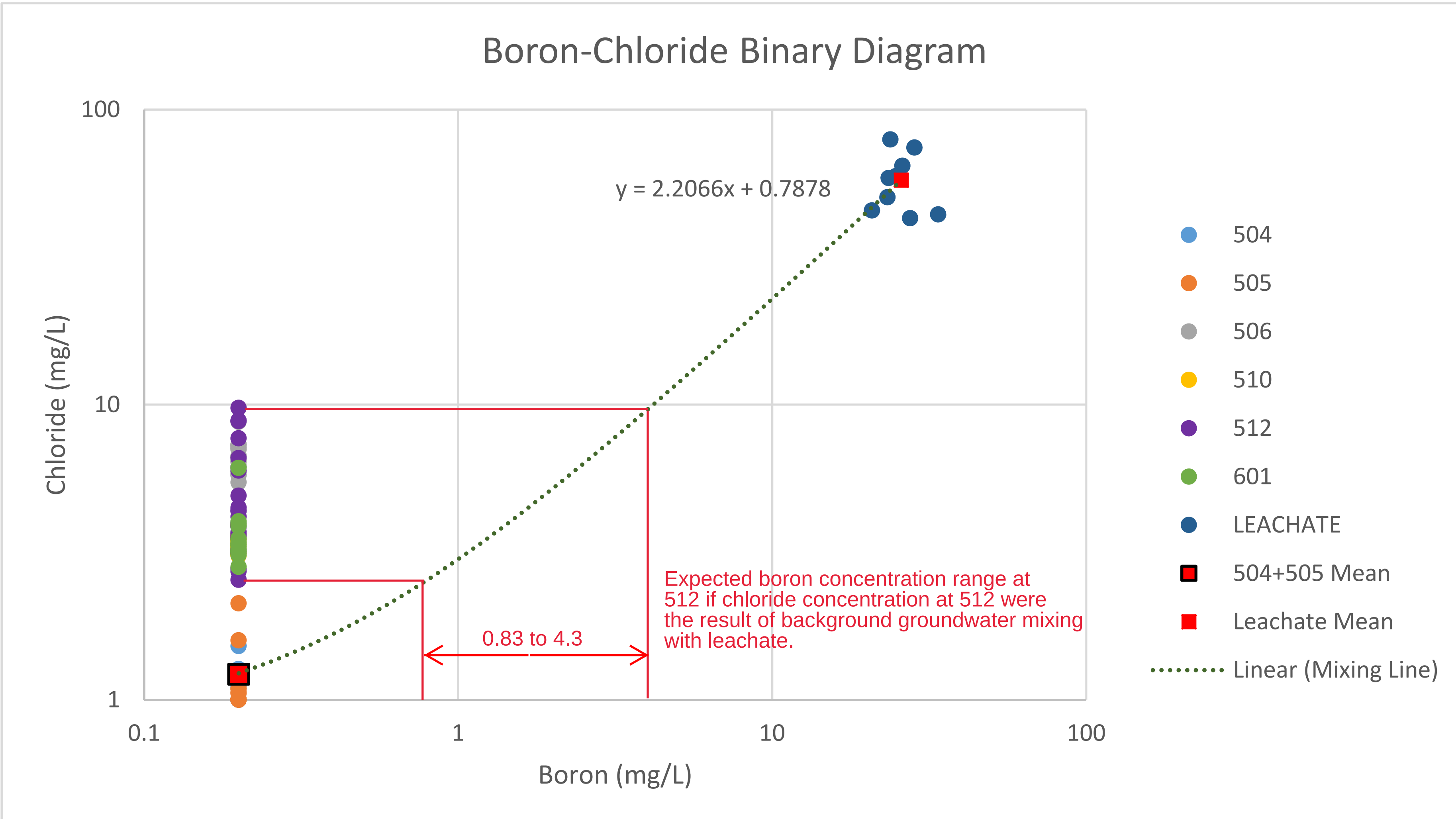
Constituent	Well	N	Mean	Std. Dev.	Std. Err.	Median	Min.	Max.	%NDs
Sulfate (mg/L)	504 (bg)	21	27.7	8.157	1.78	32.3	14.3	36.3	0
Sulfate (mg/L)	505 (bg)	17	16.87	4.522	1.097	15.9	9.73	29.2	0
Sulfate (mg/L)	512	27	46.87	24.77	4.767	41	21	99.9	0
Sulfate (mg/L)	514 (bg)	11	24.58	0.8376	0.2526	24.6	23.6	25.9	0
Sulfate (mg/L)	515 (bg)	11	36.55	25.92	7.815	22.3	15.8	93.9	0
Sulfate (mg/L)	516 (bg)	11	20.02	1.418	0.4274	19.6	18.1	22.6	0
Sulfate (mg/L)	PZ-03 (bg)	11	25.09	0.9803	0.2956	25.1	23.5	27	0

Appendix F

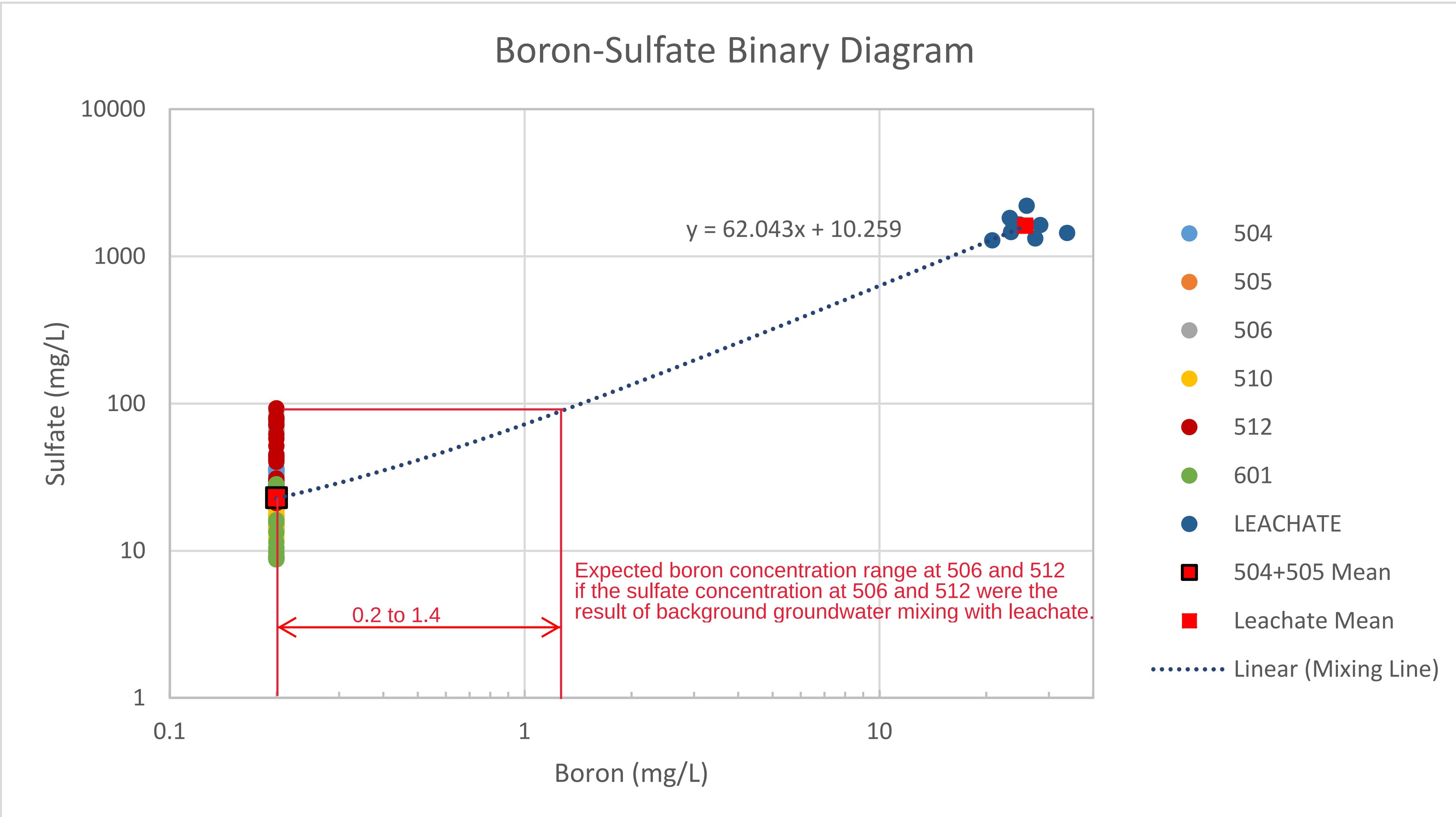
Binary Plots



Chloride-Sulfate Binary Diagram
Sulfate (mg/L)
2500
2000
1500
1000
500
0
0
10
20
30
40
50
60
70
80
90
Chloride (mg/L)
Mixing Zone
504 & 505
504
505
506
510
512
601
LEACHATE
504+505 Mean



Boron-Chloride Binary Diagram
y = 2.2066x + 0.7878
Expected boron concentration range at 512 if chloride concentration at 512 were the result of background groundwater mixing with leachate.
0.83 to 4.3
Chloride (mg/L)
100
10
1
0.1
1
10
100
Boron (mg/L)
504
505
506
510
512
601
LEACHATE
504+505 Mean
Leachate Mean
Linear (Mixing Line)



Boron-Sulfate Binary Diagram
10000
1000
100
10
1
0.1
1
10
Sulfate (mg/L)
Boron (mg/L)
y = 62.043x + 10.259
Expected boron concentration range at 506 and 512
if the sulfate concentration at 506 and 512 were the
result of background groundwater mixing with leachate.
0.2 to 1.4
504
505
506
510
512
601
LEACHATE
504+505 Mean
Leachate Mean
Linear (Mixing Line)

C.2 Groundwater Monitoring Alternative Source Demonstration Report May 2021 Groundwater Monitoring Event, CCR Landfill, Sibley Generating Station (January 2022)

CCR GROUNDWATER MONITORING
ALTERNATIVE SOURCE DEMONSTRATION REPORT
MAY 2021 GROUNDWATER MONITORING EVENT

CCR LANDFILL

Sibley Generating Station
Evergy Missouri West, Inc.
Sibley, Missouri

SCS ENGINEERS

January 2022
File No. 27213169.21

8575 W. 110th Suite 100
Overland Park, KS 66210
913-749-0700

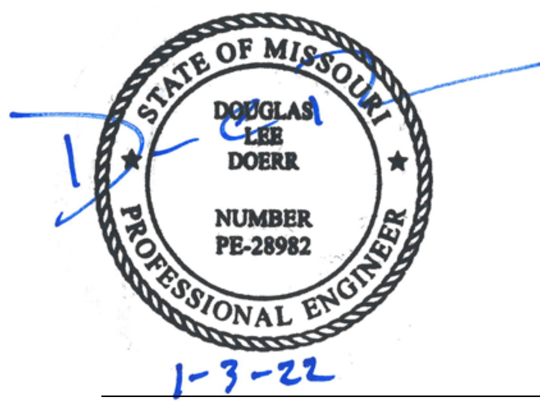
CERTIFICATIONS

I, John R. Rockhold, being a qualified groundwater scientist and Registered Geologist in the State of Missouri, do hereby certify the accuracy of the information in the CCR Groundwater Monitoring Alternative Source Demonstration Report for the CCR Landfill at the Sibley 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, R.G.

SCS Engineers

I, Douglas L. Doerr, being a qualified licensed Professional Engineer in the State of Missouri, do hereby certify the accuracy of the information in the CCR Groundwater Monitoring Alternative Source Demonstration Report for the CCR Landfill at the Sibley 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

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 CCR Landfill at the Sibley 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 24, 2021. Review and validation of the results from the May 2021 Detection Monitoring Event was completed on July 9, 2021, 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 19, 2021 and September 2, 2021.

The completed statistical evaluation identified two Appendix III constituents above their respective prediction limits established for upgradient monitoring well MW-505, two Appendix III constituents above their respective prediction limits established for monitoring well MW-506 and four Appendix III constituents above their respective prediction limits established for monitoring well MW-512.

Monitoring Well/Constituent	*UPL	Observation May 24, 2021	1st Verification July 19, 2021	2nd Verification September 2, 2021
MW-505				
Calcium	29.31	34.4	34.8	34.1
Total Dissolved Solids	180.3	181	184	188
MW-506				
Chloride	7.578	8.09	8.01	8.03
Sulfate	76.83	89.1	89.1	88.7

Monitoring Well/Constituent	*UPL	Observation May 24, 2021	1st Verification July 19, 2021	2nd Verification September 2, 2021
MW-512				
Calcium	111.3	114	120	114
Chloride	5.094	10.6	10.2	10.2
Total Dissolved Solids	466.4	505	524	555
Sulfate	44.8	110	104	107

*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 identified eight SSIs above the background prediction limits. These include calcium and total dissolved solids (TDS) at upgradient monitoring well MW-505, chloride and sulfate at monitoring well MW-506, and calcium, chloride, TDS, and sulfate at monitoring well MW-512.

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. For the above-identified SSIs for the CCR Landfill at the Sibley Generating Station, there are multiple lines of supporting evidence to indicate the above SSIs were not caused by a release from the CCR Landfill. Select multiple lines of supporting evidence are described as follows.

3.1 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 (i.e. “spikes”). 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.

The time series plot for chloride in monitoring wells MW-506 and MW-512 were compared to time series plots for chloride in several upgradient and side-gradient non-CCR monitoring system wells installed for future state-permitted landfill expansion purposes. The comparisons indicate the chloride concentrations have increased in upgradient wells MW-515 and MW-516 and the concentrations in MW-506 and MW-512 are near the concentration levels for non-impacted groundwater in the vicinity of the CCR Landfill and that non-impacted groundwater chloride concentrations can fluctuate naturally within non-impacted wells such as MW-515 and MW-516.

The time series plots for TDS in upgradient monitoring well MW-505 and MW-512 were compared to time series plots for TDS in several upgradient and side-gradient non-CCR monitoring system wells installed for future state-permitted landfill expansion purposes. TDS comparisons indicate the concentrations in both MW-505 and MW-512 are within or near the range of concentration levels for non-impacted groundwater in the vicinity of the CCR Landfill.

Time series plots for sulfate in monitoring wells MW-506 and MW-512 were compared to time series plots for sulfate in several upgradient and side-gradient non-CCR monitoring system wells installed for future state-permitted landfill expansion purposes. Sulfate comparisons indicate the concentrations in MW-506 and MW-512 are within or very near the range of concentration levels for upgradient groundwater in the vicinity of the CCR Landfill, which could not be impacted by landfill operations; specifically MW-515. Additionally, there has been increasing concentrations of sulfate in upgradient well MW-504 and large variations of concentrations in MW-515, both of which are upgradient and have not been impacted by the landfill.

Figure 1 in **Appendix A** shows these upgradient and non-CCR monitoring system wells and their relationships to groundwater flow near and beneath the CCR Landfill. Because the non-CCR monitoring system wells are located in a nearby area where they could not be impacted by the landfill due to their upgradient and side-gradient locations, and exhibit variability that includes concentrations within the range or similar to those seen in MW-505, MW-506 and MW-512, the observed concentrations are within the range of expected natural spatial variation within and between wells. This demonstrates that a source other than the CCR Landfill caused the SSIs over the background levels, or that the SSIs could have resulted from natural variation in groundwater quality. Time series plots are provided in **Appendix B**.

3.2 TREND ANALYSIS

Trend analysis was performed to evaluate for statistically significant trends utilizing Sen's Slope/Mann-Kendall Statistical Analysis. Sen's Slope/Mann-Kendall statistical analysis is used to determine if the data exhibits an SSI or statistically significant decreasing (SSD) trend. A trend is the general increase or decrease in observed values of a variable over time. A trend analysis can be used to determine the significance of an apparent trend and to estimate the magnitude of that trend. The Mann-Kendall test is nonparametric, meaning that it does not depend on an assumption of a particular underlying distribution. The test uses only the relative magnitude of data rather than actual values. Therefore, missing values are allowed, and values that are recorded as non-detects by the laboratory can still be used in the statistical analysis by assigning values equal to half their detection limits. Sen's Slope is a simple nonparametric procedure developed to estimate the true slope. The advantage of this method over linear regression is that it is not greatly affected by gross data errors or outliers, and can be computed when data are missing.

The Sen's Slope/Mann-Kendall Statistical Analysis was performed at the 98 percent confidence level utilizing the statistical program Sanitas™. Calcium data from December 2015 through the most recent data for upgradient wells MW-504 and MW-505 and downgradient well MW-512 were used to perform trend analysis. The trend analysis for calcium indicates upgradient well MW-505 and downgradient well MW-512 both have increasing trends and upgradient well MW-504 also has a positive slope (i.e. increasing trend but not statistically significant). Since an upgradient well has an increasing trend due to natural conditions not due to the unit, it is also likely the downgradient wells can increase due to natural conditions not due to the unit.

Chloride data from December 2015 through the most recent data for upgradient and side-gradient non-CCR monitoring system well MW-515 and downgradient wells MW-506 and MW-512 were used to perform trend analysis. The trend analysis for chloride indicates upgradient well MW-515 has a positive slope (i.e. increasing trend but not statistically significant) and concentrations greater than that of MW-

506 and near that of MW-512. Since this non-impacted upgradient well shows a positive concentration slope and a concentration range similar to MW-506 and MW-512 and represents un-impacted natural conditions, it is also likely the downgradient wells can increase similarly due to natural conditions and not due to impact from the unit.

TDS data from December 2015 through the most recent data for upgradient and side-gradient non-CCR monitoring system wells MW-504, MW-505 and MW-515 and downgradient well MW-512 were used to perform trend analysis. The trend analysis for TDS indicates upgradient well MW-505 and downgradient well MW-512 both have increasing trends and upgradient well MW-504 and side-gradient non-CCR well MW-515 both have positive slopes (i.e. increasing trend but not statistically significant). This indicates that non-impacted wells can have an increasing trend or positive concentration slope. Additionally, the concentration range for MW-512 is within the total range for MW-515. Since these non-impacted wells show an increasing trend or positive concentration slope, it is also likely that downgradient wells can increase similarly due to natural conditions and not due to impact from the unit.

Sulfate data from December 2015 through the most recent data for upgradient wells MW-504 and MW-505 and downgradient wells MW-506 and MW-512 were used to perform trend analysis. The trend analysis for sulfate indicates upgradient well MW-504 and downgradient wells MW-506 and MW-512 have increasing trends. Since an upgradient well has an increasing trend due to natural conditions not due to the unit, it is also likely the downgradient wells can also increase due to natural conditions not due to the unit.

These trend analyses demonstrate that a source other than the CCR Landfill could have caused the SSIs over the background level for calcium, chloride, TDS and sulfate or that the SSI resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality. Trend analyses are provided in **Appendix C**.

3.3 PIPER DIAGRAM 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 generated for upgradient wells MW-504 and MW-505, downgradient wells MW-506 and MW-512, and landfill leachate is provided in **Appendix D** along with analytical results. The Piper diagram indicates the groundwater from these four wells have similar geochemical characteristics and do not exhibit the same geochemical characteristics as the leachate. The groundwater and the leachate plot in different hydrochemical facies indicating there is no mixing of the two types of water (groundwater and leachate) and that both upgradient and downgradient groundwater characteristics are different from the leachate. This demonstrate that a source other than the CCR Landfill caused the SSIs over the background levels in MW-505, and MW-506, and MW-512, or that the SSI resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality.

3.4 STIFF DIAGRAMS

Stiff diagrams are a graphical method commonly used to portray water compositions and facilitate the interpretation and presentation of chemical analysis. They 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.

Stiff diagrams are calculated in terms of milliequivalents and take into account ionic charge and the formula weight for major ions, specifically Sodium (Na) plus Potassium (K), Calcium (Ca), Magnesium (Mg), Chloride (Cl), Sulfate (SO4), Carbonate (CO3), and Bicarbonate (HCO3). The milliequivalents per liter of the cation and anions are plotted across from each other along a central vertical line and the distance from the center line is the value for each constituent.

Stiff diagrams were prepared for MW-505, MW-506 and MW-512 alongside Stiff diagrams calculated for leachate and are provided in **Appendix E**. The Stiff diagrams indicate the groundwater from these three wells have similar geochemical characteristics and do not exhibit the same geochemical characteristics as the leachate. The groundwater and the leachate stiff diagram shapes are dis-similar indicating there is no mixing of the two types of water (groundwater and leachate) and that both upgradient and downgradient groundwater characteristics are different from the leachate. This demonstrate that a source other than the CCR Landfill caused the SSIs over the background levels in MW-505, and MW-506, and MW-512, or that the SSI resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality.

3.5 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, 25^{th} and 75^{th} 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.

The box and whiskers plot for chloride in monitoring wells MW-506 and MW-512 were compared to box and whisker plots for chloride in several upgradient and side-gradient non-CCR monitoring system wells installed for future state-permitted landfill expansion purposes. Chloride comparisons indicate the concentrations in MW-506 and MW-512 are generally within expected concentration levels for non-impacted groundwater in the vicinity of the CCR Landfill.

The box and whiskers plot for TDS in monitoring wells MW-505 and MW-512 were compared to box and whisker plots for TDS in several upgradient and side-gradient non-CCR monitoring system wells installed for future state-permitted landfill expansion purposes. TDS comparisons indicate the concentrations in MW-505 and MW-512 are generally within expected concentration levels for non-impacted groundwater in the vicinity of the CCR Landfill.

The box and whiskers plot for sulfate in monitoring wells MW-506 and MW-512 were compared to box and whisker plots for sulfate in upgradient and side-gradient non-CCR monitoring system wells installed for future state-permitted landfill expansion purposes. Sulfate comparisons indicate the concentrations in MW-506 and MW-512 are generally within the range of concentration levels for non-impacted groundwater in the vicinity of the CCR Landfill; specifically MW-515.

Figure 1 in **Appendix A** shows these upgradient and non-CCR monitoring system wells and their relationships to groundwater flow near and beneath the CCR Landfill. Because the non-CCR monitoring system wells are located in a nearby area where they could not be impacted by the landfill due to their upgradient and side-gradient locations, and exhibit natural variability that includes concentrations similar to those seen in MW-505, MW-506 and MW-512, the observed concentrations are within the range of expected natural spatial variation within and between wells. This demonstrates that a source other than the CCR Landfill caused the SSIs over the background levels, or that the SSI resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality. Box and whisker plots are provided in **Appendix F**.

3.6 BINARY PLOTS

Binary plots are another way to visualize data and allow evaluation of mixing of various waters. Binary plots for the monitoring wells and leachate were prepared for pairs of highly mobile constituents. These include chloride - sulfate, boron - sulfate, and boron - chloride. The chloride – sulfate plot identifies the mixing zone between the mean concentrations for upgradient groundwater (MW-504 and MW-505) and leachate. If leachate were mixing with upgradient groundwater, the data for the downgradient wells would fall within the mixing zone on the plot; however, the data for the downgradient wells falls below the mixing zone. The boron – sulfate and boron - chloride plots identify the mixing line between the mean concentrations for upgradient groundwater (MW-504 and MW-505) and leachate. If leachate were mixing with upgradient groundwater, the sulfate – boron and chloride – boron data for MW-506 and MW-512 would fall on the mixing line and the boron concentrations would range from 0.20 mg/L to 1.65 mg/L based on the sulfate mixing line and approximately 0.83 mg/L to 4.6 mg/L based on the chloride mixing line. However, the boron in downgradient wells was not detected at a concentration above the reporting limit of 0.2 mg/L. Therefore, because boron is present in the leachate but is not present in the downgradient wells, leachate is not mixing with groundwater.

These binary plots demonstrate that leachate is not mixing with upgradient groundwater and that a source other than the CCR Landfill caused the SSI over the background level for sulfate or that the SSI resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality. Binary plots are provided in **Appendix G**.

4 CONCLUSION

Our opinion is that a sufficient body of evidence is available and presented above to demonstrate that a source other than the CCR Landfill caused the SSIs over the background level, 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 CCR Landfill may continue with the detection monitoring program under § 257.94.

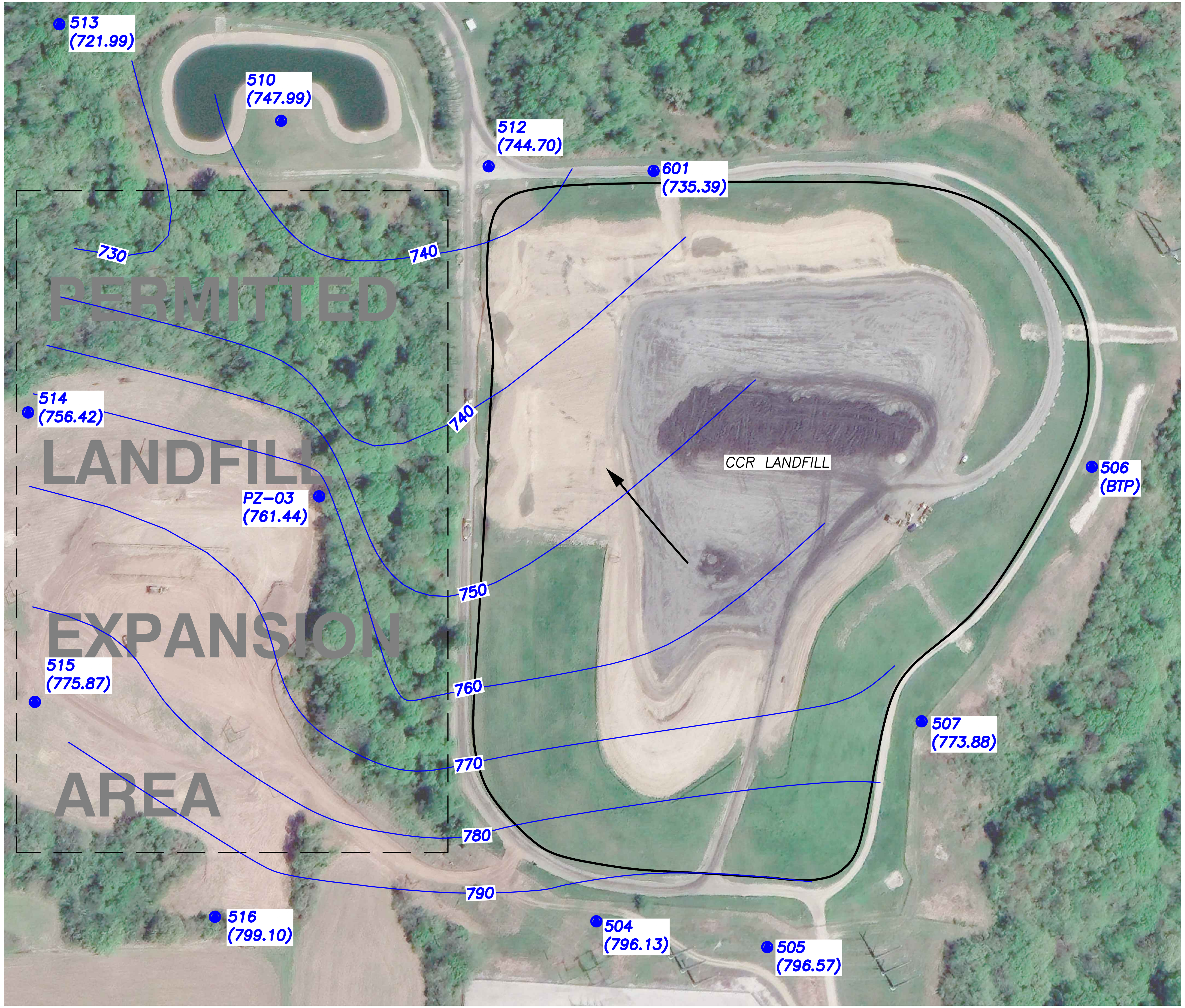
5 GENERAL COMMENTS

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 Missouri West, Inc. for specific application to the Sibley 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 signature. 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:

- 760 — GROUNDWATER POTENTIOMETRIC SURFACE ELEVATIONS (REPRESENTATIVE OF THIS UNIT)
- 601 (738.07) — GROUNDWATER MONITORING SYSTEM WELLS (GROUNDWATER ELEVATION)
- CCR LANDFILL UNIT BOUNDARY
- GROUNDWATER FLOW DIRECTION
- BTP — BELOW TOP OF PUMP

NOTES:

1. HORIZONTAL & VERTICAL DATUM: URS PLANS FOR CONSTRUCTION, KCP&L SIBLEY GENERATING STATION, DESIGN FILE 16530511.00001, DATED JANUARY 2010
2. GOOGLE EARTH AERIAL IMAGE. APRIL 2020.
3. BOUNDARY AND MONITORING WELL WELL LOCATIONS SHOWN ARE APPROXIMATE.

200 0 200 400

SCALE FEET

REV.	DATE
-	-

SHEET TITLE: POTENTIOMETRIC SURFACE MAP (MAY 2021)

PROJECT TITLE: ALTERNATIVE SOURCE DEMONSTRATION (MAY 2021)

CLIENT: EVERGY MISSOURI WEST, INC. SIBLEY GENERATING STATION SIBLEY, MISSOURI

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

PROJ. NO. 27213167.20 | DSN. BY: ALR | DWN. BY: ALR | CHK. BY: JRR | Q/A RVW BY: JRR | PROJ. MGR: JRF

CADD FILE: FIG 2 - MAY 2021 - ASD.DWG

DATE: 12/15/21

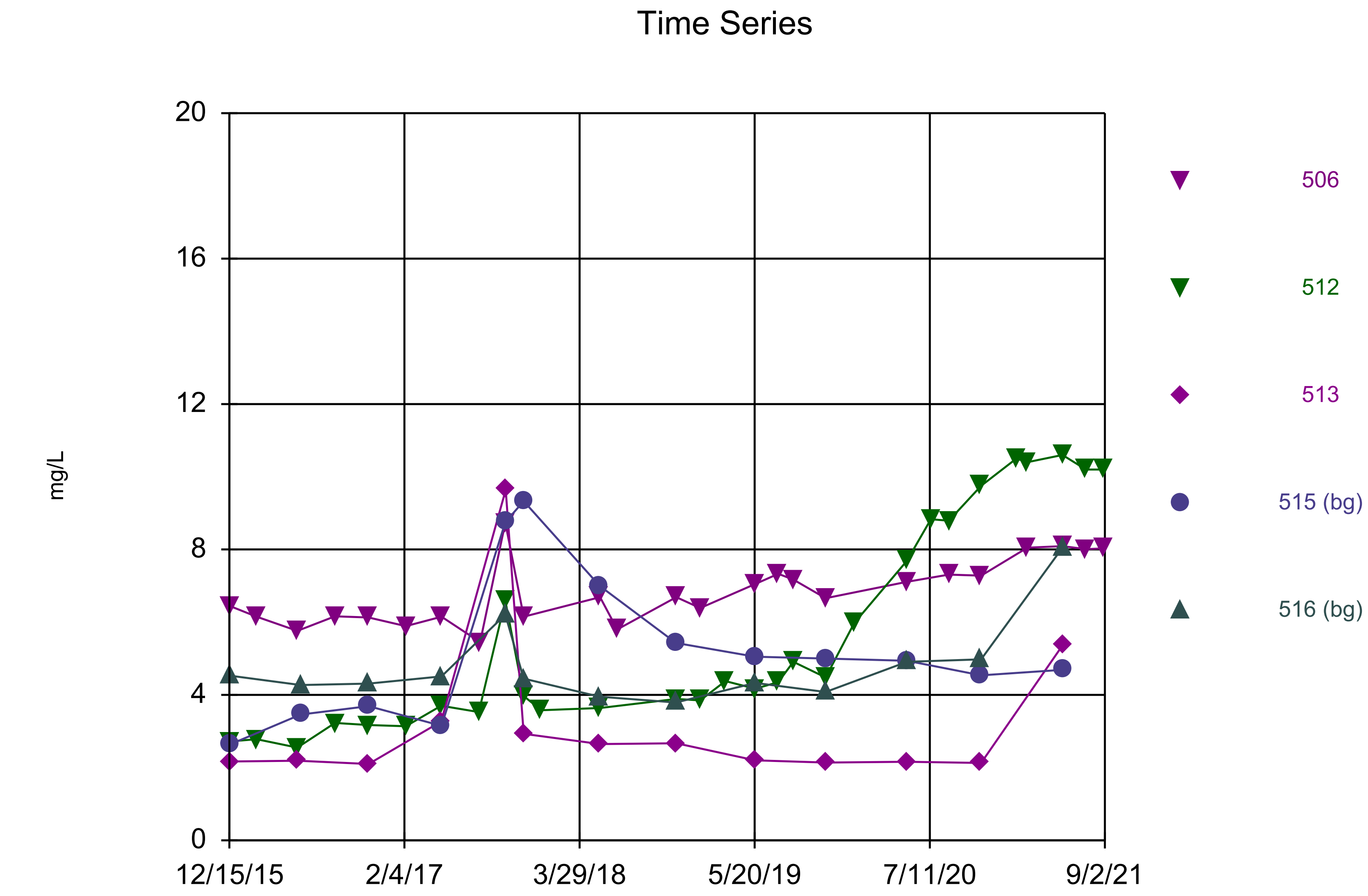
FIGURE NO. 1

N:\KCPL\Projects\Groundwater\DWG\Sibley\2021\GW\Fig 2 - May 2021 - ASD.dwg Dec 15, 2021 - 10:55am Layout Name: Fig 2 By: 4415alr

Appendix B

Time Series Plots

Sanitas™ v.9.6.32 Sanitas software licensed to SCS Engineers. UG



Constituent: Chloride Analysis Run 12/9/2021 1:23 PM View: LF III

Sibley Client: SCS Engineers Data: Sibley

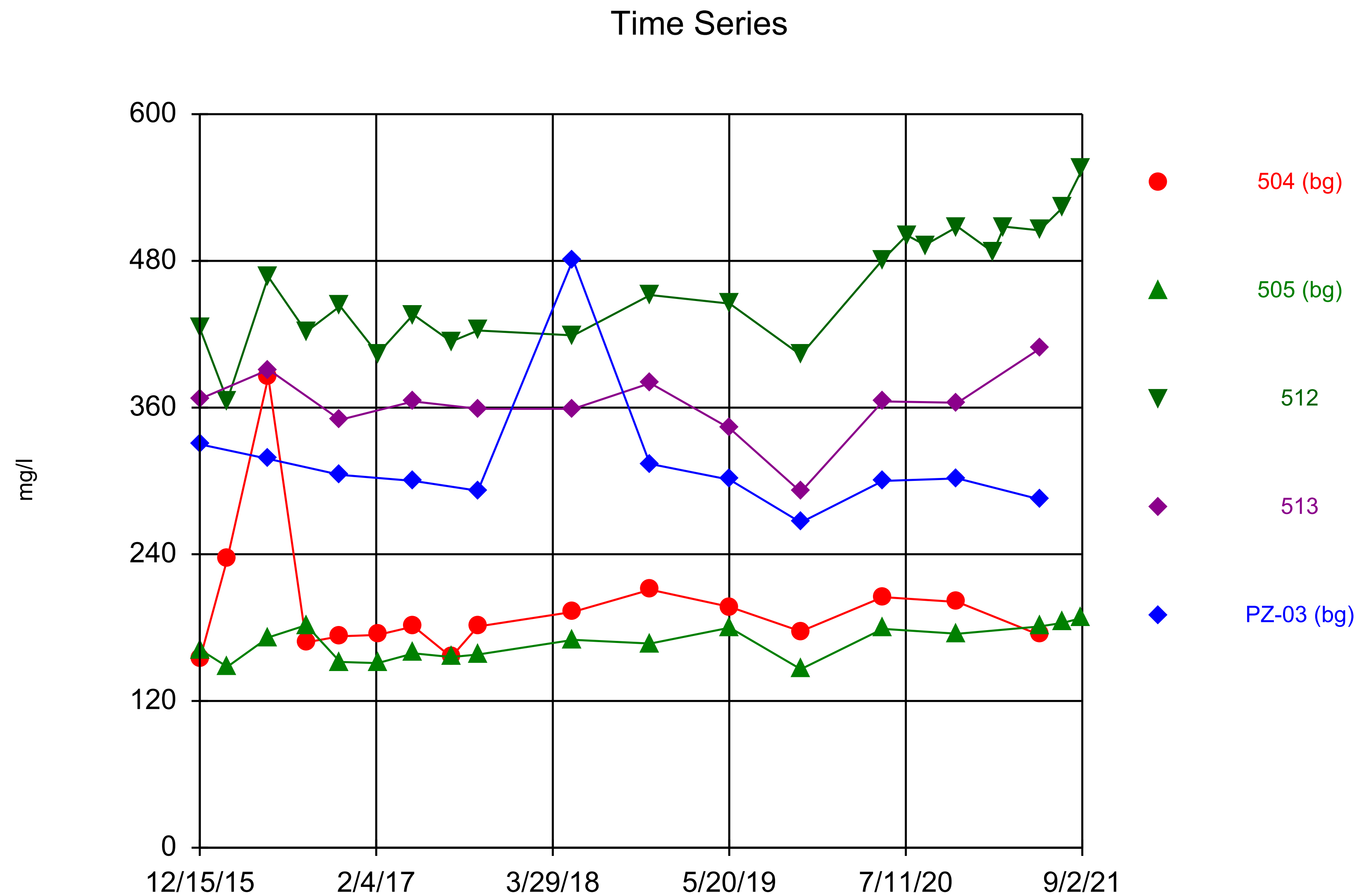
Time Series

Constituent: Chloride (mg/L) Analysis Run 12/9/2021 1:24 PM View: LF III

Sibley Client: SCS Engineers Data: Sibley

	506	512	513	515 (bg)	516 (bg)
12/15/2015	6.45	2.72	2.17	2.63	4.53
2/18/2016	6.15	2.78			
5/25/2016	5.76	2.55			
5/26/2016			2.19		
6/2/2016				3.46	4.27
8/23/2016	6.16	3.23			
11/11/2016	6.13	3.17	2.1	3.69	4.31
2/8/2017	5.89	3.14			
5/3/2017		3.7	3.27		
5/4/2017	6.15			3.15	4.51
8/1/2017		3.53			
8/4/2017	5.45				
10/3/2017	8.74	6.59		8.75	6.21
10/4/2017			9.64		
11/16/2017	6.15	3.97	2.93	9.33	4.45
12/28/2017		3.58			
5/16/2018				7	3.95
5/17/2018	6.69	3.64	2.65		
6/27/2018	5.8				
11/14/2018				5.43	3.79
11/15/2018	6.69	3.89	2.67		
1/11/2019	6.39	3.85			
3/12/2019		4.38			
5/22/2019	7.05	4.17	2.2	5.05	4.33
7/16/2019	7.33	4.35			
8/21/2019	7.17	4.91			
11/6/2019	6.66	4.48	2.14	5	4.08
1/13/2020		5.97			
5/18/2020	7.11	7.69	2.16	4.94	4.91
7/14/2020		8.83			
8/26/2020	7.31	8.79			
11/11/2020	7.28	9.75	2.13	4.54	4.98
2/3/2021		10.5			
3/1/2021	8.05	10.4			
5/24/2021	8.09	10.6	5.36	4.69	8.05
7/19/2021	8.01	10.2			
9/2/2021	8.03	10.2			

Sanitas™ v.9.6.32 Sanitas software licensed to SCS Engineers. UG



Constituent: Dissolved Solids Analysis Run 12/9/2021 1:27 PM View: LF III

Sibley Client: SCS Engineers Data: Sibley

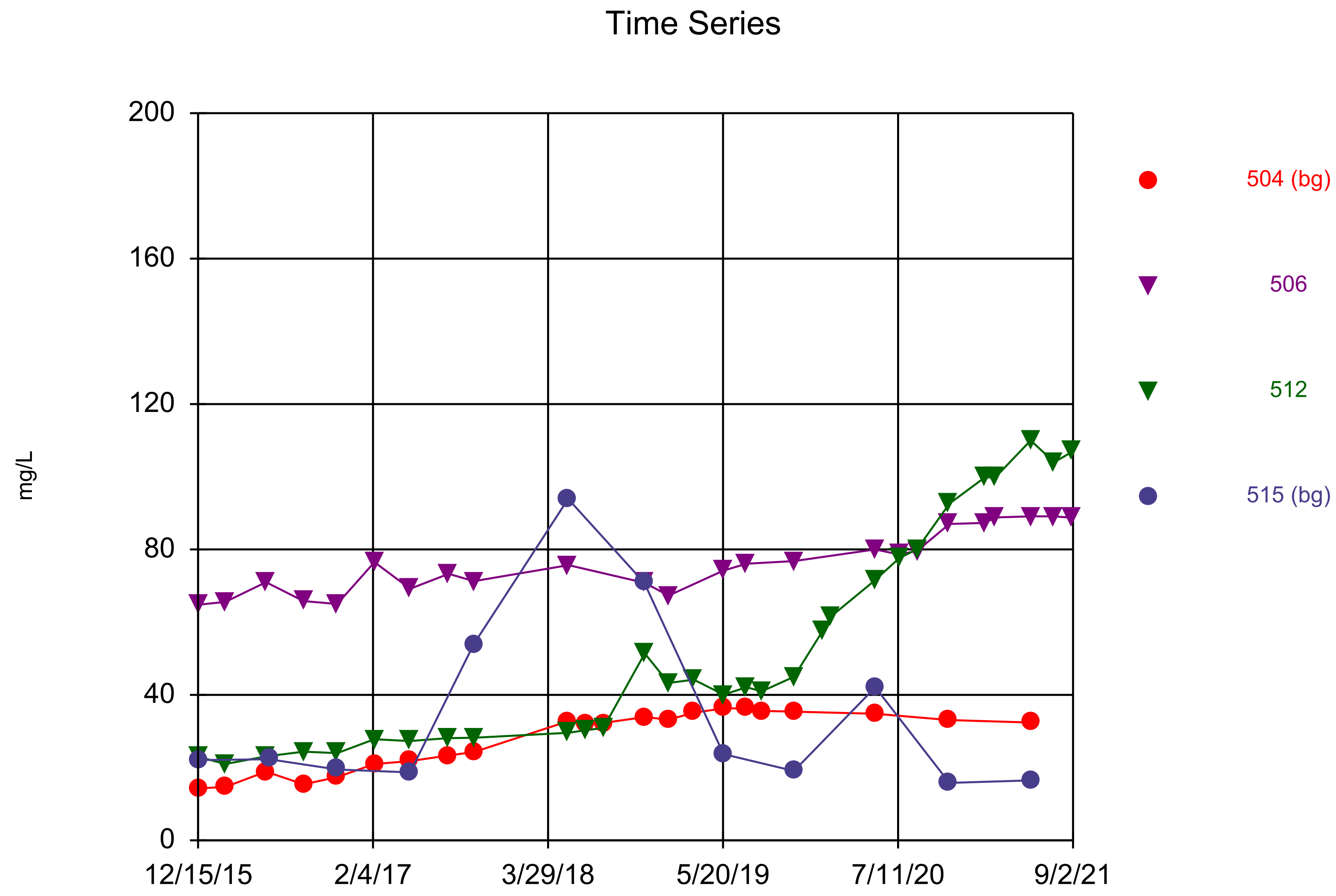
Time Series

Constituent: Dissolved Solids (mg/l)   Analysis Run 12/9/2021 1:27 PM   View: LF III

Sibley   Client: SCS Engineers   Data: Sibley

	504 (bg)	505 (bg)	512	513	PZ-03 (bg)
12/15/2015			425	367	330
12/16/2015	155	162			
2/18/2016	236	148	366		
5/25/2016	385	172	467		
5/26/2016				391	318
8/23/2016	168	182	422		
11/11/2016	173	152	443	350	305
2/8/2017	174	151	404		
5/3/2017			436	365	
5/4/2017	181	159			300
8/1/2017	156	156	414		
10/3/2017	181	158	423		292
10/4/2017				359	
5/16/2018					481
5/17/2018	193	170	419	359	
11/14/2018					314
11/15/2018	211	167	452	380	
5/22/2019	197	180	445	343	301
11/6/2019	177	146	403	291	266
5/18/2020	205	179	481	365	300
7/14/2020			501		
8/26/2020			493		
11/11/2020	201	175	508	364	302
2/3/2021			487		
3/1/2021			508		
5/24/2021	174	181	505	408	285
7/19/2021		184	524		
9/2/2021		188	555		

Sanitas™ v.9.6.32 Sanitas software licensed to SCS Engineers. UG



Constituent: Sulfate Analysis Run 12/9/2021 1:25 PM View: LF III

Sibley Client: SCS Engineers Data: Sibley

Time Series

Constituent: Sulfate (mg/L) Analysis Run 12/9/2021 1:26 PM View: LF III

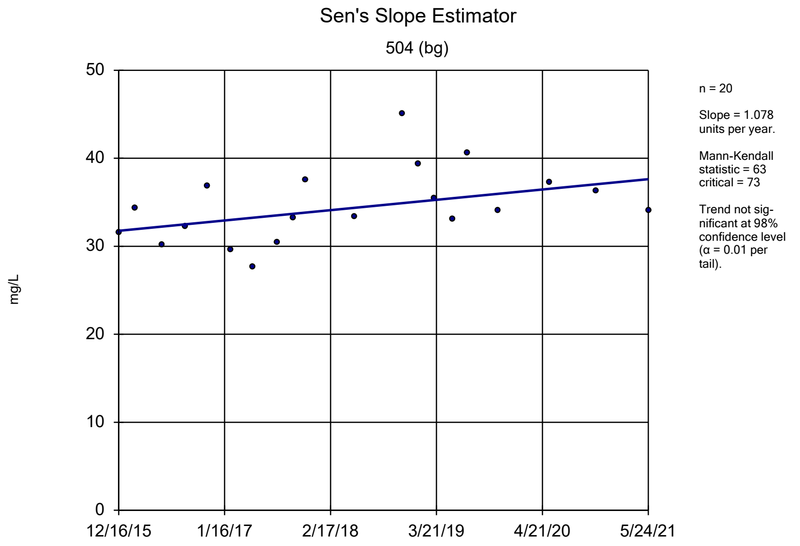
Sibley Client: SCS Engineers Data: Sibley

	504 (bg)	506	512	515 (bg)
12/15/2015		64.8	23	22.1
12/16/2015	14.3			
2/18/2016	14.7	65.6	21	
5/25/2016	18.9	71	23.1	
6/2/2016				22.3
8/23/2016	15.4	65.8	24.4	
11/11/2016	17.4	65	24	19.5
2/8/2017	21	76.5	27.8	
5/3/2017			27.3	
5/4/2017	21.8	69.2		18.7
8/1/2017	23.3		28.1	
8/4/2017		73.3		
10/3/2017	24.3	71.3	28.2	54
5/16/2018				93.9
5/17/2018	32.8	75.7	29.6	
6/27/2018	31.8		30.3	
8/8/2018	32.3		30.9	
11/14/2018				70.8
11/15/2018	33.9	70.8	51.4	
1/11/2019	33.2	67.3	43.3	
3/12/2019	35.1		44.2	
5/22/2019	36.3	74.2	40.1	23.7
7/16/2019	36.3	76.1	42.1	
8/21/2019	35.6		41	
11/6/2019	35.4	76.8	45	19.1
1/13/2020			57.5	
2/3/2020			61.6	
5/18/2020	34.8	80	71.6	42.1
7/14/2020		78.6	77.6	
8/26/2020		79.6	80.1	
11/11/2020	33.1	87	92.6	15.8
2/3/2021		87.3	99.8	
3/1/2021		88.8	99.9	
5/24/2021	32.4	89.1	110	16.5
7/19/2021		89.1	104	
9/2/2021		88.7	107	

Appendix C

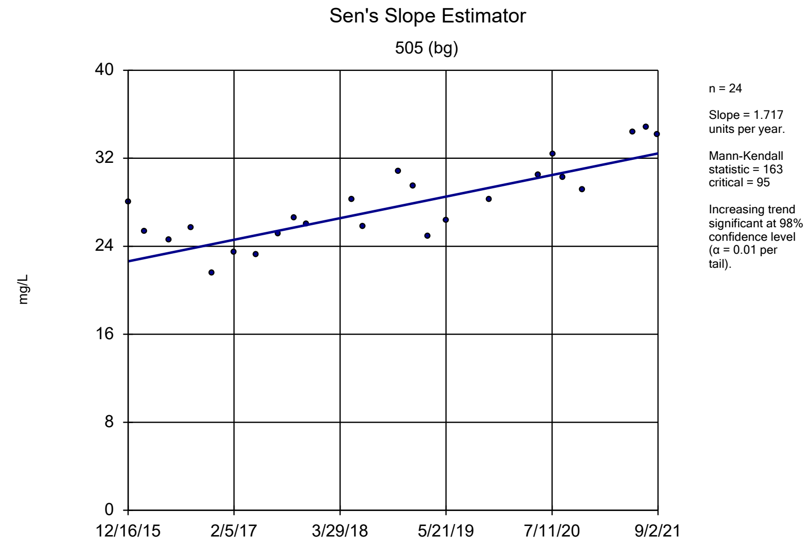
Trend Analysis

Sanitas™ v.9.6.31 Sanitas software licensed to SCS Engineers. UG



Constituent: Calcium Analysis Run 11/30/2021 1:25 PM View: LF III
Sibley Client: SCS Engineers Data: Sibley

Sanitas™ v.9.6.31 Sanitas software licensed to SCS Engineers. UG



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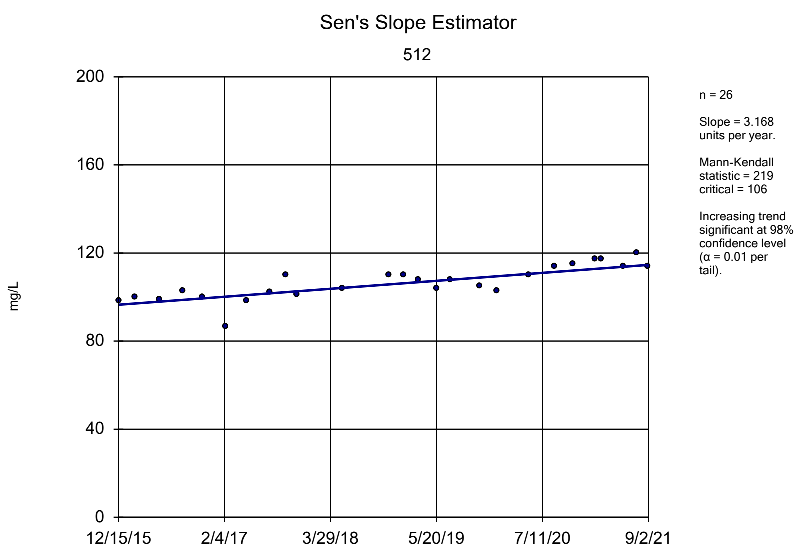
Sibley Client: SCS Engineers Data: Sibley

Sanitas™ v.9.6.31 Sanitas software licensed to SCS Engineers. UG

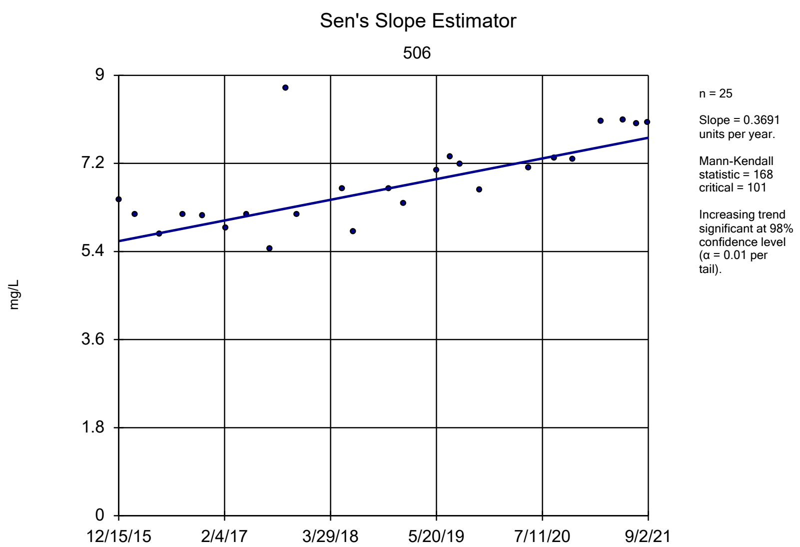


Constituent: Calcium Analysis Run 11/30/2021 1:25 PM View: LF III
Sibley Client: SCS Engineers Data: Sibley

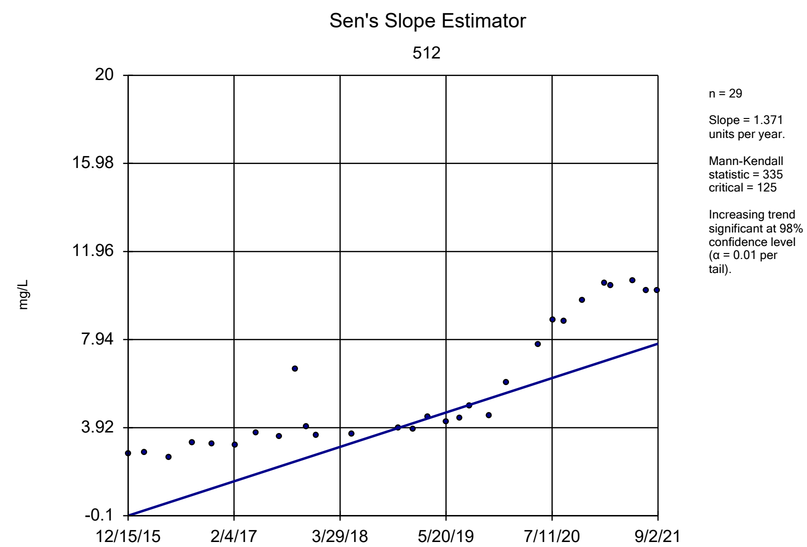
Trend Test

Sibley   Client: SCS Engineers   Data: Sibley   Printed 11/30/2021, 1:26 PM

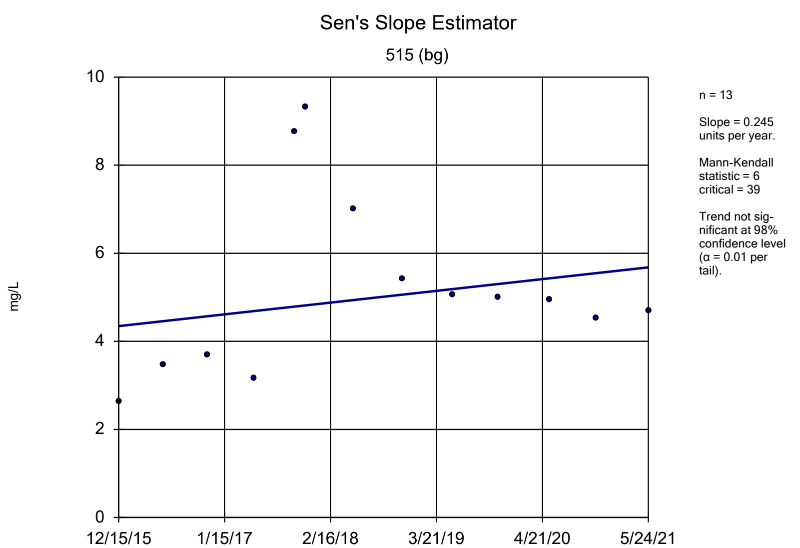
Constituent	Well	Slope	Calc.	Critical	Sig.	N	%NDs	Normality	Xform	Alpha	Method
Calcium (mg/L)	504 (bg)	1.078	63	73	No	20	0	n/a	n/a	0.02	NP
Calcium (mg/L)	**505 (bg)**	**1.717**	**163**	**95**	**Yes**	**24**	**0**	**n/a**	**n/a**	**0.02**	**NP**
Calcium (mg/L)	**512**	**3.168**	**219**	**106**	**Yes**	**26**	**0**	**n/a**	**n/a**	**0.02**	**NP**



Constituent: Chloride Analysis Run 11/30/2021 1:22 PM View: LF III
Sibley Client: SCS Engineers Data: Sibley



Constituent: Chloride Analysis Run 11/30/2021 1:22 PM View: LF III
Sibley Client: SCS Engineers Data: Sibley

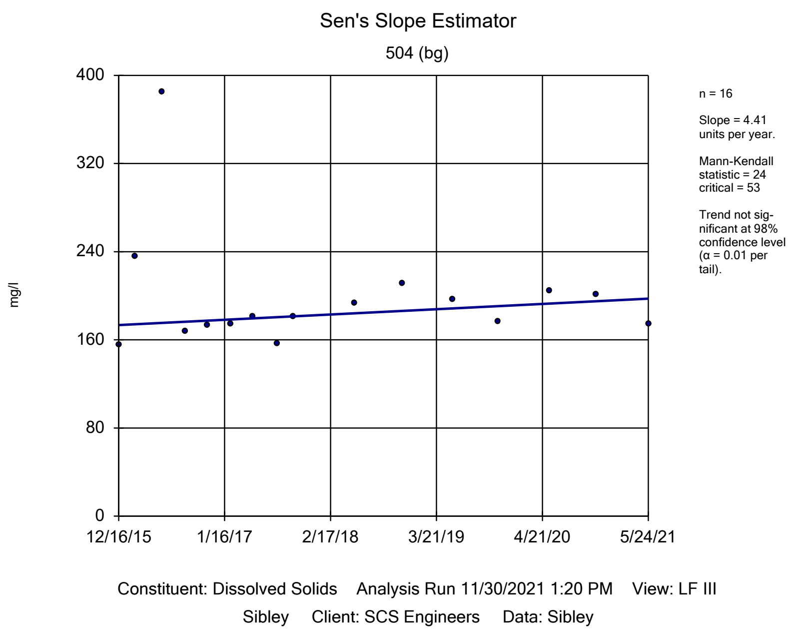


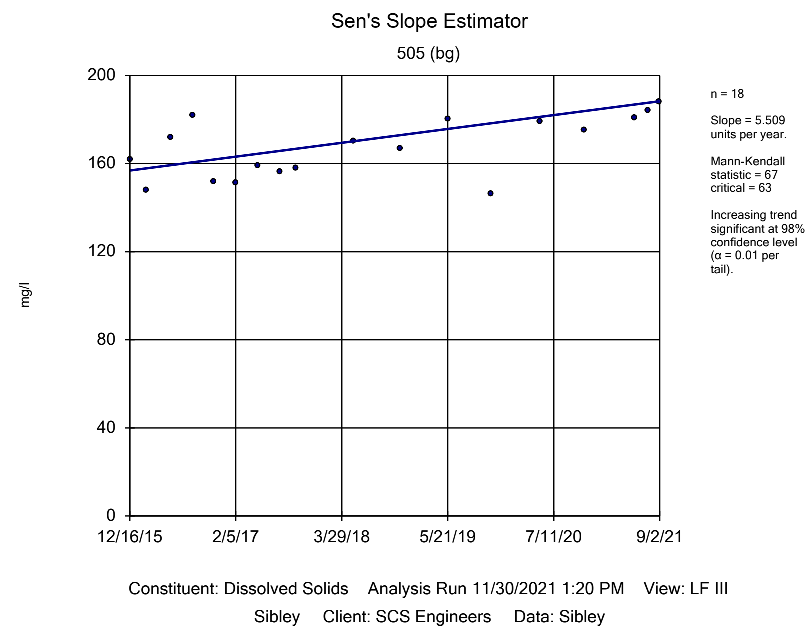
Constituent: Chloride Analysis Run 11/30/2021 1:22 PM View: LF III
Sibley Client: SCS Engineers Data: Sibley

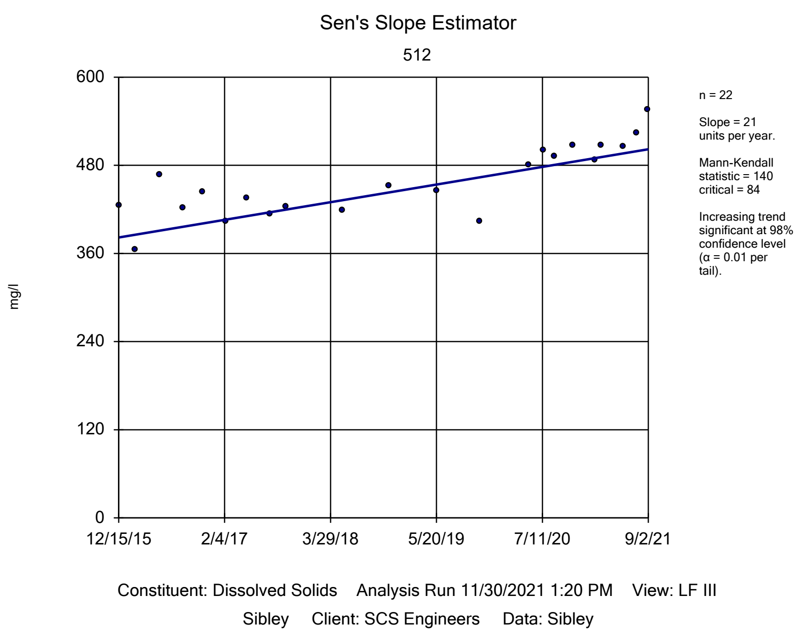
Trend Test

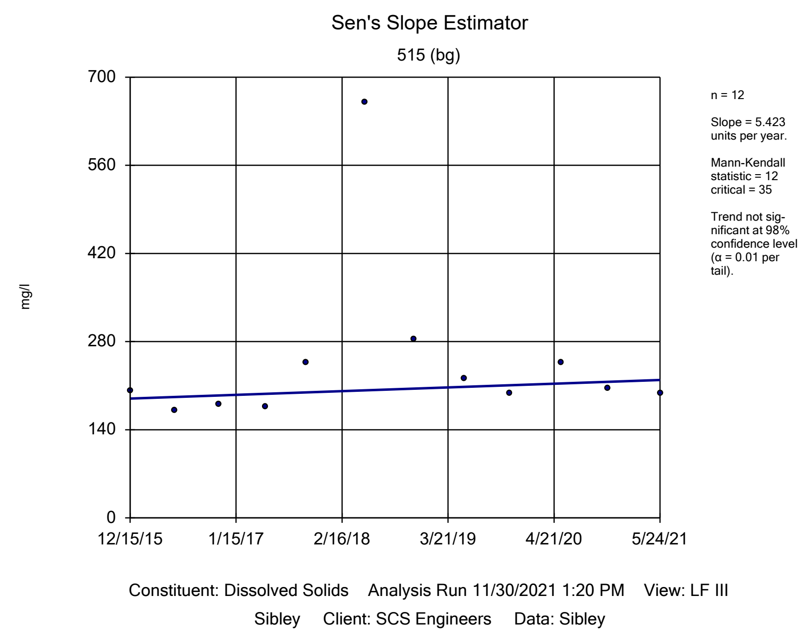
Sibley   Client: SCS Engineers   Data: Sibley   Printed 11/30/2021, 1:24 PM

Constituent	Well	Slope	Calc.	Critical	Sig.	N	%NDs	Normality	Xform	Alpha	Method
Chloride (mg/L)	**506**	**0.3691**	**168**	**101**	**Yes**	**25**	**0**	**n/a**	**n/a**	**0.02**	**NP**
Chloride (mg/L)	**512**	**1.371**	**335**	**125**	**Yes**	**29**	**0**	**n/a**	**n/a**	**0.02**	**NP**
Chloride (mg/L)	515 (bg)	0.245	6	39	No	13	0	n/a	n/a	0.02	NP


Sen's Slope Estimator
504 (bg)
mg/l
400
320
240
160
80
0
12/16/15
1/16/17
2/17/18
3/21/19
4/21/20
5/24/21
n = 16
Slope = 4.41 units per year.
Mann-Kendall statistic = 24 critical = 53
Trend not significant at 98% confidence level (α = 0.01 per tail).
Constituent: Dissolved Solids Analysis Run 11/30/2021 1:20 PM View: LF III
Sibley Client: SCS Engineers Data: Sibley


Sen's Slope Estimator
505 (bg)
mg/l
200
160
120
80
40
0
12/16/15
2/5/17
3/29/18
5/21/19
7/11/20
9/2/21
n = 18
Slope = 5.509 units per year.
Mann-Kendall statistic = 67 critical = 63
Increasing trend significant at 98% confidence level (α = 0.01 per tail).
Constituent: Dissolved Solids Analysis Run 11/30/2021 1:20 PM View: LF III
Sibley Client: SCS Engineers Data: Sibley

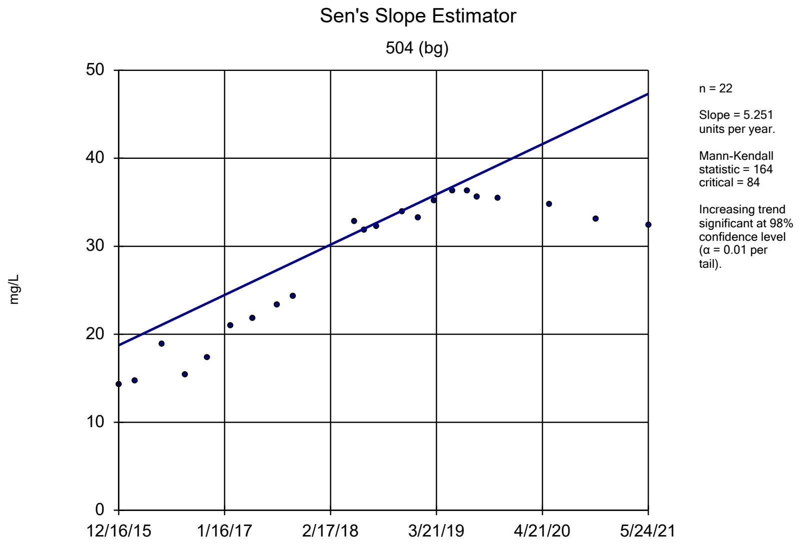

Sen's Slope Estimator
512
mg/l
600
480
360
240
120
0
12/15/15
2/4/17
3/29/18
5/20/19
7/11/20
9/2/21
n = 22
Slope = 21 units per year.
Mann-Kendall statistic = 140 critical = 84
Increasing trend significant at 98% confidence level (α = 0.01 per tail).
Constituent: Dissolved Solids Analysis Run 11/30/2021 1:20 PM View: LF III
Sibley Client: SCS Engineers Data: Sibley


Sen's Slope Estimator
515 (bg)
mg/l
700
560
420
280
140
0
12/15/15
1/15/17
2/16/18
3/21/19
4/21/20
5/24/21
n = 12
Slope = 5.423 units per year.
Mann-Kendall statistic = 12 critical = 35
Trend not significant at 98% confidence level (α = 0.01 per tail).
Constituent: Dissolved Solids Analysis Run 11/30/2021 1:20 PM View: LF III
Sibley Client: SCS Engineers Data: Sibley

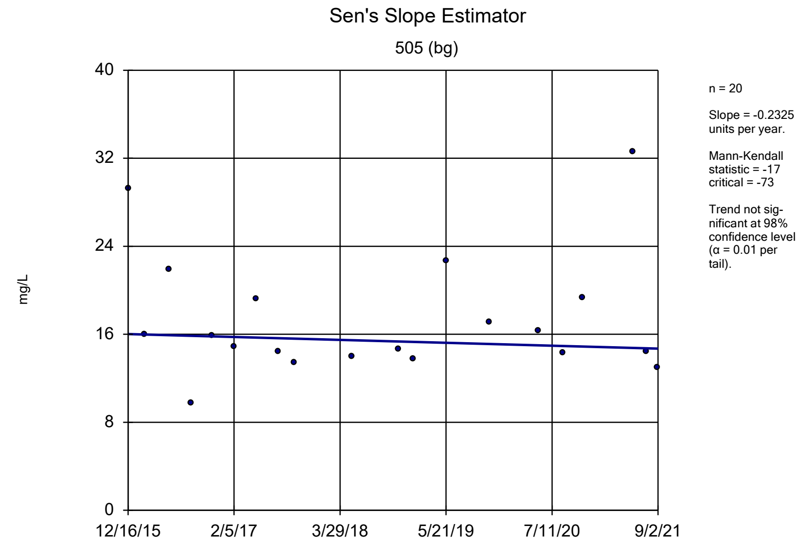
Trend Test

Sibley   Client: SCS Engineers   Data: Sibley   Printed 11/30/2021, 1:22 PM

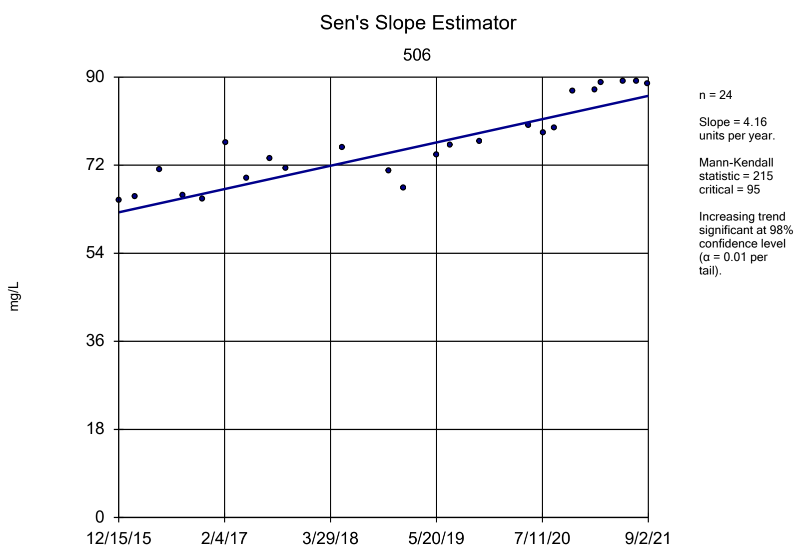
Constituent	Well	Slope	Calc.	Critical	Sig.	N	%NDs	Normality	Xform	Alpha	Method
Dissolved Solids (mg/l)	504 (bg)	4.41	24	53	No	16	0	n/a	n/a	0.02	NP
Dissolved Solids (mg/l)	**505 (bg)**	**5.509**	**67**	**63**	**Yes**	**18**	**0**	**n/a**	**n/a**	**0.02**	**NP**
Dissolved Solids (mg/l)	**512**	**21**	**140**	**84**	**Yes**	**22**	**0**	**n/a**	**n/a**	**0.02**	**NP**
Dissolved Solids (mg/l)	515 (bg)	5.423	12	35	No	12	0	n/a	n/a	0.02	NP



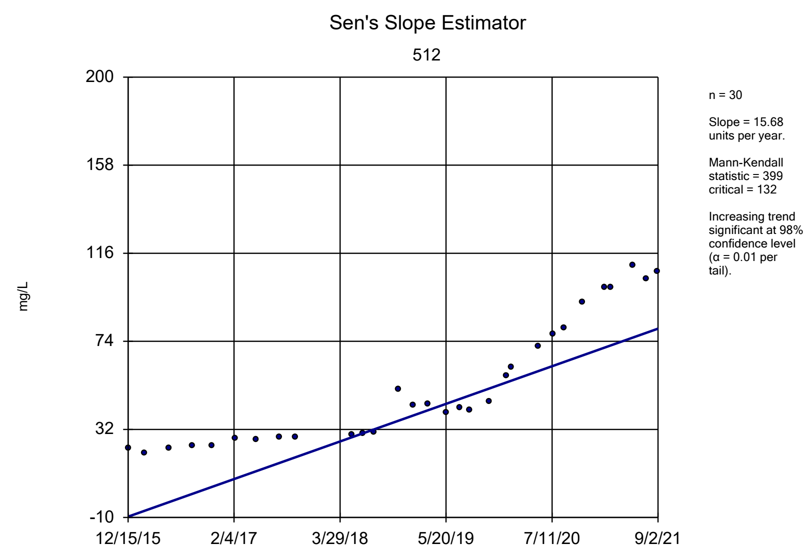
Constituent: Sulfate Analysis Run 11/30/2021 1:11 PM View: LF III
Sibley Client: SCS Engineers Data: Sibley



Constituent: Sulfate Analysis Run 11/30/2021 1:11 PM View: LF III
Sibley Client: SCS Engineers Data: Sibley



Constituent: Sulfate Analysis Run 11/30/2021 1:11 PM View: LF III
Sibley Client: SCS Engineers Data: Sibley



Constituent: Sulfate Analysis Run 11/30/2021 1:11 PM View: LF III
Sibley Client: SCS Engineers Data: Sibley

Trend Test

Sibley   Client: SCS Engineers   Data: Sibley   Printed 11/30/2021, 1:12 PM

Constituent	Well	Slope	Calc.	Critical	Sig.	N	%NDs	Normality	Xform	Alpha	Method
Sulfate (mg/L)	**504 (bg)**	**5.251**	**164**	**84**	**Yes**	**22**	**0**	**n/a**	**n/a**	**0.02**	**NP**
Sulfate (mg/L)	505 (bg)	-0.2325	-17	-73	No	20	0	n/a	n/a	0.02	NP
Sulfate (mg/L)	**506**	**4.16**	**215**	**95**	**Yes**	**24**	**0**	**n/a**	**n/a**	**0.02**	**NP**
Sulfate (mg/L)	**512**	**15.68**	**399**	**132**	**Yes**	**30**	**0**	**n/a**	**n/a**	**0.02**	**NP**

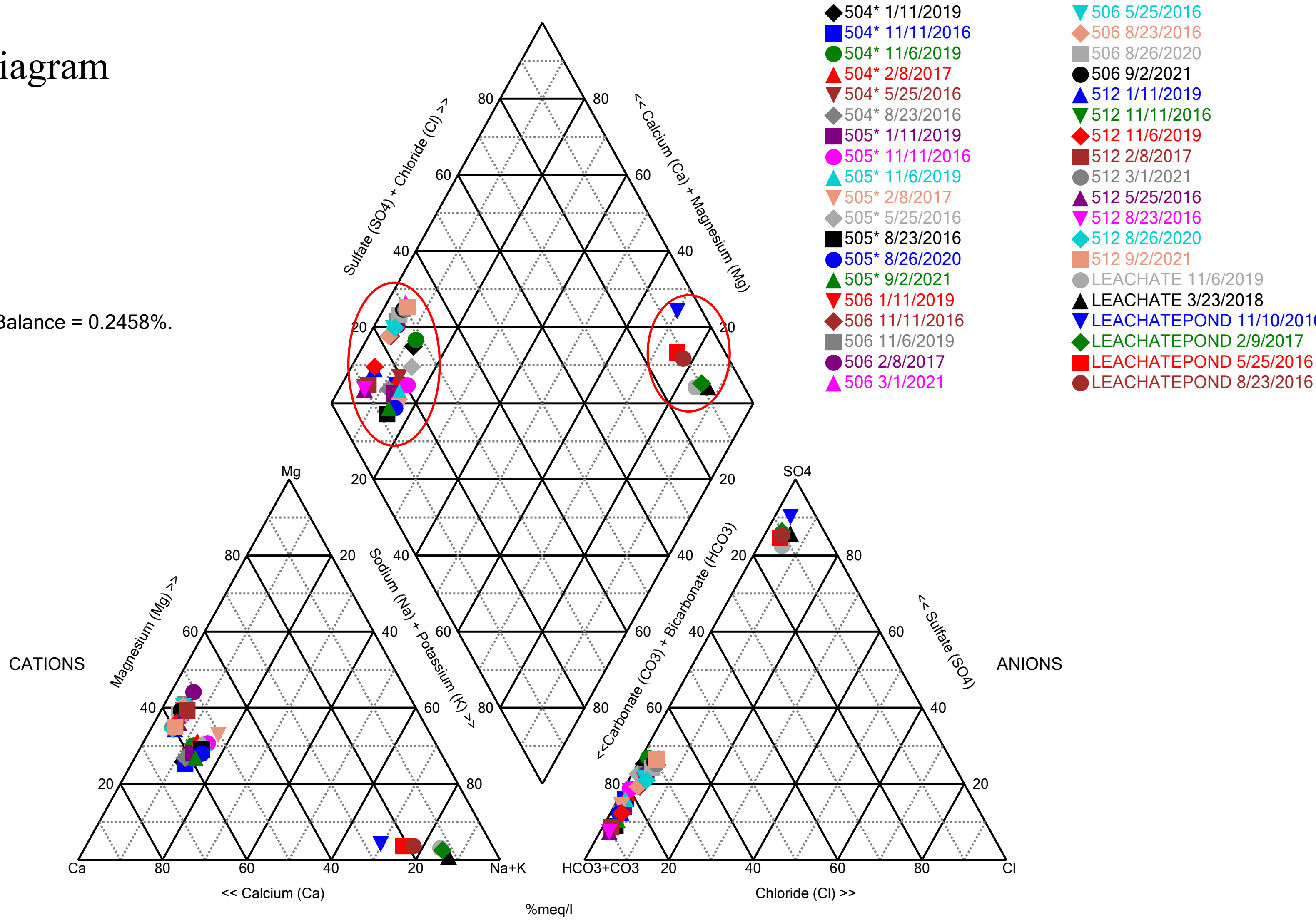
Appendix D

Piper Diagram Plots and Analytical Results

Sanitas™ v.9.6.31 Sanitas software licensed to SCS Engineers. UG

Piper Diagram

Cation-Anion Balance = 0.2458%.



Analysis Run 11/30/2021 2:02 PM View: LF III

Sibley Client: SCS Engineers Data: Sibley

Piper Diagram

Analysis Run 11/30/2021 2:03 PM View: LF III

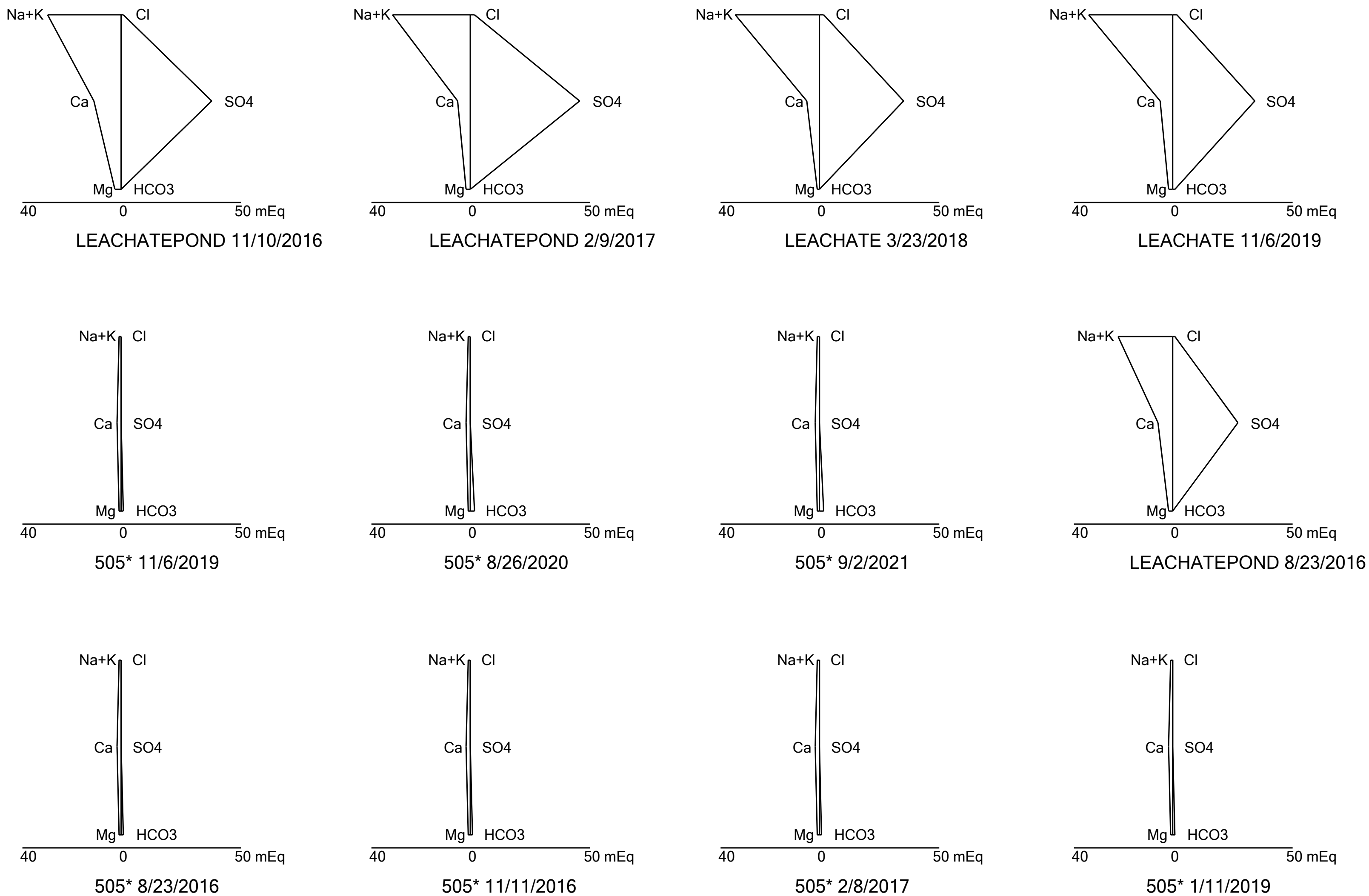
Sibley Client: SCS Engineers Data: Sibley

Totals (ppm)	Na	K	Ca	Mg	Cl	SO4	HCO3	CO3
504* 5/25/2016	6.54	1.27	30.2	8.36	0.5	18.9	89	10
504* 8/23/2016	6.61	1.15	32.2	8.56	0.5	15.4	99.5	10
504* 11/11/2016	8.17	1.3	36.9	8.97	0.5	17.4	94.7	10
504* 2/8/2017	6.83	1.28	29.6	9.94	0.5	21	105	10
504* 1/11/2019	7.64	1.9	39.3	9.85	0.5	33.2	103	10
504* 11/6/2019	7.31	1.33	34.1	10.7	0.5	35.4	101	10
505* 5/25/2016	6.93	0.5	24.6	8.05	0.5	21.9	75.3	10
505* 8/23/2016	7.28	0.5	25.7	7.97	1.19	9.73	101	10
505* 11/11/2016	6.91	0.5	21.6	7.39	0.5	15.9	68.5	10
505* 2/8/2017	8.52	0.5	23.5	9.3	0.5	14.9	94	10
505* 1/11/2019	7.54	0.5	29.5	8.42	1	13.8	87.5	10
505* 11/6/2019	8.24	0.5	28.2	9.54	0.5	17.1	93.6	10
505* 8/26/2020	8.95	1	30.3	8.95	1.03	14.3	110	10
505* 9/2/2021	8.97	1	34.1	9.34	1.23	13	118	10
506 5/25/2016	8.51	2.19	98.3	43.6	5.76	71	304	10
506 8/23/2016	8.28	1.79	97.2	42.8	6.16	65.8	326	10
506 11/11/2016	8.44	2.37	96.5	41.2	6.13	65	312	10
506 2/8/2017	8.25	2.04	83.6	43.9	5.89	76.5	307	10
506 1/11/2019	8.21	1.85	93	39.7	6.39	67.3	292	10
506 11/6/2019	8.1	1.88	93.7	42.2	6.66	76.8	306	10
506 8/26/2020	8.15	1	93.9	38.2	7.31	79.6	289	10
506 3/1/2021	8.14	1	93	38.8	8.05	88.8	277	10
506 9/2/2021	8.43	1	91.1	38.3	8.03	88.7	296	10
512 5/25/2016	10	2.24	98.9	36.8	2.55	23.1	356	10
512 8/23/2016	10.3	2.13	103	36.9	3.23	24.4	384	10
512 11/11/2016	9.96	2.16	100	35.6	3.17	24	352	10
512 2/8/2017	10	2.35	86.4	37.9	3.14	27.8	358	10
512 1/11/2019	10.6	2.25	110	37.8	3.85	43.3	366	10
512 11/6/2019	10	2.21	105	39.4	4.48	45	377	10
512 8/26/2020	10.4	2.13	114	38.9	8.79	80.1	349	10
512 3/1/2021	10	2.13	117	40.8	10.4	99.9	340	10
512 9/2/2021	10.3	2.16	114	39.9	10.2	107	349	10
LEACHATEPOND 5/25/2016	499	58.6	129	12.9	44.1	1440	10	119
LEACHATEPOND 8/23/2016	479	56.8	108	12.8	42.8	1320	10	104
LEACHATEPOND 11/10/2016	651	75.3	224	22.5	50.4	1820	30.5	68.3
LEACHATEPOND 2/9/2017	678	66.2	89.4	10.8	64.5	2200	38.9	146
LEACHATE 3/23/2018	741	70.3	88.5	4.66	79.1	1690	10	108
LEACHATE 11/6/2019	732	76.4	101	13.5	74.3	1630	53.3	125

Appendix E

Stiff Diagrams and Analytical Results

Sanitas™ v.9.6.31 Sanitas software licensed to SCS Engineers. UG



Stiff Diagram Analysis Run 11/30/2021 2:15 PM View: LF III

Sibley Client: SCS Engineers Data: Sibley

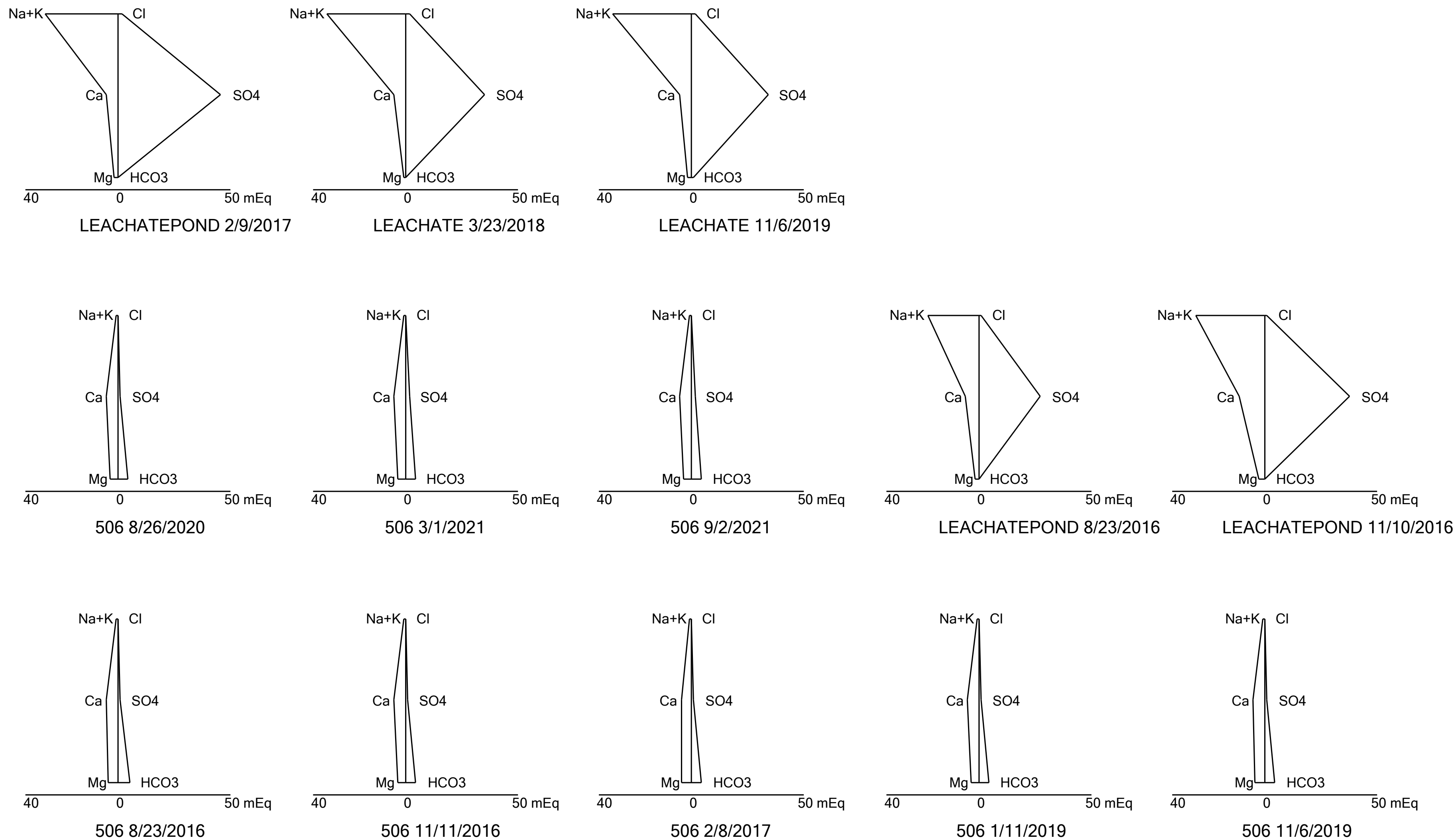
Stiff Diagram

Analysis Run 11/30/2021 2:16 PM View: LF III

Sibley Client: SCS Engineers Data: Sibley

Totals (ppm)	Na	K	Ca	Mg	Cl	SO4	HCO3
505* 8/23/2016	7.28	0.5	25.7	7.97	1.19	9.73	101
505* 11/11/2016	6.91	0.5	21.6	7.39	0.5	15.9	68.5
505* 2/8/2017	8.52	0.5	23.5	9.3	0.5	14.9	94
505* 1/11/2019	7.54	0.5	29.5	8.42	1	13.8	87.5
505* 11/6/2019	8.24	0.5	28.2	9.54	0.5	17.1	93.6
505* 8/26/2020	8.95	1	30.3	8.95	1.03	14.3	110
505* 9/2/2021	8.97	1	34.1	9.34	1.23	13	118
LEACHATEPOND 8/23/2016	479	56.8	108	12.8	42.8	1320	10
LEACHATEPOND 11/10/2016	651	75.3	224	22.5	50.4	1820	30.5
LEACHATEPOND 2/9/2017	678	66.2	89.4	10.8	64.5	2200	38.9
LEACHATE 3/23/2018	741	70.3	88.5	4.66	79.1	1690	10
LEACHATE 11/6/2019	732	76.4	101	13.5	74.3	1630	53.3

Sanitas™ v.9.6.31 Sanitas software licensed to SCS Engineers. UG



Stiff Diagram   Analysis Run 11/30/2021 2:13 PM   View: LF III

Sibley   Client: SCS Engineers   Data: Sibley

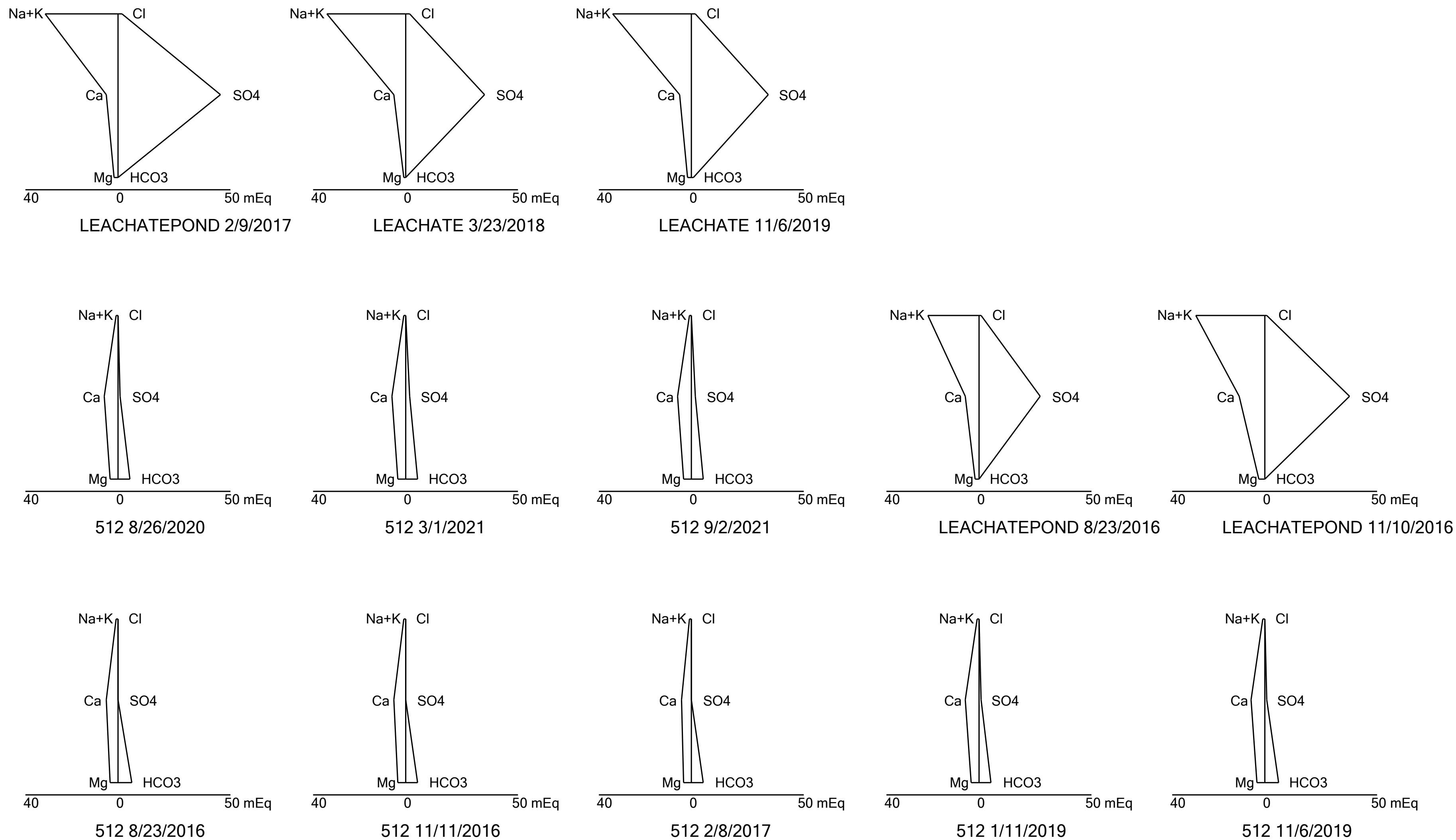
Stiff Diagram

Analysis Run 11/30/2021 2:14 PM View: LF III

Sibley Client: SCS Engineers Data: Sibley

Totals (ppm)	Na	K	Ca	Mg	Cl	SO4	HCO3
506 8/23/2016	8.28	1.79	97.2	42.8	6.16	65.8	326
506 11/11/2016	8.44	2.37	96.5	41.2	6.13	65	312
506 2/8/2017	8.25	2.04	83.6	43.9	5.89	76.5	307
506 1/11/2019	8.21	1.85	93	39.7	6.39	67.3	292
506 11/6/2019	8.1	1.88	93.7	42.2	6.66	76.8	306
506 8/26/2020	8.15	1	93.9	38.2	7.31	79.6	289
506 3/1/2021	8.14	1	93	38.8	8.05	88.8	277
506 9/2/2021	8.43	1	91.1	38.3	8.03	88.7	296
LEACHATEPOND 8/23/2016	479	56.8	108	12.8	42.8	1320	10
LEACHATEPOND 11/10/2016	651	75.3	224	22.5	50.4	1820	30.5
LEACHATEPOND 2/9/2017	678	66.2	89.4	10.8	64.5	2200	38.9
LEACHATE 3/23/2018	741	70.3	88.5	4.66	79.1	1690	10
LEACHATE 11/6/2019	732	76.4	101	13.5	74.3	1630	53.3

Sanitas™ v.9.6.31 Sanitas software licensed to SCS Engineers. UG



Stiff Diagram Analysis Run 11/30/2021 2:12 PM View: LF III

Sibley Client: SCS Engineers Data: Sibley

Stiff Diagram

Analysis Run 11/30/2021 2:13 PM View: LF III

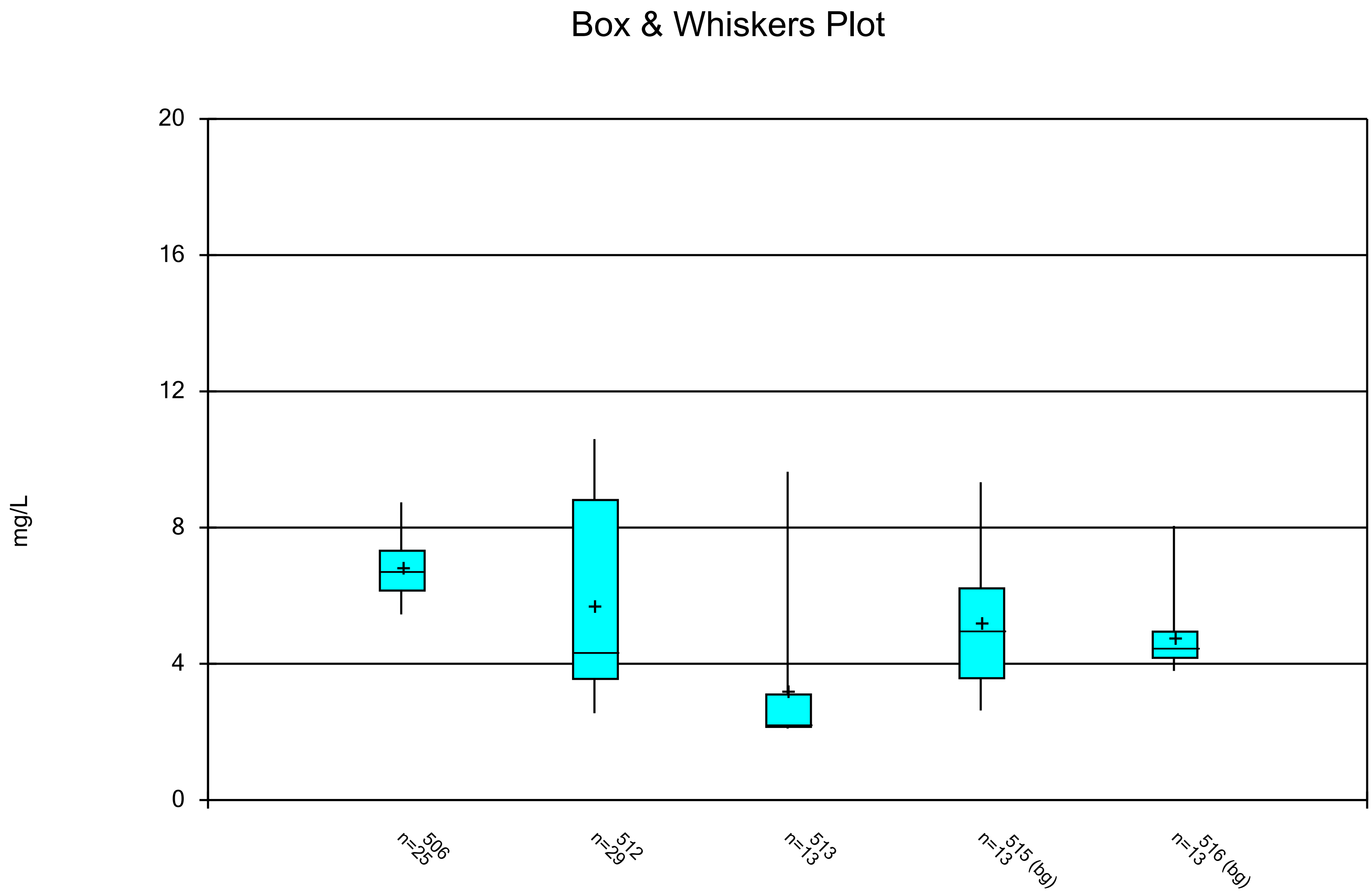
Sibley Client: SCS Engineers Data: Sibley

Totals (ppm)	Na	K	Ca	Mg	Cl	SO4	HCO3
512 8/23/2016	10.3	2.13	103	36.9	3.23	24.4	384
512 11/11/2016	9.96	2.16	100	35.6	3.17	24	352
512 2/8/2017	10	2.35	86.4	37.9	3.14	27.8	358
512 1/11/2019	10.6	2.25	110	37.8	3.85	43.3	366
512 11/6/2019	10	2.21	105	39.4	4.48	45	377
512 8/26/2020	10.4	2.13	114	38.9	8.79	80.1	349
512 3/1/2021	10	2.13	117	40.8	10.4	99.9	340
512 9/2/2021	10.3	2.16	114	39.9	10.2	107	349
LEACHATEPOND 8/23/2016	479	56.8	108	12.8	42.8	1320	10
LEACHATEPOND 11/10/2016	651	75.3	224	22.5	50.4	1820	30.5
LEACHATEPOND 2/9/2017	678	66.2	89.4	10.8	64.5	2200	38.9
LEACHATE 3/23/2018	741	70.3	88.5	4.66	79.1	1690	10
LEACHATE 11/6/2019	732	76.4	101	13.5	74.3	1630	53.3

Appendix F

Box and Whiskers Plots

Sanitas™ v.9.6.31 Sanitas software licensed to SCS Engineers. UG



Constituent: Chloride Analysis Run 11/30/2021 3:23 PM View: LF III

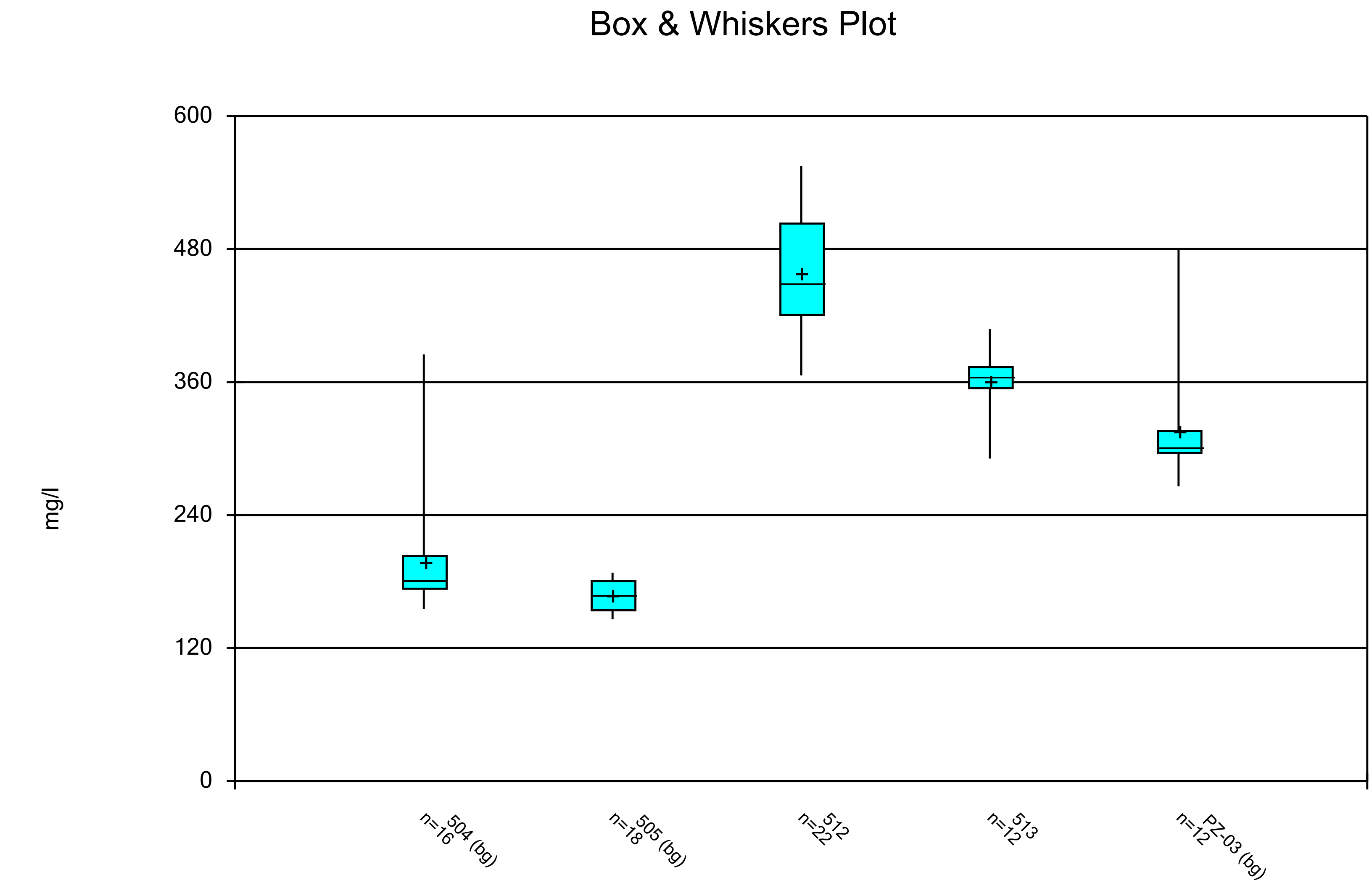
Sibley Client: SCS Engineers Data: Sibley

Box & Whiskers Plot

Sibley Client: SCS Engineers Data: Sibley Printed 11/30/2021, 3:24 PM

Constituent	Well	N	Mean	Std. Dev.	Std. Err.	Median	Min.	Max.	%NDs
Chloride (mg/L)	506	25	6.828	0.871	0.1742	6.69	5.45	8.74	0
Chloride (mg/L)	512	29	5.709	2.877	0.5342	4.35	2.55	10.6	0
Chloride (mg/L)	513	13	3.201	2.13	0.5907	2.2	2.1	9.64	0
Chloride (mg/L)	515 (bg)	13	5.205	2.039	0.5655	4.94	2.63	9.33	0
Chloride (mg/L)	516 (bg)	13	4.798	1.15	0.319	4.45	3.79	8.05	0

Sanitas™ v.9.6.31 Sanitas software licensed to SCS Engineers. UG



Constituent: Dissolved Solids   Analysis Run 11/30/2021 3:44 PM   View: LF III

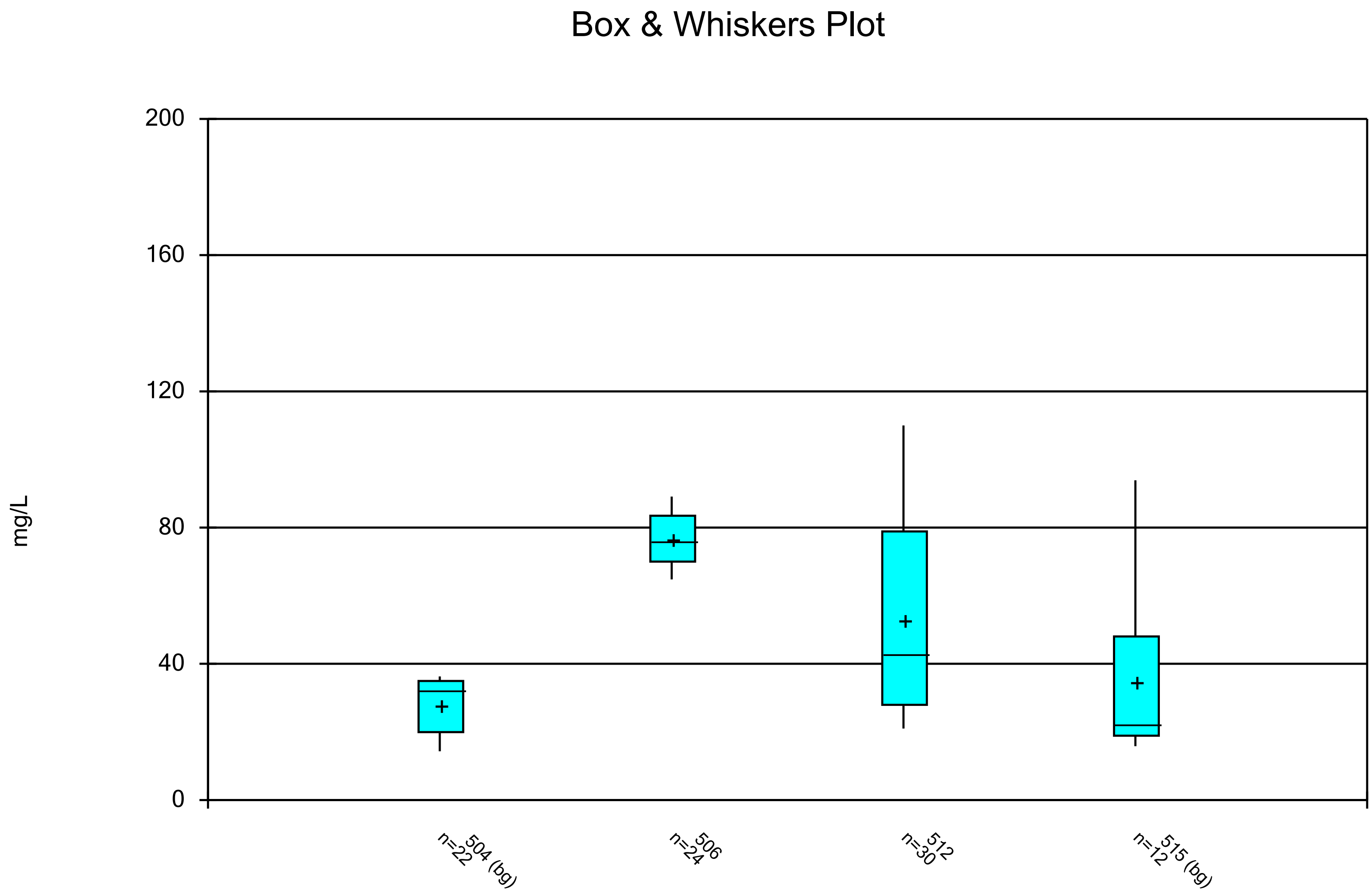
Sibley   Client: SCS Engineers   Data: Sibley

Box & Whiskers Plot

Sibley   Client: SCS Engineers   Data: Sibley   Printed 11/30/2021, 3:45 PM

Constituent	Well	N	Mean	Std. Dev.	Std. Err.	Median	Min.	Max.	%NDs
Dissolved Solids (mg/l)	504 (bg)	16	197.9	54.14	13.54	181	155	385	0
Dissolved Solids (mg/l)	505 (bg)	18	167.2	13.58	3.201	168.5	146	188	0
Dissolved Solids (mg/l)	512	22	458.2	47.75	10.18	448.5	366	555	0
Dissolved Solids (mg/l)	513	12	361.8	28.43	8.207	364.5	291	408	0
Dissolved Solids (mg/l)	PZ-03 (bg)	12	316.2	54.37	15.7	301.5	266	481	0

Sanitas™ v.9.6.31 Sanitas software licensed to SCS Engineers. UG



Constituent: Sulfate   Analysis Run 11/30/2021 3:52 PM   View: LF III

Sibley   Client: SCS Engineers   Data: Sibley

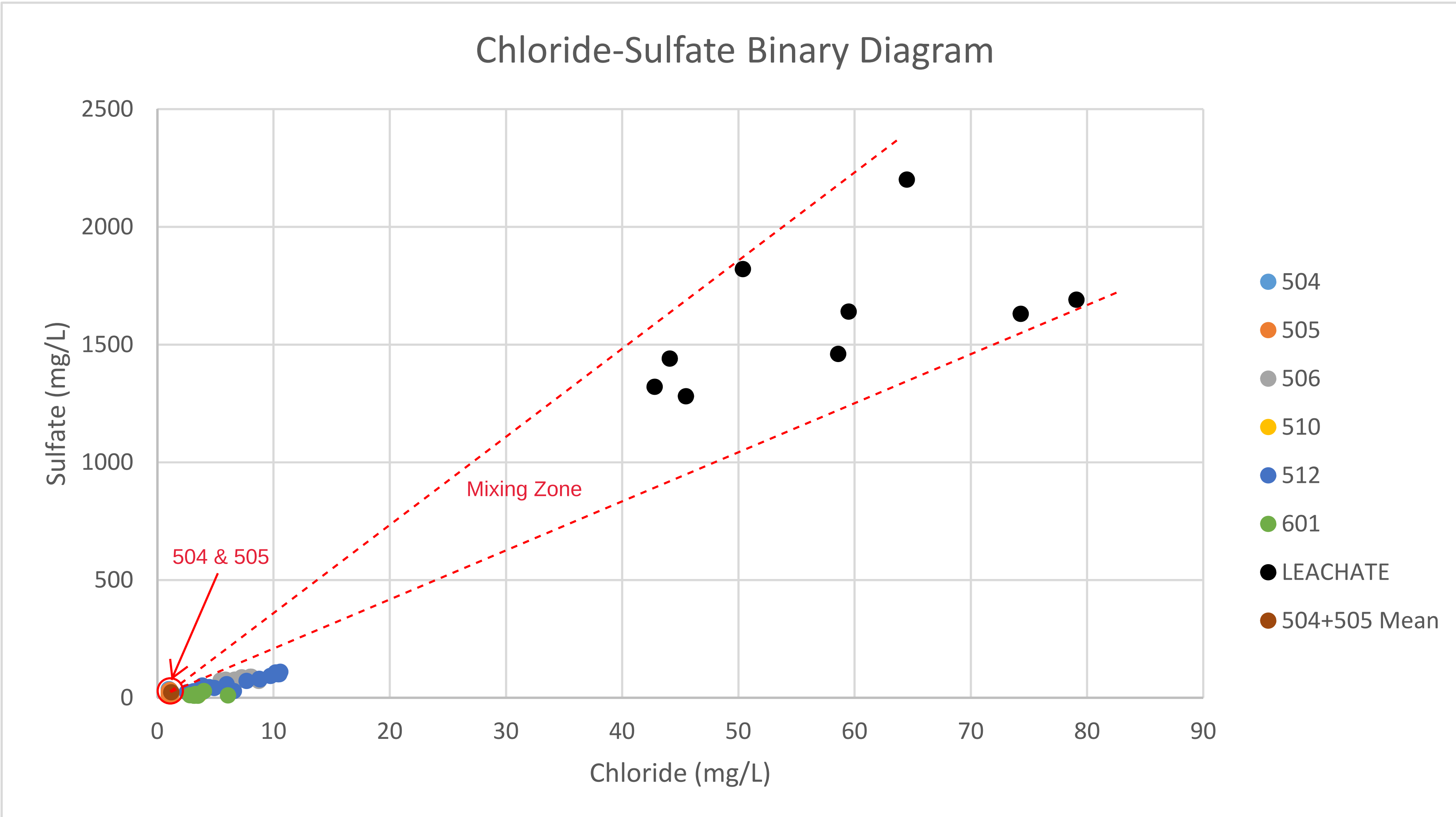
Box & Whiskers Plot

Sibley   Client: SCS Engineers   Data: Sibley   Printed 11/30/2021, 3:53 PM

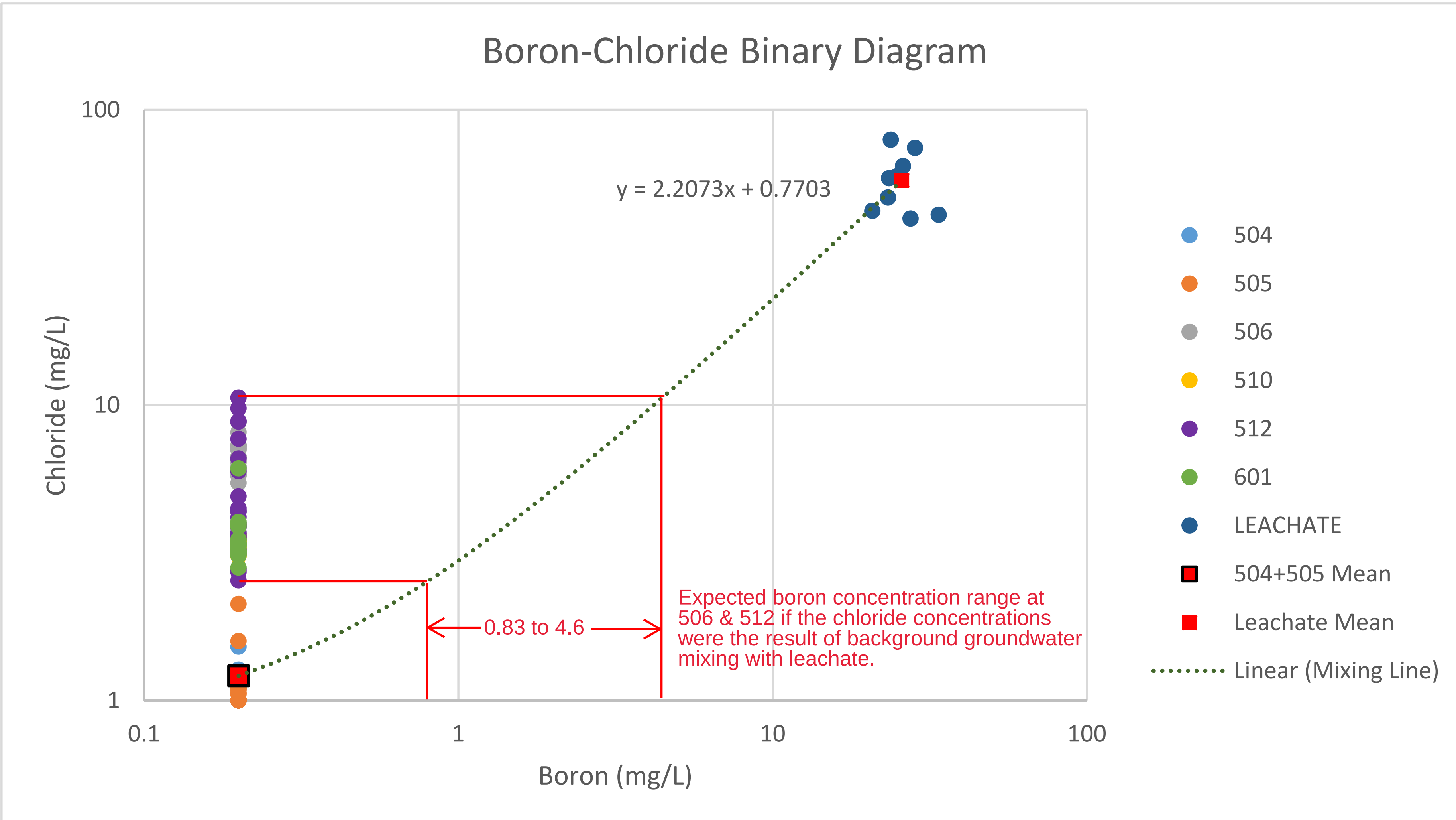
Constituent	Well	N	Mean	Std. Dev.	Std. Err.	Median	Min.	Max.	%NDs
Sulfate (mg/L)	504 (bg)	22	27.91	8.023	1.71	32.35	14.3	36.3	0
Sulfate (mg/L)	506	24	76.32	8.384	1.711	75.9	64.8	89.1	0
Sulfate (mg/L)	512	30	52.88	29.79	5.438	42.7	21	110	0
Sulfate (mg/L)	515 (bg)	12	34.88	25.38	7.327	22.2	15.8	93.9	0

Appendix G

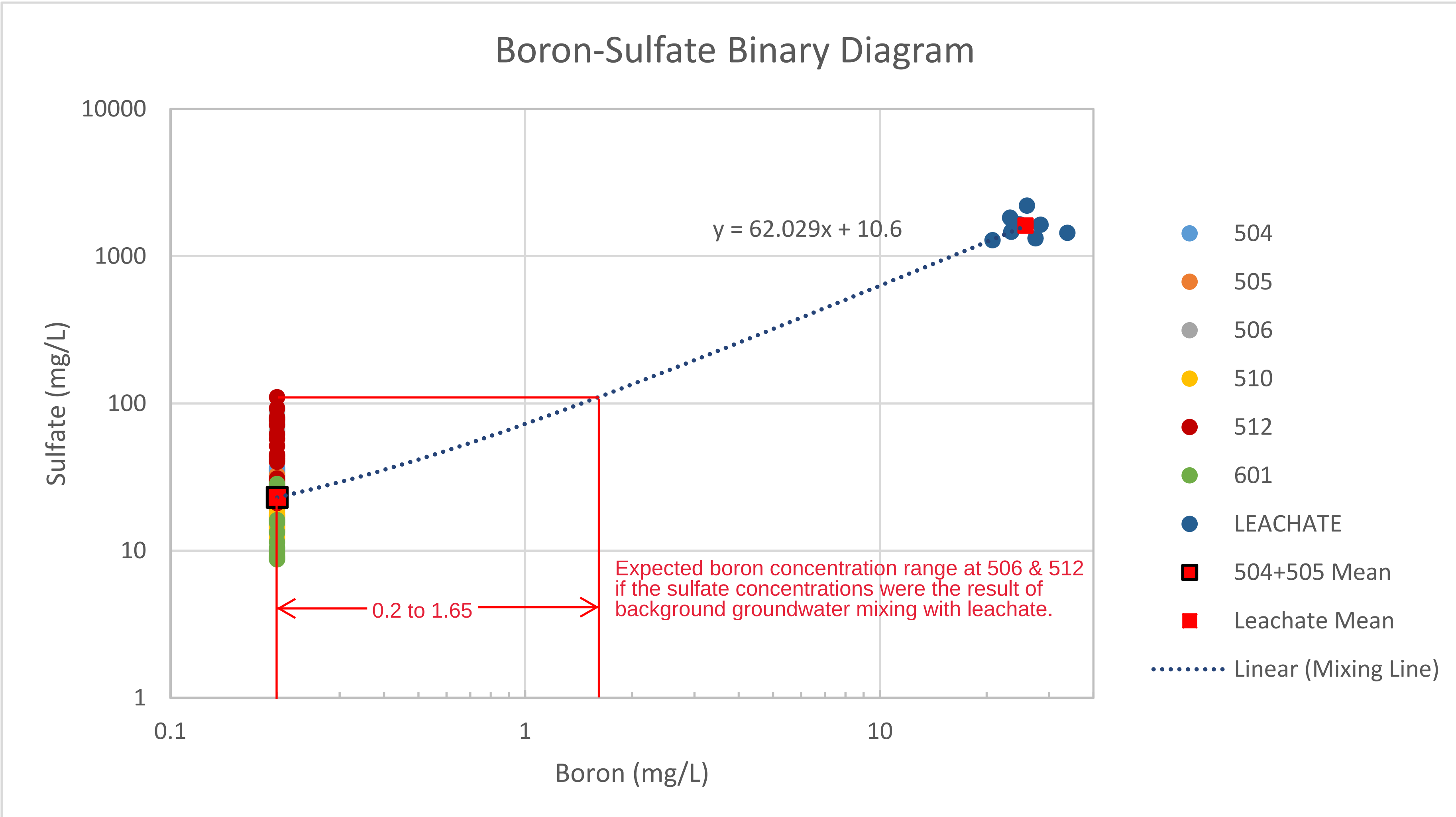
Binary Plots



Chloride-Sulfate Binary Diagram
Sulfate (mg/L)
Chloride (mg/L)
2500
2000
1500
1000
500
0
0
10
20
30
40
50
60
70
80
90
Mixing Zone
504 & 505
504
505
506
510
512
601
LEACHATE
504+505 Mean



Boron-Chloride Binary Diagram
100
10
1
0.1
1
10
100
Chloride (mg/L)
Boron (mg/L)
y = 2.2073x + 0.7703
0.83 to 4.6
Expected boron concentration range at 506 & 512 if the chloride concentrations were the result of background groundwater mixing with leachate.
504
505
506
510
512
601
LEACHATE
504+505 Mean
Leachate Mean
Linear (Mixing Line)


Boron-Sulfate Binary Diagram
10000
1000
100
10
1
Sulfate (mg/L)
0.1
1
10
Boron (mg/L)
y = 62.029x + 10.6
Expected boron concentration range at 506 & 512 if the sulfate concentrations were the result of background groundwater mixing with leachate.
0.2 to 1.65
504
505
506
510
512
601
LEACHATE
504+505 Mean
Leachate Mean
Linear (Mixing Line)