2021 Annual Groundwater Monitoring and Corrective Action Report

Columbia Energy Center
Dry Ash Disposal Facility, Modules 4, 5 and 6
Pardeeville, Wisconsin

Prepared for:

Alliant Energy

SCS ENGINEERS

25221067.00 | January 31, 2022

2830 Dairy Drive
Madison, WI 53718-6751
608-224-2830

OVERVIEW OF CURRENT STATUS

Columbia Energy Center, Dry Ash Disposal Facility, Modules 4, 5, and 6
2021 Annual Report

In accordance with §257.90(e)(6), this section at the beginning of the annual report provides an overview of the current status of groundwater monitoring and corrective action programs for the coal combustion residual (CCR) units. Supporting information is provided in the text of the annual report.

Category	Rule Requirement	Site Status
Monitoring Status – Start of Year	(i) 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;	Detection
Monitoring Status – End of Year	(ii) 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;	Detection
Statistically Significant Increases (SSIs)	(iii) If it was determined that there was an SSI 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	April/June 2021 Boron: MW-309 Chloride: MW-310 October/December 2021 none
	(B) Provide the date when the assessment monitoring program was initiated for the CCR unit.	Alternative Source Demonstration prepared for the October 2020 and April 2021 events during 2021. Assessment monitoring not required.

Category	Rule Requirement	Site Status
Statistically Significant Levels (SSL) Above Groundwater Protection Standard (GPS)	(iv) If it was determined that there was an SSL above the GPS for one or more constituents listed in appendix IV to this part pursuant to §257.95(g) include all of the following:	Not applicable – Appendix IV sampling not required
	(A) Identify those constituents listed in appendix IV to this part and the names of the monitoring wells associated with such an increase;	
	(B) Provide the date when the assessment of corrective measures was 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	
	(D) Provide the date when the assessment of corrective measures was completed for the CCR unit.	
Selection of Remedy	(v) 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 – Site is in detection monitoring
Corrective Action	(vi) Whether remedial activities were initiated or are ongoing pursuant to §257.98 during the current annual reporting period.	Not applicable – Site is in detection monitoring

Table of Contents

Section	Page
Overview of Current Status	**i**
1.0 Introduction	**1**
2.0 Background	**1**
2.1 Geologic and Hydrogeologic Setting	1
2.1.1 Regional Information	1
2.1.2 Site Information	2
2.2 CCR Rule Monitoring System	2
3.0 § 257.90(e) Annual Report Requirements	**2**
3.1 § 257.90(e)(1) Site Map	3
3.2 § 257.90(e)(2) Monitoring System Changes	3
3.3 § 257.90(e)(3) Summary of Sampling Events	3
3.4 § 257.90(e)(4) Monitoring Transition Narrative	4
3.5 § 257.90(e)(5) Other Requirements	4
3.5.1 § 257.90(e) General Requirements	4
3.5.2 § 257.94(d) Alternative Detection Monitoring Frequency	5
3.5.3 § 257.94(e)(2) Alternative Source Demonstration for Detection Monitoring	5
3.5.4 § 257.95(c) Alternative Assessment Monitoring Frequency	5
3.5.5 § 257.95(d)(3) Assessment Monitoring Results and Standards	6
3.5.6 § 257.95(g)(3)(ii) Alternative Source Demonstration for Assessment Monitoring	6
3.5.7 § 257.96(a) Extension of Time for Corrective Measures Assessment	6
3.6 §257.90(e)(6) Overview	6
4.0 References	**6**

Tables

Table 1. Groundwater Monitoring Well Network
Table 2. Groundwater Samples Summary
Table 3. Groundwater Elevation - State Monitoring Program and CCR Well Network
Table 4. Horizontal Gradients and Flow Velocity
Table 5. 2021 Groundwater Analytical Results Summary
Table 6. Groundwater Field Data Summary

Figures

Figure 1. Site Location Map
Figure 2. Site Plan and Monitoring Well Locations
Figure 3. Water Table Map, April 2021
Figure 4. Water Table Map, October 2021

Appendices

Appendix A	Summary of Regional Hydrogeologic Stratigraphy
Appendix B	Boring Logs and Well Construction Documentation
Appendix C	Laboratory Reports
	C1 April 2021 Detection Monitoring
	C2 June 2021 Resample
	C3 October 2021 Detection Monitoring
	C4 December 2021 Resample
Appendix D	Historical Monitoring Results
Appendix E	Statistical Evaluation
Appendix F	Alternative Source Demonstrations (ASDs)
	F1 Alternative Source Demonstration – October 2020
	F2 Alternative Source Demonstration – April 2021

I:\25221067.00\Deliverables\2021 Fed Annual Report - COL Mod 4-6\220131_2021 Annual CCR GW Report COL MOD 4-6 LF_Final.docx

1.0 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) Rule [40 Code of Federal Regulations (CFR) 257.50-107]. Specifically, this report was prepared to fulfill the requirements of 40 CFR 257.90(e). The applicable sections of the Rule are provided below in *italics,* followed by applicable information relative to the 2021 Annual Groundwater Monitoring and Corrective Action Report for the CCR Unit.

This report covers the period of groundwater monitoring from January 1, 2021, through December 31, 2021.

The Columbia Energy Center (COL) Dry Disposal Ash Facility is an active CCR landfill and includes an existing CCR unit and one new CCR landfill unit. Module 4 of the new unit became operational in 2018 and Modules 5 and 6 became active in 2021. The groundwater monitoring system for COL Mod 4-6 was certified on December 9, 2021. The groundwater monitoring system addressed in this report is evaluating conditions at:

- COL Dry Ash Disposal Facility – Modules 4, 5, and 6 (Mod 4-6)

The system is designed to detect monitored constituents at the waste boundary of Mod 4-6 of the COL Dry Ash Disposal Facility as required by 40 CFR 257.91(d). The groundwater monitoring system consists of two upgradient and three downgradient monitoring wells (**Table 1** and **Figure 2**). A separate groundwater monitoring system evaluates groundwater conditions for Modules 1-3 of the COL Dry Ash Disposal Facility.

2.0 BACKGROUND

To provide context for the required annual report information, the following background information is provided in this section of the report, prior to the required information:

- Geologic and hydrogeologic setting
- CCR Rule monitoring system

2.1 GEOLOGIC AND HYDROGEOLOGIC SETTING

2.1.1 Regional Information

For the purposes of groundwater monitoring, the surficial sand and gravel aquifer is considered to be the uppermost aquifer unit, as defined under 40 CFR 257.53, at the COL Ash Disposal Facility Mod 4-6. Immediately underlying the surficial sand and gravel aquifer is the Cambrian-Ordovician sandstone aquifer. A summary of the regional hydrogeologic stratigraphy is presented in **Appendix A.**

The sand and gravel aquifer is capable of producing sufficient water for industrial or municipal use in some parts of Columbia County and is capable of producing sufficient water for domestic use in many areas, including along the Wisconsin River near the Columbia Energy Center (Harr et. al, 1978). A map showing expected well yields within the sand and gravel aquifer in Columbia County is included in **Appendix A.**

Regional groundwater flow in the site vicinity is generally west toward the Wisconsin River. A map showing the regional water table elevations is included with the regional hydrogeologic information in **Appendix A.**

2.1.2 Site Information

Soils at the site are primarily sand to a depth of approximately 50 to 100 feet and overlie sandstone bedrock. Soils encountered during the site feasibility study for the COL Ash Disposal Facility were described as generally sandy with interbedded silty clay lenses up to 20 feet thick (Warzyn, 1978). During drilling of CCR wells MW-301, MW-309, MW-310, and MW-311, the unconsolidated materials were identified as consisting primarily of silty sand, sand, and gravels. The boring log for previously installed monitoring well MW-84A shows silty sand and sand as the primary unconsolidated materials at this location. All CCR monitoring wells are screened within the unconsolidated sand unit. Boring logs for the downgradient monitoring wells used to evaluate the COL Ash Disposal Facility Mod 4-6 CCR unit are included in **Appendix B.**

Shallow groundwater at the site generally flows to the north and west across the existing landfill area. The water table elevations and groundwater flow directions for the April 2021 monitoring event are shown on **Figure 3**, and the water table elevations and groundwater flow directions for the October 2021 monitoring event are shown on **Figure 4.** The groundwater elevation data for the CCR monitoring wells are provided in **Table 3.** Calculated horizontal gradients and flow velocities for representative flow paths are provided in **Table 4.**

2.2 CCR RULE MONITORING SYSTEM

The groundwater monitoring system established in accordance with the CCR Rule consists of two upgradient (background) monitoring wells and three downgradient monitoring wells (**Table 1** and **Figure 2**). The background wells include MW-301 and MW-84A. The downgradient wells include MW-309, MW-310, and MW-311. The CCR Rule wells are installed within the sand and gravel aquifer. Well depths range from approximately 29 to 52 feet, measured from the top of the well casing.

3.0 § 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:*

3.1 § 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 map of the site location is provided on **Figure 1.** A map showing the Dry Ash Disposal Facility Mod 4-6 CCR unit and all background (or upgradient) and downgradient monitoring wells with identification numbers for the groundwater monitoring program is provided as **Figure 2.** Other CCR units are also shown on **Figure 2.**

3.2 § 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 groundwater monitoring program for Mod 4-6 of the Dry Ash Disposal Facility in 2021.

The monitoring system, which was originally established to monitor Module 4, was updated to include Modules 5 and 6 following construction of these Modules in 2021. The groundwater monitoring system for COL Mod 4-6 was certified on December 9, 2021. The addition of Modules 5 and 6 was anticipated in the original design of the monitoring system, so no new wells were needed.

3.3 § 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;

Groundwater sampling events were completed in April, June, October, and December 2021 at COL Dry Ash Disposal Module 4 as part of ongoing detection monitoring. As part of the April 2021 semiannual event, retest samples were collected in June 2021. As part of the October 2021 semiannual event, a retest sample was collected at one monitoring well in December 2021.

Groundwater samples collected during the semiannual events, in April and October 2021, were analyzed for the Appendix III constituents. The retest sampling events, in June and December 2021, were limited to a subset of the Appendix III constituent list. 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 or assessment monitoring program is included in **Table 2.**

The sampling results for Appendix III parameters in 2021 are summarized in **Table 5.** Field parameter results for the 2021 sampling events are provided in **Table 6.** The analytical laboratory reports for 2021 are provided in **Appendix C.** Historical results for each monitoring well are summarized in **Appendix D.**

3.4 § 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);

There were no transitions between monitoring programs during 2021. The COL Dry Ash Disposal Facility, Mod 4-6 remained in the detection monitoring program.

In 2021, the monitoring results for the October 2020 and April 2021 monitoring events were evaluated for statistically significant increases (SSIs) in detection monitoring parameters relative to background. The comparison to background was based on a prediction limit approach, comparing the results to intrawell upper prediction limits (UPLs) based on background monitoring results from the compliance wells. The intrawell UPLs were calculated in January 2020 using background data collected through September 2018, prior to CCR placement in Mod 4. The Unified Guidance for Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities (U.S. EPA, 2009; Section 5.3.1) recommends periodic updating of background for both intrawell and interwell analyses. For semiannual monitoring, an update interval of 2 to 3 years is recommended; therefore, a UPL update is planned for 2022. The UPL calculations are included in **Appendix E**. The UPLs calculated in January 2020 were applied to the evaluation of the October 2020 and April 2021 monitoring results.

For the October 2020 event, SSIs for boron at MW-309 and chloride at MW-310 were identified. For the April 2021 event, SSIs for boron at MW-309 and for calcium and chloride at MW-310 were identified. However, alternative source demonstrations (ASDs) were completed, demonstrating that sources other than the Module 4 CCR unit were the likely cause of the observed concentrations. The ASD reports are provided in **Appendix F**.

3.5 § 257.90(e)(5) OTHER REQUIREMENTS

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

Additional potentially applicable requirements for the annual report, and the location of the requirement within the Rule, are provided in the following sections. For each cited section of the Rule, the portion referencing the annual report requirement is provided below in italics, followed by applicable information relative to the 2021 Annual Groundwater Monitoring and Corrective Action Report for the CCR Unit.

3.5.1 § 257.90(e) General Requirements

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.

Status of Groundwater Monitoring and Corrective Action Program. The groundwater monitoring and corrective action program was in detection monitoring throughout 2021.

Summary of Key Actions Completed.

- Statistical evaluation and determination of SSIs for the October 2020 and April 2021 monitoring events.
- ASD report for the SSIs identified from the October 2020 and April 2021 monitoring events.
- Two semiannual groundwater sampling and analysis events (April and October 2021).
- Resampling events at MW-309 and MW-310 in June 2021 and at MW-309 in December 2021.

Description of Any Problems Encountered: No problems were encountered in 2021.

Discussion of Actions to Resolve the Problems. Not applicable.

Projection of Key Activities for the Upcoming Year (2022):

- Statistical evaluation and determination of any SSIs for the October 2021 and April 2022 monitoring events.

- If an SSI is determined, then within 90 days either:
  - Complete alternative source demonstration (if applicable), or
  - Establish an assessment monitoring program.

- Two semiannual groundwater sampling and analysis events (April and October 2022).

3.5.2 § 257.94(d) Alternative Detection Monitoring Frequency

The owner or operator must include the demonstration providing the basis for the alternative monitoring frequency and the certification by a qualified professional engineer in the annual groundwater monitoring and corrective action report required by § 257.90(e).

Not applicable. No alternative detection monitoring frequency has been proposed.

3.5.3 § 257.94(e)(2) Alternative Source Demonstration for Detection Monitoring

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.

The ASD reports prepared to address the SSIs observed for October 2020 and April 2021 sampling events are provided in **Appendix F.** The ASD reports are certified by a qualified professional engineer.

3.5.4 § 257.95(c) Alternative Assessment Monitoring Frequency

The owner or operator must include the demonstration providing the basis for the alternative monitoring frequency and the certification by a qualified professional engineer in the annual groundwater monitoring and corrective action report required by § 257.90(e).

Not applicable. Assessment monitoring has not been initiated.

3.5.5 § 257.95(d)(3) Assessment Monitoring Results and Standards

Include the recorded concentrations required by paragraph (d)(1) of this section, identify the background concentrations established under § 257.94(b), and identify the groundwater protection standards established under paragraph (d)(2) of this section in the annual groundwater monitoring and corrective action report required by § 257.90(e).

Not applicable. Assessment monitoring has not been initiated.

3.5.6 § 257.95(g)(3)(ii) Alternative Source Demonstration for Assessment Monitoring

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.

Not applicable. Assessment monitoring has not been initiated.

3.5.7 § 257.96(a) Extension of Time for Corrective Measures Assessment

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 measure 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 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.

Not applicable. Corrective measures assessment has not been initiated.

3.6 §257.90(E)(6) OVERVIEW

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.

The specific requirements for the overview under §257.90(e)(6) are listed and the information is provided at the beginning of this report, before the Table of Contents.

4.0 REFERENCES

Harr, C.A., L.C. Trotta, and R.G. Borman, 1978, "Ground-Water Resources and Geology of Columbia County, Wisconsin," University of Wisconsin-Extension Geological and Natural History Survey Information Circular Number 37, 1978.

U.S. Environmental Protection Agency (U.S. EPA), 2009, Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance, EPA 530-R-09-007, March 2009.

Warzyn Engineering, Inc., 1978, Feasibility Study, Proposed Fly Ash and/or Scrubber Sludge Disposal Facility – Columbia Site, Wisconsin Power and Light Company, Town of Pacific, Columbia County, WI, January 1978.

Tables

1 Groundwater Monitoring Network
2 Groundwater Samples Summary
3 Groundwater Elevation - State Monitoring Program and CCR Well Network
4 Horizontal Gradients and Flow Velocity
5 2021 Groundwater Analytical Results Summary
6 Groundwater Field Data Summary

Table 1. Groundwater Monitoring Well Network
Columbia Energy Center - Dry Ash Disposal Facility MOD 4-6
SCS Engineers Project #25221067.00

Monitoring Well	Location in Monitoring Network	Role in Monitoring Network
MW-84A	Upgradient	Background
MW-301	Upgradient	Background
MW-309	Downgradient	Compliance
MW-310	Downgradient	Compliance
MW-311	Downgradient	Compliance

Created by:	RM	Date:	12/14/2020
Last revision by:	RM	Date:	1/7/2021
Checked by:	NDK	Date:	1/8/2021

Table 2. Groundwater Samples Summary

Columbia Energy Center-Dry Ash Disposal Facility MOD 4 / SCS Engineers Project #25221067.00

Sample Dates	Downgradient Wells			Background Wells	
	MW-309	MW-310	MW-311	MW-84A	MW-301
April 13-14, 2021	D	D	D	D	D
June 11, 2021	D-R	D-R	--	--	--
October 14, 2021	D	D	D	D	D
December 21, 2021	D-R	--	--	--	--
Total Samples	4	3	2	2	2

Abbreviations:
D = Detection Monitoring
D-R = Detection Monitoring Retest Sample
-- = Not Sampled

Created by:	MDB	Date:	12/16/2021
Last revision by:	MDB	Date:	12/22/2021
Checked by:	JAO	Date:	12/22/2021

Table 3. Groundwater Elevation - State Monitoring Program and CCR Well Network

Columbia Dry Ash and Ash Pond Disposal Facilities / SCS Engineers Project #25221067.00

	Well Number	MW-1AR	MW-4	MW-5R	MW-33AR	MW-33BR	MW-34A	MW-34B	MW-37A	MW-83	MW-84A	MW-84B	MW-86	MW-91AR	MW-91B	MW-92A	MW-92B
	Top of Casing Elevation (feet amsl)	822.55	819.74	805.44	808.29	808.39	805.95	806.05	813.04	807.96	814.28	814.26	824.79	809.03	808.45	808.47	808.41
	Total Depth (ft from top of casing)	44.40	39.58	25.97	31.08	57.50	35.43	56.95	31.80	25.42	40.21	52.02	45.43	32.90	52.38	28.94	51.75
	Measurement Date																
	October 2, 2012	783.41	783.70	784.96	782.38	782.23	783.03	782.99	782.66	dry	783.84	783.94	783.81	784.09	783.90	784.49	784.06
	April 15, 2013	785.44	784.02	786.09	784.16	784.14	784.74	784.79	783.87	784.49	785.83	785.76	785.22	785.14	785.01	785.75	785.34
	October 8, 2013													785.66	785.42	785.97	785.52
	October 15, 2013	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	785.66	785.42	785.97	785.52
	April 14, 2014	784.95	784.09	785.63	783.74	783.91	784.63	784.70	783.45	783.73	785.58	785.52	784.96	785.04	784.96	785.99	785.54
	October 2-3, 2014	785.03	785.39	786.08	784.37	784.28	784.57	784.54	784.56	dry	785.24	785.18	785.19	785.47	785.28	785.75	785.33
	April 13-14, 2015	783.96	783.63	785.25	783.01	782.74	783.65	783.95	782.87	dry	784.43	784.51	784.17	784.48	784.37	785.07	784.66
	October 6-7, 2015	784.28	784.44	785.72	783.68	783.33	784.05	784.02	783.66	dry	784.80	784.76	784.66	784.89	784.70	785.20	784.76
	April 4-6, 2016	785.82	aband	787.02	785.29	785.07	785.63	785.67	784.76	785.43	786.37	786.26	785.89	786.05	785.95	786.61	786.21
Dry Ash Facility (Facility ID #03025)	October 11-13, 2016	786.64	aband	788.00	787.36	786.46	786.45	786.32	786.40	786.81	787.22	787.11	786.96	787.17	786.81	787.68	787.25
	April 10-13, 2017	786.96	aband	788.13	786.39	785.99	786.30	786.28	786.34	786.23	787.16	787.06	786.96	787.24	787.03	787.90	787.60
	October 3-5, 2017	785.48	aband	786.66	784.51	784.22	784.67	784.63	784.86	784.29	NM	786.49	785.58	786.08	785.83	786.47	786.02
	October 9-10, 2017	NM	aband	NM	NM	NM	NM	NM	NM	NM	785.56 [6]	NM	NM	NM	NM	NM	NM
	February 21, 2018	783.97	aband	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	784.68	784.46	NM	NM
	April 23-25, 2018	783.99	aband	785.36	783.09	786.36	781.77	780.79	783.28	783.32	785.88	784.91	782.54	784.71	784.53	785.23	784.81
	October 23-25, 2018	788.25	aband	789.71	788.77	787.96	787.88	787.73	787.62	788.26	788.32	788.19	788.21	788.59	788.31	789.32	788.87
	April 1-4, 2019	787.05	aband	788.64	786.63	786.54	786.82	786.92	786.47	786.78	787.35	787.34	787.16	787.45	787.18	788.04	787.63
	October 7-9, 2019	787.26	aband	789.23	788.26	787.64	787.92	787.74	786.77	788.90	787.79	787.73	787.44	787.78	787.62	788.63	788.17
	May 27-28, 2020	786.92	aband	788.34	786.01	785.75	785.98	785.99	786.22	786.03	787.02	786.99	786.94	787.26	787.05	787.86	787.47
	October 7-8, 2020	785.95	aband	787.76	785.91	785.45	785.70	785.68	785.52	785.72	786.10	786.06	786.10	786.55	786.33	786.85	786.38
	February 25, 2021	NM	aband	NM	NM	NM	784.75	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	April 14, 2021	785.11	aband	787.29	784.27	784.05	784.77	784.77	784.46	c	785.84	785.81	785.60	785.86	785.69	786.47	786.06
	June 11, 2021	NM	aband	NM	784.19	NM	784.66	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	October 11-12, 14, 2021	784.47	adand	786.78	783.73	783.60	784.42	784.41	783.88	783.87	784.96	784.88	784.79	785.14	784.94	785.55	785.11
	October 17, 2021	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	Bottom of Well Elevation (ft)	778.15	780.16	779.47	777.21	750.89	770.52	749.10	781.24	782.54	774.07	762.24	779.36	776.13	756.07	779.53	756.66

	Well Number	M-3	M-4R	MW-39A	MW-39B	MW-48A	MW-48B	MW-57	MW-59	MW-216R	MW-217	MW-220RR	SG-1	SG-2	SG-3	SG-4
	Top of Casing Elevation (feet amsl)	788.23	806.10	809.62	809.50	828.86	828.84	786.29	815.48	814.21	791.55	792.90	792.06	795.25	808.60	805.36
	Total Depth (ft from top of casing)	16.90	25.55	34.80	76.07	51.88	75.80	14.40	38.50	37.85	37.37	18.96	--	--	--	--
	Measurement Date															
	October 2, 2012	780.13	786.76	781.49	781.34	782.03	781.93	780.58	779.88	781.91	780.95	780.55	789.14	793.85	dry	dry
	April 15, 2013	785.16	788.39	783.97	784.00	783.77	783.78	784.69	783.66	784.09	784.75	785.02	789.5 [1]	NM	dry	dry
	October 8, 2013	781.22	786.67	NM	NM	783.69	783.58	NM	NM	783.39	782.27	782.36	789.5 [1]	791.33	dry	dry
	October 15, 2013	NM	NM	782.94	782.81	NM	NM	782.47	783.49	NM	NM	NM	NM	NM	NM	NM
	April 14, 2014	786.04	788.96	783.57	783.68	783.56	783.57	785.51	783.41	783.73	785.25	785.87	788.90	dry	dry	dry
	October 1-3, 2014	781.16	787.55	783.42	783.32	784.05	783.94	782.32	783.55	783.79	782.63	783.03	NM	dry	dry	dry
	April 13-14, 2015	783.08	786.83	782.77	782.68	782.80	782.82	782.81	782.83	782.93	783.34	783.42	789.3	791.70	dry	dry
Ash Pond Facility (Facility ID #02325)	October 6-7, 2015	780.66	786.12	782.97	782.81	783.10	783.01	781.82	783.25	783.18	781.95	782.26	788.48	791.58	dry	dry
	April 4-6, 2016	784.21	789.09	785.27	785.27	784.79	784.76	783.21	784.97	785.68	785.02	784.36	NM	793.40	dry	dry
	October 11-13, 2016	781.88	787.88	785.75	785.52	785.73	785.61	783.12	786.51	786.16	783.75	784.09	788.32	792.52	dry	dry
	April 10-13, 2017	782.94	787.95	785.44	785.20	785.82	785.69	782.77	786.09	785.95	784.29	784.09	788.31	793.85	dry	dry
	October 3-5, 2017	780.93	787.04	783.35	783.18	784.30	784.19	782.37	784.23	783.89	782.48	782.61	788.3	793.45	dry	dry
	April 23-25, 2018	782.89	790.43	782.86	782.87	783.14	783.09	783.04	783.02	783.23	783.26	783.45	788.38	>795.25	dry	dry
	October 23-25, 2018	782.95	788.47	787.12	786.88	787.12	786.99	783.48	787.73	787.49	784.90	784.52	787.76	793.25	dry	dry
	April 1-4, 2019	785.68	789.44	786.28	786.31	786.56	786.45	785.27	787.39	786.53	786.33	785.46	788.40	794.60	dry	dry
	October 7-9, 2019	785.33	790.65	787.10	787.02	786.68	786.65	785.29	786.68	787.07	786.01	785.42	748.48	795.20	dry	dry
	May 27-29, 2020	781.80	787.73	785.12	784.92	785.74	785.59	783.11	785.89	785.60	783.41	783.89	748.48	>795.25	dry	dry
	October 7-8 &17, 2020	781.42	787.74	784.74	784.64	785.03	784.96	782.83	785.43	785.10	783.06	783.49	788.34	793.32	dry	NM
	April 12, 2021	782.30	786.34	783.66	783.65	784.13	784.08	782.79	784.08	783.97	783.15	783.49	788.03	793.45	below gauge	dry
	October 11-12, 14, 2021	781.03	786.33	782.94	782.85	783.09	783.03	781.94	783.11	783.04	782.15	782.66	788.59	795.13	dry	dry
	Bottom of Well Elevation (ft)	771.33	780.55	774.82	733.43	776.98	753.04	771.89	776.98	776.36	754.18	773.94	--	--	--	--

Table 3. Groundwater Elevation - State Monitoring Program and CCR Well Network
Columbia Dry Ash and Ash Pond Disposal Facilities / SCS Engineers Project #25221067.00

	Well Number	MW-301	MW-302	MW-303	MW-304	MW-305	M-4R	MW-33AR	MW-34A	MW-84A	MW-306	MW-307	MW-308	MW-309	MW-310	MW-311
CCR Rule Wells	Top of Casing Elevation (feet amsl)	806.89	813.00	811.52	805.42	806.32	806.10	808.29	805.95	814.28	807.63	806.89	806.9	813.27	813.62	809.74
	Screen Length (ft)	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	Total Depth (ft from top of casing)	29.40	33.6	35.80	25.7	25.6	39.58	31.08	35.43	40.21	27	26.5	28	37.67	38.41	36.19
	Top of Well Screen Elevation (ft)	787.49	789.40	785.72	789.72	790.72	776.52	787.21	780.52	784.07	790.63	790.39	788.90	785.60	785.21	783.55
	Measurement Date															
	December 21-22, 2015	NM	784.78	784.11	786.13	788.96	787.58	783.77	783.50	785.31	NM	NM	NM	NM	NM	NM
	May 27-29, 2020	787.77	787.29	785.56	789.30	787.78	787.73	786.01	785.98	787.02	785.77	785.35	786.28	785.98	785.81	785.85
	June 30, 2020	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	786.18	NM	NM
	August 6, 2020	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	785.93	NM	NM
	October 7-8, 2020	786.53	786.74	785.16	788.52	787.96	787.74	785.91	785.70	786.10	785.39	784.71	785.68	785.47	785.56	785.83
	December 11, 2020	NM	NM	NM	NM	788.19	NM	NM	NM	NM	NM	NM	NM	785.26	785.26	NM
	February 25, 2021	NM	NM	784.27	NM	788.36	NM	NM	784.75	NM	NM	NM	NM	NM	NM	NM
	April 12, 2021	786.50	785.77	784.07	787.99	788.11	786.34	784.27	784.77	785.84	784.32	784.21	785.55	784.29	784.24	784.15
	June 11, 2021	NM	NM	NM	NM	NM	NM	784.19	784.66	NM	NM	NM	NM	784.20	784.05	NM
	July 20, 2021	NM	NM	783.64	NM	788.39	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	October 11-12, 14, 2021	785.28	785.09	783.09	787.78	787.75	786.33	783.73	784.42	784.96	782.93	782.44	783.76	783.65	783.48	783.48
	December 21, 2021	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	782.93	NM	NM
	Bottom of Well Elevation (ft)	771.33	780.55	774.82	733.43	776.98	753.04	771.89	776.98	776.36	780.63	780.39	778.90	775.60	775.21	773.55

Notes:
NM = not measured

Created by: MDB Date: 5/6/2013
Last revision by: JAO Date: 12/22/2021
Checked by: RM Date: 12/22/2021

(1) The elevation for SG-1 is read off of the staff gauge (rather than measured from the top of the gauge).
(2) SG-2 could not be located during the April 2013 event.
(3) SG-3 could not be located during the October 2013 event. SG-1 could not be safely accessed during the October 2013 event.
(4) LH-2 measurements are given as leachate depth, measured by a transducer.
(5) LH-2 and LH-3 measurements were collected by WPL staff on October 9, 2017.
(6) The depth to water at MW-84A was not measured prior to purging for sampling during the October 3-5, 2017 sampling event. The level was allowed to return to static and was measured on 10/10/2017.

\\Mad-fs01\data\Projects\25221067.00\Data and Calculations\Tables\[wlstat_Columbia.xls]levels

Table 4. Horizontal Gradients and Flow Velocity
Columbia Energy Center - MOD 4 /
SCS Engineers Project #25221067.00
January - December 2021

	Northwest				
Sampling Dates	**h1 (ft)**	**h2 (ft)**	**Δl (ft)**	**Δh/Δl (ft/ft)**	**V (ft/d)**
4/12-14/2021	785.00	784.29	251.04	0.0028	0.006
10/11-14/2021	784.00	783.65	327.05	0.0011	0.0022

	West				
Sampling Dates	**h1 (ft)**	**h2 (ft)**	**Δl (ft)**	**Δh/Δl (ft/ft)**	**V (ft/d)**
4/12-14/2021	785.00	784.27	144.60	0.0050	0.010

Wells	**K Values (cm/sec)**	**K Values (ft/d)**
MW-309	2.12E-04	0.60
MW-310	1.91E-04	0.54
MW-311	6.12E-04	1.73
Geometric	2.92E-04	0.83

Assumed Porosity, n
0.40

Groundwater flow velocity equation:V = [K*(Δh/Δl)] / n

ft = feet
ft/d = feet per day
K = hydraulic conductivity
n = effective porosity
V = groundwater flow velocity

h1, h2 = point interpreted groundwater elevation at locations 1 and 2
Δl = distance between location 1 and 2
Δh/Δl = hydraulic gradient

Created by:	RM	Date:	12/29/2020
Last revision by:	RM	Date:	1/3/2022
Checked by:	MDB	Date:	1/4/2022

Table 5. 2021 Groundwater Analytical Results Summary
Columbia Dry Ash Disposal Facility - MOD 4 / SCS Engineers Project #25221067.00

Parameter Name	Background Wells				Compliance Wells											
	MW-84A		MW-301			MW-309					MW-310				MW-311	
	4/14/2021	10/14/2021	4/14/2021	10/14/2021	Intrawell UPL	4/13/2021	6/11/2021	10/14/2021	12/21/2021	Intrawell UPL	4/13/2021	6/11/2021	10/14/2021	Intrawell UPL	4/14/2021	10/14/2021
Boron, µg/L	14.3	11.1	22.2	31.4	42.2	48.0	49.9	42.9	36.4	81.9	69.6	--	72	49.8	33.6	31.7
Calcium, µg/L	69,100	75,300	117,000 P6	67,800 P6	99,900	62,300	--	83100	--	56,000	49,300	--	38,900	84,200	59,000	61,000
Chloride, mg/L	4.40	3.5	1.50 J	2.7	901	390	--	519	--	205	227	220	84.6	4.41	1.3 J	1.3 J
Fluoride, mg/L	<0.095	<0.095	<0.095	<0.095	DQ	<0.095	--	<0.095	--	DQ	<0.095	--	<0.095	DQ	<0.095	<0.095
Field pH, Std. Units	7.34	7.42	6.66	7.01	8.18	7.68	7.71	7.64	7.45	8.12	7.73	7.70	8.00	8.07	7.46	7.45
Sulfate, mg/L	1.40 J	1.3 J	8.5	17.4	53.1	30.3	--	27.7	--	118	43.3	--	54.3	131	15.6	14.2
Total Dissolved Solids, mg/L	328	326	472	334	1,730	916	--	1110	--	759	654	--	498	462	270	276

4.4 Blue shaded cell indicates the compliance well result exceeds the UPL (background) and the Limit of Quantitation (LOQ).

Abbreviations:
mg/L = milligrams per liter
µg/L = micrograms per liter
UPL = Upper Prediction Limit
DQ = Double Quantification
SSI = Statistically Significant Increase
-- = Not Analyzed
LOQ = Limit of Quantitation
LOD = Limit of Detection

Lab Notes:
J = Estimated concentration at or above the LOD and below the LOQ.
P6 = Matrix spike recovery was outside laboratory control limits due to a parent sample concentration notably higher than the spike level.

Notes:
1. Intrawell UPLs based on 1-of-2 retesting approach; therefore, there is no SSI unless the original sample result and a retest result are above the UPL.
2. Intrawell UPL for fluoride is based on the double quantification rule, because fluoride was not detected above the LOQ in the background samples.

Created by:	LMH	Date:	1/7/2021
Last revision by:	MDB	Date:	12/30/2021
Checked by:	RM	Date:	1/3/2022
Scientist/PM QA/QC:	TK	Date:	1/7/2022

I:\25221067.00\Deliverables\2021 Fed Annual Report - COL Mod 4\Tables\[Table 5 - 2021 MOD4LF Annual Analytical Results Summary.xlsx]Table 5 - 2021 Analytical

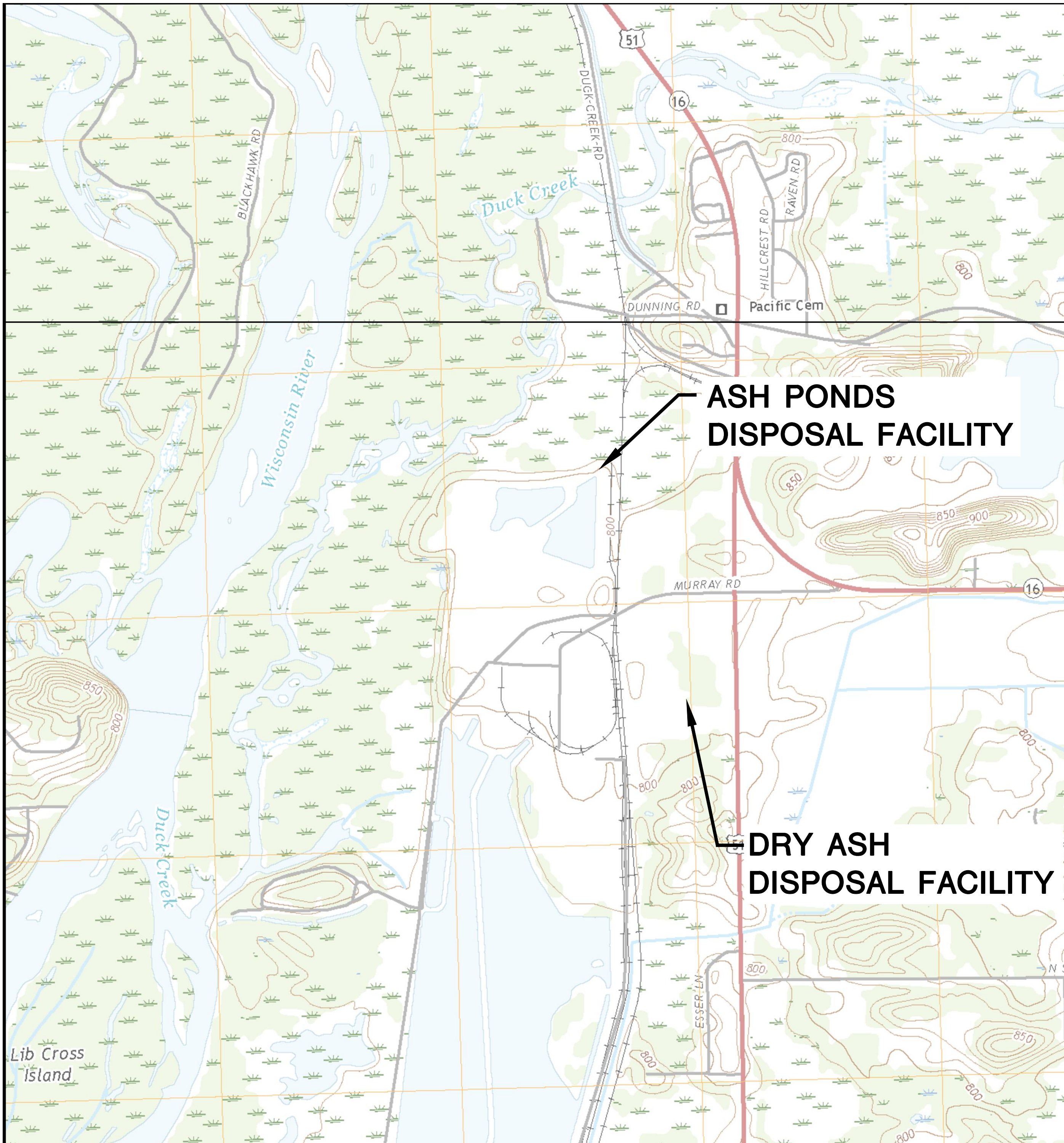
Table 6. Groundwater Field Data Summary
Columbia Energy Center - Dry Ash Disposal Facility - MOD 4 / SCS Engineers Project #25221067.00

Well	Sample Date	Groundwater Elevation (feet)	Field Temperature (deg C)	Field pH (Std. Units)	Oxygen, Dissolved (mg/L)	Field Specific Conductance (umhos/cm)	Field Oxidation Potential (mV)	Turbidity (NTU)
MW-84A	4/14/2021	785.84	10.2	7.34	9.80	610.9	95.6	2.45
	10/14/2021	784.96	12.5	7.42	9.25	598.9	89.7	3.41
MW-301	4/14/2021	786.50	7.4	6.66	3.90	857.0	102.9	2.41
	10/14/2021	785.28	11.1	7.01	0.25	597.2	57.8	3.21
MW-309	4/13/2021	784.29	10.7	7.68	10.14	1,804	124.1	2.80
	6/11/2021	784.20	13.3	7.71	11.21	3,072	67.2	0.10
	10/14/2021	783.65	13.2	7.64	9.27	2,079	85.8	9.06
	12/21/2021	782.93	11.2	7.45	9.33	1,382	142.9	2.67
MW-310	4/13/2021	784.24	10.8	7.73	9.93	1,194	106.0	0.57
	6/11/2021	784.05	12.8	7.73	11.21	1,192	55.6	0.67
	10/14/2021	783.48	13.4	7.7	9.29	884	85.2	3.16
MW-311	4/14/2021	784.15	9.5	7.46	10.23	500.2	110.4	3.49
	10/14/2021	783.48	12.8	7.45	9.42	493.5	90.7	4.26

Created by: NDK   Date: 4/21/2021
Last revision by: JAO   Date: 12/22/2021
Checked by: RM   Date: 12/22/2021

Figures

1 Site Location Map
2 Site Plan and Monitoring Well Locations
3 Water Table Map, April 2021
4 Water Table Map, October 2021



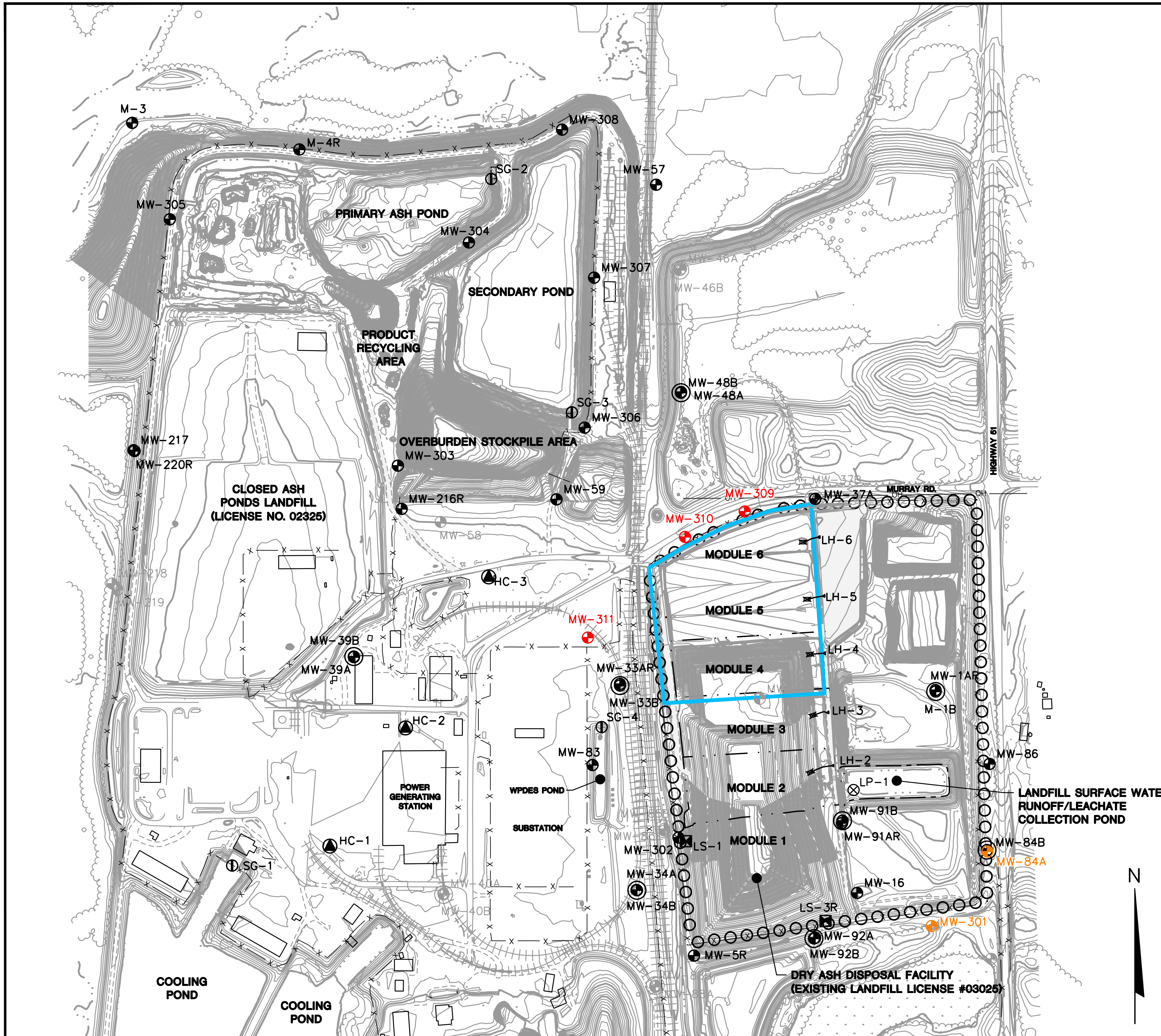
N

POYNETTE QUADRANGLE
WISCONSIN–COLUMBIA CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)
2018
SCALE: 1" = 2,000'

CLIENT	SITE	
ALLIANT ENERGY COLUMBIA ENERGY CENTER W8375 MURRAY ROAD PARDEEVILLE, WI 53954	ALLIANT ENERGY COLUMBIA ENERGY CENTER PARDEEVILLE, WI	SITE LOCATION MAP

				ENGINEER	FIGURE
PROJECT NO.	25219067.00	DRAWN BY:	BSS	SCS ENGINEERS 2830 DAIRY DRIVE MADISON, WI 53718-6751 PHONE: (608) 224-2830	1
DRAWN:	12/02/2019	CHECKED BY:	MDB		
REVISED:	01/10/2020	APPROVED BY:	TK 01/30/2020		

I:\25219067.00\Drawings\CCR 2019 Annual Report\Site Location Map.dwg, 1/30/2020 3:38:21 PM



LEGEND

- EXISTING MAJOR CONTOUR (10' INTERVAL)
- EXISTING MINOR CONTOUR (2' CONTOUR)
- EXISTING FENCELINE
- EXISTING TRACKS
- EXISTING PAVED ROAD
- EXISTING UNPAVED ROAD
- EDGE OF WATER
- APPROVED LIMITS OF WASTE (DRY ASH LANDFILL)
- CONSTRUCTED LIMITS OF WASTE (DRY ASH LANDFILL)
- WATER SUPPLY WELL
- STAFF GAUGE
- WATER TABLE WELL
- PIEZOMETER
- SURFACE WATER SAMPLE LOCATION
- LYSIMETER
- ABANDONED WATER TABLE WELL
- ABANDONED PIEZOMETER
- LEACHATE HEADWELL
- CCR UNIT
- CCR MONITORING WELL
- CCR BACKGROUND MONITORING WELL

NOTES:

1. BASE MAP CREATED FROM AERIAL SURVEY BY KBM, FLOWN DECEMBER 1, 2014, AND GROUND SURVEY BY SCS ENGINEERS IN MAY 2016, JUNE 2016, OCTOBER 2016, NOVEMBER 2016, APRIL 2017, NOVEMBER 2017, JULY 2018, AUGUST 2018, FEBRUARY 2019, MAY 2019, SEPTEMBER 2020, AUGUST 2021, AND NOVEMBER 2021.
2. MONITORING WELL LOCATIONS AND ELEVATIONS SURVEYED BY WISCONSIN POWER AND LIGHT, INC. IN DECEMBER 1994, NOVEMBER 1996, APRIL 2003, AND JANUARY 2016, AND BY SCS ENGINEERS IN FEBRUARY 2018.
3. SUPPLY WELL LOCATIONS ARE APPROXIMATE AND ASSUMED BASED ON JANUARY 2013 DRAWINGS BY TRC.
4. MONITORING WELLS MW-301 THROUGH MW-305 INSTALLED BY BADGER STATE DRILLING ON NOVEMBER 11-13, 2015.
5. MONITORING WELLS MW-306 THROUGH MW-308 INSTALLED BY BADGER STATE DRILLING ON NOVEMBER 14-15, 2016.
6. MONITORING WELLS MW-309 THROUGH MW-311 INSTALLED BY BADGER STATE DRILLING ON FEBRUARY 13-14, 2018.
7. BACKGROUND MONITORING WELLS FOR THE MODULES 4-6 DRY ASH DISPOSAL FACILITY ARE: MW-301 AND MW-84A.

500 0 500

SCALE: 1" = 500'

PROJECT NO.	25221067.00	DRAWN BY:	KP
DRAWN:	12/02/2019	CHECKED BY:	TK/PEG
REVISED:	01/17/2022	APPROVED BY:	TK 1/26/2022

ENGINEER: SCS ENGINEERS
2830 DAIRY DRIVE MADISON, WI 53718-6751
PHONE: (608) 224-2830

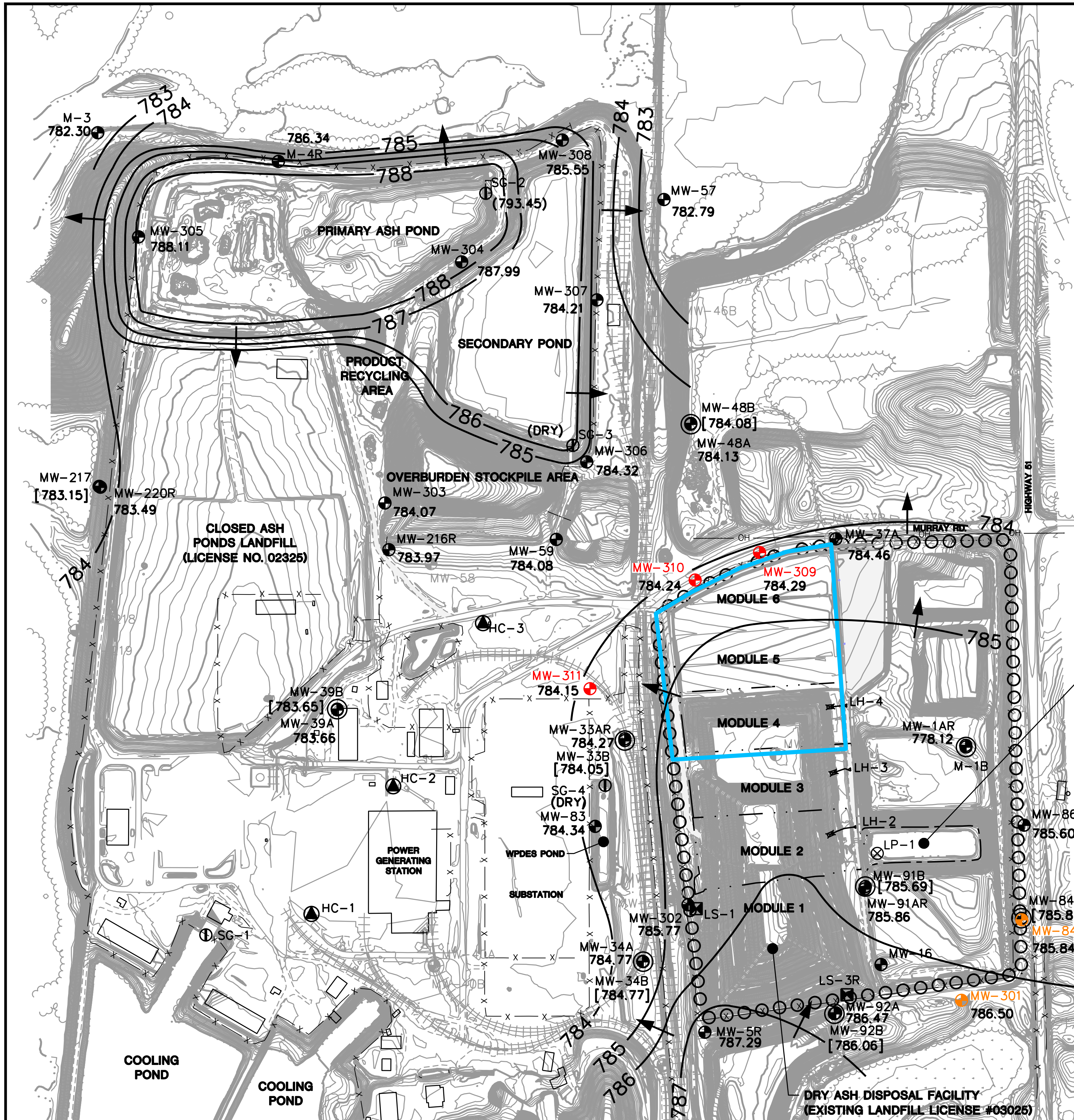
CLIENT: ALLIANT ENERGY
COLUMBIA ENERGY CENTER
W8375 MURRAY ROAD
PARDEEVILLE, WI 53954

SITE: ALLIANT ENERGY
COLUMBIA ENERGY CENTER
MODULES 4-6 DRY ASH DISPOSAL FACILITY
PARDEEVILLE, WI

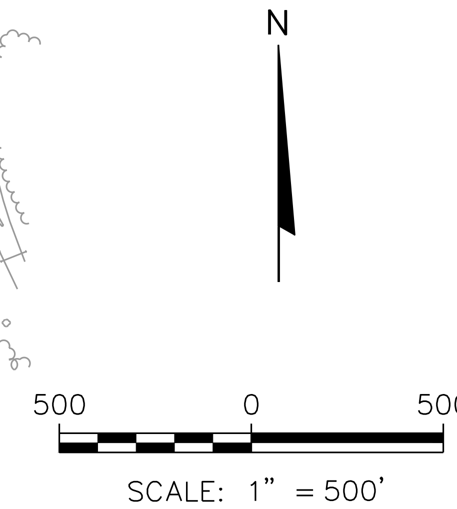
SITE PLAN AND MONITORING WELL LOCATIONS

FIGURE 2

\\Mad□s01\data\Pro□ects\25221067.00\Drawings\Site Plan and Monitoring □ell Locations Mod □6.dwg, 1/17/2022 1:02:27 PM



LANDFILL SURFACE WATER RUNOFF/LEACHATE COLLECTION POND



LEGEND

- EXISTING MAJOR CONTOUR (10' INTERVAL)
- EXISTING MINOR CONTOUR (2' CONTOUR)
- EXISTING FENCE LINE
- EXISTING TRACKS
- EXISTING PAVED ROAD
- EXISTING UNPAVED ROAD
- EDGE OF WATER
- APPROVED LIMITS OF WASTE (DRY ASH LANDFILL)
- CONSTRUCTED LIMITS OF WASTE (DRY ASH LANDFILL)
- WATER SUPPLY WELL
- STAFF GAUGE
- WATER TABLE WELL
- PIEZOMETER
- SURFACE WATER SAMPLE LOCATION
- LYSIMETER
- ABANDONED WATER TABLE WELL
- ABANDONED PIEZOMETER
- LEACHATE HEADWELL
- CCR UNIT
- CCR MONITORING WELL
- CCR BACKGROUND MONITORING WELL
- 787.62 WATER TABLE ELEVATION
- [788.87] POTENTIOMETRIC SURFACE ELEVATION (NOT CONTOURED)
- (795.20) SURFACE WATER ELEVATION (NOT CONTOURED)
- WATER TABLE CONTOUR
- APPROXIMATE GROUNDWATER FLOW DIRECTION

NOTES:

1. BASE MAP CREATED FROM AERIAL SURVEY BY KBM, FLOWN DECEMBER 1, 2014, AND GROUND SURVEY BY SCS ENGINEERS IN MAY 2016, JUNE 2016, OCTOBER 2016, NOVEMBER 2016, APRIL 2017, NOVEMBER 2017, JULY 2018, AUGUST 2018, FEBRUARY 2019, MAY 2019, SEPTEMBER 2020, AUGUST 2021, AND NOVEMBER 2021.
2. MONITORING WELL LOCATIONS AND ELEVATIONS SURVEYED BY WISCONSIN POWER AND LIGHT, INC. IN DECEMBER 1994, NOVEMBER 1996, APRIL 2003, AND JANUARY 2016 AND BY SCS ENGINEERS IN FEBRUARY 2018.
3. SUPPLY WELL LOCATIONS ARE APPROXIMATE AND ASSUMED BASED ON JANUARY 2013 DRAWINGS BY TRC.
4. MONITORING WELLS MW-301 THROUGH MW-305 INSTALLED BY BADGER STATE DRILLING ON NOVEMBER 11-13, 2015.
5. MONITORING WELLS MW-306 THROUGH MW-308 INSTALLED BY BADGER STATE DRILLING ON NOVEMBER 14-15, 2016.
6. MONITORING WELLS MW-309 THROUGH MW-311 INSTALLED BY BADGER STATE DRILLING ON FEBRUARY 13-14, 2018.
7. GROUNDWATER AND SURFACE WATER ELEVATIONS WERE MEASURED ON APRIL 12-14, 2021.
8. BACKGROUND MONITORING WELLS FOR THE MODULES 4-6 DRY ASH FACILITY ARE: MW-301 AND MW-84A.

PROJECT NO.	25221067.00	DRAWN BY:	KP
DRAWN:	06/29/2021	CHECKED BY:	NDK
REVISED:	01/17/2022	APPROVED BY:	TK 1/26/2022

ENGINEER: SCS ENGINEERS
2830 DAIRY DRIVE MADISON, WI 53718-6751
PHONE: (608) 224-2830

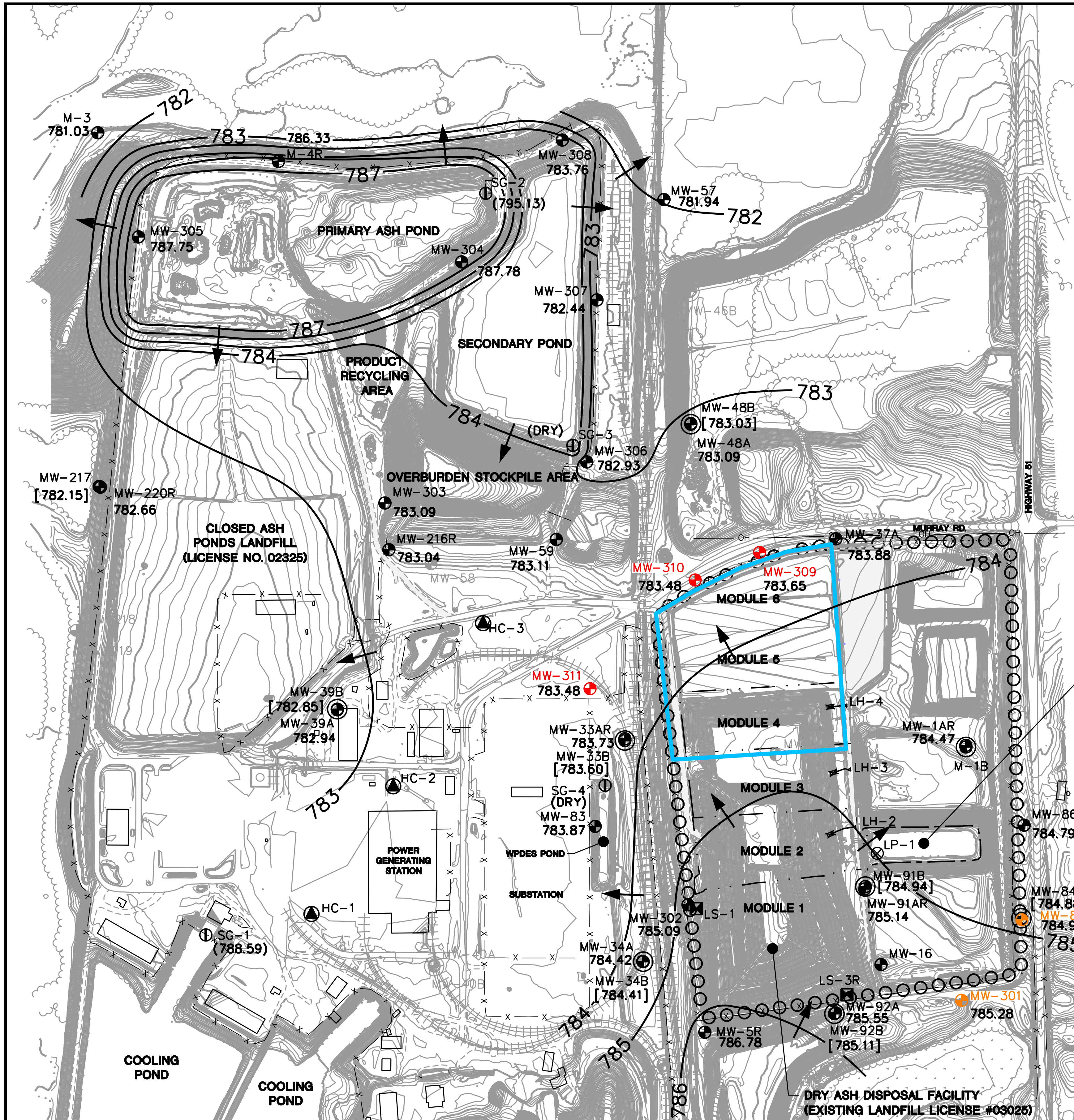
CLIENT: ALLIANT ENERGY
COLUMBIA ENERGY CENTER
W8375 MURRAY ROAD
PARDEEVILLE, WI 53954

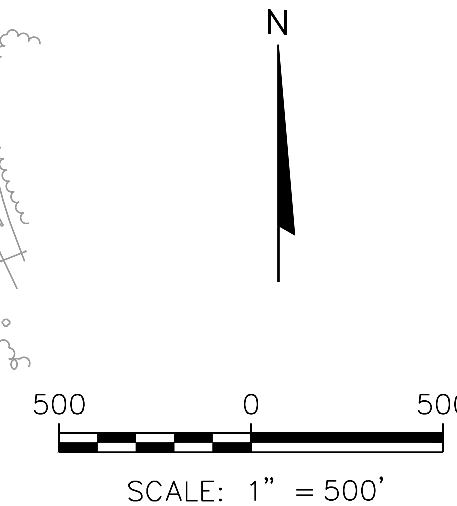
SITE: ALLIANT ENERGY
COLUMBIA ENERGY CENTER
MODULES 4-6 DRY ASH DISPOSAL FACILITY
PARDEEVILLE, WI

WATER TABLE MAP
APRIL 2021

FIGURE 3

I:\25221067.00\Drawings\ ater a le Map April 2021 M D 6.dwg, 1/18/2022 10:12:5 AM





LEGEND

- EXISTING MAJOR CONTOUR (10' INTERVAL)
- EXISTING MINOR CONTOUR (2' CONTOUR)
- EXISTING FENCE LINE
- EXISTING TRACKS
- EXISTING PAVED ROAD
- EXISTING UNPAVED ROAD
- EDGE OF WATER
- APPROVED LIMITS OF WASTE (DRY ASH LANDFILL)
- CONSTRUCTED LIMITS OF WASTE (DRY ASH LANDFILL)
- WATER SUPPLY WELL
- STAFF GAUGE
- WATER TABLE WELL
- PIEZOMETER
- SURFACE WATER SAMPLE LOCATION
- LYSIMETER
- ABANDONED WATER TABLE WELL
- ABANDONED PIEZOMETER
- LEACHATE HEADWELL
- CCR UNIT
- CCR MONITORING WELL
- CCR BACKGROUND MONITORING WELL
- 787.62 WATER TABLE ELEVATION
- [788.87] POTENTIOMETRIC SURFACE ELEVATION (NOT CONTOURED)
- (795.20) SURFACE WATER ELEVATION (NOT CONTOURED)
- WATER TABLE CONTOUR
- APPROXIMATE GROUNDWATER FLOW DIRECTION

NOTES:

1. BASE MAP CREATED FROM AERIAL SURVEY BY KBM, FLOWN DECEMBER 1, 2014, AND GROUND SURVEY BY SCS ENGINEERS IN MAY 2016, JUNE 2016, OCTOBER 2016, NOVEMBER 2016, APRIL 2017, NOVEMBER 2017, JULY 2018, AUGUST 2018, FEBRUARY 2019, MAY 2019, SEPTEMBER 2020, AUGUST 2021, AND NOVEMBER 2021.
2. MONITORING WELL LOCATIONS AND ELEVATIONS SURVEYED BY WISCONSIN POWER AND LIGHT, INC. IN DECEMBER 1994, NOVEMBER 1996, APRIL 2003, AND JANUARY 2016 AND BY SCS ENGINEERS IN FEBRUARY 2018.
3. SUPPLY WELL LOCATIONS ARE APPROXIMATE AND ASSUMED BASED ON JANUARY 2013 DRAWINGS BY TRC.
4. MONITORING WELLS MW-301 THROUGH MW-305 INSTALLED BY BADGER STATE DRILLING ON NOVEMBER 11-13, 2015.
5. MONITORING WELLS MW-306 THROUGH MW-308 INSTALLED BY BADGER STATE DRILLING ON NOVEMBER 14-15, 2016.
6. MONITORING WELLS MW-309 THROUGH MW-311 INSTALLED BY BADGER STATE DRILLING ON FEBRUARY 13-14, 2018.
7. GROUNDWATER AND SURFACE WATER ELEVATIONS WERE MEASURED ON OCTOBER 11-14, 2021.
8. BACKGROUND MONITORING WELLS FOR THE MODULES 4-6 DRY ASH FACILITY ARE: MW-301 AND MW-84A.

PROJECT NO.	25221067.00	DRAWN BY:	KP
DRAWN:	10/26/2021	CHECKED BY:	NDK
REVISED:	01/17/2022	APPROVED BY:	TK 1/26/2022

ENGINEER: SCS ENGINEERS
2830 DAIRY DRIVE MADISON, WI 53718-6751
PHONE: (608) 224-2830

CLIENT: ALLIANT ENERGY
COLUMBIA ENERGY CENTER
W8375 MURRAY ROAD
PARDEEVILLE, WI 53954

SITE: ALLIANT ENERGY
COLUMBIA ENERGY CENTER
MODULES 4-6 DRY ASH DISPOSAL FACILITY
PARDEEVILLE, WI

WATER TABLE MAP
OCTOBER 2021

FIGURE
4

I:\25221067.00\Drawings\ ater a le Map ct 2021 M D 6.dwg, 1/18/2022 10:12:32 AM

Appendix A

Summary of Regional Hydrogeologic Stratigraphy

Table COL-3. Regional Hydrogeologic Stratigraphy
Columbia Energy Center / SCS Engineers Project #25215053

Approximate Age	Hydrogeologic Unit	General Thickness (feet)	Name of Rock Unit*	Predominant Lithology
Quaternary (0-1 million years old)	Surficial Aquifer	0 to 300+	Holocene & Pleistocene Deposits	• Unconsolidated clay, silt, sand, gravel, cobbles, boulders, and organic matter
Ordovician (460 to 490 million years old)	Sandstone Aquifer	0 to 800+	Galena Decorah Platteville St. Peter Prairie du Chien	• Dolomite and shaley dolomite • Sandstone
Cambrian (490 to 500 million years old)			Trempeleau Franconia Galesville Eau Claire Mt. Simon	• Sandstone
Precambrian (more than 1 billion years old)	Used for domestic supply in some areas	--	Precambrian	• Igneous and metamorphic rocks

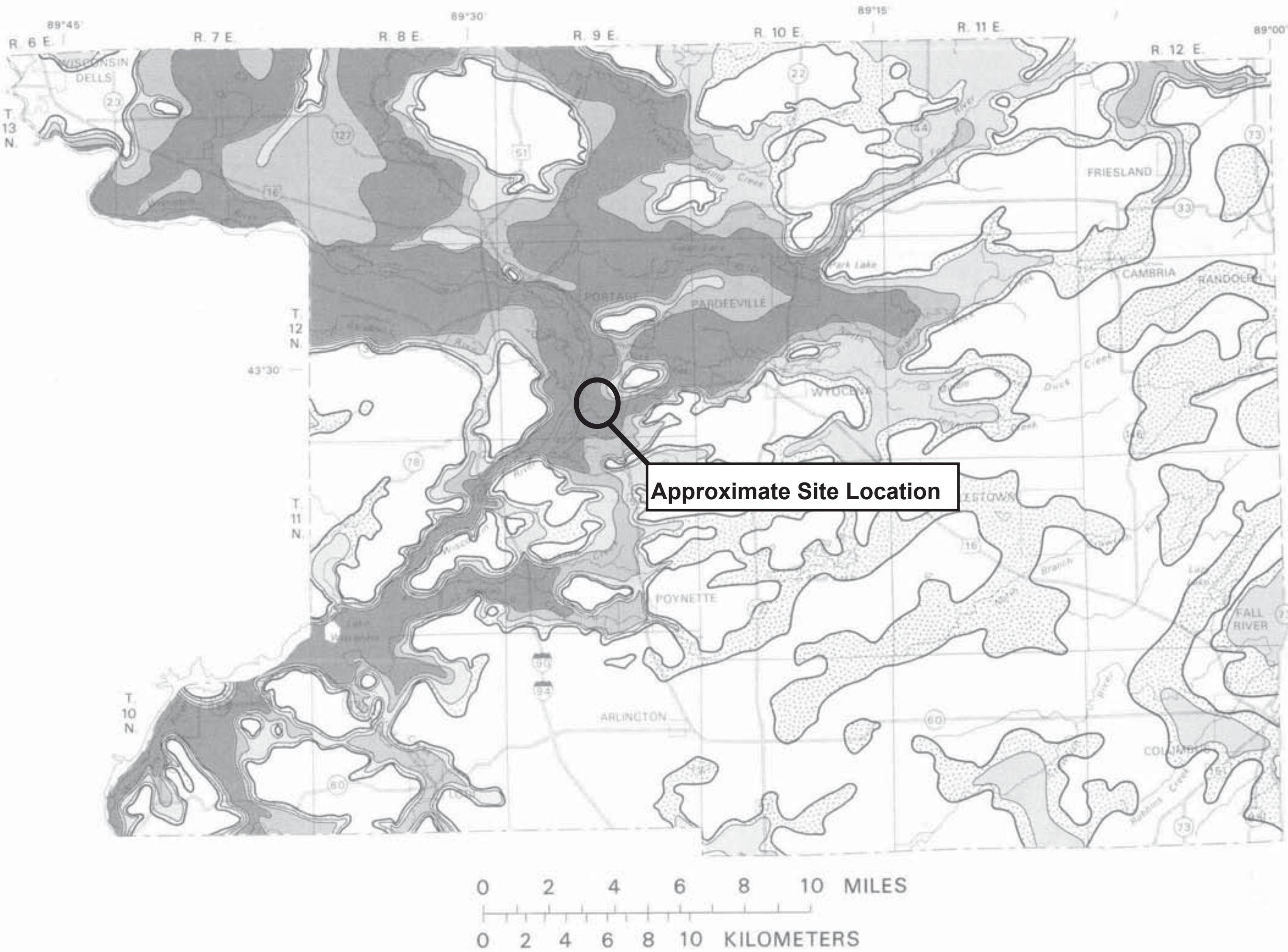
*This nomenclature and classification of rock units in this report are those of the Wisconsin Geological and Natural History Survey and do not necessarily coincide with those accepted by the U.S. Geological Survey.

Sources:

Harr, C.A., L.C. Trotta, and R.G. Borman, "Ground-Water Resources and Geology of Columbia County, Wisconsin," University of Wisconsin-Extension Geological and Natural History Survey Information Circular Number 37, 1978.

Wisconsin Geological and Natural History Survey, Bedrock Stratigraphic Units in Wisconsin, UW Extension Educational Series 51, ISSN: 1052-2115, 2011.

I:\25215053\Reports\Report 3 - Columbia\Tables\Table_2_Regional_Hydrogeologic_Stratigraphy.doc



EXPLANATION

Probable well yields

Chances of more than 100 gallons per minute are poor

Chances of 500-1000 gallons per minute are good

Chances of 100-500 gallons per minute are good

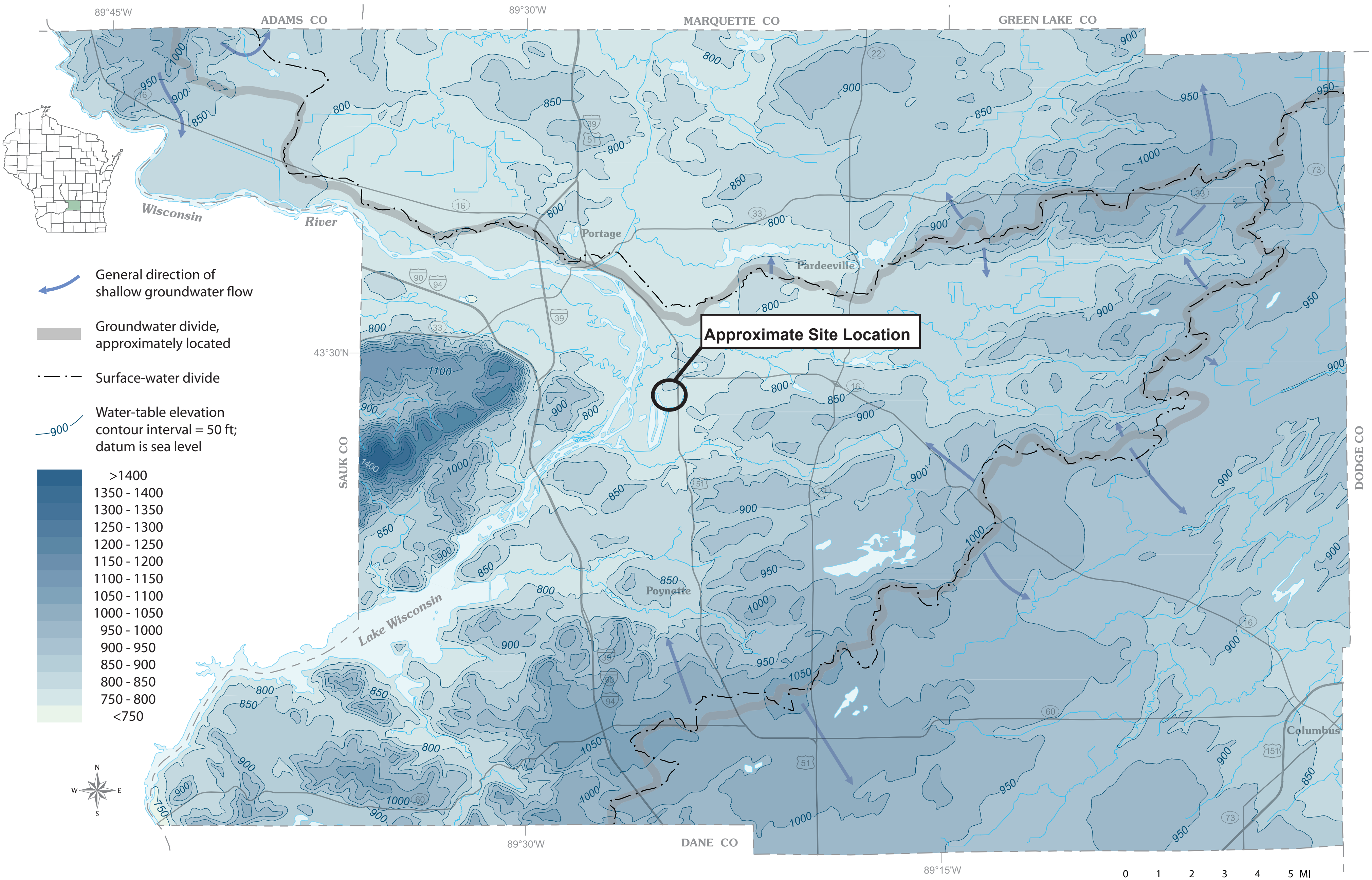
Chances of more than 1000 gallons per minute are good

Boundary of saturated sand-and-gravel aquifer

Figure 9. Probably well yields from the sand-and-gravel aquifer.

Source: Harr, C.A., L.C. Trotta, and R.G. Borman, "Ground-Water Resources and Geology of Columbia County, Wisconsin," University of Wisconisn-Extension Geological and Natural History Surevy Information Circular Number 37, 1978.

Generalized water-table elevation in Columbia County, Wisconsin



Extension Wisconsin Geological and Natural History Survey

Source: Sellwood, Stephen M., Wisconsin Geologic and Natural History Survey, Water Table Elevation, Groundwater Resources of Columbia County Wisconsin,

Appendix B

Boring Logs and Well Construction Documentation

WARZYN ENGINEERING INC

LOG OF TEST BORING

Project: Wisconsin Power & Light

Location: Columbia Generating Station

Boring No.: MW-84A
Surface Elevation: 813.4
Job No.: C 7134
Sheet 1 of 1

1409 EMIL STREET • P.O. BOX 9538, MADISON, WIS. 53715 • TEL. (608) 257-4848

SAMPLE						VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES				
No.	Type	Recovery ↓	Moisture ↓	N	Depth		Qu	W	LL	PL	D
					0–1	Dark Brown Silty SAND (SM)					
					1–37	Brown Fine to Medium SAND, Little Silt, Trace to Little Gravel and Boulders (SM)					
					37	End Boring at 37' Well Installed at 37'					

Depth scale: 5, 10, 15, 20, 25, 30, 35, 40

WATER LEVEL OBSERVATIONS

While Drilling

Upon Completion of Drilling

Time After Drilling

Depth to Water

Depth to Cave In

GENERAL NOTES

Start 10/5/83 Complete 10/5/83

Crew Chief JVS Rig B-40

Drilling Method ED 0-37'

WELL DETAIL INFORMATION SHEET

JOB NO. C 7134

BORING NO. MW-84A

DATE 10/5/83

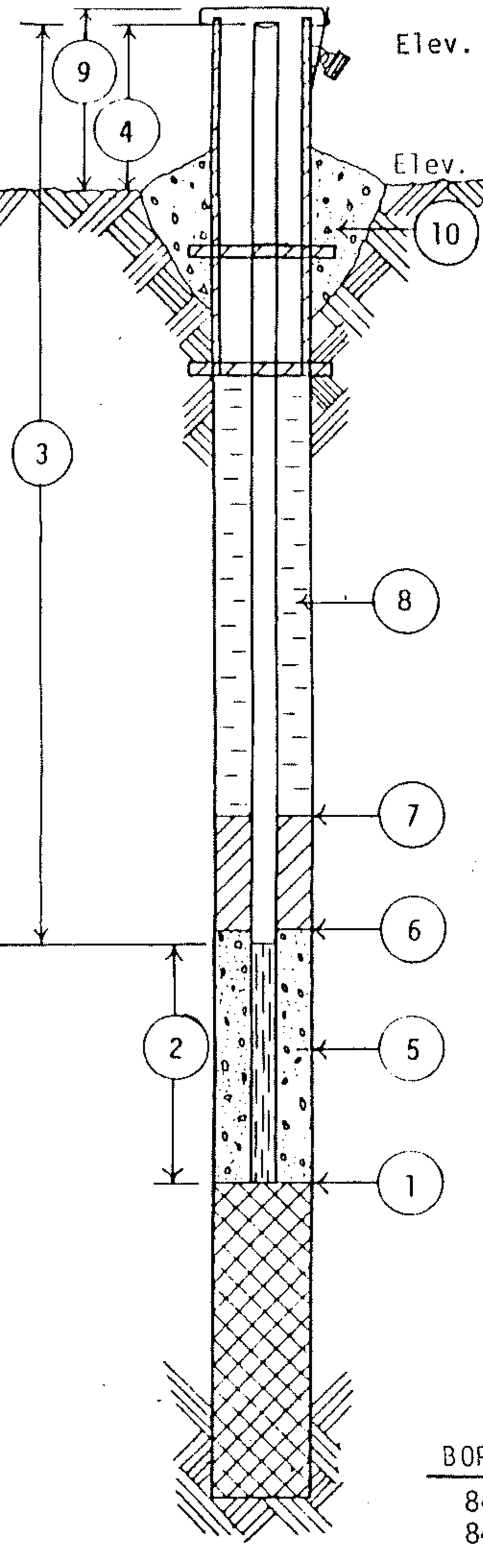
Elev. 814.57 Steel
814.32 PVC

CHIEF JS

LOCATION WP&L-Columbia Generating Station

Elev. 813.4

All depth measurements of well detail assumed to be from ground surface unless otherwise indicated.



1. DEPTH TO BOTTOM OF BOREHOLE 37 FEET
2. LENGTH OF WELL POINT, WELL SCREEN, OR SLOTTED PIPE 10 FEET
3. TOTAL LENGTH OF SOLID PIPE 29 FEET @ 2 IN. DIAMETER
4. HEIGHT OF WELL CASING ABOVE GROUND 2 FEET
5. TYPE OF FILTER MATERIAL AROUND WELL POINT OR SLOTTED PIPE Flint Sand
6. DEPTH OF LOWER OR BOTTOM SEAL 3 FEET
7. DEPTH OF UPPER OR TOP SEAL 0 FEET
8. TYPE OF BACKFILL Spoils (Sand)
9. PROTECTIVE CASING YES NO

   HEIGHT ABOVE GROUND 2'

   LOCKING CAP YES NO
10. CONCRETE CAP YES NO

WATER LEVEL CHECKS

* From top of casing, if protective casing higher take measurement from top of protective casing.

BORING #	DATE	TIME	DEPTH TO WATER	REMARKS
84A	10/7/83	3 days	21'	
84B	10/7/83	3 days	19'6"	

WARZYN ENGINEERING INC

F015.7 1E1

State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION
Form 4400-122 Rev. 7-98

Route To: Watershed/Wastewater ☐ Waste Management ☐
Remediation/Redevelopment ☐ Other ☐

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
WPL-Columbia SCS#: 25215135.00		MW-301

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
Kevin Durst Badger State Drilling	11/11/2015	11/11/2015	hollow stem auger

WI Unique Well No.	DNR Well ID No.	Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
VY701			Feet	803.69 Feet	8.5 in.

Local Grid Origin ☐ (estimated: ☐) or Boring Location ☒
State Plane 541562.2 N, 2025001.0 E S/C/N
1/4 of 1/4 of Section 27, T 12 N, R 9 E
Lat ___° ___' ___"
Long ___° ___' ___"
Local Grid Location ☐ N ☐ E
Feet ☐ S Feet ☐ W

Facility ID	County	County Code	Civil Town/City/ or Village
	Columbia	11	Portage

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID/FID	Pocket Penetration (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			0	SILTY SAND, yellowish brown (10YR 5/6), fine to medium grained.	SM									
S1	21	7 6 9 10	2							M				
S2	20	6 7 9 10	4	Same as above except, 10YR 5/4 (top section), 10YR 3/6 (bottom section), trace gravel.						M				
			6	Same as above except, 10YR 3/4 (bottom), 10YR 5/4 (top), trace little roots and sticks, trace gravel.										
S3	22	7 6 9 6	7							M				
S4	21	4 5 6 5	9.5	Same as above except, 10YR (top), 10YR 4/6 (bottom), trace clay at bottom.						M				
S5	18	2 2 4 5	12	Same as above except, fine to coarse grained sand, little gravel, trace clay in top half, 10YR 3/6.						M				
S6	20	2 3 3 3	14.5	Same as above except, 10YR 6/8.						M				

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature	Firm	
	SCS Engineers 2830 Dairy Drive Madison, WI 53711	Tel: (608) 224-2830 Fax:

This form is authorized by Chapters 281, 283, 289, 291, 292, 293, 295, and 299, Wis. Stats. Completion of this form is mandatory. Failure to file this form may result in forfeiture of between $10 and $25,000, or imprisonment for up to one year, depending on the program and conduct involved. Personally identifiable information on this form is not intended to be be used for any other purpose. NOTE: See instructions for more information, including where the completed form should be sent.

State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION SUPPLEMENT
Form 4400-122A

Boring Number MW-301 Use only as an attachment to Form 4400-122.

Sample: Number and Type	Sample: Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID/FID	Soil Properties: Pocket Penetration (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			16	SILTY SAND, yellowish brown (10YR 5/6), fine to medium grained.										
S7	20	5 4 4 3	17							M				
			18											
			19											
S8	20	2 4 4 5	20							W				
			21		SM									
S9	23	4 4 3 6	22							W				
			23											
			24	Same as above except, 10YR 6/4.										
S10	21	3 2 4 10	25							W				
			26											
			27											
			28	End of boring at 28 ft bgs.										

State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION
Form 4400-122 Rev. 7-98

Route To: Watershed/Wastewater ☐ Waste Management ☒
Remediation/Redevelopment ☐ Other ☐

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
WPL - Alliant Columbia Generating Station SCS#: 25217156.01		MW-309

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
Mark Crampton Badger State Drilling, Co.	2/13/2018	2/14/2018	hollow stem auger

WI Unique Well No.	DNR Well ID No.	Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
VR111		MW-309	26.7 Feet MSL	809.88 Feet MSL	8.5 in.

Local Grid Origin ☐ (estimated: ☐) or Boring Location ☒
State Plane 543,448 N, 2,124,151 E S/C/N
NW 1/4 of SE 1/4 of Section 27, T 12 N, R 9 E
Lat ____ ° ____ ' ____ "
Long ____ ° ____ ' ____ "
Local Grid Location
Feet ☐ N ☐ S Feet ☐ E ☐ W

Facility ID	County	County Code	Civil Town/City/ or Village
	Columbia	11	Town of Pacific

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID/FID	Standard Penetration	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			0–8.5	Hydrovaced boring to 8.5 below ground surface; open hole.										
			8.5	POORLY GRADED SAND, fine to coarse, yellow, (10YR 7/6), rounded grains.	SP									
S1	20	11 14 18							N/A	M				
S2	20	12 15 20 28		Same but with trace gravel.					N/A	M				
S3	24	16 20 26		Same as above but with no gravel.					N/A	M				

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature	Firm
	SCS Engineers 2830 Dairy Drive Madison, WI 53711 Tel: (608) 224-2830 Fax:

State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION SUPPLEMENT
Form 4400-122A

Boring Number MW-309 Use only as an attachment to Form 4400-122.

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID/FID	Soil Properties: Standard Penetration	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			16	POORLY GRADED SAND, fine to coarse, yellow, (10YR 7/6), rounded grains, trace silt.	SP									
S4	22	11 17 32 41	17						N/A	M				
S5		22 29 36	19–20						N/A	M				
S6	24	18 20 28 36	22						N/A	M				
S7		18 24 32	24–25						N/A	M				
S8	22	14 18 30 40	27						N/A	W				Depth to water at ~ 26 feet.
S9	22	22 32 34	29–30						N/A	W				
			36	End of Boring at 36.5 feet bgs.										

State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION
Form 4400-122 Rev. 7-98

Route To: Watershed/Wastewater ☐ Waste Management ☒
Remediation/Redevelopment ☐ Other ☐

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
WPL - Alliant Columbia Generating Station SCS#: 25217156.01		MW-310

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
Dave Cruise Badger State Drilling, Co.	2/13/2018	2/13/2018	hollow stem auger

WI Unique Well No.	DNR Well ID No.	Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
VR110		MW-310	27.9 Feet MSL	810.96 Feet MSL	8.5 in.

Local Grid Origin ☐ (estimated: ☐) or Boring Location ☒
State Plane 543,332 N, 2,123,880 E S/C/N
NW 1/4 of SE 1/4 of Section 27, T 12 N, R 9 E
Lat ___° ___' ___"
Long ___° ___' ___"
Local Grid Location
Feet ☐ N ☐ S Feet ☐ E ☐ W

Facility ID	County	County Code	Civil Town/City/ or Village
	Columbia	11	Town of Pacific

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID/FID	Standard Penetration	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			0–8	Hydrovaced boring to 8 feet below ground surface; open hole.										
			8	POORLY GRADED SAND AND GRAVEL, fine to medium sand, coarse gravel, brownish yellow, (10YR 6/6), angular gravel, round sand.	SP									
S1	18	4 6 8 8	9–10						N/A	M				
			11	Same as above but trace gravel.										
S2	24	18 27 38 40	11–13						N/A	M				
S3	24	26 32 40 38	14–15						N/A	M				

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature	Firm	
	SCS Engineers 2830 Dairy Drive Madison, WI 53711	Tel: (608) 224-2830 Fax:

State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION SUPPLEMENT
Form 4400-122A

Boring Number MW-310 Use only as an attachment to Form 4400-122.

Sample: Number and Type	Sample: Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID/FID	Soil Properties: Standard Penetration	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			16	POORLY GRADED SAND AND GRAVEL, fine to medium sand, coarse gravel, brownish yellow, (10YR 6/6), angular gravel, round sand.	SP									
S4	10	25 50/5	17						N/A	M				Tough drilling.
S5	24	38 60 50/4	19–20						N/A	M				
S6	12	38 50/5	22						N/A	M				
S7	24	32 46 50/4	24–25						N/A	M				
S8	16	25 40 50/5	27						N/A	W				Depth to water at ~26 feet.
S9		32 25 50/5	29–30						N/A	W				
			36	End of Boring at 36.5 feet bgs.										

State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION
Form 4400-122 Rev. 7-98

Route To: Watershed/Wastewater ☐ Waste Management ☒
Remediation/Redevelopment ☐ Other ☐

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
WPL - Alliant Columbia Generating Station SCS#: 25217156.01		MW-311

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
Mark Crampton Badger State Drilling, Co.	2/14/2018	2/14/2018	hollow stem auger

WI Unique Well No.	DNR Well ID No.	Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
VR112		MW-311	23.5 Feet MSL	806.53 Feet MSL	8.5 in.

Local Grid Origin ☐ (estimated: ☐) or Boring Location ☒
State Plane 542,874 N, 2,123,437 E S/C/N
NE 1/4 of SW 1/4 of Section 27, T 12 N, R 9 E

Lat ___° ___' ___"
Long ___° ___' ___"

Local Grid Location
Feet ☐ N ☐ S Feet ☐ E ☐ W

Facility ID	County	County Code	Civil Town/City/ or Village
	Columbia	11	Town of Pacific

Sample: Number and Type	Sample: Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID/FID	Soil Properties: Standard Penetration	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			0–8	Hydrovaced boring to 8 feet below ground surface; open hole.										
			8	POORLY GRADED SAND AND GRAVEL, fine to coarse sand, coarse gravel, yellow, (10YR 7/6), rounded sand, angular gravel.	SP									
S1	24	12 16 20 24	9–11						N/A	M				
S2	24	17 27 30 38	11–13	Same as above but with trace silt.					N/A	M				
S3	24	18 26 31	14–15						N/A	M				

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature	Firm	
	SCS Engineers 2830 Dairy Drive Madison, WI 53711	Tel: (608) 224-2830 Fax:

This form is authorized by Chapters 281, 283, 289, 291, 292, 293, 295, and 299, Wis. Stats. Completion of this form is mandatory. Failure to file this form may result in forfeiture of between $10 and $25,000, or imprisonment for up to one year, depending on the program and conduct involved. Personally identifiable information on this form is not intended to be be used for any other purpose. NOTE: See instructions for more information, including where the completed form should be sent.

SOIL BORING LOG INFORMATION SUPPLEMENT
Form 4400-122A

Boring Number MW-311 Use only as an attachment to Form 4400-122.

Sample: Number and Type	Sample: Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID/FID	Soil Properties: Standard Penetration	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			16	POORLY GRADED SAND AND GRAVEL, fine to coarse sand, coarse gravel, yellow, (10YR 7/6), rounded sand, angular gravel, trace silt.										
S4	24	18 30 40 50/5	17						N/A	M				
			18											
			19											
S5	24	30 40 45	20						N/A	M				
			21											
S6	8	45 34 50/3	22						N/A	M+/W				
			23											
			24		SP									
S7	18	46 50/5	25						N/A	W				Depth to water at ~25 feet.
			26											
S8	20	46 54 54 50/4	27						N/A	W				
			28											
			29											
S9	24	25 38 50/5	30	Same as above but with thin silt seams.					N/A	W				
			31											
			32											
			33	End of Boring at 33 feet bgs.										

SCS # 25215135

State of Wisconsin
Department of Natural Resources

Route to: Watershed/Wastewater ☐ Waste Management ☐ Remediation/Redevelopment ☐ Other ☐

MONITORING WELL CONSTRUCTION

Form 4400-113A Rev. 7-98

Facility/Project Name: WPL-Columbia	Local Grid Location of Well: ___ ft. ☐ N. ☐ S. ___ ft. ☐ E. ☐ W.	Well Name: MW-301
Facility License, Permit or Monitoring No.	Local Grid Origin ☐ (estimated: ☐) or Well Location ☐ Lat. ___° ___' ___" Long. ___° ___' ___" or	Wis. Unique Well No.: VY701 — DNR Well ID No.: ___
Facility ID: __________	St. Plane 541562.2 ft. N, 2125001 ft. E. S/C/N	Date Well Installed: 11 / 11 / 2015 (m m / d d / y y y y)
Type of Well — Well Code 11 / MW	Section Location of Waste/Source: SW 1/4 of SE 1/4 of Sec. 27, T. 12 N, R. 9 ☒ E ☐ W	Well Installed By: Name (first, last) and Firm: Kevin Duerst, Badger State Drilling
Distance from Waste/Source ___ ft. — Enf. Stds. Apply ☐	Location of Well Relative to Waste/Source: u ☐ Upgradient; s ☐ Sidegradient; d ☐ Downgradient; n ☐ Not Known — Gov. Lot Number ___	

A. Protective pipe, top elevation 807.16 ft. MSL

B. Well casing, top elevation 806.89 ft. MSL

C. Land surface elevation 803.69 ft. MSL

D. Surface seal, bottom 791.69 ft. MSL or 12 ft.

12. USCS classification of soil near screen:
GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐
SM ☒ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
Bedrock ☐

13. Sieve analysis performed? ☐ Yes ☐ No

14. Drilling method used: Rotary ☐ 5 0; Hollow Stem Auger ☒ 4 1; Other ☐

15. Drilling fluid used: Water ☐ 0 2; Air ☐ 0 1; Drilling Mud ☐ 0 3; None ☒ 9 9

16. Drilling additives used? ☐ Yes ☒ No

Describe ____________

17. Source of water (attach analysis, if required): ____________

E. Bentonite seal, top 803.69 ft. MSL or 0 ft.

F. Fine sand, top 791.69 ft. MSL or 12 ft.

G. Filter pack, top 789.69 ft. MSL or 14 ft.

H. Screen joint, top 787.69 ft. MSL or 16 ft.

I. Well bottom 777.69 ft. MSL or 26 ft.

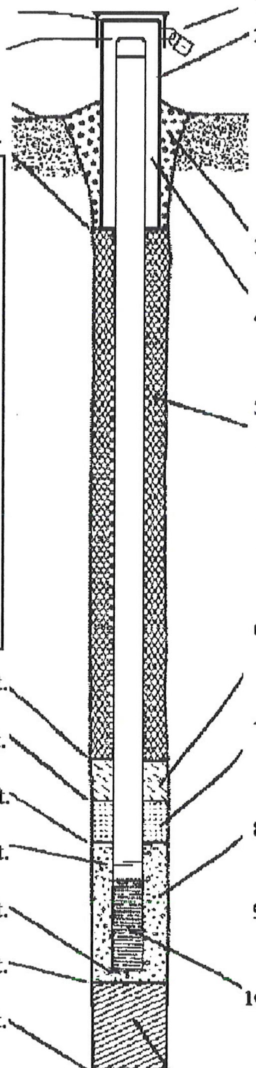
J. Filter pack, bottom 776.69 ft. MSL or 27 ft.

K. Borehole, bottom 775.69 ft. MSL or 28 ft.

L. Borehole, diameter 8.5 in.

M. O.D. well casing 2.4 in.

N. I.D. well casing 2.0 in.



1. Cap and lock? ☐ Yes ☒ No
2. Protective cover pipe:
   a. Inside diameter: 6 in.
   b. Length: 5 ft.
   c. Material: Steel ☒ 0 4; Other ☐
   d. Additional protection? ☒ Yes ☐ No — If yes, describe: bumper posts
3. Surface seal: Bentonite ☒ 3 0; Concrete ☐ 0 1; Other ☐
4. Material between well casing and protective pipe: Bentonite ☒ 3 0; Other ☐ — Bentonite to grade, sand above
5. Annular space seal: a. Granular/Chipped Bentonite ☐ 3 3
   b. ___ Lbs/gal mud weight . . . Bentonite-sand slurry ☐ 3 5
   c. ___ Lbs/gal mud weight . . . . . Bentonite slurry ☐ 3 1
   d. ___ % Bentonite . . . . . . Bentonite-cement grout ☐ 5 0
   e. ___ Ft^3 volume added for any of the above
   f. How installed: Tremie ☐ 0 1; Tremie pumped ☐ 0 2; Gravity ☐ 0 8
6. Bentonite seal: a. Bentonite granules ☐ 3 3
   b. ☐ 1/4 in. ☒ 3/8 in. ☐ 1/2 in. Bentonite chips ☑ 3 2
   c. 4 ft3 Other ☐
7. Fine sand material: Manufacturer, product name & mesh size
   a. RW Sidley Inc. #7 ☐
   b. Volume added 0.5 ft^3
8. Filter pack material: Manufacturer, product name & mesh size
   a. RW Sidley #5 ☐
   b. Volume added 2 ft^3
9. Well casing: Flush threaded PVC schedule 40 ☒ 2 3; Flush threaded PVC schedule 80 ☐ 2 4; Other ☐
10. Screen material: PVC
    a. Screen type: Factory cut ☒ 1 1; Continuous slot ☐ 0 1; Other ☐
    b. Manufacturer Johnson
    c. Slot size: 0.01 in.
    d. Slotted length: 10 ft.
11. Backfill material (below filter pack): None ☐ 1 4; Other ☒ — Native

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature	Firm
[signature]	SCS ENGINEERS, 2830 Dairy Drive, Madison, WI 53718-6751

Please complete both Forms 4400-113A and 4400-113B and return them to the appropriate DNR office and bureau. Completion of these reports is required by chs. 160, 281, 283, 289, 291, 292, 293, 295, and 299, Wis. Stats., and ch. NR 141, Wis. Adm. Code. In accordance with chs. 281, 289, 291, 292, 293, 295, and 299, Wis. Stats., failure to file these forms may result in a forfeiture of between $10 and $25,000, or imprisonment for up to one year, depending on the program and conduct involved. Personally identifiable information on these forms is not intended to be used for any other purpose. NOTE: See the instructions for more information, including where the completed forms should be sent.

SCS # 25217156.01

State of Wisconsin
Department of Natural Resources

Route to: Watershed/Wastewater ☐ Waste Management ☒ Remediation/Redevelopment ☐ Other ☐

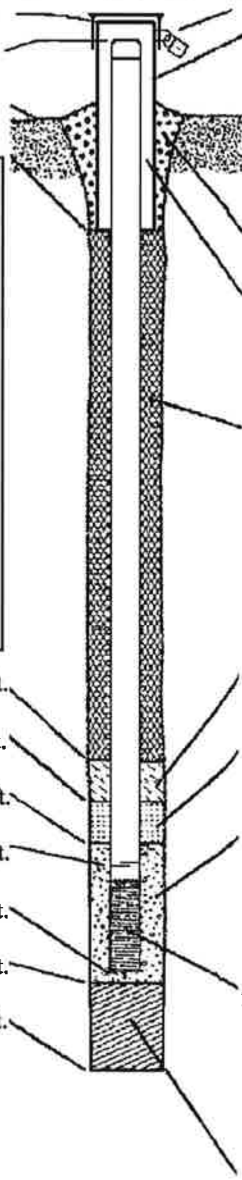
MONITORING WELL CONSTRUCTION
Form 4400-113A Rev. 7-98

Facility/Project Name: WPL-Columbia Generating Station	Local Grid Location of Well: 543447.673 ft. ☒ N. ☐ S. 2124151.113 ft. ☒ E. ☐ W.	Well Name: MW-309
Facility License, Permit or Monitoring No.	Local Grid Origin ☐ (estimated: ☐) or Well Location ☐ Lat. ___ ° ___ ' ___ " Long. ___ ° ___ ' ___ " or	Wis. Unique Well No.: VR111 / DNR Well ID No.
Facility ID	St. Plane ______ ft. N, ______ ft. E. S/C/N	Date Well Installed: 02 / 14 / 2018 (m m d d y y y y)
Type of Well: Well Code 11 / MW	Section Location of Waste/Source: NW 1/4 of SE 1/4 of Sec. 27, T. 12 N, R. 09 ☒ E ☐ W	Well Installed By: Name (first, last) and Firm: Mark Crampton, Badger State Drilling Co., Inc.
Distance from Waste/Source ___ ft. / Enf. Stds. Apply ☒	Location of Well Relative to Waste/Source: u ☐ Upgradient; s ☐ Sidegradient; d ☒ Downgradient; n ☐ Not Known	Gov. Lot Number

A. Protective pipe, top elevation 813.59 ft. MSL
B. Well casing, top elevation 813.28 ft. MSL
C. Land surface elevation 809.88 ft. MSL
D. Surface seal, bottom 807.61 ft. MSL or 2.27 ft.

12. USCS classification of soil near screen: GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☒ SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐ Bedrock ☐
13. Sieve analysis performed? ☒ Yes ☐ No
14. Drilling method used: Rotary ☐ 5 0; Hollow Stem Auger ☒ 4 1; Other ☐
15. Drilling fluid used: Water ☐ 0 2; Air ☐ 0 1; Drilling Mud ☐ 0 3; None ☒ 9 9
16. Drilling additives used? ☐ Yes ☒ No
Describe --
17. Source of water (attach analysis, if required): --

E. Bentonite seal, top 807.61 ft. MSL or 2.27 ft.
F. Fine sand, top 788.61 ft. MSL or 21.27 ft.
G. Filter pack, top 786.61 ft. MSL or 23.27 ft.
H. Screen joint, top 785.61 ft. MSL or 24.27 ft.
I. Well bottom 775.61 ft. MSL or 34.27 ft.
J. Filter pack, bottom 773.38 ft. MSL or 36.5 ft.
K. Borehole, bottom 773.38 ft. MSL or 36.5 ft.
L. Borehole, diameter 8.5 in.
M. O.D. well casing 2.38 in.
N. I.D. well casing 2.01 in.



1. Cap and lock? ☒ Yes ☐ No
2. Protective cover pipe:
   a. Inside diameter: 6 in.
   b. Length: 5 ft.
   c. Material: Steel ☒ 0 4; Other ☐
   d. Additional protection? ☐ Yes ☒ No
   If yes, describe:
3. Surface seal: Bentonite ☒ 3 0; Concrete ☐ 0 1; Other ☐
4. Material between well casing and protective pipe: Bentonite ☐ 3 0; Filter Sand (#5) Other ☒
5. Annular space seal: a. Granular/Chipped Bentonite ☒ 3 3
   b. ___ Lbs/gal mud weight . . . Bentonite-sand slurry ☐ 3 5
   c. ___ Lbs/gal mud weight . . . . . Bentonite slurry ☐ 3 1
   d. ___ % Bentonite . . . . . . Bentonite-cement grout ☐ 5 0
   e. 0.342 Ft^3 volume added for any of the above
   f. How installed: Tremie ☐ 0 1; Tremie pumped ☐ 0 2; Gravity ☒ 0 8
6. Bentonite seal: a. Bentonite granules ☐ 3 3
   b. ☐ 1/4 in. ☒ 3/8 in. ☐ 1/2 in. Bentonite chips ☒ 3 2
   c. ______ Other ☐
7. Fine sand material: Manufacturer, product name & mesh size
   a. RW Sidley #7 (1 bag) ☒
   b. Volume added ___ ft^3
8. Filter pack material: Manufacturer, product name & mesh size
   a. RW Sidley #5 (6 bags) ☒
   b. Volume added ___ ft^3
9. Well casing: Flush threaded PVC schedule 40 ☒ 2 3; Flush threaded PVC schedule 80 ☐ 2 4; Other ☐
10. Screen material: PVC
   a. Screen type: Factory cut ☒ 1 1; Continuous slot ☐ 0 1; Other ☐
   b. Manufacturer: Monoflex
   c. Slot size: 0.010 in.
   d. Slotted length: 10 ft.
11. Backfill material (below filter pack): None ☒ 1 4; Other ☐

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature	Firm
[signature]	SCS ENGINEERS, 2830 Dairy Drive, Madison, WI 53718

Please complete both Forms 4400-113A and 4400-113B and return them to the appropriate DNR office and bureau. Completion of these reports is required by chs. 160, 281, 283, 289, 291, 292, 293, 295, and 299, Wis. Stats., and ch. NR 141, Wis. Adm. Code. In accordance with chs. 281, 289, 291, 292, 293, 295, and 299, Wis. Stats., failure to file these forms may result in a forfeiture of between $10 and $25,000, or imprisonment for up to one year, depending on the program and conduct involved. Personally identifiable information on these forms is not intended to be used for any other purpose. NOTE: See the instructions for more information, including where the completed forms should be sent.

SCS # 25217156.01

State of Wisconsin
Department of Natural Resources

Route to: Watershed/Wastewater [ ] Waste Management [X] Remediation/Redevelopment [ ] Other [ ]

MONITORING WELL CONSTRUCTION
Form 4400-113A Rev. 7-98

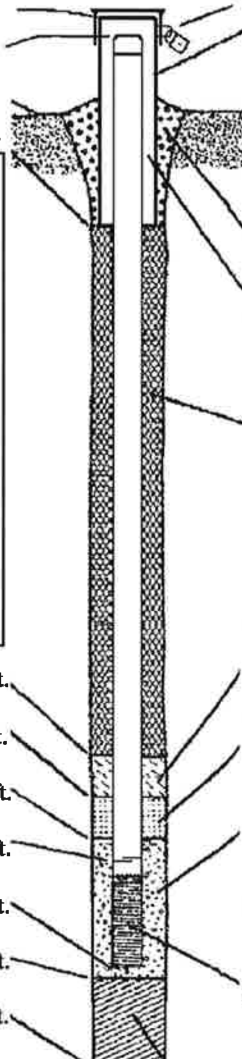
Facility/Project Name: WPL-Columbia Generating Station	Local Grid Location of Well: 543331.971 ft. [X] N. [ ] S. 2123879.85 ft. [X] E. [ ] W.	Well Name: MW-310
Facility License, Permit or Monitoring No.	Local Grid Origin [ ] (estimated: [ ]) or Well Location [ ] Lat. ___ ° ___ ' ___ " Long. ___ ° ___ ' ___ " or	Wis. Unique Well No.: VR110 / DNR Well ID No.
Facility ID	St. Plane ___ ft. N, ___ ft. E. S/C/N	Date Well Installed: 02 / 13 / 2018 (m m / d d / y y y y)
Type of Well: Well Code 11 / MW	Section Location of Waste/Source: NW 1/4 of SE 1/4 of Sec. 27, T. 12 N, R. 09 [X] E [ ] W	Well Installed By: Name (first, last) and Firm: Dave Cruise, Badger State Drilling Co., Inc.
Distance from Waste/Source ___ ft. / Enf. Stds. Apply [X]	Location of Well Relative to Waste/Source: u [ ] Upgradient; s [ ] Sidegradient; d [X] Downgradient; n [ ] Not Known / Gov. Lot Number	

A. Protective pipe, top elevation 813.93 ft. MSL

B. Well casing, top elevation 813.62 ft. MSL

C. Land surface elevation 810.96 ft. MSL

D. Surface seal, bottom 809.21 ft. MSL or 1.75 ft.



12. USCS classification of soil near screen:
GP [ ] GM [ ] GC [ ] GW [ ] SW [ ] SP [X]
SM [ ] SC [ ] ML [ ] MH [ ] CL [ ] CH [ ]
Bedrock [ ]

13. Sieve analysis performed? [X] Yes [ ] No

14. Drilling method used: Rotary [ ] 5 0; Hollow Stem Auger [X] 4 1; Other [ ]

15. Drilling fluid used: Water [ ] 0 2; Air [ ] 0 1; Drilling Mud [ ] 0 3; None [X] 9 9

16. Drilling additives used? [ ] Yes [X] No

Describe --

17. Source of water (attach analysis, if required):
--

E. Bentonite seal, top 809.21 ft. MSL or 1.75 ft.

F. Fine sand, top 789.21 ft. MSL or 21.75 ft.

G. Filter pack, top 787.21 ft. MSL or 23.75 ft.

H. Screen joint, top 785.21 ft. MSL or 25.75 ft.

I. Well bottom 775.21 ft. MSL or 35.75 ft.

J. Filter pack, bottom 774.46 ft. MSL or 36.5 ft.

K. Borehole, bottom 774.46 ft. MSL or 36.5 ft.

L. Borehole, diameter 8.5 in.

M. O.D. well casing 2.38 in.

N. I.D. well casing 2.01 in.

1. Cap and lock? [X] Yes [ ] No

2. Protective cover pipe:
a. Inside diameter: 6 in.
b. Length: 5 ft.
c. Material: Steel [X] 0 4; Other [ ]
d. Additional protection? [ ] Yes [X] No
If yes, describe:

3. Surface seal: Bentonite [X] 3 0; Concrete [ ] 0 1; Other [ ]

4. Material between well casing and protective pipe: Bentonite [ ] 3 0; Other [X] Filter Sand (#5)

5. Annular space seal: a. Granular/Chipped Bentonite [X] 3 3
b. ___ Lbs/gal mud weight . . . Bentonite-sand slurry [ ] 3 5
c. ___ Lbs/gal mud weight . . . . . Bentonite slurry [ ] 3 1
d. ___ % Bentonite . . . . . . Bentonite-cement grout [ ] 5 0
e. 0.369 Ft^3 volume added for any of the above
f. How installed: Tremie [ ] 0 1; Tremie pumped [ ] 0 2; Gravity [X] 0 8

6. Bentonite seal: a. Bentonite granules [ ] 3 3
b. [ ] 1/4 in. [X] 3/8 in. [ ] 1/2 in. Bentonite chips [X] 3 2
c. ___ Other [ ]

7. Fine sand material: Manufacturer, product name & mesh size
a. RW Sidley #7 (1 bag) [X]
b. Volume added ___ ft^3

8. Filter pack material: Manufacturer, product name & mesh size
a. RW Sidley #5 (7 bags) [X]
b. Volume added ___ ft^3

9. Well casing: Flush threaded PVC schedule 40 [X] 2 3; Flush threaded PVC schedule 80 [ ] 2 4; Other [ ]

10. Screen material: PVC
a. Screen type: Factory cut [X] 1 1; Continuous slot [ ] 0 1; Other [ ]
b. Manufacturer Monoflex
c. Slot size: 0.010 in.
d. Slotted length: 10 ft.

11. Backfill material (below filter pack): None [X] 1 4; Other [ ]

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature	Firm
[signature]	SCS ENGINEERS, 2830 Dairy Drive, Madison, WI 53718

Please complete both Forms 4400-113A and 4400-113B and return them to the appropriate DNR office and bureau. Completion of these reports is required by chs. 160, 281, 283, 289, 291, 292, 293, 295, and 299, Wis. Stats., and ch. NR 141, Wis. Adm. Code. In accordance with chs. 281, 289, 291, 292, 293, 295, and 299, Wis. Stats., failure to file these forms may result in a forfeiture of between $10 and $25,000, or imprisonment for up to one year, depending on the program and conduct involved. Personally identifiable information on these forms is not intended to be used for any other purpose. NOTE: See the instructions for more information, including where the completed forms should be sent.

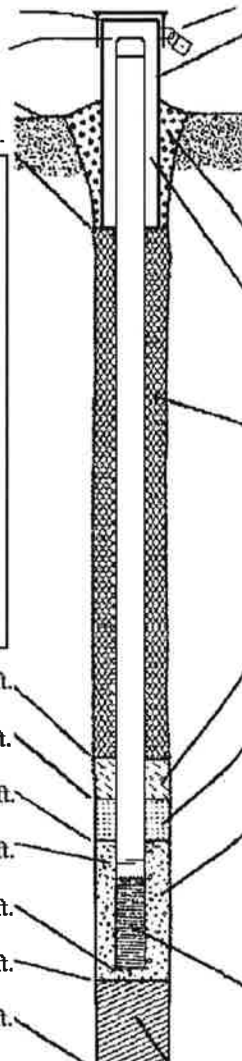
SCS # 25217156.01

State of Wisconsin
Department of Natural Resources

Route to: Watershed/Wastewater ☐ Waste Management ☒
Remediation/Redevelopment ☐ Other ☐

MONITORING WELL CONSTRUCTION
Form 4400-113A Rev. 7-98

Facility/Project Name WPL-Columbia Generating Station	Local Grid Location of Well 542874.39 ft. ☒ N. ☐ S. 2123437.50 ft. ☒ E. ☐ W.	Well Name MW-311
Facility License, Permit or Monitoring No.	Local Grid Origin ☐ (estimated: ☐) or Well Location ☐ Lat. ___ ° ___ ' ___ " Long. ___ ° ___ ' ___ " or	Wis. Unique Well No. VR112 / DNR Well ID No.
Facility ID	St. Plane ___ ft. N, ___ ft. E. S/C/N	Date Well Installed 02 / 14 / 2018 (m m / d d / y y y y)
Type of Well Well Code 11 / MW	Section Location of Waste/Source NE 1/4 of SW 1/4 of Sec. 27, T. 12 N, R. 09 ☒ E ☐ W	Well Installed By: Name (first, last) and Firm Mark Crampton Badger State Drilling Co., Inc.
Distance from Waste/Source ___ ft. / Enf. Stds. Apply ☒	Location of Well Relative to Waste/Source u ☐ Upgradient s ☐ Sidegradient d ☒ Downgradient n ☐ Not Known Gov. Lot Number	



A. Protective pipe, top elevation 810.05 ft. MSL

B. Well casing, top elevation 809.74 ft. MSL

C. Land surface elevation 806.53 ft. MSL

D. Surface seal, bottom 803.55 ft. MSL or 2.98 ft.

12. USCS classification of soil near screen:
GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☒
SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
Bedrock ☐

13. Sieve analysis performed? ☒ Yes ☐ No

14. Drilling method used: Rotary ☐ 5 0
Hollow Stem Auger ☒ 4 1
Other ☐

15. Drilling fluid used: Water ☐ 0 2 Air ☐ 0 1
Drilling Mud ☐ 0 3 None ☒ 9 9

16. Drilling additives used? ☐ Yes ☒ No

Describe --

17. Source of water (attach analysis, if required):
--

E. Bentonite seal, top 803.55 ft. MSL or 2.98 ft.

F. Fine sand, top 787.55 ft. MSL or 18.98 ft.

G. Filter pack, top 785.55 ft. MSL or 20.98 ft.

H. Screen joint, top 783.55 ft. MSL or 22.98 ft.

I. Well bottom 773.55 ft. MSL or 32.98 ft.

J. Filter pack, bottom 773.53 ft. MSL or 33 ft.

K. Borehole, bottom 773.53 ft. MSL or 33 ft.

L. Borehole, diameter 8.5 in.

M. O.D. well casing 2.38 in.

N. I.D. well casing 2.01 in.

1. Cap and lock? ☒ Yes ☐ No

2. Protective cover pipe:
a. Inside diameter: 6 in.
b. Length: 5 ft.
c. Material: Steel ☒ 0 4
Other ☐
d. Additional protection? ☐ Yes ☒ No
If yes, describe:

3. Surface seal: Bentonite ☒ 3 0
Concrete ☐ 0 1
Other ☐

4. Material between well casing and protective pipe:
Bentonite ☐ 3 0
Filter Sand (#5) Other ☒

5. Annular space seal: a. Granular/Chipped Bentonite ☒ 3 3
b. ___ Lbs/gal mud weight . . . Bentonite-sand slurry ☐ 3 5
c. ___ Lbs/gal mud weight . . . . . Bentonite slurry ☐ 3 1
d. ___ % Bentonite . . . . . . Bentonite-cement grout ☐ 5 0
e. 0.288 Ft^3 volume added for any of the above
f. How installed: Tremie ☐ 0 1
Tremie pumped ☐ 0 2
Gravity ☒ 0 8

6. Bentonite seal: a. Bentonite granules ☐ 3 3
b. ☐ 1/4 in. ☒ 3/8 in. ☐ 1/2 in. Bentonite chips ☒ 3 2
c. Other ☐

7. Fine sand material: Manufacturer, product name & mesh size
a. RW Sidley #7 (1 bag) ☒
b. Volume added ___ ft^3

8. Filter pack material: Manufacturer, product name & mesh size
a. RW Sidley #5 (6 bags) ☒
b. Volume added ___ ft^3

9. Well casing: Flush threaded PVC schedule 40 ☒ 2 3
Flush threaded PVC schedule 80 ☐ 2 4
Other ☐

10. Screen material: PVC
a. Screen type: Factory cut ☒ 1 1
Continuous slot ☐ 0 1
Other ☐
b. Manufacturer Monoflex
c. Slot size: 0.010 in.
d. Slotted length: 10 ft.

11. Backfill material (below filter pack): None ☒ 1 4
Other ☐

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature	Firm
	SCS ENGINEERS, 2830 Dairy Drive, Madison, WI 53718

Please complete both Forms 4400-113A and 4400-113B and return them to the appropriate DNR office and bureau. Completion of these reports is required by chs. 160, 281, 283, 289, 291, 292, 293, 295, and 299, Wis. Stats., and ch. NR 141, Wis. Adm. Code. In accordance with chs. 281, 289, 291, 292, 293, 295, and 299, Wis. Stats., failure to file these forms may result in a forfeiture of between $10 and $25,000, or imprisonment for up to one year, depending on the program and conduct involved. Personally identifiable information on these forms is not intended to be used for any other purpose. NOTE: See the instructions for more information, including where the completed forms should be sent.

SCS # 25217156.01

State of Wisconsin
Department of Natural Resources

MONITORING WELL DEVELOPMENT

Form 4400-113B Rev. 7-98

Route to: Watershed/Wastewater ☐ Waste Management ☒
Remediation/Redevelopment ☐ Other ☐ ____________

Facility/Project Name	County Name	Well Name	
WPL - Alliant Columbia Generating Station	Columbia	MW-309	
Facility License, Permit or Monitoring Number	County Code	Wis. Unique Well Number	DNR Well ID Number
	11	VR111	

1. Can this well be purged dry? ☒ Yes ☐ No

2. Well development method
   - surged with bailer and bailed ☐ 41
   - surged with bailer and pumped ☒ 61
   - surged with block and bailed ☐ 42
   - surged with block and pumped ☐ 62
   - surged with block, bailed and pumped ☐ 70
   - compressed air ☐ 20
   - bailed only ☐ 10
   - pumped only ☐ 51
   - pumped slowly ☐ 50
   - Other ____________ ☐

3. Time spent developing well: 75 min.

4. Depth of well (from top of well casisng): 37.67 ft.

5. Inside diameter of well: 2.0 in.

6. Volume of water in filter pack and well casing: 7.04 gal.

7. Volume of water removed from well: 50.0 gal.

8. Volume of water added (if any): ___ gal.

9. Source of water added ____________

10. Analysis performed on water added? ☐ Yes ☐ No
    (If yes, attach results)

	Before Development	After Development
11. Depth to Water (from top of well casing) a.	30.07 ft.	32.29 ft.
Date b. (mm/dd/yyyy)	02/16/2018	02/16/2018
Time c.	12:47 ☐ a.m. ☒ p.m.	13:50 ☐ a.m. ☒ p.m.
12. Sediment in well bottom	___ inches	___ inches
13. Water clarity	Clear ☐ 10 / Turbid ☒ 15	Clear ☒ 20 / Turbid ☐ 25
(Describe)	Brown Silty	

Fill in if drilling fluids were used and well is at solid waste facility:

14. Total suspended solids	___ mg/l	___ mg/l
15. COD	___ mg/l	___ mg/l

16. Well developed by: Name (first, last) and Firm
First Name: Kyle Last Name: Kramer
Firm: SCS ENGINEERS, 2830 Dairy Drive, Madison, WI 53718

17. Additional comments on development:

Two cycles of well purging dry and recharging.

Name and Address of Facility Contact /Owner/Responsible Party
First Name: Nate Last Name: Sievers
Facility/Firm: Wisconsin Power and Light
Street: W8375 Murray Road
City/State/Zip: Pardeeville, Wisconsin 53954

I hereby certify that the above information is true and correct to the best of my knowledge.
Signature:
Print Name: Kyle Kramer
Firm: SCS ENGINEERS, 2830 Dairy Drive, Madison, WI 53718

NOTE: See instructions for more information including a list of county codes and well type codes.

SCS # 25217156.01

State of Wisconsin
Department of Natural Resources

MONITORING WELL DEVELOPMENT

Form 4400-113B Rev. 7-98

Route to: Watershed/Wastewater ☐ Waste Management ☒
Remediation/Redevelopment ☐ Other ☐ ________

Facility/Project Name	County Name	Well Name
WPL - Alliant Columbia Generating Station	Columbia	MW-310

Facility License, Permit or Monitoring Number	County Code	Wis. Unique Well Number	DNR Well ID Number
	11	VR110	

1. Can this well be purged dry? ☒ Yes ☐ No

2. Well development method
   - surged with bailer and bailed ☐ 41
   - surged with bailer and pumped ☒ 61
   - surged with block and bailed ☐ 42
   - surged with block and pumped ☐ 62
   - surged with block, bailed and pumped ☐ 70
   - compressed air ☐ 20
   - bailed only ☐ 10
   - pumped only ☐ 51
   - pumped slowly ☐ 50
   - Other ________ ☐

3. Time spent developing well 171 min.

4. Depth of well (from top of well casisng) 38.41 ft.

5. Inside diameter of well 2.0 in.

6. Volume of water in filter pack and well casing 7.28 gal.

7. Volume of water removed from well 60.0 gal.

8. Volume of water added (if any) ___.__ gal.

9. Source of water added ________

10. Analysis performed on water added? ☐ Yes ☐ No
(If yes, attach results)

	Before Development	After Development
11. Depth to Water (from top of well casing)	a. 30.55 ft.	32.30 ft.
Date	b. 2/16/2018 (mm dd yyyy)	2/16/2018 (mm dd yyyy)
Time	c. 9:45 ☒ a.m. ☐ p.m.	12:36 ☐ a.m. ☒ p.m.
12. Sediment in well bottom	___.__ inches	___.__ inches
13. Water clarity	Clear ☐ 10 Turbid ☒ 15 (Describe) brown silty	Clear ☒ 20 Turbid ☐ 25 (Describe)

Fill in if drilling fluids were used and well is at solid waste facility:

14. Total suspended solids	___.__ mg/l	___.__ mg/l
15. COD	___.__ mg/l	___.__ mg/l

16. Well developed by: Name (first, last) and Firm
First Name: Kyle Last Name: Kramer
Firm: SCS ENGINEERS, 2830 Dairy Drive, Madison, WI 53718

17. Additional comments on development:
Four cycles of well purging dry and recharging.

Name and Address of Facility Contact /Owner/Responsible Party
First Name: Nate Last Name: Sievers
Facility/Firm: Wisconsin Power and Light
Street: W8375 Murray Road
City/State/Zip: Pardeeville, Wisconsin 53954

I hereby certify that the above information is true and correct to the best of my knowledge.
Signature: Kyle Kramer
Print Name: Kyle Kramer
Firm: SCS ENGINEERS, 2830 Dairy Drive, Madison, WI 53718

NOTE: See instructions for more information including a list of county codes and well type codes.

SCS # 25217156.01

State of Wisconsin
Department of Natural Resources

MONITORING WELL DEVELOPMENT
Form 4400-113B Rev. 7-98

Route to: Watershed/Wastewater ☐ Waste Management ☒
Remediation/Redevelopment ☐ Other ☐ ____________

Facility/Project Name	County Name	Well Name
WPL - Alliant Columbia Generating Station	Columbia	MW-311

Facility License, Permit or Monitoring Number	County Code	Wis. Unique Well Number	DNR Well ID Number
	11	VR112	

1. Can this well be purged dry? ☐ Yes ☒ No

2. Well development method
- surged with bailer and bailed ☐ 4 1
- surged with bailer and pumped ☒ 6 1
- surged with block and bailed ☐ 4 2
- surged with block and pumped ☐ 6 2
- surged with block, bailed and pumped ☐ 7 0
- compressed air ☐ 2 0
- bailed only ☐ 1 0
- pumped only ☐ 5 1
- pumped slowly ☐ 5 0
- Other ____________ ☐

3. Time spent developing well: 168 min.

4. Depth of well (from top of well casisng): 36.19 ft.

5. Inside diameter of well: 2.0 in.

6. Volume of water in filter pack and well casing: 8.74 gal.

7. Volume of water removed from well: 100.0 gal.

8. Volume of water added (if any): ___ gal.

9. Source of water added ____________

10. Analysis performed on water added? ☐ Yes ☐ No
(If yes, attach results)

		Before Development	After Development
11. Depth to Water (from top of well casing)	a.	26.75 ft.	28.51 ft.
Date	b.	2/16/2018 (mm dd yyyy)	2/16/2018 (mm dd yyyy)
Time	c.	2:00 ☐ a.m. ☒ p.m.	4:48 ☐ a.m. ☒ p.m.
12. Sediment in well bottom		___ inches	___ inches
13. Water clarity		Clear ☐ 1 0 Turbid ☒ 1 5 (Describe) brown silly	Clear ☒ 2 0 Turbid ☐ 2 5 (Describe)

Fill in if drilling fluids were used and well is at solid waste facility:

	Before Development	After Development
14. Total suspended solids	___ mg/l	___ mg/l
15. COD	___ mg/l	___ mg/l

16. Well developed by: Name (first, last) and Firm
First Name: Kyle Last Name: Kramer
Firm: SCS ENGINEERS, 2830 Dairy Drive, Madison, WI 53718

17. Additional comments on development:

Name and Address of Facility Contact /Owner/Responsible Party
First Name: Nate Last Name: Sievers
Facility/Firm: Columbia Dry Ash & Ash Pond Disposal Facilities
Street: W8375 Murray Road
City/State/Zip: Pardeeville, Wisconsin 53954

I hereby certify that the above information is true and correct to the best of my knowledge.
Signature: Kyle Kramer
Print Name: Kyle Kramer
Firm: SCS ENGINEERS, 2830 Dairy Drive, Madison, WI 53718

NOTE: See instructions for more information including a list of county codes and well type codes.

Appendix C

Laboratory Reports

C1 April 2021 Detection Monitoring
C2 June 2021 Resample
C3 October 2021 Detection Monitoring
C4 December 2021 Resample

C1 April 2021 Detection Monitoring

Pace Analytical®
www.pacelabs.com

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

May 03, 2021

Meghan Blodgett
SCS ENGINEERS
2830 Dairy Drive
Madison, WI 53718

RE: Project: 25219067 COLUMBIA CCR MOD 4
Pace Project No.: 40225270

Dear Meghan Blodgett:

Enclosed are the analytical results for sample(s) received by the laboratory on April 16, 2021. The results relate only to the samples included in this report. Results reported herein conform to the applicable TNI/NELAC Standards and the laboratory's Quality Manual, where applicable, unless otherwise noted in the body of the report.

The test results provided in this final report were generated by each of the following laboratories within the Pace Network:

- Pace Analytical Services - Green Bay

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

Sincerely,

Dan Milewsky
dan.milewsky@pacelabs.com
(920)469-2436
Project Manager

Enclosures

cc: Tom Karwoski, SCS ENGINEERS
Nicole Kron, SCS ENGINEERS
Jeff Maxted, ALLIANT ENERGY
Marc Morandi, ALLIANT ENERGY

CERTIFICATIONS

Project:	25219067 COLUMBIA CCR MOD 4
Pace Project No.:	40225270

Pace Analytical Services Green Bay

1241 Bellevue Street, Green Bay, WI 54302
Florida/NELAP Certification #: E87948
Illinois Certification #: 200050
Kentucky UST Certification #: 82
Louisiana Certification #: 04168
Minnesota Certification #: 055-999-334
New York Certification #: 12064
North Dakota Certification #: R-150
Virginia VELAP ID: 460263
South Carolina Certification #: 83006001
Texas Certification #: T104704529-14-1
Wisconsin Certification #: 405132750
Wisconsin DATCP Certification #: 105-444
USDA Soil Permit #: P330-16-00157
Federal Fish & Wildlife Permit #: LE51774A-0

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

SAMPLE SUMMARY

Project: 25219067 COLUMBIA CCR MOD 4
Pace Project No.: 40225270

Lab ID	Sample ID	Matrix	Date Collected	Date Received
40225270001	**MW-309**	Water	04/13/21 16:35	04/16/21 07:45
40225270002	**MW-310**	Water	04/13/21 17:10	04/16/21 07:45
40225270003	**MW-311**	Water	04/14/21 09:45	04/16/21 07:45
40225270004	**FIELD BLANK MOD4**	Water	04/13/21 17:10	04/16/21 07:45

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

SAMPLE ANALYTE COUNT

Project: 25219067 COLUMBIA CCR MOD 4
Pace Project No.: 40225270

Lab ID	Sample ID	Method	Analysts	Analytes Reported
40225270001	**MW-309**	EPA 6020	DS1	2
			VGC	7
		SM 2540C	HNT	1
		EPA 9040	ALY	1
		EPA 300.0	HMB	3
40225270002	**MW-310**	EPA 6020	DS1	2
			VGC	7
		SM 2540C	HNT	1
		EPA 9040	ALY	1
		EPA 300.0	HMB	3
40225270003	**MW-311**	EPA 6020	DS1	2
			VGC	7
		SM 2540C	HNT	1
		EPA 9040	ALY	1
		EPA 300.0	HMB	3
40225270004	**FIELD BLANK MOD4**	EPA 6020	DS1, KXS	2
		SM 2540C	HNT	1
		EPA 9040	ALY	1
		EPA 300.0	HMB	3

PASI-G = Pace Analytical Services - Green Bay

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

ANALYTICAL RESULTS

Project: 25219067 COLUMBIA CCR MOD 4
Pace Project No.: 40225270

Sample: MW-309 **Lab ID: 40225270001** Collected: 04/13/21 16:35 Received: 04/16/21 07:45 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
	Pace Analytical Services - Green Bay								
Boron	**48.0**	ug/L	10.0	3.0	1	04/20/21 06:41	04/22/21 21:35	7440-42-8	
Calcium	**62300**	ug/L	254	76.2	1	04/20/21 06:41	04/22/21 21:35	7440-70-2	
Field Data	Analytical Method:								
	Pace Analytical Services - Green Bay								
Field pH	**7.68**	Std. Units			1		04/13/21 16:35		
Field Specific Conductance	**1804.0**	umhos/cm			1		04/13/21 16:35		
Oxygen, Dissolved	**10.14**	mg/L			1		04/13/21 16:35	7782-44-7	
REDOX	**124.1**	mV			1		04/13/21 16:35		
Turbidity	**2.80**	NTU			1		04/13/21 16:35		
Static Water Level	**784.29**	feet			1		04/13/21 16:35		
Temperature, Water (C)	**10.7**	deg C			1		04/13/21 16:35		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
	Pace Analytical Services - Green Bay								
Total Dissolved Solids	**916**	mg/L	20.0	8.7	1		04/20/21 12:35		
9040 pH	Analytical Method: EPA 9040								
	Pace Analytical Services - Green Bay								
pH at 25 Degrees C	**7.7**	Std. Units	0.10	0.010	1		04/19/21 10:03		H6
300.0 IC Anions	Analytical Method: EPA 300.0								
	Pace Analytical Services - Green Bay								
Chloride	**390**	mg/L	40.0	8.6	20		04/30/21 10:09	16887-00-6	
Fluoride	**<0.095**	mg/L	0.32	0.095	1		04/30/21 01:46	16984-48-8	
Sulfate	**30.3**	mg/L	2.0	0.44	1		04/30/21 01:46	14808-79-8	

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

ANALYTICAL RESULTS

Project: 25219067 COLUMBIA CCR MOD 4
Pace Project No.: 40225270

Sample: MW-310 **Lab ID: 40225270002** Collected: 04/13/21 17:10 Received: 04/16/21 07:45 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
	Pace Analytical Services - Green Bay								
Boron	**69.6**	ug/L	10.0	3.0	1	04/20/21 06:41	04/22/21 21:41	7440-42-8	
Calcium	**49300**	ug/L	254	76.2	1	04/20/21 06:41	04/22/21 21:41	7440-70-2	
Field Data	Analytical Method:								
	Pace Analytical Services - Green Bay								
Field pH	**7.73**	Std. Units			1		04/13/21 17:10		
Field Specific Conductance	**1194.0**	umhos/cm			1		04/13/21 17:10		
Oxygen, Dissolved	**9.93**	mg/L			1		04/13/21 17:10	7782-44-7	
REDOX	**106.0**	mV			1		04/13/21 17:10		
Turbidity	**0.57**	NTU			1		04/13/21 17:10		
Static Water Level	**784.24**	feet			1		04/13/21 17:10		
Temperature, Water (C)	**10.8**	deg C			1		04/13/21 17:10		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
	Pace Analytical Services - Green Bay								
Total Dissolved Solids	**654**	mg/L	20.0	8.7	1		04/20/21 12:36		
9040 pH	Analytical Method: EPA 9040								
	Pace Analytical Services - Green Bay								
pH at 25 Degrees C	**7.8**	Std. Units	0.10	0.010	1		04/19/21 10:09		H6
300.0 IC Anions	Analytical Method: EPA 300.0								
	Pace Analytical Services - Green Bay								
Chloride	**227**	mg/L	20.0	4.3	10		04/30/21 17:06	16887-00-6	
Fluoride	**<0.095**	mg/L	0.32	0.095	1		04/30/21 10:52	16984-48-8	
Sulfate	**43.3**	mg/L	2.0	0.44	1		04/30/21 10:52	14808-79-8	

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

ANALYTICAL RESULTS

Project: 25219067 COLUMBIA CCR MOD 4
Pace Project No.: 40225270

Sample: MW-311 **Lab ID: 40225270003** Collected: 04/14/21 09:45 Received: 04/16/21 07:45 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010 Pace Analytical Services - Green Bay								
Boron	**33.6**	ug/L	10.0	3.0	1	04/20/21 06:41	04/22/21 21:48	7440-42-8	
Calcium	**59000**	ug/L	254	76.2	1	04/20/21 06:41	04/22/21 21:48	7440-70-2	
Field Data	Analytical Method: Pace Analytical Services - Green Bay								
Field pH	**7.46**	Std. Units			1		04/14/21 09:45		
Field Specific Conductance	**500.2**	umhos/cm			1		04/14/21 09:45		
Oxygen, Dissolved	**10.23**	mg/L			1		04/14/21 09:45	7782-44-7	
REDOX	**110.4**	mV			1		04/14/21 09:45		
Turbidity	**3.49**	NTU			1		04/14/21 09:45		
Static Water Level	**784.15**	feet			1		04/14/21 09:45		
Temperature, Water (C)	**9.5**	deg C			1		04/14/21 09:45		
2540C Total Dissolved Solids	Analytical Method: SM 2540C Pace Analytical Services - Green Bay								
Total Dissolved Solids	**270**	mg/L	20.0	8.7	1		04/20/21 12:36		
9040 pH	Analytical Method: EPA 9040 Pace Analytical Services - Green Bay								
pH at 25 Degrees C	**7.7**	Std. Units	0.10	0.010	1		04/19/21 10:10		H6
300.0 IC Anions	Analytical Method: EPA 300.0 Pace Analytical Services - Green Bay								
Chloride	**1.3J**	mg/L	2.0	0.43	1		04/30/21 15:54	16887-00-6	
Fluoride	**<0.095**	mg/L	0.32	0.095	1		04/30/21 15:54	16984-48-8	
Sulfate	**15.6**	mg/L	2.0	0.44	1		04/30/21 15:54	14808-79-8	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

ANALYTICAL RESULTS

Project: 25219067 COLUMBIA CCR MOD 4
Pace Project No.: 40225270

Sample: FIELD BLANK MOD4 **Lab ID: 40225270004** Collected: 04/13/21 17:10 Received: 04/16/21 07:45 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010 Pace Analytical Services - Green Bay								
Boron	**<3.0**	ug/L	10.0	3.0	1	04/20/21 06:41	04/22/21 18:38	7440-42-8	
Calcium	**<76.2**	ug/L	254	76.2	1	04/20/21 06:41	04/24/21 02:22	7440-70-2	
2540C Total Dissolved Solids	Analytical Method: SM 2540C Pace Analytical Services - Green Bay								
Total Dissolved Solids	**<8.7**	mg/L	20.0	8.7	1		04/20/21 12:36		
9040 pH	Analytical Method: EPA 9040 Pace Analytical Services - Green Bay								
pH at 25 Degrees C	**6.3**	Std. Units	0.10	0.010	1		04/19/21 10:12		H6
300.0 IC Anions	Analytical Method: EPA 300.0 Pace Analytical Services - Green Bay								
Chloride	**<0.43**	mg/L	2.0	0.43	1		04/30/21 16:09	16887-00-6	
Fluoride	**<0.095**	mg/L	0.32	0.095	1		04/30/21 16:09	16984-48-8	
Sulfate	**<0.44**	mg/L	2.0	0.44	1		04/30/21 16:09	14808-79-8	

Pace Analytical®
www.pacelabs.com

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

QUALITY CONTROL DATA

Project: 25219067 COLUMBIA CCR MOD 4
Pace Project No.: 40225270

QC Batch: 382878 | Analysis Method: EPA 6020
QC Batch Method: EPA 3010 | Analysis Description: 6020 MET
Laboratory: Pace Analytical Services - Green Bay
Associated Lab Samples: 40225270001, 40225270002, 40225270003, 40225270004

METHOD BLANK: 2208607 Matrix: Water
Associated Lab Samples: 40225270001, 40225270002, 40225270003, 40225270004

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Boron	ug/L	<3.0	10.0	04/22/21 18:17	
Calcium	ug/L	<76.2	254	04/24/21 01:55	

LABORATORY CONTROL SAMPLE: 2208608

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Boron	ug/L	500	460	92	80-120	
Calcium	ug/L	5000	4890	98	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2208609 2208610

Parameter	Units	40225233001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Boron	ug/L	2440	500	500	2810	2960	74	104	75-125	5	20	P6
Calcium	ug/L	10400	5000	5000	14900	15100	90	93	75-125	1	20	

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

Pace Analytical®
www.pacelabs.com

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

QUALITY CONTROL DATA

Project: 25219067 COLUMBIA CCR MOD 4
Pace Project No.: 40225270

QC Batch: 382941
Analysis Method: SM 2540C
QC Batch Method: SM 2540C
Analysis Description: 2540C Total Dissolved Solids
Laboratory: Pace Analytical Services - Green Bay
Associated Lab Samples: 40225270001, 40225270002, 40225270003, 40225270004

METHOD BLANK: 2208850 Matrix: Water
Associated Lab Samples: 40225270001, 40225270002, 40225270003, 40225270004

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	<8.7	20.0	04/20/21 12:31	

LABORATORY CONTROL SAMPLE: 2208851

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Dissolved Solids	mg/L	564	542	96	80-120	

SAMPLE DUPLICATE: 2208852

Parameter	Units	40225218004 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	140	140	0	10	

SAMPLE DUPLICATE: 2208853

Parameter	Units	40225218010 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	530	556	5	10	

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

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

QUALITY CONTROL DATA

Project: 25219067 COLUMBIA CCR MOD 4
Pace Project No.: 40225270

QC Batch: 382734 | Analysis Method: EPA 9040
QC Batch Method: EPA 9040 | Analysis Description: 9040 pH
Laboratory: Pace Analytical Services - Green Bay

Associated Lab Samples: 40225270001, 40225270002, 40225270003

SAMPLE DUPLICATE: 2207891

Parameter	Units	40225153001 Result	Dup Result	RPD	Max RPD	Qualifiers
pH at 25 Degrees C	Std. Units	7.1	7.2	0	20	H6

SAMPLE DUPLICATE: 2207905

Parameter	Units	40225178001 Result	Dup Result	RPD	Max RPD	Qualifiers
pH at 25 Degrees C	Std. Units	7.6	7.6	0	20	H6

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

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

QUALITY CONTROL DATA

Project: 25219067 COLUMBIA CCR MOD 4
Pace Project No.: 40225270

QC Batch: 382737
QC Batch Method: EPA 9040
Analysis Method: EPA 9040
Analysis Description: 9040 pH
Laboratory: Pace Analytical Services - Green Bay

Associated Lab Samples: 40225270004

SAMPLE DUPLICATE: 2207896

Parameter	Units	40225270004 Result	Dup Result	RPD	Max RPD	Qualifiers
pH at 25 Degrees C	Std. Units	6.3	6.4	1	20	H6

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

REPORT OF LABORATORY ANALYSIS

Pace Analytical®
www.pacelabs.com

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

QUALITY CONTROL DATA

Project: 25219067 COLUMBIA CCR MOD 4
Pace Project No.: 40225270

QC Batch: 383702
QC Batch Method: EPA 300.0
Analysis Method: EPA 300.0
Analysis Description: 300.0 IC Anions
Laboratory: Pace Analytical Services - Green Bay
Associated Lab Samples: 40225270001, 40225270002, 40225270003, 40225270004

METHOD BLANK: 2213287 Matrix: Water
Associated Lab Samples: 40225270001, 40225270002, 40225270003, 40225270004

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chloride	mg/L	<0.43	2.0	04/30/21 01:17	
Fluoride	mg/L	<0.095	0.32	04/30/21 01:17	
Sulfate	mg/L	<0.44	2.0	04/30/21 01:17	

LABORATORY CONTROL SAMPLE: 2213288

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	20	21.5	108	90-110	
Fluoride	mg/L	2	2.1	107	90-110	
Sulfate	mg/L	20	21.6	108	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2213289 2213290

Parameter	Units	40225270001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	390	400	400	816	808	107	105	90-110	1	15	
Fluoride	mg/L	<0.095	2	2	1.8	1.9	91	93	90-110	1	15	
Sulfate	mg/L	30.3	20	20	50.5	50.7	101	102	90-110	0	15	

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

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

QUALIFIERS

Project:	25219067 COLUMBIA CCR MOD 4
Pace Project No.:	40225270

DEFINITIONS

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

ND - Not Detected at or above LOD.

J - Estimated concentration at or above the LOD and below the LOQ.

LOD - Limit of Detection adjusted for dilution factor, percent moisture, initial weight and final volume.

LOQ - Limit of Quantitation adjusted for dilution factor, percent moisture, initial weight and final volume.

S - Surrogate

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

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

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected at or above the adjusted LOD.

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

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

TNI - The NELAC Institute.

ANALYTE QUALIFIERS

H6	Analysis initiated outside of the 15 minute EPA required holding time.
P6	Matrix spike recovery was outside laboratory control limits due to a parent sample concentration notably higher than the spike level.

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 25219067 COLUMBIA CCR MOD 4
Pace Project No.: 40225270

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
40225270001	**MW-309**	EPA 3010	382878	EPA 6020	382964
40225270002	**MW-310**	EPA 3010	382878	EPA 6020	382964
40225270003	**MW-311**	EPA 3010	382878	EPA 6020	382964
40225270004	**FIELD BLANK MOD4**	EPA 3010	382878	EPA 6020	382964
40225270001	**MW-309**				
40225270002	**MW-310**				
40225270003	**MW-311**				
40225270001	**MW-309**	SM 2540C	382941		
40225270002	**MW-310**	SM 2540C	382941		
40225270003	**MW-311**	SM 2540C	382941		
40225270004	**FIELD BLANK MOD4**	SM 2540C	382941		
40225270001	**MW-309**	EPA 9040	382734		
40225270002	**MW-310**	EPA 9040	382734		
40225270003	**MW-311**	EPA 9040	382734		
40225270004	**FIELD BLANK MOD4**	EPA 9040	382737		
40225270001	**MW-309**	EPA 300.0	383702		
40225270002	**MW-310**	EPA 300.0	383702		
40225270003	**MW-311**	EPA 300.0	383702		
40225270004	**FIELD BLANK MOD4**	EPA 300.0	383702		

Pace Analytical
www.pacelabs.com

CHAIN-OF-CUSTODY / Analytical Request Document

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

4025270

Page : 1 Of 1

Section A
Required Client Information:

Company:	SCS ENGINEERS
Address:	2830 Dairy Drive
	Madison, WI 53718
Email:	mblodgett@scsengineers.com
Phone:	608-216-7362 Fax:
Requested Due Date:	

Section B
Required Project Information:

Report To:	Meghan Blodgett
Copy To:	
Purchase Order #:	
Project Name:	25219067 Columbia CCR Mod 4
Project #:	25221067.00

Section C
Invoice Information:

Attention:	
Company Name:	Same
Address:	
Pace Quote:	
Pace Project Manager:	dan.milewsky@pacelabs.com,
Pace Profile #:	3946

Regulatory Agency

State / Location

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

SAMPLE ID — One Character per box. (A-Z, 0-9 / , -) Sample Ids must be unique

Requested Analysis Filtered (Y/N): Boron/Calcium N; pH N; TDS, Cl, F, SO4 N

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED START DATE	START TIME	END DATE	END TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H2SO4	HNO3	HCl	NaOH	Na2S2O3	Methanol	Other	Analyses Test Y/N	Boron/Calcium	pH	TDS, Cl, F, SO4	Residual Chlorine (Y/N)	
1																							
2	MW-309	WT		4/13/21		4/13/21	1635		3	X		X							x	x	x		001
3	MW-310	WT		4/13/21		4/13/21	1710		3	X		X							x	x	x		002
4	MW-311	WT		4/14/21		4/14/21	945		3	X		X							x	x	x		003
5	FIELD BLANK MOD4	WT		4/13/21		4/13/21	1710		3	X		X							x	x	x		004
6																							
7																							
8																							
9																							
10																							
11																							
12																							

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	TEMP in C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)
ALL SAMPLES UNFILTERED	Adam Watson / SCS Eng.	4/15/21	1000							
	C.S logistics	4/16/21	0745	[illegible] Pace	4/16/21	0745	.5	Y	N	Y

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER:

SIGNATURE of SAMPLER: DATE Signed:

Pace Container Order #800036 40225270

Addresses

Order By :		Ship To :		Return To:	
Company	SCS ENGINEERS	Company	SCS ENGINEERS (Pace Analytical Green	Company	Pace Analytical Green Bay
Contact	Blodgett, Meghan	Contact	Paul Grover	Contact	Milewsky, Dan
Email	mblodgett@scsengineers.com	Email	pgrover@scsengineers.com	Email	dan.milewsky@pacelabs.com
Address	2830 Dairy Drive	Address	2830 Dairy Drive	Address	1241 Bellevue Street
Address 2		Address 2		Address 2	Suite 9
City	Madison	City	Madison	City	Green Bay
State	WI Zip 53718	State	WI Zip 53718	State	WI Zip 54302
Phone	608-216-7362	Phone	608-216-7362	Phone	(920)469-2436

Info

Project Name	25219067 Columbia CCR Mod 4	**Due Date**	04/09/2021	**Profile**	3946	**Quote**	
Project Manager	Milewsky, Dan	**Return Date**		**Carrier**	Most Economical	**Location**	

Trip Blanks

- [ ] Include Trip Blanks

Bottle Labels

- [ ] Blank
- [ ] Pre-Printed No Sample IDs
- [x] Pre-Printed With Sample IDs

Bottles

- [ ] Boxed Cases
- [ ] Individually Wrapped
- [x] Grouped By Sample ID/Matrix

Return Shipping Labels

- [ ] No Shipper
- [ ] With Shipper

COC Options

- [ ] Number of Blanks
- [x] Pre-Printed

Misc

- [ ] Sampling Instructions
- [ ] Custody Seal
- [ ] Temp. Blanks
- [x] Coolers
- [ ] Syringes
- [ ] Extra Bubble Wrap
- [ ] Short Hold/Rush Stickers
- [x] DI Water 1 Liter(s)
- [ ] USDA Regulated Soils

# of Samples	Matrix	Test	Container	Total	# of	Lot #	Notes
5	WT	Boron/Calcium	250mL plastic w/HNO3	5	0	M-0-290-03BB	
5	WT	pH	250mL plastic unpres	5	0	M-0-290-04BB	
5	WT	TDS, Cl, F, SO4	250mL plastic unpres	5	0	M-0-290-04BB	

Hazard Shipping Placard In Place : NA

'Sample receiving hours are typically 8am-5pm, but may differ by location. Please check with your Pace Project Manager.
'Pace Analytical reserves the right to return hazardous, toxic, or radioactive samples to you.
'Pace Analytical reserves the right to charge for unused bottles, as well as cost associated with sample storage/disposal.
'Payment term are net 30 days.
'Please include the proposal number on the chain of custody to insure proper billing.

LAB USE:

Ship Date :	04/07/2021
Prepared By:	Mai Yer Her
Verified By:	

Sample

ALL SAMPLES UNFILTERED

CLIENT USE (Optional):

Date Rec'd:	
Received By:	
Verified By:	

Pace Analytical Services, LLC
1241 Bellevue Street, Suite 9
Green Bay, WI 54302

Sample Preservation Receipt Form

Client Name: SCS Engineers Project # 40225270

All containers needing preservation have been checked and noted below: ☒Yes ☐No ☐N/A

Lab Lot# of pH paper: 10D3601 Lab Std #ID of preservation (if pH adjusted):

Initial when completed: Date/ Time:

Pace Lab #	Glass: AG1U	BG1U	AG1H	AG4S	AG4U	AG5U	AG2S	BG3U	Plastic: BP1U	BP3U	BP3B	BP3N	BP3S	Vials: VG9A	DG9T	VG9U	VG9H	VG9M	VG9D	Jars: JGFU	JG9U	WGFU	WPFU	General: SP5T	ZPLC	GN	VOA Vials (>6mm) *	H2SO4 pH ≤2	NaOH+Zn Act pH ≥9	NaOH pH ≥12	HNO3 pH ≤2	pH after adjusted	Volume (mL)
001										2		1																			X		2.5 / 5 / 10
002										2		1																			X		2.5 / 5 / 10
003										2		1																			X		2.5 / 5 / 10
004										2		1																			X		2.5 / 5 / 10
005																																	2.5 / 5 / 10
006																																	2.5 / 5 / 10
007																																	2.5 / 5 / 10
008																																	2.5 / 5 / 10
009																																	2.5 / 5 / 10
010																																	2.5 / 5 / 10
011																																	2.5 / 5 / 10
012																																	2.5 / 5 / 10
013																																	2.5 / 5 / 10
014																																	2.5 / 5 / 10
015																																	2.5 / 5 / 10
016																																	2.5 / 5 / 10
017																																	2.5 / 5 / 10
018																																	2.5 / 5 / 10
019																																	2.5 / 5 / 10
020																																	2.5 / 5 / 10

4/16/21

Exceptions to preservation check: VOA, Coliform, TOC, TOX, TOH, O&G, WI DRO, Phenolics, Other:________ Headspace in VOA Vials (>6mm) : ☐Yes ☐No ☒N/A ***If yes look in headspace column**

Code	Description	Code	Description	Code	Description	Code	Description
AG1U	1 liter amber glass	BP1U	1 liter plastic unpres	VG9A	40 mL clear ascorbic	JGFU	4 oz amber jar unpres
BG1U	1 liter clear glass	BP3U	250 mL plastic unpres	DG9T	40 mL amber Na Thio	JG9U	9 oz amber jar unpres
AG1H	1 liter amber glass HCL	BP3B	250 mL plastic NaOH	VG9U	40 mL clear vial unpres	WGFU	4 oz clear jar unpres
AG4S	125 mL amber glass H2SO4	BP3N	250 mL plastic HNO3	VG9H	40 mL clear vial HCL	WPFU	4 oz plastic jar unpres
AG4U	120 mL amber glass unpres	BP3S	250 mL plastic H2SO4	VG9M	40 mL clear vial MeOH	SP5T	120 mL plastic Na Thiosulfate
AG5U	100 mL amber glass unpres			VG9D	40 mL clear vial DI	ZPLC	ziploc bag
AG2S	500 mL amber glass H2SO4					GN	
BG3U	250 mL clear glass unpres						

Sample Condition Upon Receipt Form (SCUR)

Project #:

WO# : 40225270

40225270

Client Name: SCS Engineers

Courier: ☒ CS Logistics ☐ Fed Ex ☐ Speedee ☐ UPS ☐ Waltco ☐ Client ☐ Pace Other:

Tracking #: —

Custody Seal on Cooler/Box Present: ☐ yes ☒ no Seals intact: ☐ yes ☐ no

Custody Seal on Samples Present: ☐ yes ☒ no Seals intact: ☐ yes ☐ no

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

Thermometer Used SR - 90 **Type of Ice:** Wet Blue Dry None ☒ Samples on ice, cooling process has begun

Cooler Temperature Uncorr: 1 /Corr: .5

Temp Blank Present: ☐ yes ☒ no **Biological Tissue is Frozen:** ☐ yes ☐ no

Temp should be above freezing to 6°C.
Biota Samples may be received at ≤ 0°C if shipped on Dry Ice.

Person examining contents:
Date: 4/16/21 /Initials: [illegible]
Labeled By Initials: [illegible]

Chain of Custody Present:	☒ Yes ☐ No ☐ N/A	1.
Chain of Custody Filled Out:	☒ Yes ☐ No ☐ N/A	2.
Chain of Custody Relinquished:	☒ Yes ☐ No ☐ N/A	3.
~~Sampler Name~~ & Signature on COC:	☐ Yes ☒ No ☐ N/A	4.
Samples Arrived within Hold Time:	☒ Yes ☐ No	5.
- VOA Samples frozen upon receipt	☐ Yes ☐ No	Date/Time:
Short Hold Time Analysis (<72hr):	☐ Yes ☒ No	6.
Rush Turn Around Time Requested:	☐ Yes ☒ No	7.
Sufficient Volume: For Analysis: ☒ Yes ☐ No MS/MSD:	☐ Yes ☒ No ☐ N/A	8.
Correct Containers Used:	☒ Yes ☐ No	9.
-Pace Containers Used:	☒ Yes ☐ No ☐ N/A	
-Pace IR Containers Used:	☐ Yes ☐ No ☒ N/A	
Containers Intact:	☒ Yes ☐ No	10.
Filtered volume received for Dissolved tests	☐ Yes ☐ No ☒ N/A	11.
Sample Labels match COC:	☒ Yes ☐ No ☐ N/A	12.
-Includes date/time/ID/Analysis Matrix: W		
Trip Blank Present:	☐ Yes ☐ No ☒ N/A	13.
Trip Blank Custody Seals Present	☐ Yes ☐ No ☒ N/A	
Pace Trip Blank Lot # (if purchased):		

Client Notification/ Resolution: If checked, see attached form for additional comments ☐

Person Contacted: Date/Time:

Comments/ Resolution:

PM Review is documented electronically in LIMs. By releasing the project, the PM acknowledges they have reviewed the sample logi

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

May 11, 2021

Meghan Blodgett
SCS ENGINEERS
2830 Dairy Drive
Madison, WI 53718

RE: Project: 25219067 COLUMBIA CCR BACKGRND
Pace Project No.: 40225276

Dear Meghan Blodgett:

Enclosed are the analytical results for sample(s) received by the laboratory on April 16, 2021. The results relate only to the samples included in this report. Results reported herein conform to the applicable TNI/NELAC Standards and the laboratory's Quality Manual, where applicable, unless otherwise noted in the body of the report.

The test results provided in this final report were generated by each of the following laboratories within the Pace Network:

- Pace Analytical Services - Green Bay
- Pace Analytical Services - Greensburg

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

Sincerely,

Dan Milewsky
dan.milewsky@pacelabs.com
(920)469-2436
Project Manager

Enclosures

cc: Tom Karwoski, SCS ENGINEERS
Nicole Kron, SCS ENGINEERS
Jeff Maxted, ALLIANT ENERGY
Marc Morandi, ALLIANT ENERGY

Pace Analytical®
www.pacelabs.com

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

CERTIFICATIONS

Project:	25219067 COLUMBIA CCR BACKGRND
Pace Project No.:	40225276

Pace Analytical Services Pennsylvania

1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601
ANAB DOD-ELAP Rad Accreditation #: L2417
Alabama Certification #: 41590
Arizona Certification #: AZ0734
Arkansas Certification
California Certification #: 04222CA
Colorado Certification #: PA01547
Connecticut Certification #: PH-0694
Delaware Certification
EPA Region 4 DW Rad
Florida/TNI Certification #: E87683
Georgia Certification #: C040
Florida: Cert E871149 SEKS WET
Guam Certification
Hawaii Certification
Idaho Certification
Illinois Certification
Indiana Certification
Iowa Certification #: 391
Kansas/TNI Certification #: E-10358
Kentucky Certification #: KY90133
KY WW Permit #: KY0098221
KY WW Permit #: KY0000221
Louisiana DHH/TNI Certification #: LA180012
Louisiana DEQ/TNI Certification #: 4086
Maine Certification #: 2017020
Maryland Certification #: 308
Massachusetts Certification #: M-PA1457
Michigan/PADEP Certification #: 9991
Missouri Certification #: 235
Montana Certification #: Cert0082
Nebraska Certification #: NE-OS-29-14
Nevada Certification #: PA014572018-1
New Hampshire/TNI Certification #: 297617
New Jersey/TNI Certification #: PA051
New Mexico Certification #: PA01457
New York/TNI Certification #: 10888
North Carolina Certification #: 42706
North Dakota Certification #: R-190
Ohio EPA Rad Approval: #41249
Oregon/TNI Certification #: PA200002-010
Pennsylvania/TNI Certification #: 65-00282
Puerto Rico Certification #: PA01457
Rhode Island Certification #: 65-00282
South Dakota Certification
Tennessee Certification #: 02867
Texas/TNI Certification #: T104704188-17-3
Utah/TNI Certification #: PA014572017-9
USDA Soil Permit #: P330-17-00091
Vermont Dept. of Health: ID# VT-0282
Virgin Island/PADEP Certification
Virginia/VELAP Certification #: 9526
Washington Certification #: C868
West Virginia DEP Certification #: 143
West Virginia DHHR Certification #: 9964C
Wisconsin Approve List for Rad
Wyoming Certification #: 8TMS-L

Pace Analytical Services Green Bay

1241 Bellevue Street, Green Bay, WI 54302
Florida/NELAP Certification #: E87948
Illinois Certification #: 200050
Kentucky UST Certification #: 82
Louisiana Certification #: 04168
Minnesota Certification #: 055-999-334
New York Certification #: 12064
North Dakota Certification #: R-150
Virginia VELAP ID: 460263
South Carolina Certification #: 83006001
Texas Certification #: T104704529-14-1
Wisconsin Certification #: 405132750
Wisconsin DATCP Certification #: 105-444
USDA Soil Permit #: P330-16-00157
Federal Fish & Wildlife Permit #: LE51774A-0

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

SAMPLE SUMMARY

Project: 25219067 COLUMBIA CCR BACKGRND
Pace Project No.: 40225276

Lab ID	Sample ID	Matrix	Date Collected	Date Received
40225276001	**MW-301**	Water	04/14/21 14:55	04/16/21 07:40
40225276002	**MW-84A**	Water	04/14/21 13:40	04/16/21 07:40

Pace Analytical
www.pacelabs.com

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

SAMPLE ANALYTE COUNT

Project: 25219067 COLUMBIA CCR BACKGRND
Pace Project No.: 40225276

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
40225276001	**MW-301**	EPA 6020	KXS	14	PASI-G
		EPA 7470	AJT	1	PASI-G
			VGC	7	PASI-G
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
		Total Radium Calculation	RMK	1	PASI-PA
		SM 2540C	JXM	1	PASI-G
		EPA 9040	ALY	1	PASI-G
		EPA 300.0	HMB	3	PASI-G
40225276002	**MW-84A**	EPA 6020	KXS	14	PASI-G
		EPA 7470	AJT	1	PASI-G
			VGC	7	PASI-G
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
		Total Radium Calculation	RMK	1	PASI-PA
		SM 2540C	JXM	1	PASI-G
		EPA 9040	ALY	1	PASI-G
		EPA 300.0	HMB	3	PASI-G

PASI-G = Pace Analytical Services - Green Bay
PASI-PA = Pace Analytical Services - Greensburg

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

ANALYTICAL RESULTS

Project: 25219067 COLUMBIA CCR BACKGRND
Pace Project No.: 40225276

Sample: MW-301 **Lab ID: 40225276001** Collected: 04/14/21 14:55 Received: 04/16/21 07:40 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
	Pace Analytical Services - Green Bay								
Antimony	**<0.15**	ug/L	1.0	0.15	1	04/21/21 06:55	04/21/21 21:48	7440-36-0	
Arsenic	**<0.28**	ug/L	1.0	0.28	1	04/21/21 06:55	04/21/21 21:48	7440-38-2	
Barium	**8.9**	ug/L	2.3	0.70	1	04/21/21 06:55	04/21/21 21:48	7440-39-3	
Beryllium	**<0.25**	ug/L	1.0	0.25	1	04/21/21 06:55	04/21/21 21:48	7440-41-7	
Boron	**22.2**	ug/L	10.0	3.0	1	04/21/21 06:55	04/21/21 21:48	7440-42-8	
Cadmium	**<0.15**	ug/L	1.0	0.15	1	04/21/21 06:55	04/21/21 21:48	7440-43-9	
Calcium	**117000**	ug/L	2540	762	10	04/21/21 06:55	04/21/21 19:30	7440-70-2	P6
Chromium	**<1.0**	ug/L	3.4	1.0	1	04/21/21 06:55	04/21/21 21:48	7440-47-3	
Cobalt	**<0.12**	ug/L	1.0	0.12	1	04/21/21 06:55	04/21/21 21:48	7440-48-4	
Lead	**<0.24**	ug/L	1.0	0.24	1	04/21/21 06:55	04/21/21 21:48	7439-92-1	
Lithium	**0.58J**	ug/L	1.0	0.22	1	04/21/21 06:55	04/21/21 21:48	7439-93-2	
Molybdenum	**<0.44**	ug/L	1.5	0.44	1	04/21/21 06:55	04/21/21 21:48	7439-98-7	
Selenium	**<0.32**	ug/L	1.1	0.32	1	04/21/21 06:55	04/22/21 10:16	7782-49-2	
Thallium	**<0.14**	ug/L	1.0	0.14	1	04/21/21 06:55	04/21/21 21:48	7440-28-0	
7470 Mercury	Analytical Method: EPA 7470 Preparation Method: EPA 7470								
	Pace Analytical Services - Green Bay								
Mercury	**<0.066**	ug/L	0.20	0.066	1	04/22/21 11:00	04/23/21 09:30	7439-97-6	
Field Data	Analytical Method:								
	Pace Analytical Services - Green Bay								
Field pH	**6.66**	Std. Units			1		04/14/21 14:55		
Field Specific Conductance	**857.0**	umhos/cm			1		04/14/21 14:55		
Oxygen, Dissolved	**3.90**	mg/L			1		04/14/21 14:55	7782-44-7	
REDOX	**102.9**	mV			1		04/14/21 14:55		
Turbidity	**2.41**	NTU			1		04/14/21 14:55		
Static Water Level	**786.50**	feet			1		04/14/21 14:55		
Temperature, Water (C)	**7.4**	deg C			1		04/14/21 14:55		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
	Pace Analytical Services - Green Bay								
Total Dissolved Solids	**472**	mg/L	20.0	8.7	1		04/20/21 15:00		
9040 pH	Analytical Method: EPA 9040								
	Pace Analytical Services - Green Bay								
pH at 25 Degrees C	**6.9**	Std. Units	0.10	0.010	1		04/19/21 10:15		H6
300.0 IC Anions	Analytical Method: EPA 300.0								
	Pace Analytical Services - Green Bay								
Chloride	**1.5J**	mg/L	2.0	0.43	1		04/30/21 16:37	16887-00-6	
Fluoride	**<0.095**	mg/L	0.32	0.095	1		04/30/21 16:37	16984-48-8	
Sulfate	**8.5**	mg/L	2.0	0.44	1		04/30/21 16:37	14808-79-8	

Pace Analytical
www.pacelabs.com

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

ANALYTICAL RESULTS

Project: 25219067 COLUMBIA CCR BACKGRND
Pace Project No.: 40225276

Sample: MW-84A **Lab ID: 40225276002** Collected: 04/14/21 13:40 Received: 04/16/21 07:40 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010 Pace Analytical Services - Green Bay								
Antimony	**0.55J**	ug/L	1.0	0.15	1	04/21/21 06:55	04/21/21 22:15	7440-36-0	
Arsenic	**0.91J**	ug/L	1.0	0.28	1	04/21/21 06:55	04/21/21 22:15	7440-38-2	
Barium	**13.4**	ug/L	2.3	0.70	1	04/21/21 06:55	04/21/21 22:15	7440-39-3	
Beryllium	**0.47J**	ug/L	1.0	0.25	1	04/21/21 06:55	04/21/21 22:15	7440-41-7	
Boron	**14.3**	ug/L	10.0	3.0	1	04/21/21 06:55	04/21/21 22:15	7440-42-8	
Cadmium	**0.53J**	ug/L	1.0	0.15	1	04/21/21 06:55	04/21/21 22:15	7440-43-9	
Calcium	**69100**	ug/L	254	76.2	1	04/21/21 06:55	04/21/21 22:15	7440-70-2	
Chromium	**2.6J**	ug/L	3.4	1.0	1	04/21/21 06:55	04/21/21 22:15	7440-47-3	
Cobalt	**0.52J**	ug/L	1.0	0.12	1	04/21/21 06:55	04/21/21 22:15	7440-48-4	
Lead	**0.55J**	ug/L	1.0	0.24	1	04/21/21 06:55	04/21/21 22:15	7439-92-1	
Lithium	**1.0**	ug/L	1.0	0.22	1	04/21/21 06:55	04/21/21 22:15	7439-93-2	
Molybdenum	**0.62J**	ug/L	1.5	0.44	1	04/21/21 06:55	04/21/21 22:15	7439-98-7	
Selenium	**0.48J**	ug/L	1.1	0.32	1	04/21/21 06:55	04/22/21 10:44	7782-49-2	
Thallium	**0.66J**	ug/L	1.0	0.14	1	04/21/21 06:55	04/21/21 22:15	7440-28-0	
7470 Mercury	Analytical Method: EPA 7470 Preparation Method: EPA 7470 Pace Analytical Services - Green Bay								
Mercury	**<0.066**	ug/L	0.20	0.066	1	04/22/21 11:00	04/23/21 09:32	7439-97-6	
Field Data	Analytical Method: Pace Analytical Services - Green Bay								
Field pH	**7.34**	Std. Units			1		04/14/21 13:40		
Field Specific Conductance	**610.9**	umhos/cm			1		04/14/21 13:40		
Oxygen, Dissolved	**9.80**	mg/L			1		04/14/21 13:40	7782-44-7	
REDOX	**95.6**	mV			1		04/14/21 13:40		
Turbidity	**2.45**	NTU			1		04/14/21 13:40		
Static Water Level	**785.84**	feet			1		04/14/21 13:40		
Temperature, Water (C)	**10.2**	deg C			1		04/14/21 13:40		
2540C Total Dissolved Solids	Analytical Method: SM 2540C Pace Analytical Services - Green Bay								
Total Dissolved Solids	**328**	mg/L	20.0	8.7	1		04/20/21 15:01		
9040 pH	Analytical Method: EPA 9040 Pace Analytical Services - Green Bay								
pH at 25 Degrees C	**7.6**	Std. Units	0.10	0.010	1		04/19/21 10:17		H6
300.0 IC Anions	Analytical Method: EPA 300.0 Pace Analytical Services - Green Bay								
Chloride	**4.4**	mg/L	2.0	0.43	1		04/30/21 16:52	16887-00-6	
Fluoride	**<0.095**	mg/L	0.32	0.095	1		04/30/21 16:52	16984-48-8	
Sulfate	**1.4J**	mg/L	2.0	0.44	1		04/30/21 16:52	14808-79-8	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

QUALITY CONTROL DATA

Project: 25219067 COLUMBIA CCR BACKGRND
Pace Project No.: 40225276

QC Batch: 383173
QC Batch Method: EPA 7470
Analysis Method: EPA 7470
Analysis Description: 7470 Mercury
Laboratory: Pace Analytical Services - Green Bay
Associated Lab Samples: 40225276001, 40225276002

METHOD BLANK: 2210149 Matrix: Water
Associated Lab Samples: 40225276001, 40225276002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mercury	ug/L	<0.066	0.20	04/23/21 08:32	

LABORATORY CONTROL SAMPLE: 2210150

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury	ug/L	5	4.7	93	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2210151 2210152

Parameter	Units	40225233001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mercury	ug/L	<0.066	5	5	4.8	4.7	97	94	85-115	3	20	

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

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

QUALITY CONTROL DATA

Project: 25219067 COLUMBIA CCR BACKGRND
Pace Project No.: 40225276

QC Batch: 383007 Analysis Method: EPA 6020
QC Batch Method: EPA 3010 Analysis Description: 6020 MET
Laboratory: Pace Analytical Services - Green Bay
Associated Lab Samples: 40225276001, 40225276002

METHOD BLANK: 2209295 Matrix: Water
Associated Lab Samples: 40225276001, 40225276002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Antimony	ug/L	<0.15	1.0	04/21/21 18:28	
Arsenic	ug/L	<0.28	1.0	04/21/21 18:28	
Barium	ug/L	<0.70	2.3	04/21/21 18:28	
Beryllium	ug/L	<0.25	1.0	04/21/21 18:28	
Boron	ug/L	<3.0	10.0	04/21/21 18:28	
Cadmium	ug/L	<0.15	1.0	04/21/21 18:28	
Calcium	ug/L	<76.2	254	04/21/21 18:28	
Chromium	ug/L	<1.0	3.4	04/21/21 18:28	
Cobalt	ug/L	<0.12	1.0	04/21/21 18:28	
Lead	ug/L	<0.24	1.0	04/21/21 18:28	
Lithium	ug/L	<0.22	1.0	04/21/21 18:28	
Molybdenum	ug/L	<0.44	1.5	04/21/21 18:28	
Selenium	ug/L	<0.32	1.1	04/21/21 18:28	
Thallium	ug/L	<0.14	1.0	04/21/21 18:28	

LABORATORY CONTROL SAMPLE: 2209296

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Antimony	ug/L	500	517	103	80-120	
Arsenic	ug/L	500	492	98	80-120	
Barium	ug/L	500	490	98	80-120	
Beryllium	ug/L	500	477	95	80-120	
Boron	ug/L	500	486	97	80-120	
Cadmium	ug/L	500	509	102	80-120	
Calcium	ug/L	5000	4980	100	80-120	
Chromium	ug/L	500	502	100	80-120	
Cobalt	ug/L	500	486	97	80-120	
Lead	ug/L	500	487	97	80-120	
Lithium	ug/L	500	484	97	80-120	
Molybdenum	ug/L	500	494	99	80-120	
Selenium	ug/L	500	515	103	80-120	
Thallium	ug/L	500	491	98	80-120	

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

Pace Analytical
www.pacelabs.com

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

QUALITY CONTROL DATA

Project: 25219067 COLUMBIA CCR BACKGRND
Pace Project No.: 40225276

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2209297 2209298

Parameter	Units	40225276001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Antimony	ug/L	<0.15	500	500	531	529	106	106	75-125	0	20	
Arsenic	ug/L	<0.28	500	500	495	490	99	98	75-125	1	20	
Barium	ug/L	8.9	500	500	504	503	99	99	75-125	0	20	
Beryllium	ug/L	<0.25	500	500	475	472	95	94	75-125	1	20	
Boron	ug/L	22.2	500	500	519	512	99	98	75-125	1	20	
Cadmium	ug/L	<0.15	500	500	510	509	102	102	75-125	0	20	
Calcium	ug/L	117000	5000	5000	122000	120000	104	64	75-125	2	20	P6
Chromium	ug/L	<1.0	500	500	511	511	102	102	75-125	0	20	
Cobalt	ug/L	<0.12	500	500	493	494	99	99	75-125	0	20	
Lead	ug/L	<0.24	500	500	512	504	102	101	75-125	2	20	
Lithium	ug/L	0.58J	500	500	487	482	97	96	75-125	1	20	
Molybdenum	ug/L	<0.44	500	500	514	518	103	103	75-125	1	20	
Selenium	ug/L	<0.32	500	500	483	484	97	97	75-125	0	20	
Thallium	ug/L	<0.14	500	500	526	523	105	105	75-125	0	20	

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

Pace Analytical
www.pacelabs.com

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

QUALITY CONTROL DATA

Project: 25219067 COLUMBIA CCR BACKGRND
Pace Project No.: 40225276

QC Batch: 382972
QC Batch Method: SM 2540C
Analysis Method: SM 2540C
Analysis Description: 2540C Total Dissolved Solids
Laboratory: Pace Analytical Services - Green Bay
Associated Lab Samples: 40225276001, 40225276002

METHOD BLANK: 2209087 Matrix: Water
Associated Lab Samples: 40225276001, 40225276002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	<8.7	20.0	04/20/21 14:59	

LABORATORY CONTROL SAMPLE: 2209088

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Dissolved Solids	mg/L	564	554	98	80-120	

SAMPLE DUPLICATE: 2209089

Parameter	Units	40225276001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	472	486	3	10	

SAMPLE DUPLICATE: 2209090

Parameter	Units	40225343004 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	850	808	5	10	

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

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

QUALITY CONTROL DATA

Project: 25219067 COLUMBIA CCR BACKGRND
Pace Project No.: 40225276

QC Batch: 382737 — Analysis Method: EPA 9040
QC Batch Method: EPA 9040 — Analysis Description: 9040 pH
Laboratory: Pace Analytical Services - Green Bay

Associated Lab Samples: 40225276001, 40225276002

SAMPLE DUPLICATE: 2207896

Parameter	Units	40225270004 Result	Dup Result	RPD	Max RPD	Qualifiers
pH at 25 Degrees C	Std. Units	6.3	6.4	1	20	H6

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

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

QUALITY CONTROL DATA

Project: 25219067 COLUMBIA CCR BACKGRND
Pace Project No.: 40225276

QC Batch: 383702 | Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 | Analysis Description: 300.0 IC Anions
Laboratory: Pace Analytical Services - Green Bay
Associated Lab Samples: 40225276001, 40225276002

METHOD BLANK: 2213287 | Matrix: Water
Associated Lab Samples: 40225276001, 40225276002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chloride	mg/L	<0.43	2.0	04/30/21 01:17	
Fluoride	mg/L	<0.095	0.32	04/30/21 01:17	
Sulfate	mg/L	<0.44	2.0	04/30/21 01:17	

LABORATORY CONTROL SAMPLE: 2213288

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	20	21.5	108	90-110	
Fluoride	mg/L	2	2.1	107	90-110	
Sulfate	mg/L	20	21.6	108	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2213289 2213290

Parameter	Units	40225270001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	390	400	400	816	808	107	105	90-110	1	15	
Fluoride	mg/L	<0.095	2	2	1.8	1.9	91	93	90-110	1	15	
Sulfate	mg/L	30.3	20	20	50.5	50.7	101	102	90-110	0	15	

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

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: 25219067 COLUMBIA CCR BACKGRND
Pace Project No.: 40225276

Sample: MW-301 | **Lab ID: 40225276001** | Collected: 04/14/21 14:55 | Received: 04/16/21 07:40 | Matrix: Water
PWS: | Site ID: | Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
	Pace Analytical Services - Greensburg					
Radium-226	EPA 903.1	**0.418 ± 0.563 (0.946) C:NA T:91%**	pCi/L	05/10/21 16:44	13982-63-3	
	Pace Analytical Services - Greensburg					
Radium-228	EPA 904.0	**0.739 ± 0.509 (0.983) C:66% T:83%**	pCi/L	05/07/21 15:44	15262-20-1	
	Pace Analytical Services - Greensburg					
Total Radium	Total Radium Calculation	**1.16 ± 1.07 (1.93)**	pCi/L	05/11/21 15:49	7440-14-4	

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: 25219067 COLUMBIA CCR BACKGRND
Pace Project No.: 40225276

Sample: MW-84A **Lab ID: 40225276002** Collected: 04/14/21 13:40 Received: 04/16/21 07:40 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
	Pace Analytical Services - Greensburg					
Radium-226	EPA 903.1	**-0.289 ± 0.530 (1.20) C:NA T:92%**	pCi/L	05/10/21 17:00	13982-63-3	
	Pace Analytical Services - Greensburg					
Radium-228	EPA 904.0	**0.285 ± 0.346 (0.732) C:73% T:95%**	pCi/L	05/11/21 11:28	15262-20-1	
	Pace Analytical Services - Greensburg					
Total Radium	Total Radium Calculation	**0.285 ± 0.876 (1.93)**	pCi/L	05/11/21 15:49	7440-14-4	

REPORT OF LABORATORY ANALYSIS

Pace Analytical®
www.pacelabs.com

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

QUALITY CONTROL - RADIOCHEMISTRY

Project: 25219067 COLUMBIA CCR BACKGRND
Pace Project No.: 40225276

QC Batch: 445315
QC Batch Method: EPA 904.0
Analysis Method: EPA 904.0
Analysis Description: 904.0 Radium 228
Laboratory: Pace Analytical Services - Greensburg

Associated Lab Samples: 40225276002

METHOD BLANK: 2149683 Matrix: Water

Associated Lab Samples: 40225276002

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-228	0.373 ± 0.381 (0.787) C:76% T:77%	pCi/L	05/11/21 11:27	

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

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

QUALITY CONTROL - RADIOCHEMISTRY

Project: 25219067 COLUMBIA CCR BACKGRND
Pace Project No.: 40225276

QC Batch: 445314
QC Batch Method: EPA 904.0
Analysis Method: EPA 904.0
Analysis Description: 904.0 Radium 228
Laboratory: Pace Analytical Services - Greensburg
Associated Lab Samples: 40225276001

METHOD BLANK: 2149682 Matrix: Water
Associated Lab Samples: 40225276001

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-228	0.621 ± 0.331 (0.589) C:74% T:104%	pCi/L	05/07/21 12:16	

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

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

QUALITY CONTROL - RADIOCHEMISTRY

Project: 25219067 COLUMBIA CCR BACKGRND
Pace Project No.: 40225276

QC Batch: 445313 Analysis Method: EPA 903.1
QC Batch Method: EPA 903.1 Analysis Description: 903.1 Radium-226
Laboratory: Pace Analytical Services - Greensburg
Associated Lab Samples: 40225276001, 40225276002

METHOD BLANK: 2149681 Matrix: Water
Associated Lab Samples: 40225276001, 40225276002

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-226	0.301 ± 0.462 (0.795) C:NA T:96%	pCi/L	05/10/21 16:18	

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

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

QUALIFIERS

Project: 25219067 COLUMBIA CCR BACKGRND
Pace Project No.: 40225276

DEFINITIONS

Act - Activity

Unc - Uncertainty: SDWA = 1.96 sigma count uncertainty, all other matrices = Expanded Uncertainty (95% confidence interval). Gamma Spec = Expanded Uncertainty (95.4% Confidence Interval)

(MDC) - Minimum Detectable Concentration

Trac - Tracer Recovery (%)

Carr - Carrier Recovery (%)

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

ND - Not Detected at or above LOD.

J - Estimated concentration at or above the LOD and below the LOQ.

LOD - Limit of Detection adjusted for dilution factor, percent moisture, initial weight and final volume.

LOQ - Limit of Quantitation adjusted for dilution factor, percent moisture, initial weight and final volume.

S - Surrogate

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

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

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected at or above the adjusted LOD.

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

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

TNI - The NELAC Institute.

ANALYTE QUALIFIERS

H6	Analysis initiated outside of the 15 minute EPA required holding time.
P6	Matrix spike recovery was outside laboratory control limits due to a parent sample concentration notably higher than the spike level.

REPORT OF LABORATORY ANALYSIS

Pace Analytical
www.pacelabs.com

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 25219067 COLUMBIA CCR BACKGRND
Pace Project No.: 40225276

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
40225276001	**MW-301**	EPA 3010	383007	EPA 6020	383093
40225276002	**MW-84A**	EPA 3010	383007	EPA 6020	383093
40225276001	**MW-301**	EPA 7470	383173	EPA 7470	383221
40225276002	**MW-84A**	EPA 7470	383173	EPA 7470	383221
40225276001	**MW-301**				
40225276002	**MW-84A**				
40225276001	**MW-301**	EPA 903.1	445313		
40225276002	**MW-84A**	EPA 903.1	445313		
40225276001	**MW-301**	EPA 904.0	445314		
40225276002	**MW-84A**	EPA 904.0	445315		
40225276001	**MW-301**	Total Radium Calculation	447511		
40225276002	**MW-84A**	Total Radium Calculation	447511		
40225276001	**MW-301**	SM 2540C	382972		
40225276002	**MW-84A**	SM 2540C	382972		
40225276001	**MW-301**	EPA 9040	382737		
40225276002	**MW-84A**	EPA 9040	382737		
40225276001	**MW-301**	EPA 300.0	383702		
40225276002	**MW-84A**	EPA 300.0	383702		

Pace Analytical

CHAIN-OF-CUSTODY / Analytical Request Document

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

4025276

Page : 1 Of 1

Section A — Required Client Information:

Company:	SCS ENGINEERS
Address:	2830 Dairy Drive
	Madison, WI 53718
Email:	mblodgett@scsengineers.com
Phone:	608-216-7362
Fax:	
Requested Due Date:	

Section B — Required Project Information:

Report To:	Meghan Blodgett
Copy To:	
Purchase Order #:	
Project Name:	25219067 Columbia CCR Background
Project #:	25221067.00

Section C — Invoice Information:

Attention:	
Company Name:	Same
Address:	
Pace Quote:	
Pace Project Manager:	dan.milewsky@pacelabs.com,
Pace Profile #:	x

Regulatory Agency	
State / Location	

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

SAMPLE ID: One Character per box. (A-Z, 0-9 / , -) Sample Ids must be unique

Requested Analysis Filtered (Y/N): Radium 226 N, Radium 228 N, Metals N, pH N, TDS, Cl, F, SO4 N

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED START DATE	START TIME	END DATE	END TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H2SO4	HNO3	HCl	NaOH	Na2S2O3	Methanol	Other	Analyses Test	Radium 226	Radium 228	Metals	pH	TDS, Cl, F, SO4	Residual Chlorine (Y/N)	
1	MW-301	WT		4/14/21		4/14/21	1455		5	2		3							x	x	x	x	x		001
2	MW-84A	WT		↓		↓	1340		5	2		3							x	x	x	x	x		002
3																									
4																									
5																									
6																									
7																									
8																									
9																									
10																									
11																									
12																									

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	TEMP in C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)
Full List Metals = B, Ca, Sb, As, Ba, Be, Cd, Cr, Co, Pb, Li Hg, Mo, Se, Tl ALL SAMPLES UNFILTERED	Adam Watson / SCS Engr.	4/15/21	1000							
	CS Logistics	4-16-21	0740	Mackenzie Molitch Pace	4-16-21	0740	1.0	Y	N	Y

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER:

SIGNATURE of SAMPLER:

DATE Signed:

Pace Container Order #800030 40225276

Addresses

Order By :		Ship To :		Return To:	
Company	SCS ENGINEERS	Company	SCS ENGINEERS (Pace Analytical Green	Company	Pace Analytical Green Bay
Contact	Blodgett, Meghan	Contact	Paul Grover	Contact	Milewsky, Dan
Email	mblodgett@scsengineers.com	Email	pgrover@scsengineers.com	Email	dan.milewsky@pacelabs.com
Address	2830 Dairy Drive	Address	2830 Dairy Drive	Address	1241 Bellevue Street
Address 2		Address 2		Address 2	Suite 9
City	Madison	City	Madison	City	Green Bay
State	WI Zip 53718	State	WI Zip 53718	State	WI Zip 54302
Phone	608-216-7362	Phone	608-216-7362	Phone	(920)469-2436

Info

Project Name	25219067 Columbia CCR Background	**Due Date**	04/09/2021	**Profile**	3946	**Quote**	
Project Manager	Milewsky, Dan	**Return Date**		**Carrier**	Most Economical	**Location**	

Trip Blanks

- [ ] Include Trip Blanks

Bottle Labels

- [ ] Blank
- [ ] Pre-Printed No Sample IDs
- [X] Pre-Printed With Sample IDs

Bottles

- [ ] Boxed Cases
- [ ] Individually Wrapped
- [X] Grouped By Sample ID/Matrix

Return Shipping Labels

- [ ] No Shipper
- [ ] With Shipper

COC Options

- [ ] Number of Blanks
- [X] Pre-Printed

Misc

- [ ] Sampling Instructions
- [ ] Custody Seal
- [ ] Temp. Blanks
- [X] Coolers
- [ ] Syringes
- [ ] Extra Bubble Wrap
- [ ] Short Hold/Rush Stickers
- [ ] DI Water Liter(s)
- [ ] USDA Regulated Soils

# of Samples	Matrix	Test	Container	Total	# of	Lot #	Notes
2	WT	Radium 226	1L Plastic HNO3 pres	2	0		
2	WT	Radium 228	1L Plastic HNO3 pres	2	0		
2	WT	Metals	250mL plastic w/HNO3	2	0	M-0-290-03BB	
2	WT	pH	250mL plastic unpres	2	0	M-0-290-04BB	
2	WT	TDS, Cl, F, SO4	250mL plastic unpres	2	0	M-0-290-04BB	

Hazard Shipping Placard In Place : NA

- Sample receiving hours are typically 8am-5pm, but may differ by location. Please check with your Pace Project Manager.
- Pace Analytical reserves the right to return hazardous, toxic, or radioactive samples to you.
- Pace Analytical reserves the right to charge for unused bottles, as well as cost associated with sample storage/disposal.
- Payment term are net 30 days.
- Please include the proposal number on the chain of custody to insure proper billing.

LAB USE:

Ship Date :	04/07/2021
Prepared By:	Mai Yer Her
Verified By:	

Sample

Full List Metals = B, Ca, Sb, As, Ba, Be, Cd, Cr, Co, Pb, Li Hg, Mo, Se, Tl
ALL SAMPLES UNFILTERED

CLIENT USE (Optional):

Date Rec'd:	
Received By:	
Verified By:	

F-ALL-C-009-rev.00. 19Dec2016

Pace Analytical Services, LLC
1241 Bellevue Street, Suite 9
Green Bay, WI 54302

Sample Preservation Receipt Form

Client Name: SCS Engineers

Project # 40225276

All containers needing preservation have been checked and noted below: ☒Yes ☐No ☐N/A

Lab Lot# of pH paper: 10D3601

Lab Std #ID of preservation (if pH adjusted):

Initial when completed: MLR

Date/ Time:

Pace Lab #	Glass: AG1U	BG1U	AG1H	AG4S	AG4U	AG5U	AG2S	BG3U	Plastic: BP1U	BP3U	BP3B	BP3N	BP3S	Vials: VG9A	DG9T	VG9U	VG9H	VG9M	VG9D	Jars: JGFU	JG9U	WGFU	WPFU	General: SP5T	ZPLC	GN	VOA Vials (>6mm) *	H2SO4 pH ≤2	NaOH+Zn Act pH ≥9	NaOH pH ≥12	HNO3 pH ≤2	pH after adjusted	Volume (mL)
001										2		1														2					X		2.5 / 5 / 10
002										2		1														2					X		2.5 / 5 / 10
003																																	2.5 / 5 / 10
004																																	2.5 / 5 / 10
005																																	2.5 / 5 / 10
006																																	2.5 / 5 / 10
007																																	2.5 / 5 / 10
008																																	2.5 / 5 / 10
009																																	2.5 / 5 / 10
010																																	2.5 / 5 / 10
011																																	2.5 / 5 / 10
012																																	2.5 / 5 / 10
013																																	2.5 / 5 / 10
014																																	2.5 / 5 / 10
015																																	2.5 / 5 / 10
016																																	2.5 / 5 / 10
017																																	2.5 / 5 / 10
018																																	2.5 / 5 / 10
019																																	2.5 / 5 / 10
020																																	2.5 / 5 / 10

MLR
4-16-21

Exceptions to preservation check: VOA, Coliform, TOC, TOX, TOH, O&G, WI DRO, Phenolics, Other: Ba226/228 MLR 4-16-21 Headspace in VOA Vials (>6mm) : ☐Yes ☐No ☒N/A ***If yes look in headspace column**

AG1U	1 liter amber glass	**BP1U**	1 liter plastic unpres	**VG9A**	40 mL clear ascorbic	**JGFU**	4 oz amber jar unpres
BG1U	1 liter clear glass	**BP3U**	250 mL plastic unpres	**DG9T**	40 mL amber Na Thio	**JG9U**	9 oz amber jar unpres
AG1H	1 liter amber glass HCL	**BP3B**	250 mL plastic NaOH	**VG9U**	40 mL clear vial unpres	**WGFU**	4 oz clear jar unpres
AG4S	125 mL amber glass H2SO4	**BP3N**	250 mL plastic HNO3	**VG9H**	40 mL clear vial HCL	**WPFU**	4 oz plastic jar unpres
AG4U	120 mL amber glass unpres	**BP3S**	250 mL plastic H2SO4	**VG9M**	40 mL clear vial MeOH	**SP5T**	120 mL plastic Na Thiosulfate
AG5U	100 mL amber glass unpres			**VG9D**	40 mL clear vial DI	**ZPLC**	ziploc bag
AG2S	500 mL amber glass H2SO4					**GN**	1L poly HNO3 pres.
BG3U	250 mL clear glass unpres						

Page 1 of 2

Sample Condition Upon Receipt Form (SCUR)

Project #:

WO# : 40225276

40225276

Client Name: SCS Engineers

Courier: ☒ CS Logistics ☐ Fed Ex ☐ Speedee ☐ UPS ☐ Waltco
☐ Client ☐ Pace Other:

Tracking #:

Custody Seal on Cooler/Box Present: ☐ yes ☒ no Seals intact: ☐ yes ☐ no

Custody Seal on Samples Present: ☐ yes ☒ no Seals intact: ☐ yes ☐ no

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

Thermometer Used SR - 99 **Type of Ice:** Wet Blue Dry None ☒ Samples on ice, cooling process has begun

Cooler Temperature Uncorr: 1.0 /Corr: 1.0

Temp Blank Present: ☐ yes ☒ no **Biological Tissue is Frozen:** ☐ yes ☐ no

Temp should be above freezing to 6°C.
Biota Samples may be received at ≤ 0°C if shipped on Dry Ice.

Person examining contents:
Date: 4-16-21 /Initials: MR
Labeled By Initials: JJ

Chain of Custody Present:	☒Yes ☐No ☐N/A	1. sample MR 4-16-21
Chain of Custody Filled Out:	☐Yes ☒No ☐N/A	2. copy to info, proj. state, sample type MR 4-16-21
Chain of Custody Relinquished:	☒Yes ☐No ☐N/A	3.
Sampler Name & Signature on COC:	☐Yes ☒No ☐N/A	4.
Samples Arrived within Hold Time:	☒Yes ☐No	5.
- VOA Samples frozen upon receipt	☐Yes ☐No	Date/Time:
Short Hold Time Analysis (<72hr):	☒Yes ☐No	6.
Rush Turn Around Time Requested:	☐Yes ☒No	7.
Sufficient Volume:		8.
For Analysis: ☒Yes ☐No MS/MSD:	☐Yes ☒No ☐N/A	
Correct Containers Used:	☒Yes ☐No	9.
-Pace Containers Used:	☒Yes ☒No ☐N/A	
-Pace IR Containers Used:	☐Yes ☐No ☒N/A	
Containers Intact:	☒Yes ☐No	10.
Filtered volume received for Dissolved tests	☐Yes ☐No ☒N/A	11.
Sample Labels match COC:	☒Yes ☐No ☐N/A	12.
-Includes date/time/ID/Analysis Matrix: W		
Trip Blank Present:	☐Yes ☐No ☒N/A	13.
Trip Blank Custody Seals Present	☐Yes ☐No ☒N/A	
Pace Trip Blank Lot # (if purchased):		

Client Notification/ Resolution: If checked, see attached form for additional comments ☐

Person Contacted: Date/Time:

Comments/ Resolution:

PM Review is documented electronically in LIMs. By releasing the project, the PM acknowledges they have reviewed the sample logi

C2 June 2021 Resample

Pace Analytical®
www.pacelabs.com

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

June 21, 2021

Meghan Blodgett
SCS ENGINEERS
2830 Dairy Drive
Madison, WI 53718

RE: Project: 25221067 ALLIANT-COLUMBIA
Pace Project No.: 40228358

Dear Meghan Blodgett:

Enclosed are the analytical results for sample(s) received by the laboratory on June 12, 2021. The results relate only to the samples included in this report. Results reported herein conform to the applicable TNI/NELAC Standards and the laboratory's Quality Manual, where applicable, unless otherwise noted in the body of the report.

The test results provided in this final report were generated by each of the following laboratories within the Pace Network:

- Pace Analytical Services - Green Bay

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

Sincerely,

Dan Milewsky
dan.milewsky@pacelabs.com
(920)469-2436
Project Manager

Enclosures

cc: Tom Karwoski, SCS ENGINEERS
Nicole Kron, SCS ENGINEERS
Jeff Maxted, ALLIANT ENERGY
Marc Morandi, ALLIANT ENERGY

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

CERTIFICATIONS

Project:	25221067 ALLIANT-COLUMBIA
Pace Project No.:	40228358

Pace Analytical Services Green Bay

1241 Bellevue Street, Green Bay, WI 54302
Florida/NELAP Certification #: E87948
Illinois Certification #: 200050
Kentucky UST Certification #: 82
Louisiana Certification #: 04168
Minnesota Certification #: 055-999-334
New York Certification #: 12064
North Dakota Certification #: R-150
Virginia VELAP ID: 460263
South Carolina Certification #: 83006001
Texas Certification #: T104704529-14-1
Wisconsin Certification #: 405132750
Wisconsin DATCP Certification #: 105-444
USDA Soil Permit #: P330-16-00157
Federal Fish & Wildlife Permit #: LE51774A-0

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

SAMPLE SUMMARY

Project: 25221067 ALLIANT-COLUMBIA
Pace Project No.: 40228358

Lab ID	Sample ID	Matrix	Date Collected	Date Received
40228358001	**MW 309**	Water	06/11/21 10:10	06/12/21 08:15
40228358002	**FIELD BLANK**	Water	06/11/21 10:20	06/12/21 08:15
40228358003	**MW 310**	Water	06/11/21 10:30	06/12/21 08:15
40228358004	**FIELD BLANK**	Water	06/11/21 10:30	06/12/21 08:15

Pace Analytical
www.pacelabs.com

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

SAMPLE ANALYTE COUNT

Project: 25221067 ALLIANT-COLUMBIA
Pace Project No.: 40228358

Lab ID	Sample ID	Method	Analysts	Analytes Reported
40228358001	**MW 309**	EPA 6020	KXS	1
			VGC	7
40228358002	**FIELD BLANK**	EPA 6020	KXS	1
40228358003	**MW 310**		VGC	7
		EPA 300.0	HMB	1
40228358004	**FIELD BLANK**	EPA 300.0	HMB	1

PASI-G = Pace Analytical Services - Green Bay

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

ANALYTICAL RESULTS

Project: 25221067 ALLIANT-COLUMBIA
Pace Project No.: 40228358

Sample: MW 309 **Lab ID: 40228358001** Collected: 06/11/21 10:10 Received: 06/12/21 08:15 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010 Pace Analytical Services - Green Bay								
Boron	**49.9**	ug/L	10.0	3.0	1	06/15/21 05:31	06/16/21 02:30	7440-42-8	
Field Data	Analytical Method: Pace Analytical Services - Green Bay								
Field pH	**7.71**	Std. Units			1		06/11/21 10:10		
Field Specific Conductance	**3072**	umhos/cm			1		06/11/21 10:10		
Oxygen, Dissolved	**11.21**	mg/L			1		06/11/21 10:10	7782-44-7	
REDOX	**67.2**	mV			1		06/11/21 10:10		
Turbidity	**0.10**	NTU			1		06/11/21 10:10		
Static Water Level	**784.20**	feet			1		06/11/21 10:10		
Temperature, Water (C)	**13.3**	deg C			1		06/11/21 10:10		

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

ANALYTICAL RESULTS

Project: 25221067 ALLIANT-COLUMBIA
Pace Project No.: 40228358

Sample: FIELD BLANK **Lab ID: 40228358002** Collected: 06/11/21 10:20 Received: 06/12/21 08:15 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010 Pace Analytical Services - Green Bay								
Boron	**<3.0**	ug/L	10.0	3.0	1	06/15/21 05:31	06/16/21 02:16	7440-42-8	

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

ANALYTICAL RESULTS

Project: 25221067 ALLIANT-COLUMBIA
Pace Project No.: 40228358

Sample: MW 310 **Lab ID: 40228358003** Collected: 06/11/21 10:30 Received: 06/12/21 08:15 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Field Data	Analytical Method: Pace Analytical Services - Green Bay								
Field pH	**7.73**	Std. Units			1		06/11/21 10:30		
Field Specific Conductance	**1192**	umhos/cm			1		06/11/21 10:30		
Oxygen, Dissolved	**11.21**	mg/L			1		06/11/21 10:30	7782-44-7	
REDOX	**55.6**	mV			1		06/11/21 10:30		
Turbidity	**0.67**	NTU			1		06/11/21 10:30		
Static Water Level	**784.05**	feet			1		06/11/21 10:30		
Temperature, Water (C)	**12.8**	deg C			1		06/11/21 10:30		
300.0 IC Anions	Analytical Method: EPA 300.0 Pace Analytical Services - Green Bay								
Chloride	**220**	mg/L	20.0	4.3	10		06/18/21 17:50	16887-00-6	

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

ANALYTICAL RESULTS

Project: 25221067 ALLIANT-COLUMBIA
Pace Project No.: 40228358

Sample: FIELD BLANK **Lab ID: 40228358004** Collected: 06/11/21 10:30 Received: 06/12/21 08:15 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
300.0 IC Anions	Analytical Method: EPA 300.0 Pace Analytical Services - Green Bay								
Chloride	**<0.43**	mg/L	2.0	0.43	1		06/17/21 14:36	16887-00-6	

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

QUALITY CONTROL DATA

Project: 25221067 ALLIANT-COLUMBIA
Pace Project No.: 40228358

QC Batch: 387893
QC Batch Method: EPA 3010
Analysis Method: EPA 6020
Analysis Description: 6020 MET
Laboratory: Pace Analytical Services - Green Bay
Associated Lab Samples: 40228358001, 40228358002

METHOD BLANK: 2237867 Matrix: Water
Associated Lab Samples: 40228358001, 40228358002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Boron	ug/L	<3.0	10.0	06/16/21 02:09	

LABORATORY CONTROL SAMPLE: 2237868

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Boron	ug/L	500	443	89	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2237869 2237870

Parameter	Units	40228358001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Boron	ug/L	49.9	500	500	472	457	84	81	75-125	3	20	

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

Pace Analytical
www.pacelabs.com

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

QUALITY CONTROL DATA

Project: 25221067 ALLIANT-COLUMBIA
Pace Project No.: 40228358

QC Batch: 387994
QC Batch Method: EPA 300.0
Analysis Method: EPA 300.0
Analysis Description: 300.0 IC Anions
Laboratory: Pace Analytical Services - Green Bay
Associated Lab Samples: 40228358003, 40228358004

METHOD BLANK: 2238231 Matrix: Water
Associated Lab Samples: 40228358003, 40228358004

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chloride	mg/L	<0.43	2.0	06/17/21 10:38	

LABORATORY CONTROL SAMPLE: 2238232

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	20	20.2	101	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2238233 2238234

Parameter	Units	40228358003 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	220	200	200	435	435	107	107	90-110	0	15	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2238235 2238236

Parameter	Units	40228315008 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	39.8J	1000	1000	1090	1100	105	106	90-110	0	15	

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

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

QUALIFIERS

Project:	25221067 ALLIANT-COLUMBIA
Pace Project No.:	40228358

DEFINITIONS

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

ND - Not Detected at or above LOD.

J - Estimated concentration at or above the LOD and below the LOQ.

LOD - Limit of Detection adjusted for dilution factor, percent moisture, initial weight and final volume.

LOQ - Limit of Quantitation adjusted for dilution factor, percent moisture, initial weight and final volume.

S - Surrogate

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

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

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected at or above the adjusted LOD.

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

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

TNI - The NELAC Institute.

Pace Analytical www.pacelabs.com

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 25221067 ALLIANT-COLUMBIA
Pace Project No.: 40228358

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
40228358001	**MW 309**	EPA 3010	387893	EPA 6020	387967
40228358002	**FIELD BLANK**	EPA 3010	387893	EPA 6020	387967
40228358001	**MW 309**				
40228358003	**MW 310**				
40228358003	**MW 310**	EPA 300.0	387994		
40228358004	**FIELD BLANK**	EPA 300.0	387994		

UPPER MIDWEST REGION
MN: 612-607-1700 WI: 920-469-2436

Pace Analytical®
www.pacelabs.com

CHAIN OF COUNTY

40228358

(Please Print Clearly)

Company Name:	SCS
Branch/Location:	Madison, WI
Project Contact:	Meg Blodgett
Phone:	(608) 216-7362
Project Number:	25221067
Project Name:	Alliant - Columbia
Project State:	WI
Sampled By (Print):	Paul A. Groover
Sampled By (Sign):	Paul A. Groover
PO #:	
Regulatory Program:	

*Preservation Codes
A=None B=HCL C=H2SO4 D=HNO3 E=DI Water F=Methanol G=NaOH
H=Sodium Bisulfate Solution I=Sodium Thiosulfate J=Other

Quote #:	
Mail To Contact:	
Mail To Company:	
Mail To Address:	
Invoice To Contact:	
Invoice To Company:	
Invoice To Address:	
Invoice To Phone:	

Data Package Options (billable)
☐ EPA Level III
☐ EPA Level IV

MS/MSD
☐ On your sample (billable)
☐ NOT needed on your sample

Matrix Codes
A = Air, B = Biota, C = Charcoal, O = Oil, S = Soil, Sl = Sludge
W = Water, DW = Drinking Water, GW = Ground Water, SW = Surface Water, WW = Waste Water, WP = Wipe

PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX	FILTERED? (YES/NO) Y/N	Boron (No / D)	Cloride (No / A)	CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)	Profile #
					PRESERVATION (CODE)* Pick Letter	D	A			
001	MW309	6-11-21	10:10	GW		X				
002	Field Blank	↓	10:20	DI		X				
003	MW 310		10:30	GW			X			
004	Field Blank	↓	10:30	DI			X			

Rush Turnaround Time Requested - Prelims
(Rush TAT subject to approval/surcharge)
Date Needed:

Transmit Prelim Rush Results by (complete what you want):

Email #1:	
Email #2:	
Telephone:	
Fax:	

Samples on HOLD are subject to special pricing and release of liability

Relinquished By:	Date/Time:	Received By:	Date/Time:
Paul A. Groover	6/11/21 16:00		
CS logistics	6.12.21 8:15	[signature] Pace	6.12.21 8:15

PACE Project No. 40228358

Receipt Temp = 5 °C

Sample Receipt pH: OK / Adjusted

Cooler Custody Seal: Present / Not Present
Intact / Not Intact

Version 6.0 06/14/06

ORIGINAL

C019a(27Jun2006)

Sample Preservation Receipt Form

Pace Analytical Services, LLC
1241 Bellevue Street, Suite 9
Green Bay, WI 54302

Client Name: SCS

Project # 40228358

All containers needing preservation have been checked and noted below: ☒Yes ☐No ☐N/A

Lab Lot# of pH paper: 10D3601

Lab Std #ID of preservation (if pH adjusted):

Initial when completed: EL

Date/ Time:

Pace Lab #	Glass								Plastic					Vials						Jars				General			VOA Vials (>6mm) *	H2SO4 pH ≤2	NaOH+Zn Act pH ≥9	NaOH pH ≥12	HNO3 pH ≤2	pH after adjusted	Volume (mL)
	AG1U	BG1U	AG1H	AG4S	AG4U	AG5U	AG2S	BG3U	BP1U	BP3U	BP3B	BP3N	BP3S	VG9A	DG9T	VG9U	VG9H	VG9M	VG9D	JGFU	JG9U	WGFU	WPFU	SP5T	ZPLC	GN							
001												I																			X		2.5 / 5 / 10
002												I																			X		2.5 / 5 / 10
003										I																							2.5 / 5 / 10
004										I																							2.5 / 5 / 10
005																																	2.5 / 5 / 10
006																																	2.5 / 5 / 10
007																																	2.5 / 5 / 10
008																																	2.5 / 5 / 10
009																																	2.5 / 5 / 10
010																																	2.5 / 5 / 10
011																																	2.5 / 5 / 10
012																																	2.5 / 5 / 10
013																																	2.5 / 5 / 10
014																																	2.5 / 5 / 10
015																																	2.5 / 5 / 10
016																																	2.5 / 5 / 10
017																																	2.5 / 5 / 10
018																																	2.5 / 5 / 10
019																																	2.5 / 5 / 10
020																																	2.5 / 5 / 10

6.12.21 EL

Exceptions to preservation check: VOA, Coliform, TOC, TOX, TOH, O&G, WI DRO, Phenolics, Other:__________ Headspace in VOA Vials (>6mm) : ☐Yes ☐No ☒N/A ***If yes look in headspace column**

AG1U	1 liter amber glass	**BP1U**	1 liter plastic unpres	**VG9A**	40 mL clear ascorbic	**JGFU**	4 oz amber jar unpres
BG1U	1 liter clear glass	**BP3U**	250 mL plastic unpres	**DG9T**	40 mL amber Na Thio	**JG9U**	9 oz amber jar unpres
AG1H	1 liter amber glass HCL	**BP3B**	250 mL plastic NaOH	**VG9U**	40 mL clear vial unpres	**WGFU**	4 oz clear jar unpres
AG4S	125 mL amber glass H2SO4	**BP3N**	250 mL plastic HNO3	**VG9H**	40 mL clear vial HCL	**WPFU**	4 oz plastic jar unpres
AG4U	120 mL amber glass unpres	**BP3S**	250 mL plastic H2SO4	**VG9M**	40 mL clear vial MeOH	**SP5T**	120 mL plastic Na Thiosulfate
AG5U	100 mL amber glass unpres			**VG9D**	40 mL clear vial DI	**ZPLC**	ziploc bag
AG2S	500 mL amber glass H2SO4					**GN**	
BG3U	250 mL clear glass unpres						

Pace Analytical® 1241 Bellevue Street, Green Bay, WI 54302	Document Name: **Sample Condition Upon Receipt (SCUR)**	Document Revised: 26Mar2020
	Document No.: **ENV-FRM-GBAY-0014-Rev.00**	Author: Pace Green Bay Quality Office

Sample Condition Upon Receipt Form (SCUR)

Project #:

WO# : 40228358

40228358

Client Name: SCS

Courier: ☒ CS Logistics ☐ Fed Ex ☐ Speedee ☐ UPS ☐ Waltco ☐ Client ☐ Pace Other:

Tracking #:

Custody Seal on Cooler/Box Present: ☒ yes ☐ no Seals intact: ☒ yes ☐ no

Custody Seal on Samples Present: ☐ yes ☒ no Seals intact: ☐ yes ☐ no

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

Thermometer Used SR - 102 **Type of Ice:** Wet Blue Dry None ☒ Samples on ice, cooling process has begun

Cooler Temperature Uncorr: 0 /Corr: .5

Temp Blank Present: ☒ yes ☐ no **Biological Tissue is Frozen:** ☐ yes ☐ no

Temp should be above freezing to 6°C.
Biota Samples may be received at ≤ 0°C if shipped on Dry Ice.

Person examining contents:
Date: 6-12-21 /Initials: EL
Labeled By Initials: ags

Chain of Custody Present:	☒ Yes ☐ No ☐ N/A	1.
Chain of Custody Filled Out:	☐ Yes ☒ No ☐ N/A	2. No pg#, No mail info or Invoice info EL 6.12.21
Chain of Custody Relinquished:	☒ Yes ☐ No ☐ N/A	3.
Sampler Name & Signature on COC:	☒ Yes ☐ No ☐ N/A	4.
Samples Arrived within Hold Time:	☒ Yes ☐ No	5.
- VOA Samples frozen upon receipt	☐ Yes ☐ No	Date/Time:
Short Hold Time Analysis (<72hr):	☐ Yes ☒ No	6.
Rush Turn Around Time Requested:	☐ Yes ☒ No	7.
Sufficient Volume: For Analysis: ☒ Yes ☐ No	MS/MSD: ☐ Yes ☒ No ☐ N/A	8.
Correct Containers Used:	☒ Yes ☐ No	9.
-Pace Containers Used:	☒ Yes ☐ No ☐ N/A	
-Pace IR Containers Used:	☐ Yes ☐ No ☒ N/A	
Containers Intact:	☒ Yes ☐ No	10.
Filtered volume received for Dissolved tests	☐ Yes ☐ No ☒ N/A	11.
Sample Labels match COC:	☒ Yes ☐ No ☐ N/A	12.
-Includes date/time/ID/Analysis Matrix: W		
Trip Blank Present:	☐ Yes ☐ No ☒ N/A	13.
Trip Blank Custody Seals Present	☐ Yes ☐ No ☒ N/A	
Pace Trip Blank Lot # (if purchased):		

Client Notification/ Resolution: If checked, see attached form for additional comments ☐

Person Contacted: Date/Time:

Comments/ Resolution:

PM Review is documented electronically in LIMs. By releasing the project, the PM acknowledges they have reviewed the sample logi

Page 2 of 2

C3 October 2021 Detection Monitoring

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

November 02, 2021

Meghan Blodgett
SCS ENGINEERS
2830 Dairy Drive
Madison, WI 53718

RE: Project: 25219067 COLUMBIA CCR MOD 4
Pace Project No.: 40235318

Dear Meghan Blodgett:

Enclosed are the analytical results for sample(s) received by the laboratory on October 16, 2021. The results relate only to the samples included in this report. Results reported herein conform to the applicable TNI/NELAC Standards and the laboratory's Quality Manual, where applicable, unless otherwise noted in the body of the report.

The test results provided in this final report were generated by each of the following laboratories within the Pace Network:
- Pace Analytical Services - Green Bay

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

Sincerely,

Dan Milewsky
dan.milewsky@pacelabs.com
(920)469-2436
Project Manager

Enclosures

cc: Sherren Clark, SCS Engineers
Tom Karwoski, SCS ENGINEERS
Nicole Kron, SCS ENGINEERS
Jeff Maxted, ALLIANT ENERGY
Marc Morandi, ALLIANT ENERGY

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

CERTIFICATIONS

Project:	25219067 COLUMBIA CCR MOD 4
Pace Project No.:	40235318

Pace Analytical Services Green Bay

1241 Bellevue Street, Green Bay, WI 54302
Florida/NELAP Certification #: E87948
Illinois Certification #: 200050
Kentucky UST Certification #: 82
Louisiana Certification #: 04168
Minnesota Certification #: 055-999-334
New York Certification #: 12064
North Dakota Certification #: R-150
Virginia VELAP ID: 460263
South Carolina Certification #: 83006001
Texas Certification #: T104704529-14-1
Wisconsin Certification #: 405132750
Wisconsin DATCP Certification #: 105-444
USDA Soil Permit #: P330-16-00157
Federal Fish & Wildlife Permit #: LE51774A-0

Pace Analytical
www.pacelabs.com

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

SAMPLE SUMMARY

Project: 25219067 COLUMBIA CCR MOD 4
Pace Project No.: 40235318

Lab ID	Sample ID	Matrix	Date Collected	Date Received
40235318001	**MW-309**	Water	10/14/21 14:15	10/16/21 08:35
40235318002	**MW-310**	Water	10/14/21 12:45	10/16/21 08:35
40235318003	**MW-311**	Water	10/14/21 11:40	10/16/21 08:35
40235318004	**FIELD BLANK MOD4**	Water	10/14/21 12:45	10/16/21 08:35

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

SAMPLE ANALYTE COUNT

Project: 25219067 COLUMBIA CCR MOD 4
Pace Project No.: 40235318

Lab ID	Sample ID	Method	Analysts	Analytes Reported
40235318001	**MW-309**	EPA 6020B	KXS	2
			MEA	7
		SM 2540C	HNT	1
		EPA 9040	ALY	1
		EPA 300.0	HMB	3
40235318002	**MW-310**	EPA 6020B	KXS	2
			MEA	7
		SM 2540C	HNT	1
		EPA 9040	ALY	1
		EPA 300.0	HMB	3
40235318003	**MW-311**	EPA 6020B	KXS	2
			MEA	7
		SM 2540C	HNT	1
		EPA 9040	ALY	1
		EPA 300.0	HMB	3
40235318004	**FIELD BLANK MOD4**	EPA 6020B	KXS	2
		SM 2540C	HNT	1
		EPA 9040	ALY	1
		EPA 300.0	HMB	3

PASI-G = Pace Analytical Services - Green Bay

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

ANALYTICAL RESULTS

Project: 25219067 COLUMBIA CCR MOD 4
Pace Project No.: 40235318

Sample: MW-309 **Lab ID: 40235318001** Collected: 10/14/21 14:15 Received: 10/16/21 08:35 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020B MET ICPMS	Analytical Method: EPA 6020B Preparation Method: EPA 3010A Pace Analytical Services - Green Bay								
Boron	**42.9**	ug/L	10.0	3.0	1	10/20/21 06:24	10/26/21 16:34	7440-42-8	
Calcium	**83100**	ug/L	254	76.2	1	10/20/21 06:24	10/26/21 16:34	7440-70-2	
Field Data	Analytical Method: Pace Analytical Services - Green Bay								
Field pH	**7.64**	Std. Units			1		10/14/21 14:15		
Field Specific Conductance	**2079**	umhos/cm			1		10/14/21 14:15		
Oxygen, Dissolved	**9.27**	mg/L			1		10/14/21 14:15	7782-44-7	
REDOX	**85.8**	mV			1		10/14/21 14:15		
Turbidity	**9.06**	NTU			1		10/14/21 14:15		
Static Water Level	**783.65**	feet			1		10/14/21 14:15		
Temperature, Water (C)	**13.2**	deg C			1		10/14/21 14:15		
2540C Total Dissolved Solids	Analytical Method: SM 2540C Pace Analytical Services - Green Bay								
Total Dissolved Solids	**1110**	mg/L	20.0	8.7	1		10/19/21 13:33		
9040 pH	Analytical Method: EPA 9040 Pace Analytical Services - Green Bay								
pH at 25 Degrees C	**7.8**	Std. Units	0.10	0.010	1		10/21/21 11:16		H6
300.0 IC Anions	Analytical Method: EPA 300.0 Pace Analytical Services - Green Bay								
Chloride	**519**	mg/L	20.0	4.3	10		10/25/21 18:59	16887-00-6	
Fluoride	**<0.095**	mg/L	0.32	0.095	1		10/25/21 17:47	16984-48-8	
Sulfate	**27.7**	mg/L	2.0	0.44	1		10/25/21 17:47	14808-79-8	

Pace Analytical
www.pacelabs.com

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

ANALYTICAL RESULTS

Project: 25219067 COLUMBIA CCR MOD 4
Pace Project No.: 40235318

Sample: MW-310 **Lab ID: 40235318002** Collected: 10/14/21 12:45 Received: 10/16/21 08:35 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020B MET ICPMS	Analytical Method: EPA 6020B Preparation Method: EPA 3010A Pace Analytical Services - Green Bay								
Boron	**72.0**	ug/L	10.0	3.0	1	10/20/21 06:24	10/26/21 16:41	7440-42-8	
Calcium	**38900**	ug/L	254	76.2	1	10/20/21 06:24	10/26/21 16:41	7440-70-2	
Field Data	Analytical Method: Pace Analytical Services - Green Bay								
Field pH	**7.70**	Std. Units			1		10/14/21 12:45		
Field Specific Conductance	**884**	umhos/cm			1		10/14/21 12:45		
Oxygen, Dissolved	**9.29**	mg/L			1		10/14/21 12:45	7782-44-7	
REDOX	**85.2**	mV			1		10/14/21 12:45		
Turbidity	**3.16**	NTU			1		10/14/21 12:45		
Static Water Level	**783.48**	feet			1		10/14/21 12:45		
Temperature, Water (C)	**13.4**	deg C			1		10/14/21 12:45		
2540C Total Dissolved Solids	Analytical Method: SM 2540C Pace Analytical Services - Green Bay								
Total Dissolved Solids	**498**	mg/L	20.0	8.7	1		10/19/21 13:33		
9040 pH	Analytical Method: EPA 9040 Pace Analytical Services - Green Bay								
pH at 25 Degrees C	**8.0**	Std. Units	0.10	0.010	1		10/21/21 11:18		H6
300.0 IC Anions	Analytical Method: EPA 300.0 Pace Analytical Services - Green Bay								
Chloride	**84.6**	mg/L	20.0	4.3	10		10/25/21 19:14	16887-00-6	
Fluoride	**<0.095**	mg/L	0.32	0.095	1		10/25/21 18:02	16984-48-8	
Sulfate	**54.3**	mg/L	2.0	0.44	1		10/25/21 18:02	14808-79-8	

Pace Analytical®
www.pacelabs.com

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

ANALYTICAL RESULTS

Project: 25219067 COLUMBIA CCR MOD 4
Pace Project No.: 40235318

Sample: MW-311 **Lab ID: 40235318003** Collected: 10/14/21 11:40 Received: 10/16/21 08:35 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020B MET ICPMS	Analytical Method: EPA 6020B Preparation Method: EPA 3010A Pace Analytical Services - Green Bay								
Boron	**31.7**	ug/L	10.0	3.0	1	10/20/21 06:24	10/26/21 16:48	7440-42-8	
Calcium	**61000**	ug/L	254	76.2	1	10/20/21 06:24	10/26/21 16:48	7440-70-2	
Field Data	Analytical Method: Pace Analytical Services - Green Bay								
Field pH	**7.45**	Std. Units			1		10/14/21 11:40		
Field Specific Conductance	**493.5**	umhos/cm			1		10/14/21 11:40		
Oxygen, Dissolved	**9.42**	mg/L			1		10/14/21 11:40	7782-44-7	
REDOX	**90.7**	mV			1		10/14/21 11:40		
Turbidity	**4.26**	NTU			1		10/14/21 11:40		
Static Water Level	**783.48**	feet			1		10/14/21 11:40		
Temperature, Water (C)	**12.8**	deg C			1		10/14/21 11:40		
2540C Total Dissolved Solids	Analytical Method: SM 2540C Pace Analytical Services - Green Bay								
Total Dissolved Solids	**276**	mg/L	20.0	8.7	1		10/19/21 13:34		
9040 pH	Analytical Method: EPA 9040 Pace Analytical Services - Green Bay								
pH at 25 Degrees C	**7.9**	Std. Units	0.10	0.010	1		10/21/21 11:19		H6
300.0 IC Anions	Analytical Method: EPA 300.0 Pace Analytical Services - Green Bay								
Chloride	**1.3J**	mg/L	2.0	0.43	1		10/25/21 18:16	16887-00-6	
Fluoride	**<0.095**	mg/L	0.32	0.095	1		10/25/21 18:16	16984-48-8	
Sulfate	**14.2**	mg/L	2.0	0.44	1		10/25/21 18:16	14808-79-8	

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

ANALYTICAL RESULTS

Project: 25219067 COLUMBIA CCR MOD 4

Pace Project No.: 40235318

Sample: FIELD BLANK MOD4 **Lab ID: 40235318004** Collected: 10/14/21 12:45 Received: 10/16/21 08:35 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020B MET ICPMS	Analytical Method: EPA 6020B Preparation Method: EPA 3010A								
	Pace Analytical Services - Green Bay								
Boron	**<3.0**	ug/L	10.0	3.0	1	10/20/21 06:24	10/26/21 13:52	7440-42-8	
Calcium	**<76.2**	ug/L	254	76.2	1	10/20/21 06:24	10/26/21 13:52	7440-70-2	
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
	Pace Analytical Services - Green Bay								
Total Dissolved Solids	**<8.7**	mg/L	20.0	8.7	1		10/19/21 13:34		
9040 pH	Analytical Method: EPA 9040								
	Pace Analytical Services - Green Bay								
pH at 25 Degrees C	**8.8**	Std. Units	0.10	0.010	1		10/21/21 11:20		H6
300.0 IC Anions	Analytical Method: EPA 300.0								
	Pace Analytical Services - Green Bay								
Chloride	**<0.43**	mg/L	2.0	0.43	1		11/01/21 13:51	16887-00-6	
Fluoride	**<0.095**	mg/L	0.32	0.095	1		11/01/21 13:51	16984-48-8	
Sulfate	**<0.44**	mg/L	2.0	0.44	1		11/01/21 13:51	14808-79-8	

Pace Analytical www.pacelabs.com

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

QUALITY CONTROL DATA

Project: 25219067 COLUMBIA CCR MOD 4
Pace Project No.: 40235318

QC Batch: 399050 | Analysis Method: EPA 6020B
QC Batch Method: EPA 3010A | Analysis Description: 6020B MET
Laboratory: Pace Analytical Services - Green Bay
Associated Lab Samples: 40235318001, 40235318002, 40235318003, 40235318004

METHOD BLANK: 2304130 Matrix: Water
Associated Lab Samples: 40235318001, 40235318002, 40235318003, 40235318004

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Boron	ug/L	<3.0	10.0	10/26/21 13:37	
Calcium	ug/L	<76.2	254	10/26/21 13:37	

LABORATORY CONTROL SAMPLE: 2304131

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Boron	ug/L	250	243	97	80-120	
Calcium	ug/L	10000	10000	100	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2304132 2304133

Parameter	Units	40235317001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Boron	ug/L	31.4	250	250	273	277	97	98	75-125	1	20	
Calcium	ug/L	67800	10000	10000	77700	80700	100	129	75-125	4	20	P6

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

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

QUALITY CONTROL DATA

Project: 25219067 COLUMBIA CCR MOD 4
Pace Project No.: 40235318

QC Batch: 398939
QC Batch Method: SM 2540C
Analysis Method: SM 2540C
Analysis Description: 2540C Total Dissolved Solids
Laboratory: Pace Analytical Services - Green Bay
Associated Lab Samples: 40235318001, 40235318002, 40235318003, 40235318004

METHOD BLANK: 2303507 Matrix: Water
Associated Lab Samples: 40235318001, 40235318002, 40235318003, 40235318004

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	<8.7	20.0	10/19/21 13:29	

LABORATORY CONTROL SAMPLE: 2303508

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Dissolved Solids	mg/L	575	566	98	80-120	

SAMPLE DUPLICATE: 2303509

Parameter	Units	40235220001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	248	272	9	10	

SAMPLE DUPLICATE: 2303510

Parameter	Units	40235316003 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	374	390	4	10	

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

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

QUALITY CONTROL DATA

Project: 25219067 COLUMBIA CCR MOD 4
Pace Project No.: 40235318

QC Batch: 399227 | Analysis Method: EPA 9040
QC Batch Method: EPA 9040 | Analysis Description: 9040 pH
Laboratory: Pace Analytical Services - Green Bay
Associated Lab Samples: 40235318001, 40235318002, 40235318003, 40235318004

SAMPLE DUPLICATE: 2304971

Parameter	Units	40235095010 Result	Dup Result	RPD	Max RPD	Qualifiers
pH at 25 Degrees C	Std. Units	7.8	7.8	0	20	H6

SAMPLE DUPLICATE: 2304972

Parameter	Units	40235316004 Result	Dup Result	RPD	Max RPD	Qualifiers
pH at 25 Degrees C	Std. Units	7.8	7.8	1	20	H6

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

REPORT OF LABORATORY ANALYSIS

Pace Analytical®
www.pacelabs.com

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

QUALITY CONTROL DATA

Project: 25219067 COLUMBIA CCR MOD 4
Pace Project No.: 40235318

QC Batch: 399429
QC Batch Method: EPA 300.0
Analysis Method: EPA 300.0
Analysis Description: 300.0 IC Anions
Laboratory: Pace Analytical Services - Green Bay
Associated Lab Samples: 40235318001, 40235318002, 40235318003

METHOD BLANK: 2306433 Matrix: Water
Associated Lab Samples: 40235318001, 40235318002, 40235318003

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chloride	mg/L	<0.43	2.0	10/25/21 14:26	
Fluoride	mg/L	<0.095	0.32	10/25/21 14:26	
Sulfate	mg/L	<0.44	2.0	10/25/21 14:26	

LABORATORY CONTROL SAMPLE: 2306434

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	20	18.3	92	90-110	
Fluoride	mg/L	2	2.1	104	90-110	
Sulfate	mg/L	20	18.2	91	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2306435 2306436

Parameter	Units	10582635003 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	3.2	20	20	24.2	24.2	105	105	90-110	0	15	
Fluoride	mg/L	<0.095	2	2	2.1	2.1	101	100	90-110	0	15	
Sulfate	mg/L	3.2	20	20	24.0	23.8	104	103	90-110	1	15	

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

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

QUALITY CONTROL DATA

Project: 25219067 COLUMBIA CCR MOD 4
Pace Project No.: 40235318

QC Batch:	399901	Analysis Method:	EPA 300.0
QC Batch Method:	EPA 300.0	Analysis Description:	300.0 IC Anions
		Laboratory:	Pace Analytical Services - Green Bay

Associated Lab Samples: 40235318004

METHOD BLANK: 2309132 Matrix: Water

Associated Lab Samples: 40235318004

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chloride	mg/L	<0.43	2.0	10/30/21 10:42	
Fluoride	mg/L	<0.095	0.32	11/01/21 12:21	
Sulfate	mg/L	<0.44	2.0	10/30/21 10:42	

LABORATORY CONTROL SAMPLE: 2309133

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	20	21.3	107	90-110	
Fluoride	mg/L	2	2.0	102	90-110	
Sulfate	mg/L	20	21.2	106	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2309134 2309135

Parameter	Units	40235316004 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	1.9J	20	20	24.0	24.0	111	110	90-110	0	15	M0
Fluoride	mg/L	<0.095	2	2	2.2	2.2	111	111	90-110	0	15	M0
Sulfate	mg/L	56.1	100	100	164	163	108	107	90-110	1	15	

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

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

QUALIFIERS

Project: 25219067 COLUMBIA CCR MOD 4
Pace Project No.: 40235318

DEFINITIONS

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

ND - Not Detected at or above LOD.

J - Estimated concentration at or above the LOD and below the LOQ.

LOD - Limit of Detection adjusted for dilution factor, percent moisture, initial weight and final volume.

LOQ - Limit of Quantitation adjusted for dilution factor, percent moisture, initial weight and final volume.

S - Surrogate

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

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

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected at or above the adjusted LOD.

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

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

TNI - The NELAC Institute.

ANALYTE QUALIFIERS

H6	Analysis initiated outside of the 15 minute EPA required holding time.
M0	Matrix spike recovery and/or matrix spike duplicate recovery was outside laboratory control limits.
P6	Matrix spike recovery was outside laboratory control limits due to a parent sample concentration notably higher than the spike level.

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 25219067 COLUMBIA CCR MOD 4
Pace Project No.: 40235318

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
40235318001	**MW-309**	EPA 3010A	399050	EPA 6020B	399167
40235318002	**MW-310**	EPA 3010A	399050	EPA 6020B	399167
40235318003	**MW-311**	EPA 3010A	399050	EPA 6020B	399167
40235318004	**FIELD BLANK MOD4**	EPA 3010A	399050	EPA 6020B	399167
40235318001	**MW-309**				
40235318002	**MW-310**				
40235318003	**MW-311**				
40235318001	**MW-309**	SM 2540C	398939		
40235318002	**MW-310**	SM 2540C	398939		
40235318003	**MW-311**	SM 2540C	398939		
40235318004	**FIELD BLANK MOD4**	SM 2540C	398939		
40235318001	**MW-309**	EPA 9040	399227		
40235318002	**MW-310**	EPA 9040	399227		
40235318003	**MW-311**	EPA 9040	399227		
40235318004	**FIELD BLANK MOD4**	EPA 9040	399227		
40235318001	**MW-309**	EPA 300.0	399429		
40235318002	**MW-310**	EPA 300.0	399429		
40235318003	**MW-311**	EPA 300.0	399429		
40235318004	**FIELD BLANK MOD4**	EPA 300.0	399901		

Pace Analytical

CHAIN-OF-CUSTODY / Analytical Request Document

40235318

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

Page : 1 Of 1

Section A — Required Client Information:

Company:	SCS ENGINEERS
Address:	2830 Dairy Drive
	Madison, WI 53718
Email:	mblodgett@scsengineers.com
Phone:	608-216-7362
Fax:	
Requested Due Date:	

Section B — Required Project Information:

Report To:	Meghan Blodgett
Copy To:	
Purchase Order #:	
Project Name:	25219067 Columbia CCR Mod 4
Project #:	~~[illegible]~~ 25221067.00

Section C — Invoice Information:

Attention:	Meghan Blodgett
Company Name:	SCS Engineers
Address:	
Pace Quote:	
Pace Project Manager:	dan.milewsky@pacelabs.com,
Pace Profile #:	3946

Regulatory Agency

State / Location

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

SAMPLE ID — One Character per box. (A-Z, 0-9 / , -) Sample Ids must be unique

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED START DATE	START TIME	END DATE	END TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H2SO4	HNO3	HCl	NaOH	Na2S2O3	Methanol	Other	Analyses Test Y/N	Boron/Calcium	pH	TDS, Cl, F, SO4	Residual Chlorine (Y/N)	
1																							
2	MW-309	WT				10/14/21	1415			2		1							X	X	X		001
3	MW-310	WT				↓	1245			2		1							X	X	X		002
4	MW-311	WT				↓	1140			2		1							X	X	X		003
5	FIELD BLANK MOD4	WT				↓	1245			2		1							X	X	X		004
6																							
7																							
8																							
9																							
10																							
11																							
12																							

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	TEMP in C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)
ALL SAMPLES UNFILTERED		10/15/21	1530							
	CS Logistics	10/16/21	0835	Anthony Wendel	10/16/21	0835	.5	Y	N	Y

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER:

SIGNATURE of SAMPLER: DATE Signed:

Pace Container Order #865031

4023538

Addresses

	Order By :	Ship To :	Return To:
Company	SCS ENGINEERS	SCS ENGINEERS (Pace Analytical Green	Pace Analytical Green Bay
Contact	Blodgett, Meghan	Adam Watson	Milewsky, Dan
Email	mblodgett@scsengineers.com	awatson@scsengineers.com	dan.milewsky@pacelabs.com
Address	2830 Dairy Drive	2830 Dairy Drive	1241 Bellevue Street
Address 2			Suite 9
City	Madison	Madison	Green Bay
State	WI	WI	WI
Zip	53718	53718	54302
Phone	608-216-7362	608-216-7362	(920)469-2436

Info

Project Name 25219067 Columbia CCR Background

Due Date 10/08/2021

Profile 3946-12

Quote

Project Manager Milewsky, Dan

Return Date

Carrier Most Economical

Location

Trip Blanks

- [ ] Include Trip Blanks

Bottle Labels

- [ ] Blank
- [ ] Pre-Printed No Sample IDs
- [X] Pre-Printed With Sample IDs

Bottles

- [ ] Boxed Cases
- [ ] Individually Wrapped
- [X] Grouped By Sample ID/Matrix

Return Shipping Labels

- [ ] No Shipper
- [ ] With Shipper

COC Options

- [ ] Number of Blanks
- [X] Pre-Printed

Misc

- [ ] Sampling Instructions
- [ ] Custody Seal
- [X] Temp. Blanks
- [X] Coolers
- [ ] Syringes
- [ ] Extra Bubble Wrap
- [ ] Short Hold/Rush Stickers
- [ ] DI Water Liter(s)
- [ ] USDA Regulated Soils

# of Samples	Matrix	Test	Container	Total	# of	Lot #	Notes
2	WT	Radium 226	1L Plastic HNO3 pres	2	0		
2	WT	Radium 228	1L Plastic HNO3 pres	2	0		
2	WT	Metals	250mL plastic w/HNO3	2	0	M-1-106-03BB	
2	WT	pH	250mL plastic unpres	2	0	M-1-203-03BB	
2	WT	TDS, Cl, F, SO4	250mL plastic unpres	2	0	M-1-203-03BB	

Hazard Shipping Placard In Place : NA

- Sample receiving hours are typically 8am-5pm, but may differ by location. Please check with your Pace Project Manager.
- Pace Analytical reserves the right to return hazardous, toxic, or radioactive samples to you.
- Pace Analytical reserves the right to charge for unused bottles, as well as cost associated with sample storage/disposal.
- Payment term are net 30 days.
- Please include the proposal number on the chain of custody to insure proper billing.

LAB USE:

Ship Date : 10/07/2021

Prepared By: Mai Yer Her

Verified By:

Sample

Full List Metals = B, Ca, Sb, As, Ba, Be, Cd, Cr, Co, Pb, Li Hg, Mo, Se, Tl
ALL SAMPLES UNFILTERED

CLIENT USE (Optional):

Date Rec'd:

Received By:

Verified By:

F-ALL-C-009-rev.00. 19Dec2016

Sample Preservation Receipt Form

Pace Analytical Services, LLC
1241 Bellevue Street, Suite 9
Green Bay, WI 54302

Client Name: SCS Engineers

Project # 40235318

All containers needing preservation have been checked and noted below: ☒Yes ☐No ☐N/A

Lab Lot# of pH paper: 1003604 Lab Std #ID of preservation (if pH adjusted):

Initial when completed: AL Date/ Time:

Pace Lab #	Glass: AG1U	AG1H	BG1U	AG4S	AG4U	AG5U	AG2S	BG3U	Plastic: BP1U	BP3U	BP3B	BP3N	BP3S	Vials: VG9A	DG9T	VG9U	VG9H	VG9M	VG9D	Jars: JGFU	JG9U	WGFU	WPFU	General: SP5T	ZPLC	GN	VOA Vials (>6mm) *	H2SO4 pH ≤2	NaOH+Zn Act pH ≥9	NaOH pH ≥12	HNO3 pH ≤2	pH after adjusted	Volume (mL)
001										2		1																			X		2.5 / 5 / 10
002										2		1																			X		2.5 / 5 / 10
003										2		1																			X		2.5 / 5 / 10
004										2		1																			X		2.5 / 5 / 10
005																																	2.5 / 5 / 10
006																																	2.5 / 5 / 10
007																																	2.5 / 5 / 10
008																																	2.5 / 5 / 10
009																																	2.5 / 5 / 10
010																																	2.5 / 5 / 10
011																																	2.5 / 5 / 10
012																																	2.5 / 5 / 10
013																																	2.5 / 5 / 10
014																																	2.5 / 5 / 10
015																																	2.5 / 5 / 10
016																																	2.5 / 5 / 10
017																																	2.5 / 5 / 10
018																																	2.5 / 5 / 10
019																																	2.5 / 5 / 10
020																																	2.5 / 5 / 10

10/16/21 AL

Exceptions to preservation check: VOA, Coliform, TOC, TOX, TOH, O&G, WI DRO, Phenolics, Other:______ Headspace in VOA Vials (>6mm) : ☐Yes ☐No ☒N/A *If yes look in headspace column

Code	Description
AG1U	1 liter amber glass
BG1U	1 liter clear glass
AG1H	1 liter amber glass HCL
AG4S	125 mL amber glass H2SO4
AG4U	120 mL amber glass unpres
AG5U	100 mL amber glass unpres
AG2S	500 mL amber glass H2SO4
BG3U	250 mL clear glass unpres
BP1U	1 liter plastic unpres
BP3U	250 mL plastic unpres
BP3B	250 mL plastic NaOH
BP3N	250 mL plastic HNO3
BP3S	250 mL plastic H2SO4
VG9A	40 mL clear ascorbic
DG9T	40 mL amber Na Thio
VG9U	40 mL clear vial unpres
VG9H	40 mL clear vial HCL
VG9M	40 mL clear vial MeOH
VG9D	40 mL clear vial DI
JGFU	4 oz amber jar unpres
JG9U	9 oz amber jar unpres
WGFU	4 oz clear jar unpres
WPFU	4 oz plastic jar unpres
SP5T	120 mL plastic Na Thiosulfate
ZPLC	ziploc bag
GN	

Pace Analytical® 1241 Bellevue Street, Green Bay, WI 54302	Document Name: **Sample Condition Upon Receipt (SCUR)**	Document Revised: 26Mar2020
	Document No.: **ENV-FRM-GBAY-0014-Rev.00**	Author: Pace Green Bay Quality Office

Sample Condition Upon Receipt Form (SCUR)

Project #:

WO# : 40235318

40235318

Client Name: SCS Engineers

Courier: ☒ CS Logistics ☐ Fed Ex ☐ Speedee ☐ UPS ☐ Waltco ☐ Client ☐ Pace Other:

Tracking #: —

Custody Seal on Cooler/Box Present: ☐ yes ☒ no Seals intact: ☐ yes ☐ no

Custody Seal on Samples Present: ☐ yes ☒ no Seals intact: ☐ yes ☐ no

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

Thermometer Used SR - 107 **Type of Ice:** Wet Blue Dry None ☒ Samples on ice, cooling process has begun

Cooler Temperature Uncorr: 5 /Corr: 5

Temp Blank Present: ☐ yes ☒ no **Biological Tissue is Frozen:** ☐ yes ☐ no

Temp should be above freezing to 6°C.
Biota Samples may be received at ≤ 0°C if shipped on Dry Ice.

Person examining contents:
Date: 10/16/21 **/Initials:** A2
Labeled By Initials: AP

Chain of Custody Present:	☒Yes ☐No ☐N/A	1.
Chain of Custody Filled Out:	☐Yes ☒No ☐N/A	2. filt. 10/16/21 A2
Chain of Custody Relinquished:	☐Yes ☒No ☐N/A	3. does have date/time 10/16/21 A2
Sampler Name & Signature on COC:	☐Yes ☒No ☐N/A	4.
Samples Arrived within Hold Time:	☒Yes ☐No	5.
- VOA Samples frozen upon receipt	☐Yes ☐No	Date/Time:
Short Hold Time Analysis (<72hr):	☐Yes ☒No	6.
Rush Turn Around Time Requested:	☐Yes ☒No	7.
Sufficient Volume:		8.
For Analysis: ☒Yes ☐No	MS/MSD: ☐Yes ☒No ☐N/A	
Correct Containers Used:	☒Yes ☐No	9.
-Pace Containers Used:	☒Yes ☐No ☐N/A	
-Pace IR Containers Used:	☐Yes ☐No ☒N/A	
Containers Intact:	☒Yes ☐No	10.
Filtered volume received for Dissolved tests	☐Yes ☐No ☒N/A	11.
Sample Labels match COC:	☒Yes ☐No ☐N/A	12.
-Includes date/time/ID/Analysis Matrix: W		
Trip Blank Present:	☐Yes ☐No ☒N/A	13.
Trip Blank Custody Seals Present	☐Yes ☐No ☒N/A	
Pace Trip Blank Lot # (if purchased):		

Client Notification/ Resolution: If checked, see attached form for additional comments ☐

Person Contacted: Date/Time:

Comments/ Resolution:

PM Review is documented electronically in LIMs. By releasing the project, the PM acknowledges they have reviewed the sample logir

Page 2 of 2

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

December 08, 2021

Meghan Blodgett
SCS ENGINEERS
2830 Dairy Drive
Madison, WI 53718

RE: Project: 25219067 COLUMBIA CCR BACKGRND
Pace Project No.: 40235317

Dear Meghan Blodgett:

Enclosed are the analytical results for sample(s) received by the laboratory on October 16, 2021. The results relate only to the samples included in this report. Results reported herein conform to the applicable TNI/NELAC Standards and the laboratory's Quality Manual, where applicable, unless otherwise noted in the body of the report.

The test results provided in this final report were generated by each of the following laboratories within the Pace Network:

- Pace Analytical Services - Green Bay
- Pace Analytical Services - Greensburg

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

Sincerely,

Dan Milewsky
dan.milewsky@pacelabs.com
(920)469-2436
Project Manager

Enclosures

cc: Sherren Clark, SCS Engineers
Tom Karwoski, SCS ENGINEERS
Nicole Kron, SCS ENGINEERS
Ryan Matzuk, SCS Engineers
Jeff Maxted, ALLIANT ENERGY
Marc Morandi, ALLIANT ENERGY

CERTIFICATIONS

Project:	25219067 COLUMBIA CCR BACKGRND
Pace Project No.:	40235317

Pace Analytical Services Pennsylvania

1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601
ANAB DOD-ELAP Rad Accreditation #: L2417
Alabama Certification #: 41590
Arizona Certification #: AZ0734
Arkansas Certification
California Certification #: 04222CA
Colorado Certification #: PA01547
Connecticut Certification #: PH-0694
Delaware Certification
EPA Region 4 DW Rad
Florida/TNI Certification #: E87683
Georgia Certification #: C040
Florida: Cert E871149 SEKS WET
Guam Certification
Hawaii Certification
Idaho Certification
Illinois Certification
Indiana Certification
Iowa Certification #: 391
Kansas/TNI Certification #: E-10358
Kentucky Certification #: KY90133
KY WW Permit #: KY0098221
KY WW Permit #: KY0000221
Louisiana DHH/TNI Certification #: LA180012
Louisiana DEQ/TNI Certification #: 4086
Maine Certification #: 2017020
Maryland Certification #: 308
Massachusetts Certification #: M-PA1457
Michigan/PADEP Certification #: 9991
Missouri Certification #: 235
Montana Certification #: Cert0082
Nebraska Certification #: NE-OS-29-14
Nevada Certification #: PA014572018-1
New Hampshire/TNI Certification #: 297617
New Jersey/TNI Certification #: PA051
New Mexico Certification #: PA01457
New York/TNI Certification #: 10888
North Carolina Certification #: 42706
North Dakota Certification #: R-190
Ohio EPA Rad Approval: #41249
Oregon/TNI Certification #: PA200002-010
Pennsylvania/TNI Certification #: 65-00282
Puerto Rico Certification #: PA01457
Rhode Island Certification #: 65-00282
South Dakota Certification
Tennessee Certification #: 02867
Texas/TNI Certification #: T104704188-17-3
Utah/TNI Certification #: PA014572017-9
USDA Soil Permit #: P330-17-00091
Vermont Dept. of Health: ID# VT-0282
Virgin Island/PADEP Certification
Virginia/VELAP Certification #: 9526
Washington Certification #: C868
West Virginia DEP Certification #: 143
West Virginia DHHR Certification #: 9964C
Wisconsin Approve List for Rad
Wyoming Certification #: 8TMS-L

Pace Analytical Services Green Bay

1241 Bellevue Street, Green Bay, WI 54302
Florida/NELAP Certification #: E87948
Illinois Certification #: 200050
Kentucky UST Certification #: 82
Louisiana Certification #: 04168
Minnesota Certification #: 055-999-334
New York Certification #: 12064
North Dakota Certification #: R-150
Virginia VELAP ID: 460263
South Carolina Certification #: 83006001
Texas Certification #: T104704529-14-1
Wisconsin Certification #: 405132750
Wisconsin DATCP Certification #: 105-444
USDA Soil Permit #: P330-16-00157
Federal Fish & Wildlife Permit #: LE51774A-0

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

SAMPLE SUMMARY

Project: 25219067 COLUMBIA CCR BACKGRND
Pace Project No.: 40235317

Lab ID	Sample ID	Matrix	Date Collected	Date Received
40235317001	**MW-301**	Water	10/14/21 17:05	10/16/21 08:35
40235317002	**MW-84A**	Water	10/14/21 15:20	10/16/21 08:35

Pace Analytical
www.pacelabs.com

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

SAMPLE ANALYTE COUNT

Project: 25219067 COLUMBIA CCR BACKGRND
Pace Project No.: 40235317

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
40235317001	**MW-301**	EPA 6020B	KXS	15	PASI-G
		EPA 7470	AJT	1	PASI-G
			MEA	7	PASI-G
		EPA 903.1	SLC	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
		Total Radium Calculation	JAL	1	PASI-PA
		SM 2540C	HNT	1	PASI-G
		EPA 9040	ALY	1	PASI-G
		EPA 300.0	HMB	3	PASI-G
40235317002	**MW-84A**	EPA 6020B	KXS	15	PASI-G
		EPA 7470	AJT	1	PASI-G
			MEA	7	PASI-G
		EPA 903.1	SLC	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
		Total Radium Calculation	JAL	1	PASI-PA
		SM 2540C	HNT	1	PASI-G
		EPA 9040	ALY	1	PASI-G
		EPA 300.0	HMB	3	PASI-G

PASI-G = Pace Analytical Services - Green Bay
PASI-PA = Pace Analytical Services - Greensburg

Pace Analytical
www.pacelabs.com

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

ANALYTICAL RESULTS

Project: 25219067 COLUMBIA CCR BACKGRND
Pace Project No.: 40235317

Sample: MW-301 **Lab ID: 40235317001** Collected: 10/14/21 17:05 Received: 10/16/21 08:35 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020B MET ICPMS	Analytical Method: EPA 6020B Preparation Method: EPA 3010A Pace Analytical Services - Green Bay								
Lithium	**0.46J**	ug/L	1.0	0.22	1	10/20/21 06:24	10/26/21 14:44	7439-93-2	
Beryllium	**<0.25**	ug/L	1.0	0.25	1	10/20/21 06:24	10/26/21 14:44	7440-41-7	
Boron	**31.4**	ug/L	10.0	3.0	1	10/20/21 06:24	10/26/21 14:44	7440-42-8	
Calcium	**67800**	ug/L	254	76.2	1	10/20/21 06:24	10/26/21 14:44	7440-70-2	P6
Chromium	**<1.0**	ug/L	3.4	1.0	1	10/20/21 06:24	10/26/21 14:44	7440-47-3	
Cobalt	**0.34J**	ug/L	1.0	0.12	1	10/20/21 06:24	10/26/21 14:44	7440-48-4	
Arsenic	**0.35J**	ug/L	1.0	0.28	1	10/20/21 06:24	10/26/21 14:44	7440-38-2	
Selenium	**<0.32**	ug/L	1.1	0.32	1	10/20/21 06:24	10/26/21 14:44	7782-49-2	
Molybdenum	**<0.44**	ug/L	1.5	0.44	1	10/20/21 06:24	10/26/21 14:44	7439-98-7	
Cadmium	**<0.15**	ug/L	1.0	0.15	1	10/20/21 06:24	10/26/21 14:44	7440-43-9	
Antimony	**<0.15**	ug/L	1.0	0.15	1	10/20/21 06:24	10/26/21 14:44	7440-36-0	
Barium	**7.7**	ug/L	2.3	0.70	1	10/20/21 06:24	10/26/21 14:44	7440-39-3	
Mercury	**<0.093**	ug/L	0.31	0.093	1	10/20/21 06:24	10/26/21 14:44	7439-97-6	
Thallium	**0.17J**	ug/L	1.0	0.14	1	10/20/21 06:24	10/26/21 14:44	7440-28-0	
Lead	**<0.24**	ug/L	1.0	0.24	1	10/20/21 06:24	10/26/21 14:44	7439-92-1	
7470 Mercury	Analytical Method: EPA 7470 Preparation Method: EPA 7470 Pace Analytical Services - Green Bay								
Mercury	**<0.066**	ug/L	0.20	0.066	1	11/11/21 10:35	11/12/21 13:03	7439-97-6	H1,M0
Field Data	Analytical Method: Pace Analytical Services - Green Bay								
Field pH	**7.01**	Std. Units			1		10/14/21 17:05		
Field Specific Conductance	**597.2**	umhos/cm			1		10/14/21 17:05		
Oxygen, Dissolved	**0.25**	mg/L			1		10/14/21 17:05	7782-44-7	
REDOX	**57.8**	mV			1		10/14/21 17:05		
Turbidity	**3.21**	NTU			1		10/14/21 17:05		
Static Water Level	**785.28**	feet			1		10/14/21 17:05		
Temperature, Water (C)	**11.1**	deg C			1		10/14/21 17:05		
2540C Total Dissolved Solids	Analytical Method: SM 2540C Pace Analytical Services - Green Bay								
Total Dissolved Solids	**334**	mg/L	20.0	8.7	1		10/19/21 13:33		
9040 pH	Analytical Method: EPA 9040 Pace Analytical Services - Green Bay								
pH at 25 Degrees C	**7.3**	Std. Units	0.10	0.010	1		10/21/21 11:12		H6
300.0 IC Anions	Analytical Method: EPA 300.0 Pace Analytical Services - Green Bay								
Chloride	**2.7**	mg/L	2.0	0.43	1		11/09/21 02:59	16887-00-6	
Fluoride	**<0.095**	mg/L	0.32	0.095	1		11/09/21 02:59	16984-48-8	
Sulfate	**17.4**	mg/L	2.0	0.44	1		11/09/21 02:59	14808-79-8	

Pace Analytical
www.pacelabs.com

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

ANALYTICAL RESULTS

Project: 25219067 COLUMBIA CCR BACKGRND
Pace Project No.: 40235317

Sample: MW-84A **Lab ID: 40235317002** Collected: 10/14/21 15:20 Received: 10/16/21 08:35 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020B MET ICPMS	Analytical Method: EPA 6020B Preparation Method: EPA 3010A Pace Analytical Services - Green Bay								
Antimony	**<0.15**	ug/L	1.0	0.15	1	10/20/21 06:24	10/26/21 15:28	7440-36-0	
Arsenic	**0.41J**	ug/L	1.0	0.28	1	10/20/21 06:24	10/26/21 15:28	7440-38-2	
Barium	**12.9**	ug/L	2.3	0.70	1	10/20/21 06:24	10/26/21 15:28	7440-39-3	
Beryllium	**<0.25**	ug/L	1.0	0.25	1	10/20/21 06:24	10/26/21 15:28	7440-41-7	
Boron	**11.1**	ug/L	10.0	3.0	1	10/20/21 06:24	10/26/21 15:28	7440-42-8	
Cadmium	**<0.15**	ug/L	1.0	0.15	1	10/20/21 06:24	10/26/21 15:28	7440-43-9	
Calcium	**75300**	ug/L	254	76.2	1	10/20/21 06:24	10/26/21 15:28	7440-70-2	
Chromium	**1.9J**	ug/L	3.4	1.0	1	10/20/21 06:24	10/26/21 15:28	7440-47-3	
Cobalt	**0.12J**	ug/L	1.0	0.12	1	10/20/21 06:24	10/26/21 15:28	7440-48-4	
Lead	**<0.24**	ug/L	1.0	0.24	1	10/20/21 06:24	10/26/21 15:28	7439-92-1	
Lithium	**0.28J**	ug/L	1.0	0.22	1	10/20/21 06:24	10/26/21 15:28	7439-93-2	
Mercury	**<0.093**	ug/L	0.31	0.093	1	10/20/21 06:24	10/26/21 15:28	7439-97-6	
Molybdenum	**<0.44**	ug/L	1.5	0.44	1	10/20/21 06:24	10/26/21 15:28	7439-98-7	
Selenium	**<0.32**	ug/L	1.1	0.32	1	10/20/21 06:24	10/26/21 15:28	7782-49-2	
Thallium	**0.19J**	ug/L	1.0	0.14	1	10/20/21 06:24	10/26/21 15:28	7440-28-0	
7470 Mercury	Analytical Method: EPA 7470 Preparation Method: EPA 7470 Pace Analytical Services - Green Bay								
Mercury	**<0.066**	ug/L	0.20	0.066	1	11/11/21 10:35	11/12/21 13:10	7439-97-6	H1
Field Data	Analytical Method: Pace Analytical Services - Green Bay								
Field pH	**7.42**	Std. Units			1		10/14/21 15:20		
Field Specific Conductance	**598.9**	umhos/cm			1		10/14/21 15:20		
Oxygen, Dissolved	**9.25**	mg/L			1		10/14/21 15:20	7782-44-7	
REDOX	**89.7**	mV			1		10/14/21 15:20		
Turbidity	**3.41**	NTU			1		10/14/21 15:20		
Static Water Level	**784.96**	feet			1		10/14/21 15:20		
Temperature, Water (C)	**12.5**	deg C			1		10/14/21 15:20		
2540C Total Dissolved Solids	Analytical Method: SM 2540C Pace Analytical Services - Green Bay								
Total Dissolved Solids	**326**	mg/L	20.0	8.7	1		10/19/21 13:33		
9040 pH	Analytical Method: EPA 9040 Pace Analytical Services - Green Bay								
pH at 25 Degrees C	**7.8**	Std. Units	0.10	0.010	1		10/21/21 11:15		H6
300.0 IC Anions	Analytical Method: EPA 300.0 Pace Analytical Services - Green Bay								
Chloride	**3.5**	mg/L	2.0	0.43	1		11/09/21 03:56	16887-00-6	M0
Fluoride	**<0.095**	mg/L	0.32	0.095	1		11/09/21 03:56	16984-48-8	M0
Sulfate	**1.3J**	mg/L	2.0	0.44	1		11/09/21 03:56	14808-79-8	M0

Pace Analytical
www.pacelabs.com

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

QUALITY CONTROL DATA

Project: 25219067 COLUMBIA CCR BACKGRND
Pace Project No.: 40235317

QC Batch: 401437 | Analysis Method: EPA 7470
QC Batch Method: EPA 7470 | Analysis Description: 7470 Mercury
Laboratory: Pace Analytical Services - Green Bay
Associated Lab Samples: 40235317001, 40235317002

METHOD BLANK: 2317754 | Matrix: Water
Associated Lab Samples: 40235317001, 40235317002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mercury	ug/L	<0.066	0.20	11/12/21 12:58	

LABORATORY CONTROL SAMPLE: 2317755

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury	ug/L	5	5.6	111	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2317756 2317757

Parameter	Units	40235317001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mercury	ug/L	<0.066	5	5	6.2	6.2	123	123	85-115	0	20	M0

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

Pace Analytical
www.pacelabs.com

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

QUALITY CONTROL DATA

Project: 25219067 COLUMBIA CCR BACKGRND
Pace Project No.: 40235317

QC Batch: 399050 | Analysis Method: EPA 6020B
QC Batch Method: EPA 3010A | Analysis Description: 6020B MET
Laboratory: Pace Analytical Services - Green Bay

Associated Lab Samples: 40235317001, 40235317002

METHOD BLANK: 2304130 Matrix: Water

Associated Lab Samples: 40235317001, 40235317002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Antimony	ug/L	<0.15	1.0	10/26/21 13:37	
Arsenic	ug/L	<0.28	1.0	10/26/21 13:37	
Barium	ug/L	<0.70	2.3	10/26/21 13:37	
Beryllium	ug/L	<0.25	1.0	10/26/21 13:37	
Boron	ug/L	<3.0	10.0	10/26/21 13:37	
Cadmium	ug/L	<0.15	1.0	10/26/21 13:37	
Calcium	ug/L	<76.2	254	10/26/21 13:37	
Chromium	ug/L	<1.0	3.4	10/26/21 13:37	
Cobalt	ug/L	<0.12	1.0	10/26/21 13:37	
Lead	ug/L	<0.24	1.0	10/26/21 13:37	
Lithium	ug/L	<0.22	1.0	10/26/21 13:37	
Mercury	ug/L	<0.093	0.31	10/26/21 13:37	
Molybdenum	ug/L	<0.44	1.5	10/26/21 13:37	
Selenium	ug/L	<0.32	1.1	10/26/21 13:37	
Thallium	ug/L	<0.14	1.0	10/26/21 13:37	

LABORATORY CONTROL SAMPLE: 2304131

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Antimony	ug/L	250	241	96	80-120	
Arsenic	ug/L	250	239	96	80-120	
Barium	ug/L	250	243	97	80-120	
Beryllium	ug/L	250	240	96	80-120	
Boron	ug/L	250	243	97	80-120	
Cadmium	ug/L	250	244	98	80-120	
Calcium	ug/L	10000	10000	100	80-120	
Chromium	ug/L	250	232	93	80-120	
Cobalt	ug/L	250	242	97	80-120	
Lead	ug/L	250	231	93	80-120	
Lithium	ug/L	250	242	97	80-120	
Mercury	ug/L	5	5.1	102	80-120	
Molybdenum	ug/L	250	240	96	80-120	
Selenium	ug/L	250	246	98	80-120	
Thallium	ug/L	250	237	95	80-120	

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

REPORT OF LABORATORY ANALYSIS

Pace Analytical®
www.pacelabs.com

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

QUALITY CONTROL DATA

Project: 25219067 COLUMBIA CCR BACKGRND
Pace Project No.: 40235317

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2304132 2304133

Parameter	Units	40235317001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Antimony	ug/L	<0.15	250	250	240	243	96	97	75-125	1	20	
Arsenic	ug/L	0.35J	250	250	240	241	96	96	75-125	1	20	
Barium	ug/L	7.7	250	250	251	254	97	98	75-125	1	20	
Beryllium	ug/L	<0.25	250	250	238	238	95	95	75-125	0	20	
Boron	ug/L	31.4	250	250	273	277	97	98	75-125	1	20	
Cadmium	ug/L	<0.15	250	250	243	244	97	98	75-125	1	20	
Calcium	ug/L	67800	10000	10000	77700	80700	100	129	75-125	4	20	P6
Chromium	ug/L	<1.0	250	250	232	236	93	94	75-125	2	20	
Cobalt	ug/L	0.34J	250	250	241	245	96	98	75-125	2	20	
Lead	ug/L	<0.24	250	250	234	236	93	94	75-125	1	20	
Lithium	ug/L	0.46J	250	250	242	244	97	98	75-125	1	20	
Mercury	ug/L	<0.093	5	5	5.2	5.4	104	107	75-125	3	20	
Molybdenum	ug/L	<0.44	250	250	244	245	97	98	75-125	1	20	
Selenium	ug/L	<0.32	250	250	244	245	98	98	75-125	0	20	
Thallium	ug/L	0.17J	250	250	243	244	97	97	75-125	0	20	

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

Pace Analytical www.pacelabs.com

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

QUALITY CONTROL DATA

Project: 25219067 COLUMBIA CCR BACKGRND
Pace Project No.: 40235317

QC Batch: 398939
QC Batch Method: SM 2540C
Analysis Method: SM 2540C
Analysis Description: 2540C Total Dissolved Solids
Laboratory: Pace Analytical Services - Green Bay
Associated Lab Samples: 40235317001, 40235317002

METHOD BLANK: 2303507 Matrix: Water
Associated Lab Samples: 40235317001, 40235317002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	<8.7	20.0	10/19/21 13:29	

LABORATORY CONTROL SAMPLE: 2303508

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Dissolved Solids	mg/L	575	566	98	80-120	

SAMPLE DUPLICATE: 2303509

Parameter	Units	40235220001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	248	272	9	10	

SAMPLE DUPLICATE: 2303510

Parameter	Units	40235316003 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	374	390	4	10	

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

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

QUALITY CONTROL DATA

Project: 25219067 COLUMBIA CCR BACKGRND
Pace Project No.: 40235317

QC Batch: 399227
QC Batch Method: EPA 9040
Analysis Method: EPA 9040
Analysis Description: 9040 pH
Laboratory: Pace Analytical Services - Green Bay
Associated Lab Samples: 40235317001, 40235317002

SAMPLE DUPLICATE: 2304971

Parameter	Units	40235095010 Result	Dup Result	RPD	Max RPD	Qualifiers
pH at 25 Degrees C	Std. Units	7.8	7.8	0	20	H6

SAMPLE DUPLICATE: 2304972

Parameter	Units	40235316004 Result	Dup Result	RPD	Max RPD	Qualifiers
pH at 25 Degrees C	Std. Units	7.8	7.8	1	20	H6

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

Pace Analytical
www.pacelabs.com

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

QUALITY CONTROL DATA

Project: 25219067 COLUMBIA CCR BACKGRND
Pace Project No.: 40235317

QC Batch: 400930
QC Batch Method: EPA 300.0
Analysis Method: EPA 300.0
Analysis Description: 300.0 IC Anions
Laboratory: Pace Analytical Services - Green Bay
Associated Lab Samples: 40235317001, 40235317002

METHOD BLANK: 2315482 Matrix: Water
Associated Lab Samples: 40235317001, 40235317002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chloride	mg/L	<0.43	2.0	11/08/21 19:10	
Fluoride	mg/L	<0.095	0.32	11/08/21 19:10	
Sulfate	mg/L	<0.44	2.0	11/08/21 19:10	

LABORATORY CONTROL SAMPLE: 2315483

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	20	18.7	94	90-110	
Fluoride	mg/L	2	1.9	93	90-110	
Sulfate	mg/L	20	18.2	91	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2315484 2315485

Parameter	Units	40235824001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	7.3	20	20	29.8	30.1	113	114	90-110	1	15	M0
Fluoride	mg/L	<0.095	2	2	2.2	2.2	110	111	90-110	1	15	M0
Sulfate	mg/L	18.5	20	20	41.0	41.1	112	113	90-110	0	15	M0

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2315486 2315487

Parameter	Units	40235317002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	3.5	20	20	25.8	27.1	111	118	90-110	5	15	M0
Fluoride	mg/L	<0.095	2	2	2.2	2.3	109	114	90-110	5	15	M0
Sulfate	mg/L	1.3J	20	20	23.2	24.5	109	116	90-110	6	15	M0

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

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: 25219067 COLUMBIA CCR BACKGRND
Pace Project No.: 40235317

Sample: MW-301 | **Lab ID: 40235317001** | Collected: 10/14/21 17:05 | Received: 10/16/21 08:35 | Matrix: Water
PWS: | Site ID: | Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
	Pace Analytical Services - Greensburg					
Radium-226	EPA 903.1	**0.172 ± 0.337 (0.617) C:NA T:96%**	pCi/L	11/17/21 12:14	13982-63-3	
	Pace Analytical Services - Greensburg					
Radium-228	EPA 904.0	**-0.0327 ± 0.419 (0.973) C:61% T:89%**	pCi/L	11/15/21 11:02	15262-20-1	
	Pace Analytical Services - Greensburg					
Total Radium	Total Radium Calculation	**0.172 ± 0.756 (1.59)**	pCi/L	11/24/21 15:38	7440-14-4	

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: 25219067 COLUMBIA CCR BACKGRND
Pace Project No.: 40235317

Sample: MW-84A | **Lab ID: 40235317002** | Collected: 10/14/21 15:20 | Received: 10/16/21 08:35 | Matrix: Water
PWS: | Site ID: | Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
	Pace Analytical Services - Greensburg					
Radium-226	EPA 903.1	**0.000 ± 0.242 (0.493) C:NA T:100%**	pCi/L	11/17/21 12:14	13982-63-3	
	Pace Analytical Services - Greensburg					
Radium-228	EPA 904.0	**0.243 ± 0.576 (1.27) C:60% T:88%**	pCi/L	11/15/21 11:01	15262-20-1	
	Pace Analytical Services - Greensburg					
Total Radium	Total Radium Calculation	**0.243 ± 0.818 (1.76)**	pCi/L	11/24/21 15:38	7440-14-4	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

QUALITY CONTROL - RADIOCHEMISTRY

Project: 25219067 COLUMBIA CCR BACKGRND
Pace Project No.: 40235317

QC Batch: 471019
QC Batch Method: EPA 903.1
Analysis Method: EPA 903.1
Analysis Description: 903.1 Radium-226
Laboratory: Pace Analytical Services - Greensburg

Associated Lab Samples: 40235317001, 40235317002

METHOD BLANK: 2273682
Matrix: Water

Associated Lab Samples: 40235317001, 40235317002

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-226	-0.0899 ± 0.216 (0.540) C:NA T:95%	pCi/L	11/17/21 12:14	

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

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

QUALITY CONTROL - RADIOCHEMISTRY

Project: 25219067 COLUMBIA CCR BACKGRND
Pace Project No.: 40235317

QC Batch: 471020
QC Batch Method: EPA 904.0
Analysis Method: EPA 904.0
Analysis Description: 904.0 Radium 228
Laboratory: Pace Analytical Services - Greensburg
Associated Lab Samples: 40235317001, 40235317002

METHOD BLANK: 2273691 Matrix: Water
Associated Lab Samples: 40235317001, 40235317002

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-228	0.552 ± 0.431 (0.853) C:67% T:79%	pCi/L	11/19/21 11:42	

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

REPORT OF LABORATORY ANALYSIS

Pace Analytical®
www.pacelabs.com

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

QUALIFIERS

Project: 25219067 COLUMBIA CCR BACKGRND
Pace Project No.: 40235317

DEFINITIONS

Act - Activity
Unc - Uncertainty: SDWA = 1.96 sigma count uncertainty, all other matrices = Expanded Uncertainty (95% confidence interval).
Gamma Spec = Expanded Uncertainty (95.4% Confidence Interval)
(MDC) - Minimum Detectable Concentration
Trac - Tracer Recovery (%)
Carr - Carrier Recovery (%)
DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.
ND - Not Detected at or above LOD.
J - Estimated concentration at or above the LOD and below the LOQ.
LOD - Limit of Detection adjusted for dilution factor, percent moisture, initial weight and final volume.
LOQ - Limit of Quantitation adjusted for dilution factor, percent moisture, initial weight and final volume.
S - Surrogate
1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.
Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.
LCS(D) - Laboratory Control Sample (Duplicate)
MS(D) - Matrix Spike (Duplicate)
DUP - Sample Duplicate
RPD - Relative Percent Difference
NC - Not Calculable.
SG - Silica Gel - Clean-Up
U - Indicates the compound was analyzed for, but not detected at or above the adjusted LOD.
N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.
Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.
TNI - The NELAC Institute.

WORKORDER QUALIFIERS

WO: 40235317

[1] Mercury by Method 7470 was analyzed past hold due to laboratory oversight. Mercury by Method 6020 has been provided as supplemental data.

ANALYTE QUALIFIERS

H1	Analysis conducted outside the recognized method holding time.
H6	Analysis initiated outside of the 15 minute EPA required holding time.
M0	Matrix spike recovery and/or matrix spike duplicate recovery was outside laboratory control limits.
P6	Matrix spike recovery was outside laboratory control limits due to a parent sample concentration notably higher than the spike level.

Pace Analytical®
www.pacelabs.com

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 25219067 COLUMBIA CCR BACKGRND
Pace Project No.: 40235317

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
40235317001	**MW-301**	EPA 3010A	399050	EPA 6020B	399167
40235317002	**MW-84A**	EPA 3010A	399050	EPA 6020B	399167
40235317001	**MW-301**	EPA 7470	401437	EPA 7470	401479
40235317002	**MW-84A**	EPA 7470	401437	EPA 7470	401479
40235317001	**MW-301**				
40235317002	**MW-84A**				
40235317001	**MW-301**	EPA 903.1	471019		
40235317002	**MW-84A**	EPA 903.1	471019		
40235317001	**MW-301**	EPA 904.0	471020		
40235317002	**MW-84A**	EPA 904.0	471020		
40235317001	**MW-301**	Total Radium Calculation	474011		
40235317002	**MW-84A**	Total Radium Calculation	474011		
40235317001	**MW-301**	SM 2540C	398939		
40235317002	**MW-84A**	SM 2540C	398939		
40235317001	**MW-301**	EPA 9040	399227		
40235317002	**MW-84A**	EPA 9040	399227		
40235317001	**MW-301**	EPA 300.0	400930		
40235317002	**MW-84A**	EPA 300.0	400930		

Pace Analytical

CHAIN-OF-CUSTODY / Analytical Request Document

4023317

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

Page : 1 Of 1

Section A Required Client Information:	Section B Required Project Information:	Section C Invoice Information:
Company: SCS ENGINEERS	Report To: Meghan Blodgett	Attention: Meghan Blodgett
Address: 2830 Dairy Drive	Copy To:	Company Name: SCS Engineers
Madison, WI 53718		Address:
Email: mblodgett@scsengineers.com	Purchase Order #:	Pace Quote:
Phone: 608-216-7362 Fax:	Project Name: 25219067 Columbia CCR Background	Pace Project Manager: dan.milewsky@pacelabs.com,
Requested Due Date:	Project #: 25221067.00	Pace Profile #: x

Regulatory Agency:

State / Location:

SAMPLE ID — One Character per box. (A-Z, 0-9 / , -) Sample Ids must be unique

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

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED START DATE	START TIME	END DATE	END TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H2SO4	HNO3	HCl	NaOH	Na2S2O3	Methanol	Other	Analyses Test Y/N	Radium 226	Radium 228	Metals	pH	TDS, Cl, F, SO4	Residual Chlorine (Y/N)	
1	MW-301	WT				10/14/21	1705			2		3							x	x	x	x	x		001
2	MW-84A	WT				↓	1520			2		3							x	x	x	x	x		002
3																									
4																									
5																									
6																									
7																									
8																									
9																									
10																									
11																									
12																									

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	TEMP in C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)
Full List Metals = B, Ca, Sb, As, Ba, Be, Cd, Cr, Co, Pb, Li Hg, Mo, Se, Tl ALL SAMPLES UNFILTERED		10/15/21	1530							
	CS Logistics	10/16/21	0835	Anthony [signature]	10/16/21	0835	.5	Y	N	Y

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER:

SIGNATURE of SAMPLER: DATE Signed:

Pace Container Order #865037 4023537

Addresses

Order By :		Ship To :		Return To:	
Company	SCS ENGINEERS	Company	SCS ENGINEERS (Pace Analytical Green	Company	Pace Analytical Green Bay
Contact	Blodgett, Meghan	Contact	Adam Watson	Contact	Milewsky, Dan
Email	mblodgett@scsengineers.com	Email	awatson@scsengineers.com	Email	dan.milewsky@pacelabs.com
Address	2830 Dairy Drive	Address	2830 Dairy Drive	Address	1241 Bellevue Street
Address 2		Address 2		Address 2	Suite 9
City	Madison	City	Madison	City	Green Bay
State	WI Zip 53718	State	WI Zip 53718	State	WI Zip 54302
Phone	608-216-7362	Phone	608-216-7362	Phone	(920)469-2436

Info

Project Name	25219067 Columbia CCR Secondary Pond	**Due Date**	10/08/2021	**Profile**	3946-12	**Quote**	
Project Manager	Milewsky, Dan	**Return Date**		**Carrier**	Most Economical	**Location**	

Trip Blanks
- [ ] Include Trip Blanks

Bottle Labels
- [ ] Blank
- [ ] Pre-Printed No Sample IDs
- [X] Pre-Printed With Sample IDs

Bottles
- [ ] Boxed Cases
- [ ] Individually Wrapped
- [X] Grouped By Sample ID/Matrix

Return Shipping Labels
- [ ] No Shipper
- [ ] With Shipper

COC Options
- [ ] Number of Blanks
- [X] Pre-Printed

Misc
- [ ] Sampling Instructions
- [ ] Custody Seal
- [X] Temp. Blanks
- [X] Coolers
- [ ] Syringes
- [ ] Extra Bubble Wrap
- [ ] Short Hold/Rush Stickers
- [X] DI Water: 1 Liter(s)
- [ ] USDA Regulated Soils

# of Samples	Matrix	Test	Container	Total	# of	Lot #	Notes
4	WT	Metals	250mL plastic w/HNO3	4	0	M-1-106-03BB	
4	WT	pH	250mL plastic unpres	4	0	M-1-203-03BB	
4	WT	TDS, Cl, F, SO4	250mL plastic unpres	4	0	M-1-203-03BB	
4	WT	Radium 226	1L plastic HNO3 preserved	4	0		
4	WT	Radium 228	1L Plastic HNO3 Presered	4	0		

Hazard Shipping Placard In Place : NA

*Sample receiving hours are typically 8am-5pm, but may differ by location. Please check with your Pace Project Manager.
*Pace Analytical reserves the right to return hazardous, toxic, or radioactive samples to you.
*Pace Analytical reserves the right to charge for unused bottles, as well as cost associated with sample storage/disposal.
*Payment term are net 30 days.
*Please include the proposal number on the chain of custody to insure proper billing.

LAB USE:

Ship Date :	10/07/2021
Prepared By:	Mai Yer Her
Verified By:	

Sample

Metals=As,Ba,Cr,Co,Li,Mo,Se,Ca,B
ALL SAMPLES UNFILTERED

CLIENT USE (Optional):

Date Rec'd:	
Received By:	
Verified By:	

F-ALL-C-009-rev.00. 19Dec2016

Sample Preservation Receipt Form

Pace Analytical Services, LLC
1241 Bellevue Street, Suite 9
Green Bay, WI 54302

Client Name: SCS Engineers

Project # 40235317

All containers needing preservation have been checked and noted below: ☒Yes ☐No ☐N/A

Lab Lot# of pH paper: 1003604 Lab Std #ID of preservation (if pH adjusted):

Initial when completed: AW Date/ Time:

Pace Lab #	Glass: AG1U	BG1U	AG1H	AG4S	AG4U	AG5U	AG2S	BG3U	Plastic: BP1U	BP3U	BP3B	BP3N	BP3S	Vials: VG9A	DG9T	VG9U	VG9H	VG9M	VG9D	Jars: JGFU	JG9U	WGFU	WPFU	General: SP5T	ZPLC	GN	VOA Vials (>6mm) *	H2SO4 pH ≤2	NaOH+Zn Act pH ≥9	NaOH pH ≥12	HNO3 pH ≤2	pH after adjusted	Volume (mL)
001										2		1														2					X		2.5 / 5 / 10
002										2		1														2					X		2.5 / 5 / 10
003																																	2.5 / 5 / 10
004																																	2.5 / 5 / 10
005																																	2.5 / 5 / 10
006																																	2.5 / 5 / 10
007																																	2.5 / 5 / 10
008																																	2.5 / 5 / 10
009																																	2.5 / 5 / 10
010																																	2.5 / 5 / 10
011																																	2.5 / 5 / 10
012																																	2.5 / 5 / 10
013																																	2.5 / 5 / 10
014																																	2.5 / 5 / 10
015																																	2.5 / 5 / 10
016																																	2.5 / 5 / 10
017																																	2.5 / 5 / 10
018																																	2.5 / 5 / 10
019																																	2.5 / 5 / 10
020																																	2.5 / 5 / 10

10/16/21 AW

Exceptions to preservation check: VOA, Coliform, TOC, TOX, TOH, O&G, WI DRO, Phenolics, Other: Radium Headspace in VOA Vials (>6mm) : ☐Yes ☐No ☒N/A *If yes look in headspace column

Code	Description
AG1U	1 liter amber glass
BG1U	1 liter clear glass
AG1H	1 liter amber glass HCL
AG4S	125 mL amber glass H2SO4
AG4U	120 mL amber glass unpres
AG5U	100 mL amber glass unpres
AG2S	500 mL amber glass H2SO4
BG3U	250 mL clear glass unpres
BP1U	1 liter plastic unpres
BP3U	250 mL plastic unpres
BP3B	250 mL plastic NaOH
BP3N	250 mL plastic HNO3
BP3S	250 mL plastic H2SO4
VG9A	40 mL clear ascorbic
DG9T	40 mL amber Na Thio
VG9U	40 mL clear vial unpres
VG9H	40 mL clear vial HCL
VG9M	40 mL clear vial MeOH
VG9D	40 mL clear vial DI
JGFU	4 oz amber jar unpres
JG9U	9 oz amber jar unpres
WGFU	4 oz clear jar unpres
WPFU	4 oz plastic jar unpres
SP5T	120 mL plastic Na Thiosulfate
ZPLC	ziploc bag
GN	1 liter plastic HNO3

Pace Analytical® 1241 Bellevue Street, Green Bay, WI 54302	Document Name: Sample Condition Upon Receipt (SCUR)	Document Revised: 26Mar2020
	Document No.: ENV-FRM-GBAY-0014-Rev.00	Author: Pace Green Bay Quality Office

Sample Condition Upon Receipt Form (SCUR)

Project #:

WO# : 40235317

40235317

Client Name: SCS Engineers

Courier: ☒ CS Logistics ☐ Fed Ex ☒ Speedee ☐ UPS ☐ Waltco ☐ Client ☐ Pace Other:

Tracking #: —

Custody Seal on Cooler/Box Present: ☐ yes ☒ no Seals intact: ☐ yes ☐ no

Custody Seal on Samples Present: ☐ yes ☒ no Seals intact: ☐ yes ☐ no

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

Thermometer Used SR-107 **Type of Ice:** Wet Blue Dry None ☒ Samples on ice, cooling process has begun

Cooler Temperature Uncorr: .5 /Corr: .5

Temp Blank Present: ☐ yes ☒ no **Biological Tissue is Frozen:** ☐ yes ☐ no

Temp should be above freezing to 6°C.
Biota Samples may be received at ≤ 0°C if shipped on Dry Ice.

Person examining contents:
Date: 10/16/21 /Initials: AJ
Labeled By Initials: MP

Chain of Custody Present:	☒Yes ☐No ☐N/A	1.
Chain of Custody Filled Out:	☐Yes ☒No ☐N/A	2. f.l.t. 10/16/21 AJ
Chain of Custody Relinquished:	☐Yes ☒No ☐N/A	3. does have date/time 10/16/21 AJ
Sampler Name & Signature on COC:	☐Yes ☒No ☐N/A	4.
Samples Arrived within Hold Time:	☒Yes ☐No	5.
- VOA Samples frozen upon receipt	☐Yes ☐No	Date/Time:
Short Hold Time Analysis (<72hr):	☐Yes ☒No	6.
Rush Turn Around Time Requested:	☐Yes ☒No	7.
Sufficient Volume: For Analysis: ☒Yes ☐No MS/MSD:	☐Yes ☒No ☐N/A	8.
Correct Containers Used:	☒Yes ☐No	9.
-Pace Containers Used:	☒Yes ☐No ☐N/A	
-Pace IR Containers Used:	☐Yes ☐No ☒N/A	
Containers Intact:	☒Yes ☐No	10.
Filtered volume received for Dissolved tests	☐Yes ☐No ☒N/A	11.
Sample Labels match COC:	☒Yes ☐No ☐N/A	12.
-Includes date/time/ID/Analysis Matrix: W		
Trip Blank Present:	☐Yes ☐No ☒N/A	13.
Trip Blank Custody Seals Present	☐Yes ☐No ☒N/A	
Pace Trip Blank Lot # (if purchased):		

Client Notification/ Resolution: If checked, see attached form for additional comments ☐

Person Contacted: Date/Time:

Comments/ Resolution:

PM Review is documented electronically in LIMs. By releasing the project, the PM acknowledges they have reviewed the sample logir

Page 2 of 2

C4 December 2021 Resample

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

January 04, 2022

Meghan Blodgett
SCS ENGINEERS
2830 Dairy Drive
Madison, WI 53718

RE: Project: 25221067.00 ALLIANT COLUMBIA
Pace Project No.: 40238756

Dear Meghan Blodgett:

Enclosed are the analytical results for sample(s) received by the laboratory on December 22, 2021. The results relate only to the samples included in this report. Results reported herein conform to the applicable TNI/NELAC Standards and the laboratory's Quality Manual, where applicable, unless otherwise noted in the body of the report.

The test results provided in this final report were generated by each of the following laboratories within the Pace Network:

- Pace Analytical Services - Green Bay

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

Sincerely,

Dan Milewsky
dan.milewsky@pacelabs.com
(920)469-2436
Project Manager

Enclosures

cc: Sherren Clark, SCS Engineers
Tom Karwoski, SCS ENGINEERS
Nicole Kron, SCS ENGINEERS
Ryan Matzuk, SCS Engineers
Jeff Maxted, ALLIANT ENERGY
Marc Morandi, ALLIANT ENERGY

REPORT OF LABORATORY ANALYSIS

Pace Analytical®
www.pacelabs.com

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

CERTIFICATIONS

Project:	25221067.00 ALLIANT COLUMBIA
Pace Project No.:	40238756

Pace Analytical Services Green Bay

1241 Bellevue Street, Green Bay, WI 54302
Florida/NELAP Certification #: E87948
Illinois Certification #: 200050
Kentucky UST Certification #: 82
Louisiana Certification #: 04168
Minnesota Certification #: 055-999-334
New York Certification #: 12064
North Dakota Certification #: R-150
Virginia VELAP ID: 460263
South Carolina Certification #: 83006001
Texas Certification #: T104704529-14-1
Wisconsin Certification #: 405132750
Wisconsin DATCP Certification #: 105-444
USDA Soil Permit #: P330-16-00157
Federal Fish & Wildlife Permit #: LE51774A-0

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

SAMPLE SUMMARY

Project: 25221067.00 ALLIANT COLUMBIA
Pace Project No.: 40238756

Lab ID	Sample ID	Matrix	Date Collected	Date Received
40238756001	**MW-309**	Water	12/21/21 13:40	12/22/21 07:30
40238756002	**FIELD BLANK**	Water	12/21/21 13:40	12/22/21 07:30

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

SAMPLE ANALYTE COUNT

Project: 25221067.00 ALLIANT COLUMBIA
Pace Project No.: 40238756

Lab ID	Sample ID	Method	Analysts	Analytes Reported
40238756001	**MW-309**	EPA 6020B	KXS	1
			MEA	7
40238756002	**FIELD BLANK**	EPA 6020B	KXS	1

PASI-G = Pace Analytical Services - Green Bay

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

ANALYTICAL RESULTS

Project: 25221067.00 ALLIANT COLUMBIA
Pace Project No.: 40238756

Sample: MW-309 **Lab ID: 40238756001** Collected: 12/21/21 13:40 Received: 12/22/21 07:30 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020B MET ICPMS	Analytical Method: EPA 6020B Preparation Method: EPA 3010A Pace Analytical Services - Green Bay								
Boron	**36.4**	ug/L	10.0	3.0	1	12/27/21 06:57	12/27/21 22:38	7440-42-8	
Field Data	Analytical Method: Pace Analytical Services - Green Bay								
Field pH	**7.45**	Std. Units			1		12/21/21 13:40		
Field Specific Conductance	**1382**	umhos/cm			1		12/21/21 13:40		
Oxygen, Dissolved	**9.33**	mg/L			1		12/21/21 13:40	7782-44-7	
REDOX	**142.9**	mV			1		12/21/21 13:40		
Turbidity	**2.67**	NTU			1		12/21/21 13:40		
Static Water Level	**782.93**	feet			1		12/21/21 13:40		
Temperature, Water (C)	**11.17**	deg C			1		12/21/21 13:40		

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

ANALYTICAL RESULTS

Project: 25221067.00 ALLIANT COLUMBIA
Pace Project No.: 40238756

Sample: FIELD BLANK **Lab ID: 40238756002** Collected: 12/21/21 13:40 Received: 12/22/21 07:30 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020B MET ICPMS	Analytical Method: EPA 6020B Preparation Method: EPA 3010A Pace Analytical Services - Green Bay								
Boron	**<3.0**	ug/L	10.0	3.0	1	12/27/21 06:57	12/27/21 22:23	7440-42-8	

Pace Analytical
www.pacelabs.com

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

QUALITY CONTROL DATA

Project: 25221067.00 ALLIANT COLUMBIA
Pace Project No.: 40238756

QC Batch: 405008
QC Batch Method: EPA 3010A
Analysis Method: EPA 6020B
Analysis Description: 6020B MET
Laboratory: Pace Analytical Services - Green Bay
Associated Lab Samples: 40238756001, 40238756002

METHOD BLANK: 2337706 Matrix: Water
Associated Lab Samples: 40238756001, 40238756002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Boron	ug/L	<3.0	10.0	12/27/21 22:16	

LABORATORY CONTROL SAMPLE: 2337707

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Boron	ug/L	250	246	99	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2337708 2337709

Parameter	Units	40238756001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Boron	ug/L	36.4	250	250	273	272	94	94	75-125	0	20	

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

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

QUALIFIERS

Project: 25221067.00 ALLIANT COLUMBIA
Pace Project No.: 40238756

DEFINITIONS

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

ND - Not Detected at or above LOD.

J - Estimated concentration at or above the LOD and below the LOQ.

LOD - Limit of Detection adjusted for dilution factor, percent moisture, initial weight and final volume.

LOQ - Limit of Quantitation adjusted for dilution factor, percent moisture, initial weight and final volume.

S - Surrogate

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

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

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected at or above the adjusted LOD.

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

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

TNI - The NELAC Institute.

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 25221067.00 ALLIANT COLUMBIA
Pace Project No.: 40238756

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
40238756001	**MW-309**	EPA 3010A	405008	EPA 6020B	405071
40238756002	**FIELD BLANK**	EPA 3010A	405008	EPA 6020B	405071
40238756001	**MW-309**				

Pace Analytical®

CHAIN-OF-CUSTODY Analytical Request Document

Chain-of-Custody is a LEGAL DOCUMENT - Complete all relevent fields

LAB USE ONLY- Affix Workorder/Login Label Here or List Pace Workorder Number or MTJL Log-in Number Here

40238756

ALL SHADED AREAS are for LAB USE ONLY

Company: SCS Engineers

Billing Information: ← Same

Address: 2830 Dairy Dr.

Report To: Meghan Blodgett

Email To: MBlodgett@scsengineers.com

Copy To:

Site Collection Info/Address: Columbia

Customer Project Name/Number: 25221067.00

State: WI County/City: Columbia Time Zone Collected: [ ] PT [ ] MT [X] CT [ ] ET

Phone: 608-224-2830
Email:

Site/Facility ID #:

Compliance Monitoring? [ ] Yes [ ] No

Collected By (print): Adam Watson

Purchase Order #:
Quote #:

DW PWS ID #:
DW Location Code:

Collected By (signature): [signature]

Turnaround Date Required:

Immediately Packed on Ice: [X] Yes [ ] No

Sample Disposal:
[ ] Dispose as appropriate [ ] Return
[ ] Archive: ____________
[ ] Hold: ____________

Rush:
[ ] Same Day [ ] Next Day
[ ] 2 Day [ ] 3 Day [ ] 4 Day [ ] 5 Day
(Expedite Charges Apply)

Field Filtered (if applicable): [ ] Yes [X] No

Analysis: ____________

Container Preservative Type **

Lab Project Manager:

** Preservative Types: (1) nitric acid, (2) sulfuric acid, (3) hydrochloric acid, (4) sodium hydroxide, (5) zinc acetate, (6) methanol, (7) sodium bisulfate, (8) sodium thiosulfate, (9) hexane, (A) ascorbic acid, (B) ammonium sulfate, (C) ammonium hydroxide, (D) TSP, (U) Unpreserved, (O) Other ____________

* Matrix Codes (Insert in Matrix box below): Drinking Water (DW), Ground Water (GW), Wastewater (WW), Product (P), Soil/Solid (SL), Oil (OL), Wipe (WP), Air (AR), Tissue (TS), Bioassay (B), Vapor (V), Other (OT)

Customer Sample ID	Matrix *	Comp / Grab	Collected (or Composite Start) Date	Collected (or Composite Start) Time	Composite End Date	Composite End Time	Res Cl	# of Ctns	Analyses: Boron	Lab Sample # / Comments
MW-309	GW		12/21/21	1340				1	X	001
Field Blank	~~GW~~		12/21/21	1340				1	X	002

Lab Profile/Line:

```
Lab Sample Receipt Checklist:

Custody Seals Present/Intact   Y N NA
Custody Signatures Present     Y N NA
Collector Signature Present    Y N NA
Bottles Intact                 Y N NA
Correct Bottles                Y N NA
Sufficient Volume              Y N NA
Samples Received on Ice        Y N NA
VOA - Headspace Acceptable     Y N NA
USDA Regulated Soils           Y N NA
Samples in Holding Time        Y N NA
Residual Chlorine Present      Y N NA
Cl Strips:
Sample pH Acceptable           Y N NA
pH Strips:
Sulfide Present                Y N NA
Lead Acetate Strips:

LAB USE ONLY:
Lab Sample # / Comments:
```

SLW 12/22/21

Customer Remarks / Special Conditions / Possible Hazards:

Type of Ice Used: Wet Blue Dry None

SHORT HOLDS PRESENT (<72 hours): Y N N/A

Packing Material Used:

Lab Tracking #: 2697791

Radchem sample(s) screened (<500 cpm): Y N NA

Samples received via: FEDEX UPS Client Courier Pace Courier

Lab Sample Temperature Info:
Temp Blank Received: Y N NA
Therm ID#: ____________
Cooler 1 Temp Upon Receipt: ____oC
Cooler 1 Therm Corr. Factor: ____oC
Cooler 1 Corrected Temp: ____oC
Comments:

SLW 12/22/21

Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:
Adam Watson / SCS Engineers	12/21/21 1315		
[signature]	12/22/21 0730	Susan [signature] Pace	12/22/21 0730

MTJL LAB USE ONLY
Table #:
Acctnum:
Template:
Prelogin:
PM:
PB:

Trip Blank Received: Y N NA
HCL MeOH TSP Other

Non Conformance(s): YES / NO

Page: ____ of: ____

Pace Analytical Services, LLC
1241 Bellevue Street, Suite 9
Green Bay, WI 54302

Sample Preservation Receipt Form

Client Name: SCS Engineers   Project # 40258756

All containers needing preservation have been checked and noted below: ☑Yes ☐No ☐N/A

Lab Lot# of pH paper: 10D0104   Lab Std #ID of preservation (if pH adjusted):

Initial when completed: SCW   Date/ Time:

	Glass								Plastic					Vials						Jars				General									
Pace Lab #	AG1U	BG1U	AG1H	AG4S	AG4U	AG5U	AG2S	BG3U	BP1U	BP3U	BP3B	BP3N	BP3S	VG9A	DG9T	VG9U	VG9H	VG9M	VG9D	JGFU	JG9U	WGFU	WPFU	SP5T	ZPLC	GN	VOA Vials (>6mm) *	H2SO4 pH ≤2	NaOH+Zn Act pH ≥9	NaOH pH ≥12	HNO3 pH ≤2	pH after adjusted	Volume (mL)
001												1																			X		2.5 / 5 / 10
002												1																			X		2.5 / 5 / 10
003																																	2.5 / 5 / 10
004																																	2.5 / 5 / 10
005																																	2.5 / 5 / 10
006																																	2.5 / 5 / 10
007																																	2.5 / 5 / 10
008																																	2.5 / 5 / 10
009																																	2.5 / 5 / 10
010																																	2.5 / 5 / 10
011																																	2.5 / 5 / 10
012																																	2.5 / 5 / 10
013																																	2.5 / 5 / 10
014																																	2.5 / 5 / 10
015																																	2.5 / 5 / 10
016																																	2.5 / 5 / 10
017																																	2.5 / 5 / 10
018																																	2.5 / 5 / 10
019																																	2.5 / 5 / 10
020																												10/20/21 SCW					2.5 / 5 / 10

Exceptions to preservation check: VOA, Coliform, TOC, TOX, TOH, O&G, WI DRO, Phenolics, Other:__________ Headspace in VOA Vials (>6mm) : ☐Yes ☐No ☑N/A ***If yes look in headspace column**

AG1U	1 liter amber glass	BP1U	1 liter plastic unpres	VG9A	40 mL clear ascorbic	JGFU	4 oz amber jar unpres
BG1U	1 liter clear glass	BP3U	250 mL plastic unpres	DG9T	40 mL amber Na Thio	JG9U	9 oz amber jar unpres
AG1H	1 liter amber glass HCL	BP3B	250 mL plastic NaOH	VG9U	40 mL clear vial unpres	WGFU	4 oz clear jar unpres
AG4S	125 mL amber glass H2SO4	BP3N	250 mL plastic HNO3	VG9H	40 mL clear vial HCL	WPFU	4 oz plastic jar unpres
AG4U	120 mL amber glass unpres	BP3S	250 mL plastic H2SO4	VG9M	40 mL clear vial MeOH	SP5T	120 mL plastic Na Thiosulfate
AG5U	100 mL amber glass unpres			VG9D	40 mL clear vial DI	ZPLC	ziploc bag
AG2S	500 mL amber glass H2SO4					GN	
BG3U	250 mL clear glass unpres						

F-GB-C-046-Rev.03 (11Feb2020) Sample Preservation Receipt Form

Pace Analytical® 1241 Bellevue Street, Green Bay, WI 54302	Document Name: **Sample Condition Upon Receipt (SCUR)**	Document Revised: 26Mar2020
	Document No.: **ENV-FRM-GBAY-0014-Rev.00**	Author: Pace Green Bay Quality Office

Sample Condition Upon Receipt Form (SCUR)

Client Name: SCS Engineers

Project #:

WO# : 40238756

40238756

Courier: [x] CS Logistics [ ] Fed Ex [ ] Speedee [ ] UPS [ ] Waltco [ ] Client [ ] Pace Other:

Tracking #:

Custody Seal on Cooler/Box Present: [ ] yes [x] no Seals intact: [ ] yes [ ] no

Custody Seal on Samples Present: [ ] yes [x] no Seals intact: [ ] yes [ ] no

Packing Material: [ ] Bubble Wrap [ ] Bubble Bags [x] None [ ] Other

Thermometer Used SR - 105 **Type of Ice:** Wet Blue Dry None [x] Samples on ice, cooling process has begun

Cooler Temperature Uncorr: 2 /Corr: 2

Temp Blank Present: [x] yes [ ] no **Biological Tissue is Frozen:** [ ] yes [ ] no

Temp should be above freezing to 6°C.
Biota Samples may be received at ≤ 0°C if shipped on Dry Ice.

Person examining contents: Date: 12/22/21 /Initials: SRK

Labeled By Initials: SRK

Chain of Custody Present:	[x] Yes [ ] No [ ] N/A	1.
Chain of Custody Filled Out:	[ ] Yes [x] No [ ] N/A	2. Pg # 12/22/21 SRK
Chain of Custody Relinquished:	[x] Yes [ ] No [ ] N/A	3.
Sampler Name & Signature on COC:	[x] Yes [ ] No [ ] N/A	4.
Samples Arrived within Hold Time:	[x] Yes [ ] No	5.
- VOA Samples frozen upon receipt	[ ] Yes [ ] No	Date/Time:
Short Hold Time Analysis (<72hr):	[ ] Yes [x] No	6.
Rush Turn Around Time Requested:	[ ] Yes [x] No	7.
Sufficient Volume: For Analysis: [x] Yes [ ] No	MS/MSD: [ ] Yes [x] No [ ] N/A	8.
Correct Containers Used:	[x] Yes [ ] No	9.
-Pace Containers Used:	[x] Yes [ ] No [ ] N/A	
-Pace IR Containers Used:	[ ] Yes [ ] No [x] N/A	
Containers Intact:	[x] Yes [ ] No	10.
Filtered volume received for Dissolved tests	[ ] Yes [ ] No [x] N/A	11.
Sample Labels match COC:	[x] Yes [ ] No [ ] N/A	12.
-Includes date/time/ID/Analysis Matrix: W		
Trip Blank Present:	[ ] Yes [ ] No [x] N/A	13.
Trip Blank Custody Seals Present	[ ] Yes [ ] No [x] N/A	
Pace Trip Blank Lot # (if purchased):		

Client Notification/ Resolution: If checked, see attached form for additional comments [ ]

Person Contacted: Date/Time:

Comments/ Resolution:

PM Review is documented electronically in LIMs. By releasing the project, the PM acknowledges they have reviewed the sample logi

Page 2 of 2

Appendix D

Historical Monitoring Results

Single Location

Name: WPL - Columbia

Location ID: MW-84A
Number of Sampling Dates: 20

Parameter Name	Units	12/22/2015	4/5/2016	7/8/2016	7/28/2016	10/13/2016	12/29/2016	1/25/2017	4/11/2017	6/6/2017	8/8/2017	10/24/2017	4/25/2018	8/8/2018	10/24/2018
Boron	ug/L	11.9	14	14.7	--	11.1	14.7	16.1	12.9	14.8	22.9	13.8	25	12.8	10.1
Calcium	ug/L	74000	72200	67600	--	74000	76000	70800	73200	76100	74900	77500	76600	76000	74000
Chloride	mg/L	4.9	4.7	5.1	--	4.3	4.7	4.6	4.9	5.5	5.5	5.1	4.8	4.9	4.2
Fluoride	mg/L	<0.2	<0.2	<0.2	--	<0.1	<0.1	0.12	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Field pH	Std. Units	7.6	7.61	7.45	7.34	7.91	7.25	6.99	7.8	7.28	7.23	7.68	7.45	7.38	7.24
Sulfate	mg/L	4.9	4.3	3.7	--	2.6	2.7	3	2.8	2.7	2	2.2	2.8	1.9	1.6
Total Dissolved Solids	mg/L	316	322	316	--	324	316	328	342	344	342	314	328	372	330
Antimony	ug/L	<0.073	0.084	0.1	--	<0.073	<0.073	<0.073	<0.073	<0.15	<0.15	--	<0.15	<0.15	<0.15
Arsenic	ug/L	0.15	0.29	0.14	--	0.35	0.19	0.35	<0.099	<0.28	0.28	--	<0.28	<0.28	0.33
Barium	ug/L	15.3	12.7	12.2	--	14.2	18.4	13.8	14.1	13.4	14	--	14.6	13.7	14.5
Beryllium	ug/L	<0.13	<0.13	<0.13	--	<0.13	<0.13	<0.13	<0.13	<0.18	<0.18	--	<0.18	<0.18	<0.18
Cadmium	ug/L	<0.089	<0.089	<0.089	--	<0.089	<0.089	<0.089	<0.089	<0.081	<0.081	--	<0.081	--	<0.15
Chromium	ug/L	2.5	1.9	1.8	--	2	2	1.9	2.4	2	1.6	--	2.4	1.5	1.6
Cobalt	ug/L	0.095	<0.036	0.053	--	<0.036	<0.036	<0.036	<0.036	<0.085	<0.085	--	<0.085	<0.085	<0.12
Lead	ug/L	0.16	<0.04	0.39	--	0.049	0.11	<0.04	0.041	<0.2	<0.2	--	<0.2	--	<0.24
Lithium	ug/L	0.72	0.44	0.5	--	0.56	0.56	0.56	0.55	0.46	0.58	--	0.5	0.4	0.49
Mercury	ug/L	<0.1	<0.1	<0.13	--	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	--	<0.13	--	<0.084
Molybdenum	ug/L	<0.07	<0.07	0.073	--	0.12	<0.07	<0.07	<0.07	<0.44	<0.44	--	<0.44	<0.44	<0.44
Selenium	ug/L	<0.21	<0.21	<0.21	--	<0.21	<0.21	<0.21	<0.21	<0.32	<0.32	--	<0.32	<0.32	<0.32
Thallium	ug/L	<0.14	<0.14	<0.14	--	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	--	<0.14	<0.14	<0.14
Total Radium	pCi/L	0.593	0.0809	--	1.37	0.825	0.404	1.39	0.0929	0.676	0.509	--	0.526	0.529	0.62
Radium-226	pCi/L	0.156	-0.088	--	-0.058	0.132	0.168	0.624	0.0768	0.27	0.242	--	0.155	-0.203	0.313
Radium-228	pCi/L	0.437	0.0809	--	1.37	0.693	0.236	0.766	0.0161	0.406	0.267	--	0.371	0.529	0.307
Field Specific Conductance	umhos/cm	599	427	574.8	579.3	1002	578.2	489	948	535.3	557.2	491	581.7	617.1	609
Oxygen, Dissolved	mg/L	9.7	9.37	3.78	5.11	9.61	8.94	6.48	9.28	9.46	7.5	9.3	3.94	8.84	10.01
Field Oxidation Potential	mV	154	165.1	139.9	138.3	82.7	87	192.9	102	123.6	204.7	210	53.3	142.7	71.5
Groundwater Elevation	feet	785.31	786.3	785.89	785.61	787.22	786.63	786.7	787.16	787.63	786.68	785.32	785.88	786.55	788.32
Temperature	deg C	10.4	10.2	11.3	11	11.5	10.8	10.9	10.6	11.3	11.2	11.1	10.2	12	11.6
Turbidity	NTU	--	0.86	2.75	0.17	0.3	0.25	0.33	0.04	0.56	0.08	2.93	0.81	0.71	3.79
pH at 25 Degrees C	Std. Units	7.5	7.4	7.4	--	7.3	7.4	7.3	7.7	7.6	7.4	7.6	7.6	7.4	7.5

Location ID: MW-84A
Number of Sampling Dates: 20

Parameter Name	Units	4/3/2019	10/9/2019	2/3/2020	5/29/2020	10/8/2020	4/14/2021
Boron	ug/L	13.6	12	15.7	10	9.7	14.3
Calcium	ug/L	80100	73500	72700	77600	69200	69100
Chloride	mg/L	3.6	3.9	3.7	3.7	4.3	4.4
Fluoride	mg/L	<0.1	<0.1	--	<0.095	<0.095	<0.095
Field pH	Std. Units	7.03	7.23	7.51	7.34	7.49	7.34
Sulfate	mg/L	1.4	1.3	<2.2	1.5	1.3	1.4
Total Dissolved Solids	mg/L	318	310	316	340	320	328
Antimony	ug/L	<0.15	<0.15	--	<0.15	<0.15	0.55
Arsenic	ug/L	<0.28	0.46	0.38	0.34	0.49	0.91
Barium	ug/L	14.7	13.2	14	13.9	12.6	13.4
Beryllium	ug/L	<0.18	<0.25	--	<0.25	<0.25	0.47
Cadmium	ug/L	<0.15	<0.15	--	<0.15	<0.15	0.53
Chromium	ug/L	1.8	1.6	1.6	1.7	1.6	2.6
Cobalt	ug/L	<0.12	<0.12	<0.12	<0.12	<0.12	0.52
Lead	ug/L	<0.24	<0.24	--	<0.24	<0.24	0.55
Lithium	ug/L	0.56	0.52	0.58	0.4	0.39	1
Mercury	ug/L	<0.084	<0.084	--	<0.084	<0.066	<0.066
Molybdenum	ug/L	<0.44	<0.44	<0.44	<0.44	<0.44	0.62
Selenium	ug/L	<0.32	<0.32	<0.32	<0.32	<0.32	0.48
Thallium	ug/L	<0.14	<0.14	<0.14	<0.14	<0.14	0.66
Total Radium	pCi/L	0.681	0.247	0.1	0.395	0.39	0.285
Radium-226	pCi/L	0.199	0.247	0.1	0.368	0	-0.289
Radium-228	pCi/L	0.482	-0.024	-0.153	0.0273	0.39	0.285
Field Specific Conductance	umhos/cm	637.2	614.1	618.4	613.7	610.1	610.9
Oxygen, Dissolved	mg/L	9.49	11.36	8.43	9.81	9.39	9.8
Field Oxidation Potential	mV	103.4	181.7	121.5	135	153.2	95.6
Groundwater Elevation	feet	787.35	787.79	786.5	787.02	786.1	785.84
Temperature	deg C	10.2	11.8	10.3	10.6	11.9	10.2
Turbidity	NTU	1.9	2.41	1.23	2.15	0	2.45
pH at 25 Degrees C	Std. Units	7.4	7.5	7.4	7.6	7.6	7.6

Single Location

Name: WPL - Columbia

Location ID: MW-301

Number of Sampling Dates: 19

Parameter Name	Units	12/22/2015	4/5/2016	7/8/2016	10/13/2016	12/29/2016	1/25/2017	4/11/2017	6/6/2017	8/8/2017	10/23/2017	4/25/2018	8/8/2018	10/24/2018	4/2/2019
Boron	ug/L	26.5	25.2	23.6	30.6	32.8	32.6	28.8	21.3	30.6	34.3	24.3	22.8	27.8	26.9
Calcium	ug/L	126000	115000	108000	118000	129000	124000	120000	111000	108000	87200	112000	105000	101000	126000
Chloride	mg/L	3.7	4	3.5	2.2	2	1.5	2	3.5	5.5	4	2.3	5.2	3.2	0.79
Fluoride	mg/L	<0.2	<0.2	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Field pH	Std. Units	6.85	7.01	6.87	7.28	6.63	7.1	7.11	6.7	6.75	7.37	6.76	6.91	6.79	6.62
Sulfate	mg/L	9.3	15.3	15	13.9	12.3	6.5	10.3	17.1	31.6	27.5	8.6	21.6	19.2	4.4
Total Dissolved Solids	mg/L	478	486	464	490	444	514	502	458	462	362	464	502	424	462
Antimony	ug/L	0.15	0.094	0.13	<0.073	0.4	<0.073	<0.073	<0.15	<0.15	--	<0.15	0.36	<0.15	0.32
Arsenic	ug/L	0.26	0.26	0.19	0.24	0.4	0.13	0.18	<0.28	<0.28	--	<0.28	0.45	<0.28	0.4
Barium	ug/L	20.2	11.1	11.6	15.6	15	13.5	13.2	11.3	11.8	--	9.3	10.2	11.5	11.8
Beryllium	ug/L	<0.13	<0.13	<0.13	<0.13	0.19	<0.13	<0.13	<0.18	<0.18	--	<0.18	0.37	<0.18	0.28
Cadmium	ug/L	<0.089	<0.089	<0.089	<0.089	0.32	<0.089	<0.089	<0.081	<0.081	--	<0.081	--	<0.15	0.21
Chromium	ug/L	2.1	0.58	0.59	<0.39	0.7	0.53	0.7	2.3	<1	--	<1	<1	<1	<1
Cobalt	ug/L	1.4	0.25	0.22	0.041	0.38	0.071	0.064	0.13	0.12	--	<0.085	0.28	<0.12	0.35
Lead	ug/L	0.9	0.077	0.48	<0.04	0.34	<0.04	<0.04	<0.2	<0.2	--	<0.2	--	<0.24	0.3
Lithium	ug/L	1.3	0.58	0.69	0.6	0.87	0.67	0.68	0.62	0.6	--	0.55	0.85	0.52	0.9
Mercury	ug/L	<0.1	<0.1	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	--	<0.13	--	<0.084	<0.084
Molybdenum	ug/L	0.35	0.15	0.14	0.12	0.38	<0.07	<0.07	<0.44	<0.44	--	<0.44	<0.44	<0.44	<0.44
Selenium	ug/L	0.3	0.21	0.39	<0.21	0.26	<0.21	<0.21	<0.32	<0.32	--	<0.32	0.71	<0.32	0.49
Thallium	ug/L	<0.14	<0.14	<0.14	<0.14	0.48	<0.14	<0.14	<0.14	<0.14	--	<0.14	0.3	<0.14	0.48
Total Radium	pCi/L	1.31	1.11	0.89	0.631	1.01	2.42	1.35	1.3	1.74	--	0.882	0.0351	0.652	0.552
Radium-226	pCi/L	0.655	0.294	0.404	-0.067	0.108	1.46	0.513	0.287	1.09	--	0.122	-0.06	0.247	0
Radium-228	pCi/L	0.651	0.82	0.486	0.631	0.905	0.964	0.833	1.01	0.647	--	0.76	0.0351	0.405	0.552
Field Specific Conductance	umhos/cm	897	573	796	1464	859	1018	1354	698.4	691.7	561	774	799	767	883
Oxygen, Dissolved	mg/L	1.7	2.71	1.47	1.99	1.34	1.24	1.44	1.81	1.43	1.1	2.35	2.14	2.49	2.2
Field Oxidation Potential	mV	135	123.7	133.9	100.8	95.8	226.1	100.9	115.1	187.4	204	74.3	126.5	77.9	152.1
Groundwater Elevation	feet	785.56	768.12	786.31	787.64	787.37	787.27	787.89	788.25	787.34	785.89	785.29	787.06	788.98	787.04
Temperature	deg C	9.7	7.7	10	11.2	10.1	8.8	7.7	8.9	10.2	11.1	7.4	10.6	11.1	7.5
Turbidity	NTU	--	1.52	3.89	0.59	0.74	0.42	0.1	0.22	0.18	1.52	1.12	0.46	3.3	2.02
pH at 25 Degrees C	Std. Units	7	7	6.8	6.8	6.9	6.9	7.1	7	7	7.3	7	7	7.1	6.8

Location ID: MW-301
Number of Sampling Dates: 19

Parameter Name	Units	10/9/2019	2/3/2020	5/29/2020	10/8/2020	4/14/2021
Boron	ug/L	35.9	27.9	21.3	28.8	22.2
Calcium	ug/L	114000	113000	112000	93000	117000
Chloride	mg/L	1.7	1.3	2	3.4	1.5
Fluoride	mg/L	<0.1	--	<0.095	<0.095	<0.095
Field pH	Std. Units	6.67	6.89	6.73	6.95	6.66
Sulfate	mg/L	8.4	7.2	11.5	25.1	8.5
Total Dissolved Solids	mg/L	418	462	452	412	472
Antimony	ug/L	<0.15	--	<0.15	0.33	<0.15
Arsenic	ug/L	0.42	<0.28	0.33	0.62	<0.28
Barium	ug/L	10	10.9	9.8	9.4	8.9
Beryllium	ug/L	<0.25	--	<0.25	<0.25	<0.25
Cadmium	ug/L	<0.15	--	<0.15	0.19	<0.15
Chromium	ug/L	<1	<1	<1	<1	<1
Cobalt	ug/L	<0.12	0.17	<0.12	0.29	<0.12
Lead	ug/L	<0.24	--	<0.24	0.25	<0.24
Lithium	ug/L	0.61	0.67	0.47	0.46	0.58
Mercury	ug/L	<0.084	--	<0.084	<0.066	<0.066
Molybdenum	ug/L	<0.44	<0.44	<0.44	<0.44	<0.44
Selenium	ug/L	<0.32	<0.32	<0.32	<0.32	<0.32
Thallium	ug/L	<0.14	<0.14	<0.14	0.3	<0.14
Total Radium	pCi/L	0.701	0.502	0.193	0.38	1.16
Radium-226	pCi/L	0.252	0.136	0	0.0511	0.418
Radium-228	pCi/L	0.449	0.366	0.193	0.329	0.739
Field Specific Conductance	umhos/cm	801	868	797	760	857
Oxygen, Dissolved	mg/L	1.67	1.07	2	1.22	3.9
Field Oxidation Potential	mV	173	132.3	118.7	183.9	102.9
Groundwater Elevation	feet	788.47	787.24	787.77	786.53	786.5
Temperature	deg C	11.3	8.5	8.1	11	7.4
Turbidity	NTU	2.12	1.41	0	0	2.41
pH at 25 Degrees C	Std. Units	7	6.8	7	7.2	6.9

Single Location

Name: WPL - Columbia

Location ID: MW-309

Number of Sampling Dates: 20

Parameter Name	Units	2/21/2018	3/23/2018	4/23/2018	5/24/2018	6/23/2018	7/23/2018	8/22/2018	9/21/2018	10/22/2018	4/2/2019	10/8/2019	5/29/2020	6/30/2020	8/6/2020	10/8/2020	12/11/2020	4/13/2021	6/11/2021	10/14/2021	12/21/2021
Boron	ug/L	31.4	31	30.4	28	26.6	35.5	40.5	30	--	37.4	33.4	54.6	50.7	55.3	57.7	65.9	48	49.9	42.9	36.4
Calcium	ug/L	42700	41800	39600	52700	67600	63800	93600	55200	--	45300	46900	51600	--	--	65300	--	62300	--	83100	--
Chloride	mg/L	147	157	157	141	203	557	811	329	--	145	43.2	350	--	--	575	--	390	--	519	--
Fluoride	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1	--	<0.1	<0.1	<0.095	--	--	<0.095	--	<0.095	--	<0.095	--
Field pH	Std. Units	7.84	8.08	7.71	7.59	7.5	7.55	7.53	7.83	7.56	7.49	7.75	7.35	7.33	7.72	7.33	7.42	7.68	7.71	7.64	7.45
Sulfate	mg/L	12.2	12.2	12	17.5	24.1	33.1	43.3	35.9	--	35.2	21.9	28.6	--	--	21.8	--	30.3	--	27.7	--
Total Dissolved Solids	mg/L	576	552	562	478	548	1210	1570	830	--	548	370	960	--	--	1160	--	916	--	1110	--
Antimony	ug/L	0.28	<0.15	0.36	0.24	0.76	0.31	0.57	<0.15	--	--	--	--	--	--	--	--	--	--	--	--
Arsenic	ug/L	<0.28	0.35	0.77	<0.28	0.56	0.55	0.46	<0.28	--	--	--	--	--	--	--	--	--	--	--	--
Barium	ug/L	24.1	22.2	21.3	15.3	18.3	31.2	46.2	22.2	--	--	--	--	--	--	--	--	--	--	--	--
Beryllium	ug/L	0.21	<0.18	0.2	<0.18	0.38	<0.18	<0.18	<0.18	--	--	--	--	--	--	--	--	--	--	--	--
Cadmium	ug/L	0.11	<0.081	0.27	<0.081	0.58	0.23	0.3	<0.15	--	--	--	--	--	--	--	--	--	--	--	--
Chromium	ug/L	2.3	1.9	2.3	1.9	2.2	<1	2.6	1.3	--	--	--	--	--	--	--	--	--	--	--	--
Cobalt	ug/L	0.5	0.18	0.39	0.11	0.54	0.29	0.35	<0.12	--	--	--	--	--	--	--	--	--	--	--	--
Lead	ug/L	0.66	<0.2	0.39	<0.2	0.76	0.34	0.39	<0.24	--	--	--	--	--	--	--	--	--	--	--	--
Lithium	ug/L	1.4	0.88	1.1	0.77	1.1	0.88	1.1	0.76	--	--	--	--	--	--	--	--	--	--	--	--
Mercury	ug/L	<0.13	--	<0.13	<0.13	<0.13	<0.13	<0.13	<0.084	<0.084	--	--	--	--	--	--	--	--	--	--	--
Molybdenum	ug/L	2.1	2.6	2	<0.44	0.7	0.47	<0.44	<0.44	--	--	--	--	--	--	--	--	--	--	--	--
Selenium	ug/L	0.39	0.37	0.6	0.41	1.1	0.51	0.39	0.33	--	--	--	--	--	--	--	--	--	--	--	--
Thallium	ug/L	0.16	<0.14	0.83	<0.14	0.57	0.42	0.38	<0.14	--	--	--	--	--	--	--	--	--	--	--	--
Total Radium	pCi/L	0.516	1.25	1.13	0.895	0.673	1.74	0.754	0.569	--	--	--	--	--	--	--	--	--	--	--	--
Radium-226	pCi/L	0.486	0.815	0.539	0.0638	-0.208	0.334	0.232	0.569	--	--	--	--	--	--	--	--	--	--	--	--
Radium-228	pCi/L	0.03	0.431	0.595	0.831	0.673	1.41	0.522	-0.304	--	--	--	--	--	--	--	--	--	--	--	--
Field Specific Conductance	umhos/cm	983	1094	985	921	1057	2290	2948	1423	1424	1041	687	1785	1726	1656	2222	2227	1804	3072	2079	1382
Oxygen, Dissolved	mg/L	11.4	6.74	5.43	8.76	9.93	9.27	7.26	10.75	10.23	9.79	11.52	9.83	9.71	9.05	9.4	8.08	10.14	11.21	9.27	9.33
Field Oxidation Potential	mV	45.4	123	94.2	54.5	89.9	163.8	106.4	65.5	157.1	120.1	125.2	230.6	65.7	224.2	147.7	112.2	124.1	67.2	85.8	142.9
Groundwater Elevation	feet	783.2	783.11	783.07	785.45	786.03	786.27	785.54	787.08	787.99	786.3	787.26	785.98	786.18	785.93	785.47	785.26	784.29	784.2	783.65	782.93
Temperature	deg C	10.3	10.6	11	12.1	12	13.3	13.4	12.72	13.3	10.1	13	11	13.3	12.9	12.9	11.8	10.7	13.3	13.2	11.17
Turbidity	NTU	4.84	28.88	4.76	3.35	1.94	2.73	2.09	3.18	2.81	1.25	4.89	1.74	3.74	3.56	0	0	2.8	0.1	9.06	2.67
pH at 25 Degrees C	Std. Units	7.8	8	7.9	7.6	7.6	7.7	7.8	7.7	--	7.7	7.7	8	--	--	7.7	--	7.7	--	7.8	--

Single Location

Name: WPL - Columbia

Location ID: MW-310

Number of Sampling Dates: 19

Parameter Name	Units	2/21/2018	3/23/2018	4/23/2018	5/24/2018	6/23/2018	7/23/2018	8/22/2018	9/21/2018	10/22/2018	4/2/2019	6/12/2019	10/8/2019	12/23/2019	5/29/2020	10/8/2020	12/11/2020	4/13/2021	6/11/2021	10/14/2021
Boron	ug/L	67.1	62.1	60.7	59.2	61.4	69.5	64.2	80.3	--	73	--	81.8	--	74.4	77.6	--	69.6	--	72
Calcium	ug/L	32400	33400	32100	32100	34300	39700	38800	54100	--	38800	--	57600	55400	41100	62000	56800	49300	--	38900
Chloride	mg/L	19.8	21.7	22.1	68.6	59.8	118	139	152	--	76	--	190	--	128	310	227	227	220	84.6
Fluoride	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--	<0.1	--	<0.1	--	<0.095	<0.095	--	<0.095	--	<0.095
Field pH	Std. Units	7.85	8.06	7.75	7.74	7.82	7.81	7.77	7.98	7.7	9.79	7.82	7.82	7.7	7.54	7.52	7.62	7.73	7.73	7.7
Sulfate	mg/L	31.6	33.1	32	28	30.4	60.2	32.8	118	--	58.4	--	85.9	--	68.2	60	--	43.3	--	54.3
Total Dissolved Solids	mg/L	406	398	396	436	438	532	526	736	--	470	--	650	--	582	846	700	654	--	498
Antimony	ug/L	0.15	<0.15	0.3	0.21	0.97	0.42	0.17	0.49	--	--	--	--	--	--	--	--	--	--	--
Arsenic	ug/L	<0.28	0.42	0.82	0.45	1.2	0.66	0.43	0.76	--	--	--	--	--	--	--	--	--	--	--
Barium	ug/L	19.8	19.5	19	20.7	20.3	21.2	21	26.1	--	--	--	--	--	--	--	--	--	--	--
Beryllium	ug/L	<0.18	<0.18	0.72	<0.18	0.59	0.29	<0.18	<0.18	--	--	--	--	--	--	--	--	--	--	--
Cadmium	ug/L	<0.081	<0.081	0.14	0.11	0.78	0.31	<0.15	0.17	--	--	--	--	--	--	--	--	--	--	--
Chromium	ug/L	1.1	1.2	1.4	1.4	2.4	<1	1.3	<1	--	--	--	--	--	--	--	--	--	--	--
Cobalt	ug/L	0.18	0.13	0.26	0.15	0.75	0.32	0.13	0.24	--	--	--	--	--	--	--	--	--	--	--
Lead	ug/L	<0.2	<0.2	0.21	<0.2	0.77	0.45	<0.24	0.25	--	--	--	--	--	--	--	--	--	--	--
Lithium	ug/L	1	0.85	1.4	0.81	1.2	1.2	0.92	1.1	--	--	--	--	--	--	--	--	--	--	--
Mercury	ug/L	<0.13	--	<0.13	<0.13	<0.13	<0.13	<0.13	<0.084	<0.084	--	--	--	--	--	--	--	--	--	--
Molybdenum	ug/L	2.3	3.6	2.8	1.9	1.9	1.7	1.2	4.8	--	--	--	--	--	--	--	--	--	--	--
Selenium	ug/L	<0.32	<0.32	0.55	<0.32	0.96	0.75	<0.32	1.4	--	--	--	--	--	--	--	--	--	--	--
Thallium	ug/L	<0.14	<0.14	0.73	<0.14	0.9	0.44	<0.14	0.27	--	--	--	--	--	--	--	--	--	--	--
Total Radium	pCi/L	0.114	0.709	0.969	0.346	0.12	0.257	0.308	0.475	--	--	--	--	--	--	--	--	--	--	--
Radium-226	pCi/L	-0.053	0.423	-0.261	-0.115	0.12	0.0705	0.247	0.285	--	--	--	--	--	--	--	--	--	--	--
Radium-228	pCi/L	0.114	0.286	0.969	0.346	-0.00299	0.186	0.0614	0.19	--	--	--	--	--	--	--	--	--	--	--
Field Specific Conductance	umhos/cm	684	765	688	840	791	998	1016	1114	1182	924	--	1226	1416	1035	1481	1212	1194	1192	884
Oxygen, Dissolved	mg/L	11.02	5.83	2.87	8.85	10.09	8.32	3.43	10.49	10.27	7.86	--	11.57	9.65	10.07	9.63	8.3	9.93	11.21	9.29
Field Oxidation Potential	mV	25	64.2	68.2	63.5	74.5	165.7	137	51.5	145	119	--	139.4	40	207.8	150.4	111.5	106	55.6	85.2
Groundwater Elevation	feet	783.05	783.1	782.97	785.97	786.64	786.35	785.4	787.24	788.18	786.38	--	787.94	775.22	785.81	785.56	785.26	784.24	784.05	783.48
Temperature	deg C	11.04	11.2	11.2	11.7	12	13.2	13.4	13.52	13.6	10.5	--	13.4	12.4	11.5	13.2	12.5	10.8	12.8	13.4
Turbidity	NTU	0.94	1.7	1.35	0.04	1.12	0.41	0.32	3.99	5.53	1.13	--	2.66	2.06	1.96	0	0	0.57	0.67	3.16
pH at 25 Degrees C	Std. Units	7.8	7.8	7.9	7.8	7.8	7.8	7.9	7.6	--	7.8	--	7.8	--	8	7.8	--	7.8	--	8

Single Location

Name: WPL - Columbia

Location ID: MW-311

Number of Sampling Dates: 15

Parameter Name	Units	2/21/2018	3/23/2018	4/23/2018	5/24/2018	6/23/2018	7/23/2018	8/22/2018	9/21/2018	10/22/2018	4/2/2019	10/8/2019	5/29/2020	10/8/2020	4/14/2021	10/14/2021
Boron	ug/L	43.7	42.7	40.1	31.7	33.6	30.1	32.4	27.5	--	35.7	33.5	25.7	26.2	33.6	31.7
Calcium	ug/L	58000	61000	56600	62500	70700	76800	65700	75400	--	65600	63900	62200	73400	59000	61000
Chloride	mg/L	2.9	2.7	2.6	3.5	3	2	2	3.9	--	1.9	1.5	1.5	1.4	1.3	1.3
Fluoride	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--	<0.1	<0.1	<0.095	<0.095	<0.095	<0.095
Field pH	Std. Units	7.72	7.93	7.62	7.54	7.65	7.59	7.6	7.95	7.5	7.51	7.69	7.37	7.66	7.46	7.45
Sulfate	mg/L	7.1	7.2	7.9	36.9	72.3	84.7	53.6	92.4	--	23.1	21.2	39.1	72.1	15.6	14.2
Total Dissolved Solids	mg/L	260	274	262	304	352	372	332	424	--	276	272	326	380	270	276
Antimony	ug/L	0.15	<0.15	<0.15	<0.15	0.18	<0.15	0.43	<0.15	--	--	--	--	--	--	--
Arsenic	ug/L	<0.28	0.56	0.42	0.32	0.31	0.46	0.56	0.56	--	--	--	--	--	--	--
Barium	ug/L	13.3	12.3	12.4	10.7	15.4	16.3	14.2	18.2	--	--	--	--	--	--	--
Beryllium	ug/L	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	0.19	<0.18	--	--	--	--	--	--	--
Cadmium	ug/L	<0.081	<0.081	<0.081	<0.081	<0.081	<0.081	0.29	<0.15	--	--	--	--	--	--	--
Chromium	ug/L	2.1	2.2	2.2	2.2	2.3	1.3	2.3	1.5	--	--	--	--	--	--	--
Cobalt	ug/L	0.24	0.11	<0.085	0.11	0.11	0.12	0.35	<0.12	--	--	--	--	--	--	--
Lead	ug/L	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.3	<0.24	--	--	--	--	--	--	--
Lithium	ug/L	0.75	0.62	0.58	0.52	0.72	0.67	0.83	0.82	--	--	--	--	--	--	--
Mercury	ug/L	<0.13	--	<0.13	<0.13	<0.13	<0.13	<0.13	<0.084	<0.084	--	--	--	--	--	--
Molybdenum	ug/L	2.1	1.9	2.1	0.55	0.93	0.56	0.74	2.5	--	--	--	--	--	--	--
Selenium	ug/L	0.83	0.78	0.6	0.9	0.86	0.62	0.93	1.2	--	--	--	--	--	--	--
Thallium	ug/L	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	0.3	<0.14	--	--	--	--	--	--	--
Total Radium	pCi/L	0.608	1.14	0.898	0.162	0.0331	0.338	0.0614	0.773	--	--	--	--	--	--	--
Radium-226	pCi/L	0.205	0.569	0.502	0	-0.058	0.338	0.0614	0.424	--	--	--	--	--	--	--
Radium-228	pCi/L	0.403	0.571	0.396	0.162	0.0331	-0.0845	-0.253	0.349	--	--	--	--	--	--	--
Field Specific Conductance	umhos/cm	455	508.1	459.1	539	596	606.8	573.2	600	699	337.8	495.6	547.2	606.1	500.2	493.5
Oxygen, Dissolved	mg/L	11.74	4.77	0.87	8.91	9.75	7.91	1.97	10.31	9.96	9.77	11.68	10.64	9.38	10.23	9.42
Field Oxidation Potential	mV	31	74	65.3	70.1	82.6	157	150.3	42.4	146	116.3	144.3	176.3	137.1	110.4	90.7
Groundwater Elevation	feet	783.02	783	781.83	786.11	786.47	786.55	785.46	787.66	788.64	786.38	787.64	785.85	785.83	784.15	783.48
Temperature	deg C	10.3	10.5	10.5	11	11	12.1	12.6	13.07	13.4	9.7	12.9	10.5	12.7	9.5	12.8
Turbidity	NTU	2.56	9.12	2.58	0.59	0.58	1.13	0.65	10.3	3.73	2.91	8.56	4.7	0.7	3.49	4.26
pH at 25 Degrees C	Std. Units	7.7	7.9	7.7	7.6	7.7	7.6	7.7	7.6	--	7.6	7.6	7.7	7.7	7.7	7.9

Appendix E

Statistical Evaluation

January 10, 2020
File No. 25219067.00

TECHNICAL MEMORANDUM

SUBJECT: Statistical Evaluation of Groundwater Monitoring Results
COL Mod 4 Landfill, October 2019 Sampling Event

PREPARED BY: Sherren Clark

CHECKED BY: Nicole Kron

STATISTICAL METHOD

The statistical analysis uses a prediction interval approach as recommended for detection monitoring in the March 2009 United States Environmental Protection Agency (USEPA) Unified Guidance for Statistical Analysis of Groundwater Monitoring Data at Resource Conservation and Recovery Act (RCRA) Facilities. For the prediction interval evaluation, intrawell testing was selected based on the considerations outlined in Chapter 6 of the Unified Guidance. The statistical program used to calculate the intrawell prediction interval is Sanitas™.Under the intrawell approach, detection monitoring results are compared to upper prediction limits (UPLs) calculated based on background monitoring results from the same wells.

Eight rounds of background monitoring were performed prior to CCR disposal in the Mod 4 CCR landfill. The background wells for Mod 4 (MW-84A and MW-301) are shared background wells for all of the COL CCR units. Compliance wells for Mod 4 include MW-309, MW-310, and MW-311. For the Mod 4 compliance wells, background monitoring was performed from February 2018 through September 2018. Because the Mod 4 evaluation is intrawell, the background well data is not used in the statistical evaluation, but is available for use in data interpretation as needed.

For the October 2019 monitoring event and future events, the statistical approach was modified slightly from the previous compliance events. The previous events used an intrawell UPL without retesting, calculated using ChemStat software. The October 2019 event and future events will use an intrawell UPL with 1-of-2 retesting, calculated using Sanitas software. The retesting approach results in a slightly lower UPL, but only 1 of 2 samples collected for the event (original and retest) must meet the UPL to demonstrate compliance.

The October 2019 monitoring event includes the following sample dates:

- October 8-9, 2019: All wells, all detection monitoring parameters
- December 23, 2019: MW-310, retest for calcium

TIME SERIES PLOTS

Time series plots were prepared for the required detection monitoring parameters to show the concentration variations over time, and are included in Attachment A. The time series plots include the three compliance wells and two background wells for Mod 4.

OUTLIER ANALYSIS

For the intrawell evaluation, an outlier analysis was performed for the background monitoring results at each of the three compliance wells. A statistical outlier is a value that is extremely different from the other values in the data set. The Sanitas outlier tests identify data points that do not appear to fit the distribution of the rest of the data set and determine if they differ significantly from the rest of the data. The outlier analysis performed in Sanitas includes the following steps:

1) Run normality test (Shapiro Wilk)
   a) If not normal, transform to natural log and test for lognormal distribution

2) If normally or lognormally distributed, run USEPA's 1989 Outlier Test to identify suspected outliers:
   a) If number of background samples is less than or equal to 25, run Dixon's test for suspected outliers.
   b) If number of background samples is more than 25, run Rosner's test for suspected outliers.

3) If not normally distributed, run Tukey's test for outliers.

4) Review data flagged as possible outliers to evaluate whether they should be removed from the background data set. Also review time series plots for possible outliers that were not picked up in the statistical evaluation (e.g., outlier test may not identify outliers when two values are similar to each other, but very different from all other data).

The Sanitas output for the outlier analysis is provided in Attachment B.

Results identified as statistical outliers are checked for possible lab instrument failure, field collection problems, or data entry errors. However, outliers may exist naturally in the data if there is an extremely wide inherent or temporal variability in the data. The Unified Guidance states that unless a likely error can be identified, the outlier should not be removed.

For the October 2019 data evaluation, the following background values were identified as potential outliers and handled as described:

- Sulfate (MW-310): Two high results from the July and September 2018 sampling were flagged by Sanitas as statistical outliers. These results were kept in the dataset because there was no known explanation for the varying results, and the results fall within a reasonable range for this parameter. Because the background samples were all collected within one calendar year, the degree of natural variation and seasonality cannot yet be determined.

- **Total Dissolved Solids (MW-310):** One high result from the September 2018 sampling was flagged by Sanitas as a statistical outlier. This result was kept in the dataset because there was no known explanation for the varying results, and the result falls within a reasonable range for this parameter. Because the background samples were all collected within one calendar year, the degree of natural variation and seasonality cannot yet be determined.

INTRAWELL PREDICTION LIMITS

Intrawell upper prediction limits (UPLs) were calculated using background data from the compliance wells for each monitored constituent, with outliers handled as noted above. The prediction limit analysis performed in Sanitas includes the following steps:

1) If more than 50 percent of results are non-detect, apply a non-parametric UPL. For small background sample sizes, the non-parametric UPL is the highest background value. For a parameter with 100 percent non-detects in the background values, the Double Quanitification rule applies, which says that an statistically significant increase (SSI) occurs when two results exceeding the quantification limit are reported for a compliance well.

2) If 50 percent or fewer of the results are non-detect, run normality test (Shapiro Wilk/Francia) to assess whether the data fit a normal distribution or can be transformed to fit a normal distribution (e.g., lognormal).

3) If normal or transformed normal, calculate parametric UPL.

4) If not normal or transformed normal, calculate non-parametric UPL.

Consistent with the Unified Guidance, parametric prediction limits were calculated based on a 1-of-2 retesting protocol and a target 10 percent annual site-wide false positive rate. Sanitas establishes the per-test significance level based on user inputs of the number of events per year, number of constituents being evaluated, and number of compliance wells. For the October 2019 event, the following values were used:

Parameter	Value	Comments
Evaluations per year	2	April and October events
Constituents analyzed	6	Total of 7 constituents analyzed for detection monitoring. Fluoride not counted because all background results were non-detect
Compliance wells	3	MW-309, MW-310, MW-311

Non-parametric prediction limits are also based on a 1-of-2 retesting protocol. The non-parametric limit is the highest value in the background dataset. Due to the small sample size, the false positive rate for the non-parametric tests is higher than for the parametric tests, but will go down as more background data are obtained.

For results with 100 percent non-detects in the background data, evaluation under the Double Quantification Rule means that a SSI has not occurred for a compliance well unless two sample results from the well exceed the laboratory's reporting limit or quanitification limit. For evaluation of parameters with less than 100 percent non-detects in the background sampling, the non-detects were replaced with a value of one-half the detection limit. For all parameters, only results at or above the laboratory's reporting limit or quanitification limit are compared to the UPL for SSI determination.

Intrawell prediction limit analysis results for 2019 are included in Attachment C.

Sanitas settings are provided in Attachment D.

RESULTS

No SSIs were identified for the October 2019 monitoring event. Calcium exceeded the 1-of-2 UPL in the initial October sample from MW-310, but was below the UPL in the December retest sample; therefore, there is no SSI.

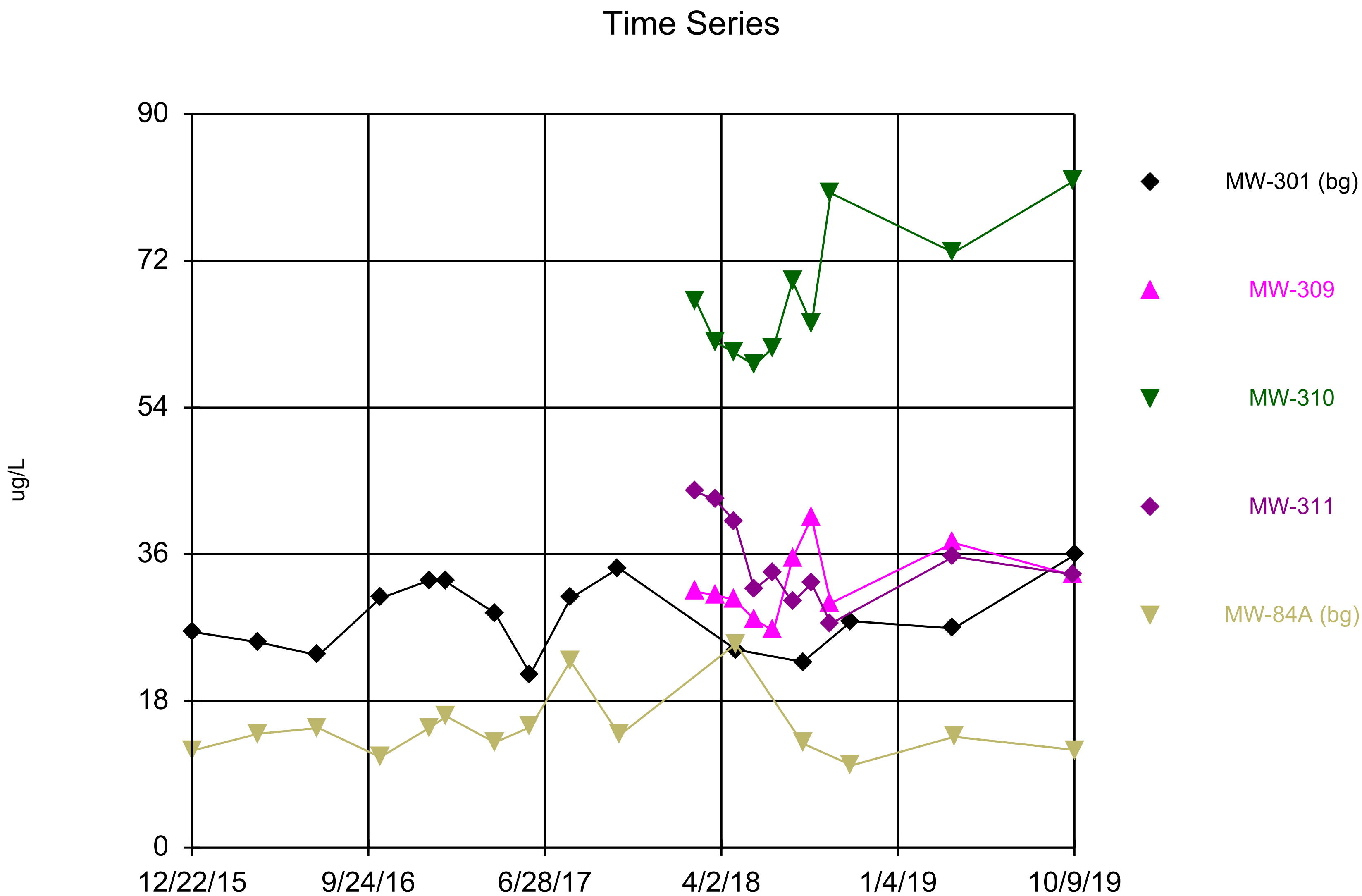
SCC/NDK/

I:\25219067.00\Data and Calculations\Sanitas\MOD 4 Intrawell\Oct 2019_Stats Memo to File\COL Mod 4_2019 Oct_Stats Memo.docx

Attachment A

Times Series Plots

Sanitas™ v.9.6.24 Software licensed to SCS Engineers. UG



Constituent: Boron Analysis Run 1/8/2020 2:40 PM

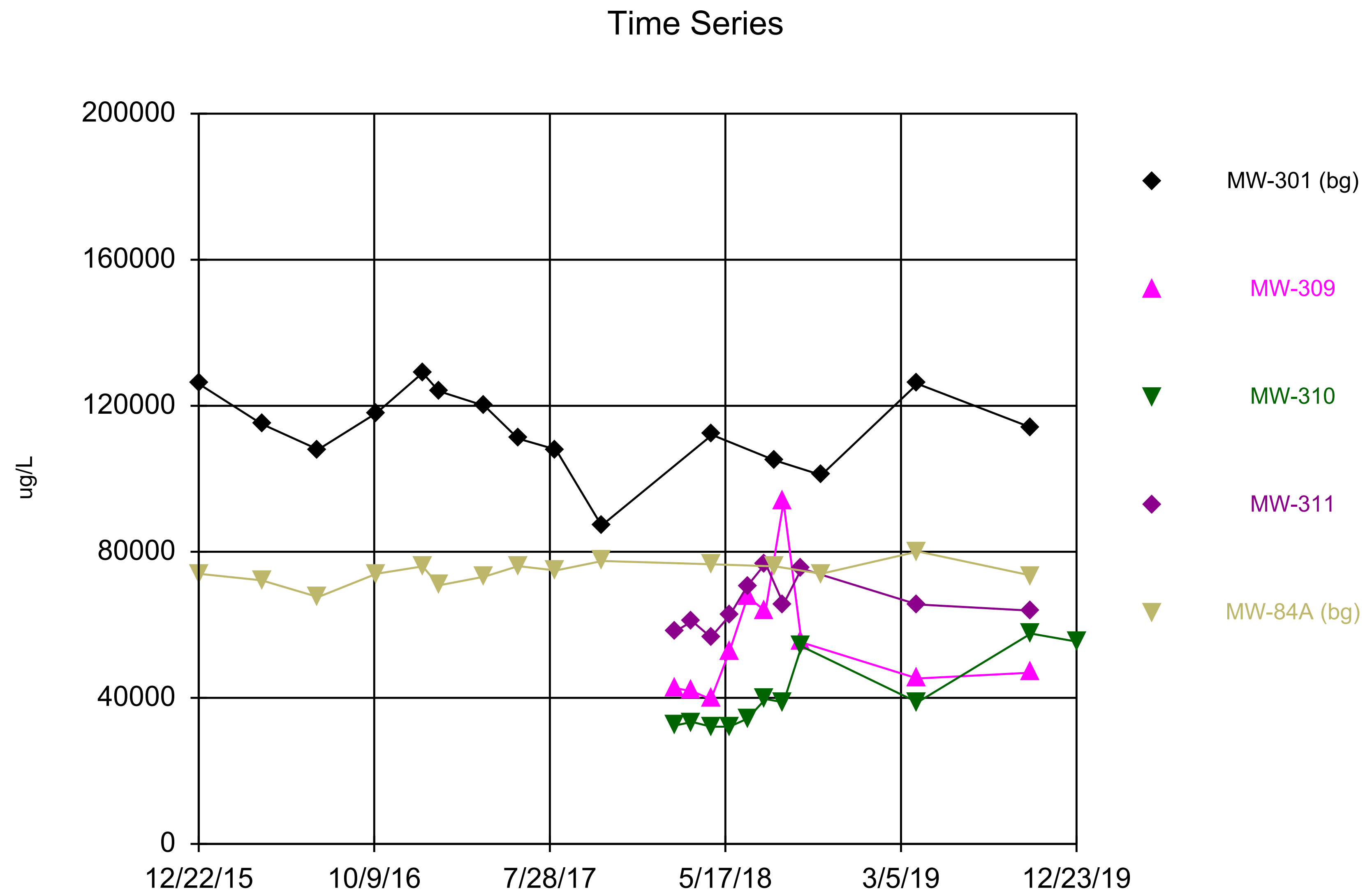
Columbia Energy Center Client: SCS Engineers Data: Input -191203

Time Series

Constituent: Boron (ug/L)   Analysis Run 1/8/2020 2:42 PM

Columbia Energy Center   Client: SCS Engineers   Data: Input -191203

	MW-301 (bg)	MW-309	MW-310	MW-311	MW-84A (bg)
12/22/2015	26.5				11.9
4/5/2016	25.2				14
7/8/2016	23.6				14.7
10/13/2016	30.6				11.1
12/29/2016	32.8				14.7
1/25/2017	32.6				16.1
4/11/2017	28.8				12.9
6/6/2017	21.3				14.8
8/8/2017	30.6				22.9
10/23/2017	34.3				
10/24/2017					13.8
2/21/2018		31.4	67.1	43.7	
3/23/2018		31	62.1	42.7	
4/23/2018		30.4	60.7	40.1	
4/25/2018	24.3				25
5/24/2018		28	59.2	31.7	
6/23/2018		26.6	61.4	33.6	
7/23/2018		35.5	69.5	30.1	
8/8/2018	22.8				12.8
8/22/2018		40.5	64.2	32.4	
9/21/2018		30	80.3	27.5	
10/24/2018	27.8				10.1 (J)
4/2/2019	26.9	37.4	73	35.7	
4/3/2019					13.6
10/8/2019		33.4	81.8	33.5	
10/9/2019	35.9				12



Constituent: Calcium Analysis Run 1/8/2020 2:40 PM

Columbia Energy Center Client: SCS Engineers Data: Input -191203

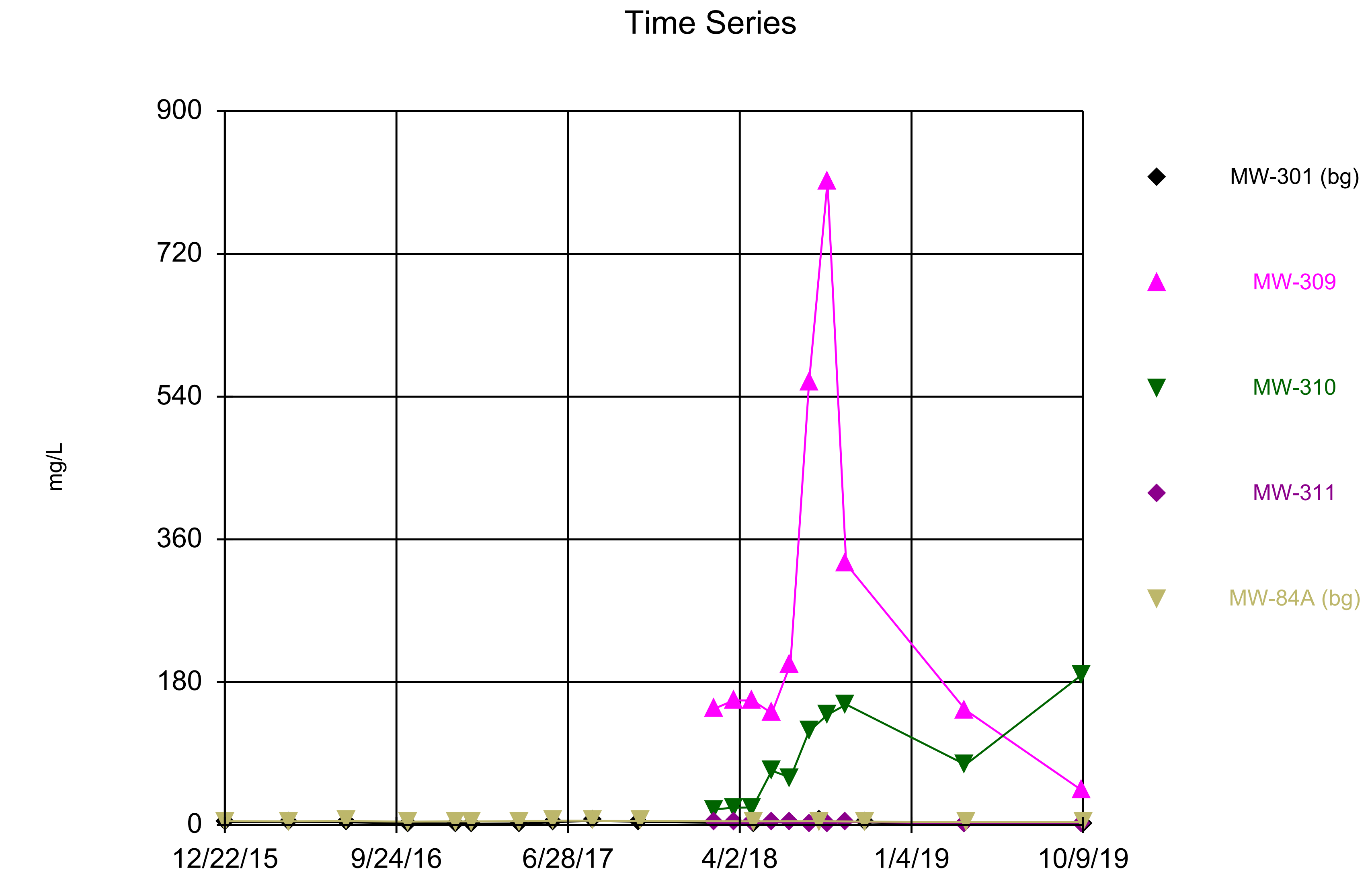
Time Series

Constituent: Calcium (ug/L)   Analysis Run 1/8/2020 2:42 PM

Columbia Energy Center   Client: SCS Engineers   Data: Input -191203

	MW-301 (bg)	MW-309	MW-310	MW-311	MW-84A (bg)
12/22/2015	126000				74000
4/5/2016	115000				72200
7/8/2016	108000				67600
10/13/2016	118000				74000
12/29/2016	129000				76000
1/25/2017	124000				70800
4/11/2017	120000				73200
6/6/2017	111000				76100
8/8/2017	108000				74900
10/23/2017	87200				
10/24/2017					77500
2/21/2018		42700	32400	58000	
3/23/2018		41800	33400	61000	
4/23/2018		39600	32100	56600	
4/25/2018	112000				76600
5/24/2018		52700	32100	62500	
6/23/2018		67600	34300	70700	
7/23/2018		63800	39700	76800	
8/8/2018	105000				76000
8/22/2018		93600	38800	65700	
9/21/2018		55200	54100	75400	
10/24/2018	101000				74000
4/2/2019	126000	45300	38800	65600	
4/3/2019					80100
10/8/2019		46900	57600	63900	
10/9/2019	114000				73500
12/23/2019			55400 (P6)		

Sanitas™ v.9.6.24 Software licensed to SCS Engineers. UG



Constituent: Chloride Analysis Run 1/8/2020 2:40 PM

Columbia Energy Center Client: SCS Engineers Data: Input -191203

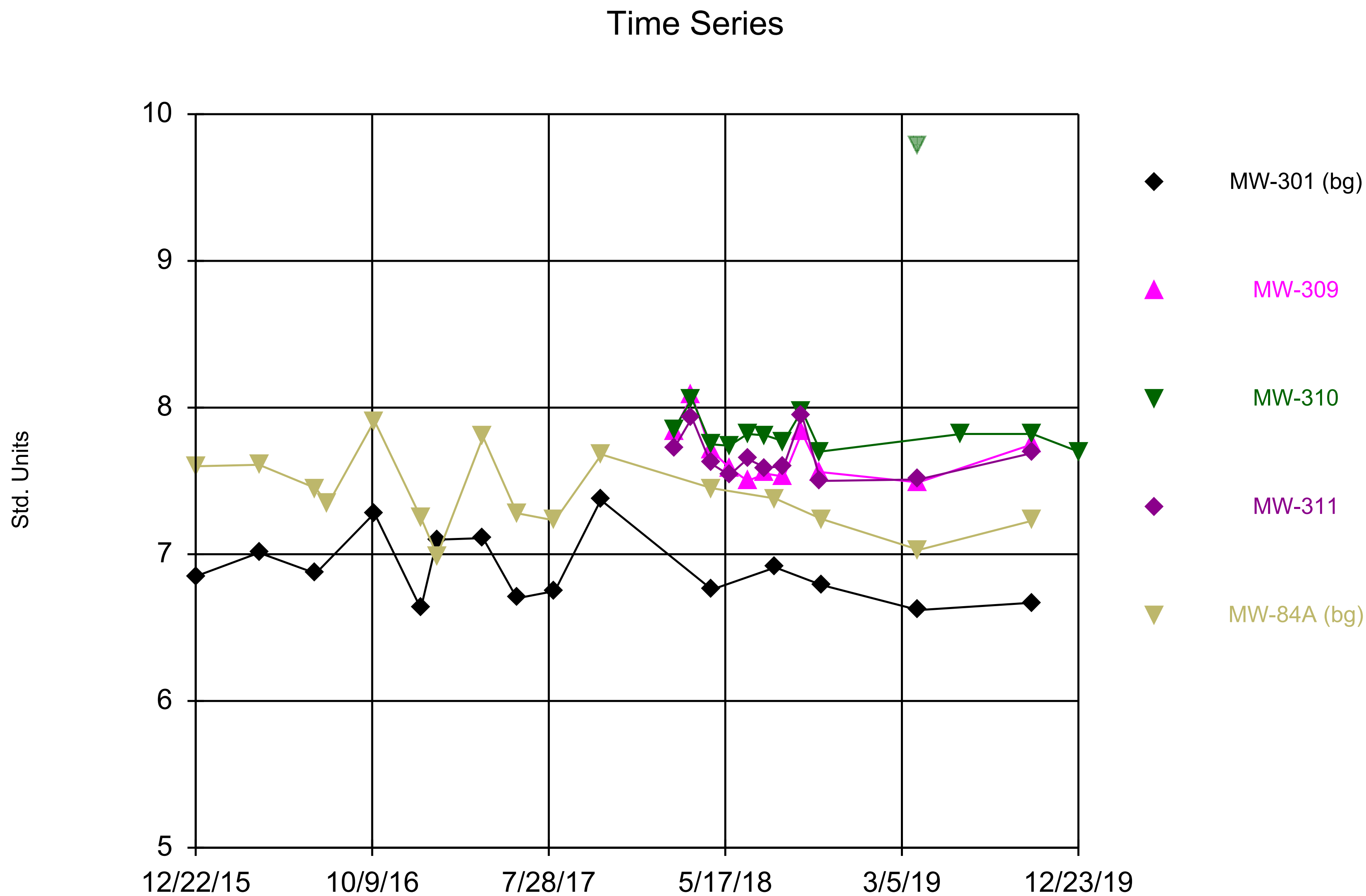
Time Series

Constituent: Chloride (mg/L)   Analysis Run 1/8/2020 2:42 PM

Columbia Energy Center   Client: SCS Engineers   Data: Input -191203

	MW-301 (bg)	MW-309	MW-310	MW-311	MW-84A (bg)
12/22/2015	3.7 (J)				4.9
4/5/2016	4				4.7
7/8/2016	3.5 (J)				5.1
10/13/2016	2.2				4.3
12/29/2016	2 (J)				4.7
1/25/2017	1.5 (J)				4.6
4/11/2017	2				4.9
6/6/2017	3.5				5.5
8/8/2017	5.5				5.5
10/23/2017	4				
10/24/2017					5.1
2/21/2018		147	19.8	2.9	
3/23/2018		157	21.7	2.7	
4/23/2018		157	22.1	2.6	
4/25/2018	2.3				4.8
5/24/2018		141	68.6	3.5	
6/23/2018		203	59.8	3	
7/23/2018		557	118	2 (J)	
8/8/2018	5.2				4.9
8/22/2018		811	139	2 (J)	
9/21/2018		329	152	3.9	
10/24/2018	3.2				4.2
4/2/2019	0.79 (J)	145	76	1.9 (J)	
4/3/2019					3.6
10/8/2019		43.2	190	1.5 (J)	
10/9/2019	1.7 (J)				3.9

Sanitas™ v.9.6.24 Software licensed to SCS Engineers. UG



Constituent: Field pH   Analysis Run 1/8/2020 2:40 PM

Columbia Energy Center   Client: SCS Engineers   Data: Input -191203

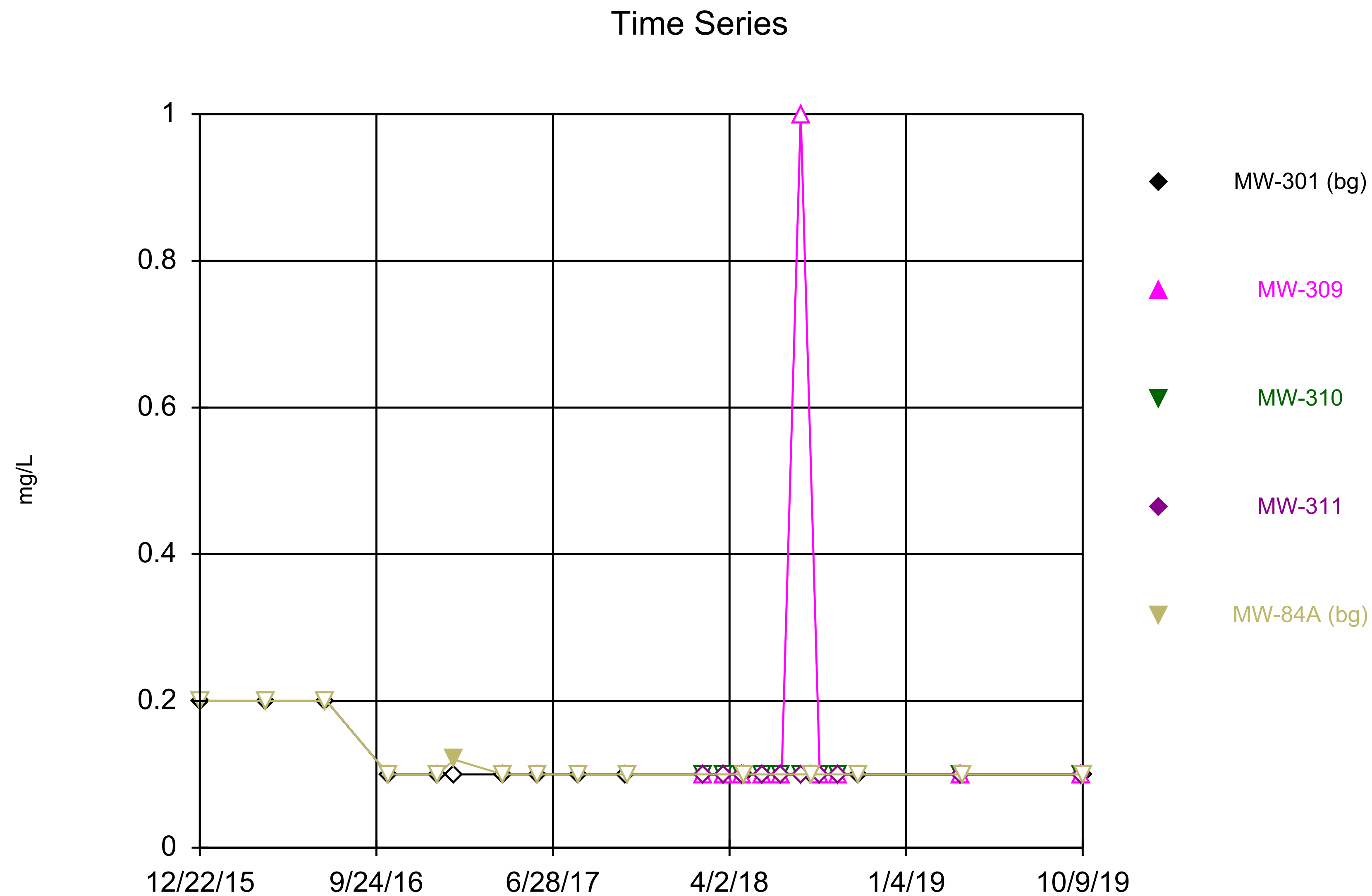
Time Series

Constituent: Field pH (Std. Units) Analysis Run 1/8/2020 2:42 PM

Columbia Energy Center Client: SCS Engineers Data: Input -191203

	MW-301 (bg)	MW-309	MW-310	MW-311	MW-84A (bg)
12/22/2015	6.85				7.6
4/5/2016	7.01				7.61
7/8/2016	6.87				7.45
7/28/2016					7.34
10/13/2016	7.28				7.91
12/29/2016	6.63				7.25
1/25/2017	7.1				6.99
4/11/2017	7.11				7.8
6/6/2017	6.7				7.28
8/8/2017	6.75				7.23
10/23/2017	7.37				
10/24/2017					7.68
2/21/2018		7.84	7.85	7.72	
3/23/2018		8.08	8.06	7.93	
4/23/2018		7.71	7.75	7.62	
4/25/2018	6.76				7.45
5/24/2018		7.59	7.74	7.54	
6/23/2018		7.5	7.82	7.65	
7/23/2018		7.55	7.81	7.59	
8/8/2018	6.91				7.38
8/22/2018		7.53	7.77	7.6	
9/21/2018		7.83	7.98	7.95	
10/22/2018		7.56	7.7	7.5	
10/24/2018	6.79				7.24
4/2/2019	6.62	7.49	9.79 (R)	7.51	
4/3/2019					7.03
6/12/2019			7.82		
10/8/2019		7.75	7.82	7.69	
10/9/2019	6.67				7.23
12/23/2019			7.7		

Sanitas™ v.9.6.24 Software licensed to SCS Engineers. UG
Hollow symbols indicate censored values.



Constituent: Fluoride Analysis Run 1/8/2020 2:40 PM

Columbia Energy Center Client: SCS Engineers Data: Input -191203

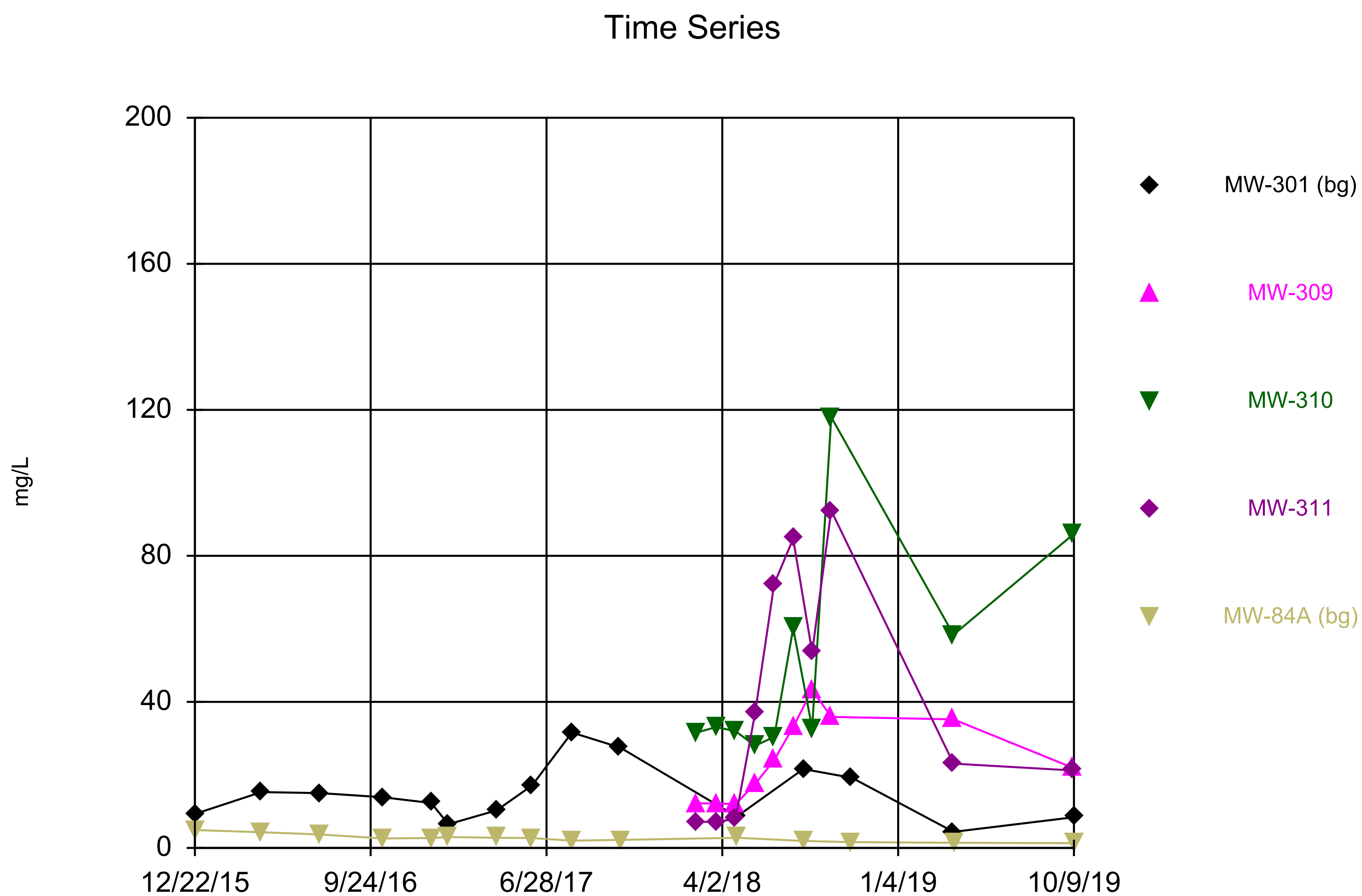
Time Series

Constituent: Fluoride (mg/L) Analysis Run 1/8/2020 2:42 PM

Columbia Energy Center Client: SCS Engineers Data: Input -191203

	MW-301 (bg)	MW-309	MW-310	MW-311	MW-84A (bg)
12/22/2015	<0.2				<0.2
4/5/2016	<0.2				<0.2
7/8/2016	<0.2				<0.2
10/13/2016	<0.1				<0.1
12/29/2016	<0.1				<0.1
1/25/2017	<0.1				0.12 (J)
4/11/2017	<0.1				<0.1
6/6/2017	<0.1				<0.1
8/8/2017	<0.1				<0.1
10/23/2017	<0.1				
10/24/2017					<0.1
2/21/2018		<0.1	<0.1	<0.1	
3/23/2018		<0.1	<0.1	<0.1	
4/23/2018		<0.1	<0.1	<0.1	
4/25/2018	<0.1				<0.1
5/24/2018		<0.1	<0.1	<0.1	
6/23/2018		<0.1	<0.1	<0.1	
7/23/2018		<1	<0.1	<0.1	
8/8/2018	<0.1				<0.1
8/22/2018		<0.1	<0.1	<0.1	
9/21/2018		<0.1	<0.1	<0.1	
10/24/2018	<0.1				<0.1
4/2/2019	<0.1	<0.1	<0.1	<0.1	
4/3/2019					<0.1
10/8/2019		<0.1	<0.1	<0.1	
10/9/2019	<0.1				<0.1

Sanitas™ v.9.6.24 Software licensed to SCS Engineers. UG



Constituent: Sulfate   Analysis Run 1/8/2020 2:40 PM

Columbia Energy Center   Client: SCS Engineers   Data: Input -191203

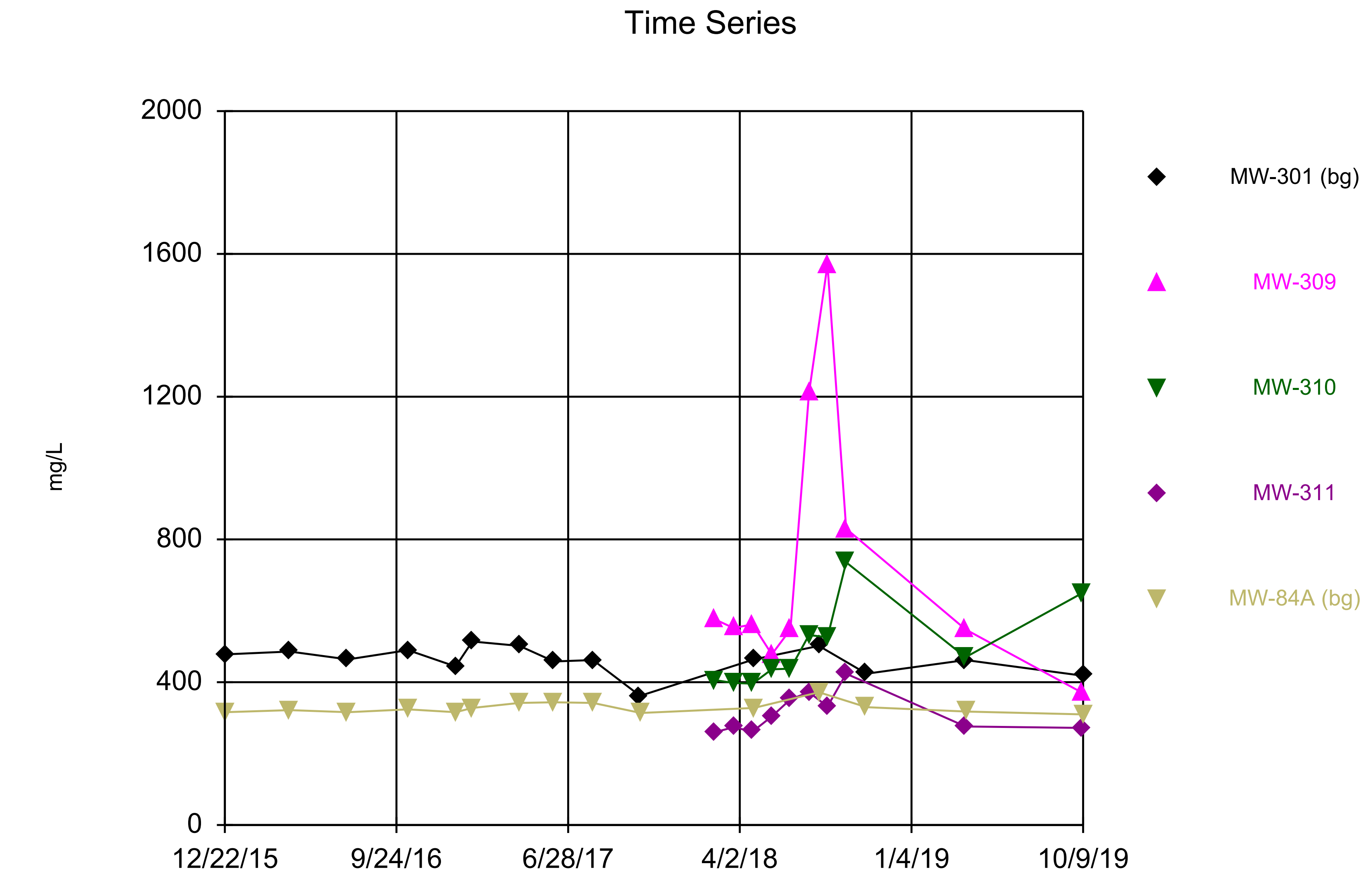
Time Series

Constituent: Sulfate (mg/L) Analysis Run 1/8/2020 2:42 PM

Columbia Energy Center Client: SCS Engineers Data: Input -191203

	MW-301 (bg)	MW-309	MW-310	MW-311	MW-84A (bg)
12/22/2015	9.3				4.9
4/5/2016	15.3				4.3
7/8/2016	15				3.7 (J)
10/13/2016	13.9				2.6 (J)
12/29/2016	12.3 (J)				2.7 (J)
1/25/2017	6.5				3
4/11/2017	10.3				2.8 (J)
6/6/2017	17.1				2.7 (J)
8/8/2017	31.6				2 (J)
10/23/2017	27.5				
10/24/2017					2.2 (J)
2/21/2018		12.2	31.6	7.1	
3/23/2018		12.2	33.1	7.2	
4/23/2018		12	32	7.9	
4/25/2018	8.6				2.8 (J)
5/24/2018		17.5	28	36.9	
6/23/2018		24.1	30.4	72.3	
7/23/2018		33.1	60.2	84.7	
8/8/2018	21.6				1.9 (J)
8/22/2018		43.3	32.8	53.6	
9/21/2018		35.9	118	92.4	
10/24/2018	19.2				1.6 (J)
4/2/2019	4.4	35.2	58.4	23.1	
4/3/2019					1.4 (J)
10/8/2019		21.9	85.9	21.2	
10/9/2019	8.4				1.3 (J)

Sanitas™ v.9.6.24 Software licensed to SCS Engineers. UG



Constituent: Total Dissolved Solids Analysis Run 1/8/2020 2:40 PM

Columbia Energy Center Client: SCS Engineers Data: Input -191203

Time Series

Constituent: Total Dissolved Solids (mg/L)   Analysis Run 1/8/2020 2:42 PM

Columbia Energy Center   Client: SCS Engineers   Data: Input -191203

	MW-301 (bg)	MW-309	MW-310	MW-311	MW-84A (bg)
12/22/2015	478				316
4/5/2016	486				322
7/8/2016	464				316
10/13/2016	490				324
12/29/2016	444				316
1/25/2017	514				328
4/11/2017	502				342
6/6/2017	458				344
8/8/2017	462				342
10/23/2017	362				
10/24/2017					314
2/21/2018		576	406	260	
3/23/2018		552	398	274	
4/23/2018		562	396	262	
4/25/2018	464				328
5/24/2018		478	436	304	
6/23/2018		548	438	352	
7/23/2018		1210	532	372	
8/8/2018	502				372
8/22/2018		1570	526	332	
9/21/2018		830	736	424	
10/24/2018	424				330
4/2/2019	462	548	470	276	
4/3/2019					318
10/8/2019		370	650	272	
10/9/2019	418				310

Attachment B

Outlier Analysis

Outlier Analysis

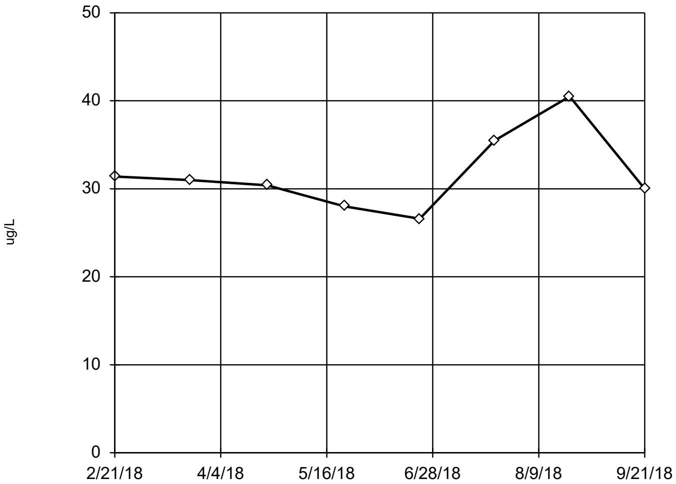
Columbia Energy Center   Client: SCS Engineers   Data: Input -191203   Printed 12/12/2019, 4:31 PM

Constituent	Well	Outlier	Value(s)	Date(s)	Method	Alpha	N	Mean	Std. Dev.	Distribution	Normality Test
Boron (ug/L)	MW-309	No	n/a	n/a	EPA 1989	0.05	8	31.68	4.42	normal	ShapiroWilk
Boron (ug/L)	MW-310	No	n/a	n/a	Dixon`s	0.05	8	65.56	6.87	normal	ShapiroWilk
Boron (ug/L)	MW-311	No	n/a	n/a	EPA 1989	0.05	8	35.23	6.1	normal	ShapiroWilk
Calcium (ug/L)	MW-309	No	n/a	n/a	EPA 1989	0.05	8	57125	17960	normal	ShapiroWilk
Calcium (ug/L)	MW-310	No	n/a	n/a	NP (nrm)	NaN	8	37113	7486	unknown	ShapiroWilk
Calcium (ug/L)	MW-311	No	n/a	n/a	EPA 1989	0.05	8	65838	7714	normal	ShapiroWilk
Chloride (mg/L)	MW-309	No	n/a	n/a	EPA 1989	0.05	8	312.8	246.6	ln(x)	ShapiroWilk
Chloride (mg/L)	MW-310	No	n/a	n/a	EPA 1989	0.05	8	75.13	54.55	normal	ShapiroWilk
Chloride (mg/L)	MW-311	No	n/a	n/a	EPA 1989	0.05	8	2.825	0.6628	normal	ShapiroWilk
Field pH (Std. Units)	MW-309	No	n/a	n/a	EPA 1989	0.05	8	7.704	0.2016	normal	ShapiroWilk
Field pH (Std. Units)	MW-310	No	n/a	n/a	EPA 1989	0.05	8	7.848	0.1146	normal	ShapiroWilk
Field pH (Std. Units)	MW-311	No	n/a	n/a	EPA 1989	0.05	8	7.7	0.1569	normal	ShapiroWilk
Fluoride (mg/L)	MW-309	n/a	n/a	n/a	NP (nrm)	NaN	8	0.2125	0.3182	unknown	ShapiroWilk
Fluoride (mg/L)	MW-310	n/a	n/a	n/a	NP (nrm)	NaN	8	0.1	0	unknown	ShapiroWilk
Fluoride (mg/L)	MW-311	n/a	n/a	n/a	NP (nrm)	NaN	8	0.1	0	unknown	ShapiroWilk
Sulfate (mg/L)	MW-309	No	n/a	n/a	EPA 1989	0.05	8	23.79	12.31	normal	ShapiroWilk
Sulfate (mg/L)	**MW-310**	**Yes**	**60.2,118**	**7/23/2018...**	**Dixon`s**	**0.05**	**8**	**45.76**	**30.93**	**normal**	**ShapiroWilk**
Sulfate (mg/L)	MW-311	No	n/a	n/a	EPA 1989	0.05	8	45.26	35.75	normal	ShapiroWilk
Total Dissolved Solids (mg/L)	MW-309	No	n/a	n/a	EPA 1989	0.05	8	790.8	395.8	ln(x)	ShapiroWilk
Total Dissolved Solids (mg/L)	**MW-310**	**Yes**	**736**	**9/21/2018**	**Dixon`s**	**0.05**	**8**	**483.5**	**115.4**	**normal**	**ShapiroWilk**
Total Dissolved Solids (mg/L)	MW-311	No	n/a	n/a	EPA 1989	0.05	8	322.5	58.52	normal	ShapiroWilk

Sanitas™ v.9.6.24 Software licensed to SCS Engineers. EPA

EPA Screening (suspected outliers for Dixon's Test)

MW-309



n = 8

Dixon's will not be run.
No suspect values identified
or unable to establish
suspect values.
Mean 31.68, std. dev.
4.42, critical Tn 2.032

Normality test used:
Shapiro Wilk@alpha = 0.05
Calculated = 0.8951
Critical = 0.818
The distribution was found
to be normally distrib-
uted.

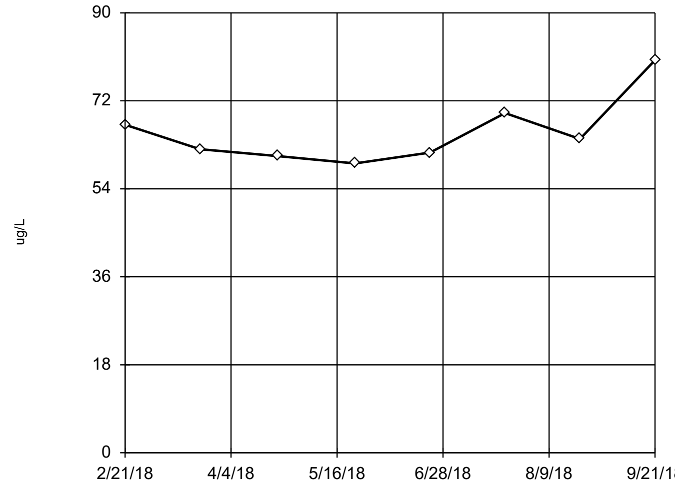
Constituent: Boron   Analysis Run 12/12/2019 4:30 PM

Columbia Energy Center   Client: SCS Engineers   Data: Input -191203

Sanitas™ v.9.6.24 Software licensed to SCS Engineers. EPA

Dixon's Outlier Test

MW-310



n = 8

No statistical outliers.
Testing for 1 high outlier.
Mean = 65.56.
Std. Dev. = 6.87.
80.3: c = 0.551
tabl = 0.554.
Alpha = 0.05.

Normality test used:
Shapiro Wilk@alpha = 0.05
Calculated = 0.9326
Critical = 0.803
The distribution was found
to be normally distrib-
uted.

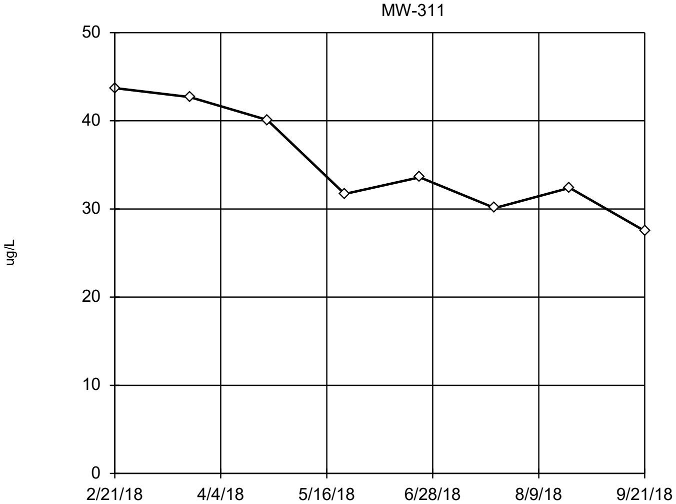
Constituent: Boron   Analysis Run 12/12/2019 4:30 PM

Columbia Energy Center   Client: SCS Engineers   Data: Input -191203

Sanitas™ v.9.6.24 Software licensed to SCS Engineers. EPA

EPA Screening (suspected outliers for Dixon's Test)

MW-311



n = 8

Dixon's will not be run.
No suspect values identified
or unable to establish
suspect values.
Mean 35.23, std. dev.
6.1, critical Tn 2.032

Normality test used:
Shapiro Wilk@alpha = 0.05
Calculated = 0.9014
Critical = 0.818
The distribution was found
to be normally distrib-
uted.

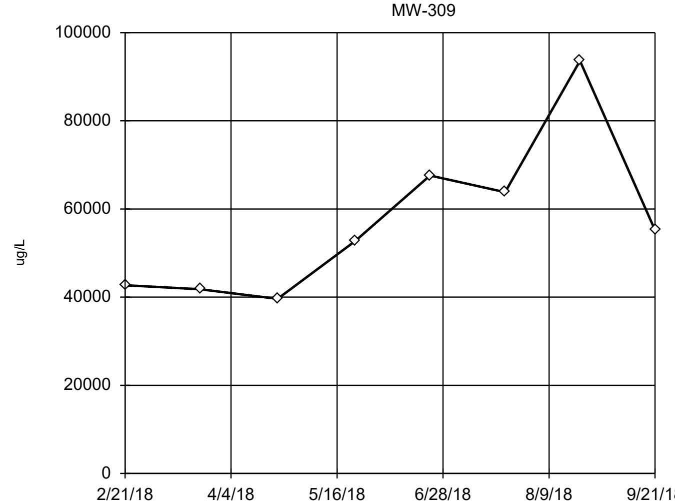
Constituent: Boron   Analysis Run 12/12/2019 4:30 PM

Columbia Energy Center   Client: SCS Engineers   Data: Input -191203

Sanitas™ v.9.6.24 Software licensed to SCS Engineers. EPA

EPA Screening (suspected outliers for Dixon's Test)

MW-309



n = 8

Dixon's will not be run.
No suspect values identified
or unable to establish
suspect values.
Mean 57125, std. dev.
17960, critical Tn 2.032

Normality test used:
Shapiro Wilk@alpha = 0.05
Calculated = 0.8834
Critical = 0.818
The distribution was found
to be normally distrib-
uted.

Constituent: Calcium   Analysis Run 12/12/2019 4:30 PM

Columbia Energy Center   Client: SCS Engineers   Data: Input -191203

EPA 1989 Outlier Screening

Constituent: Boron (ug/L)   Analysis Run 12/12/2019 4:31 PM

Columbia Energy Center   Client: SCS Engineers   Data: Input -191203

	MW-309
2/21/2018	31.4
3/23/2018	31
4/23/2018	30.4
5/24/2018	28
6/23/2018	26.6
7/23/2018	35.5
8/22/2018	40.5
9/21/2018	30

Dixon's Outlier Test

Constituent: Boron (ug/L)   Analysis Run 12/12/2019 4:31 PM

Columbia Energy Center   Client: SCS Engineers   Data: Input -191203

	MW-310
2/21/2018	67.1
3/23/2018	62.1
4/23/2018	60.7
5/24/2018	59.2
6/23/2018	61.4
7/23/2018	69.5
8/22/2018	64.2
9/21/2018	80.3

EPA 1989 Outlier Screening

Constituent: Boron (ug/L) Analysis Run 12/12/2019 4:31 PM

Columbia Energy Center Client: SCS Engineers Data: Input -191203

	MW-311
2/21/2018	43.7
3/23/2018	42.7
4/23/2018	40.1
5/24/2018	31.7
6/23/2018	33.6
7/23/2018	30.1
8/22/2018	32.4
9/21/2018	27.5

EPA 1989 Outlier Screening

Constituent: Calcium (ug/L)   Analysis Run 12/12/2019 4:31 PM

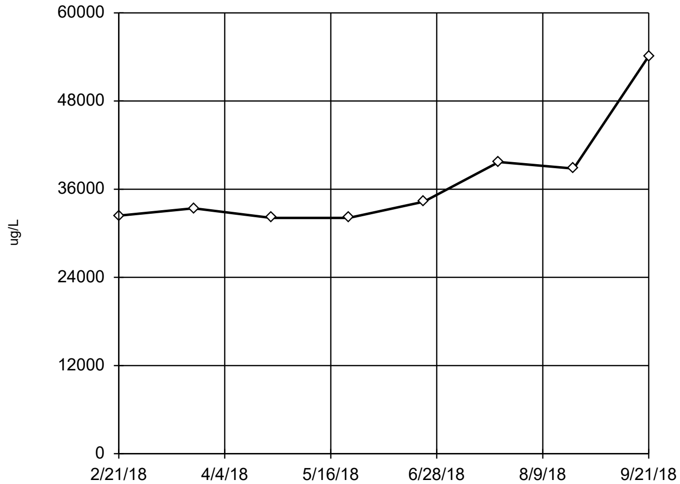
Columbia Energy Center   Client: SCS Engineers   Data: Input -191203

	MW-309
2/21/2018	42700
3/23/2018	41800
4/23/2018	39600
5/24/2018	52700
6/23/2018	67600
7/23/2018	63800
8/22/2018	93600
9/21/2018	55200

Sanitas™ v.9.6.24 Software licensed to SCS Engineers. EPA

Tukey's Outlier Screening

MW-310



n = 8

No outliers found.
Tukey's method used in lieu of parametric test because the Shapiro Wilk normality test failed at the 0.05 alpha level.

High cutoff = 60250, low cutoff = 11250, based on IQR multiplier of 3.

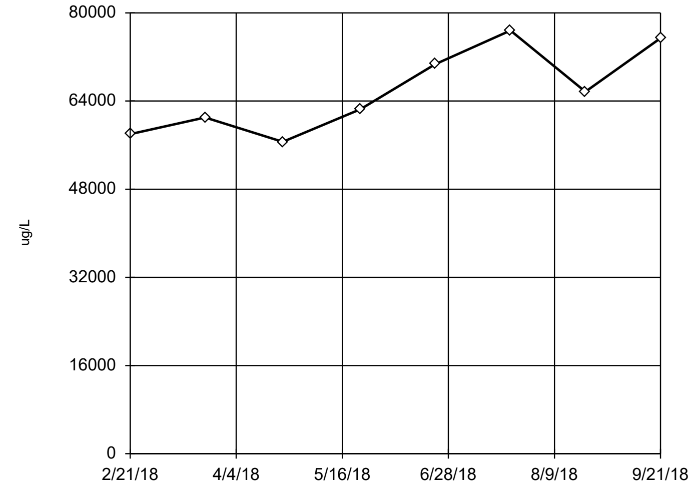
Constituent: Calcium Analysis Run 12/12/2019 4:30 PM

Columbia Energy Center Client: SCS Engineers Data: Input -191203

Sanitas™ v.9.6.24 Software licensed to SCS Engineers. EPA

EPA Screening (suspected outliers for Dixon's Test)

MW-311



n = 8

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 65838, std. dev. 7714, critical Tn 2.032

Normality test used:
Shapiro Wilk@alpha = 0.05
Calculated = 0.9222
Critical = 0.818
The distribution was found to be normally distributed.

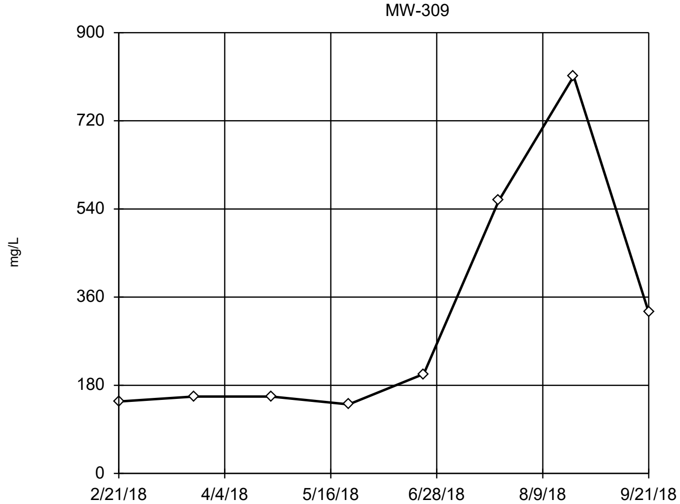
Constituent: Calcium Analysis Run 12/12/2019 4:30 PM

Columbia Energy Center Client: SCS Engineers Data: Input -191203

Sanitas™ v.9.6.24 Software licensed to SCS Engineers. EPA

EPA Screening (suspected outliers for Dixon's Test)

MW-309



n = 8

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 312.8, std. dev. 246.6, critical Tn 2.032

Normality test used:
Shapiro Wilk@alpha = 0.05
Calculated = 0.8269
Critical = 0.818 (after natural log transformation)
The distribution was found to be log-normal.

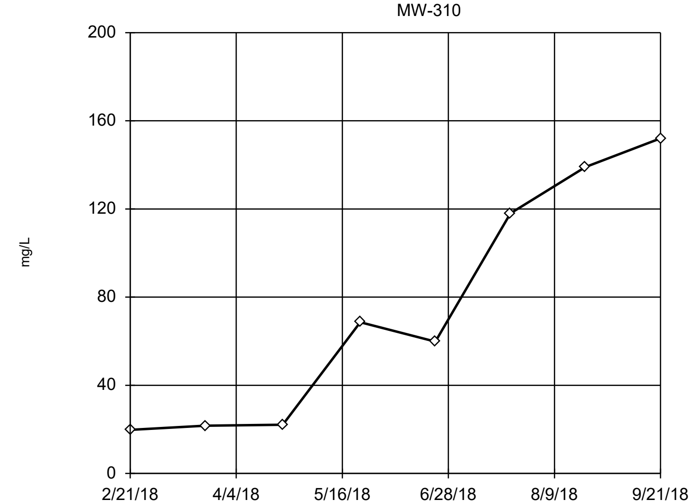
Constituent: Chloride Analysis Run 12/12/2019 4:30 PM

Columbia Energy Center Client: SCS Engineers Data: Input -191203

Sanitas™ v.9.6.24 Software licensed to SCS Engineers. EPA

EPA Screening (suspected outliers for Dixon's Test)

MW-310



n = 8

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 75.13, std. dev. 54.55, critical Tn 2.032

Normality test used:
Shapiro Wilk@alpha = 0.05
Calculated = 0.8662
Critical = 0.818
The distribution was found to be normally distributed.

Constituent: Chloride Analysis Run 12/12/2019 4:30 PM

Columbia Energy Center Client: SCS Engineers Data: Input -191203

Tukey's Outlier Screening

Constituent: Calcium (ug/L) Analysis Run 12/12/2019 4:31 PM

Columbia Energy Center Client: SCS Engineers Data: Input -191203

	MW-310
2/21/2018	32400
3/23/2018	33400
4/23/2018	32100
5/24/2018	32100
6/23/2018	34300
7/23/2018	39700
8/22/2018	38800
9/21/2018	54100

EPA 1989 Outlier Screening

Constituent: Calcium (ug/L) Analysis Run 12/12/2019 4:31 PM

Columbia Energy Center Client: SCS Engineers Data: Input -191203

	MW-311
2/21/2018	58000
3/23/2018	61000
4/23/2018	56600
5/24/2018	62500
6/23/2018	70700
7/23/2018	76800
8/22/2018	65700
9/21/2018	75400

EPA 1989 Outlier Screening

Constituent: Chloride (mg/L)   Analysis Run 12/12/2019 4:31 PM

Columbia Energy Center   Client: SCS Engineers   Data: Input -191203

	MW-309
2/21/2018	147
3/23/2018	157
4/23/2018	157
5/24/2018	141
6/23/2018	203
7/23/2018	557
8/22/2018	811
9/21/2018	329

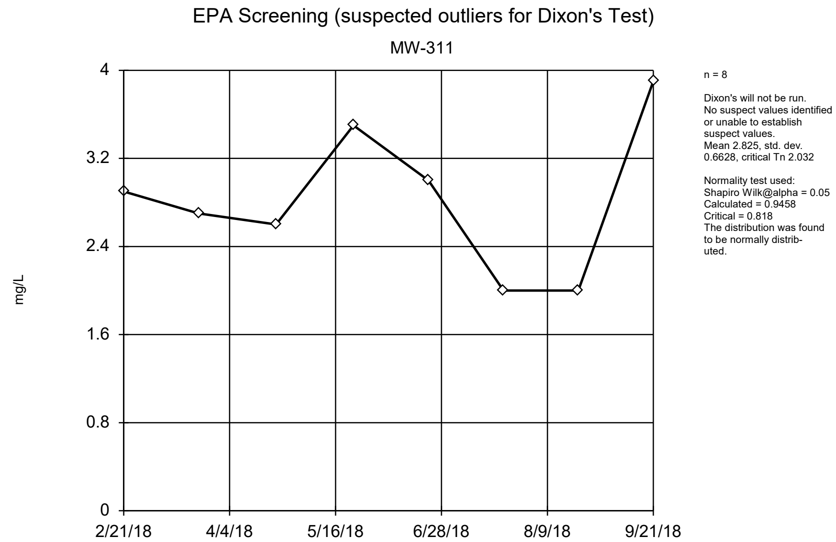
EPA 1989 Outlier Screening

Constituent: Chloride (mg/L)   Analysis Run 12/12/2019 4:31 PM

Columbia Energy Center   Client: SCS Engineers   Data: Input -191203

	MW-310
2/21/2018	19.8
3/23/2018	21.7
4/23/2018	22.1
5/24/2018	68.6
6/23/2018	59.8
7/23/2018	118
8/22/2018	139
9/21/2018	152

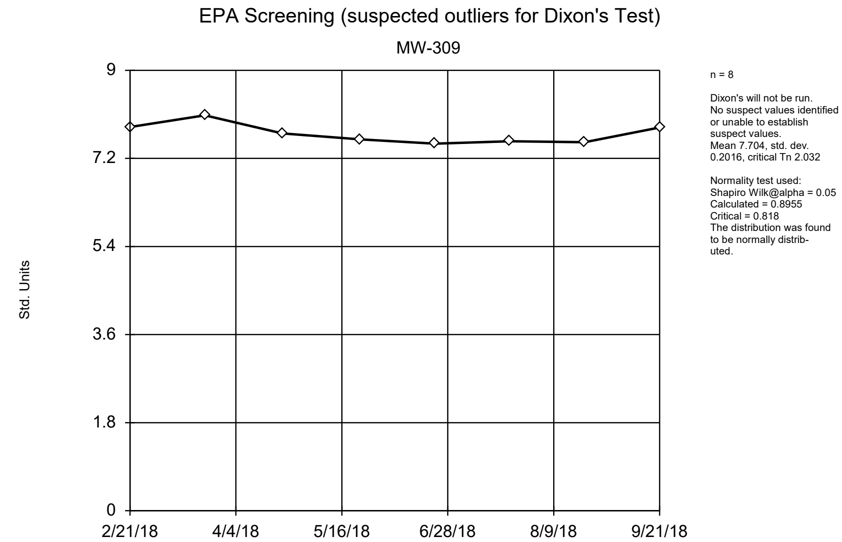
Sanitas™ v.9.6.24 Software licensed to SCS Engineers. EPA



Constituent: Chloride   Analysis Run 12/12/2019 4:30 PM

Columbia Energy Center   Client: SCS Engineers   Data: Input -191203

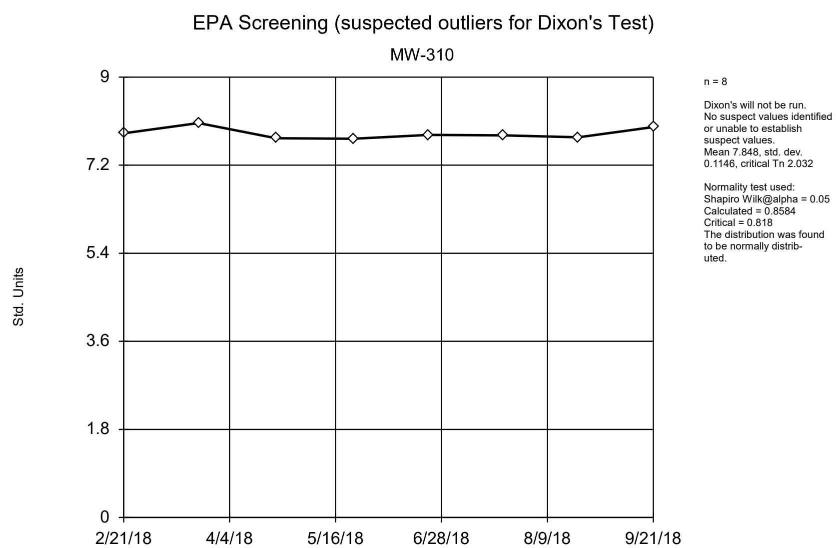
Sanitas™ v.9.6.24 Software licensed to SCS Engineers. EPA



Constituent: Field pH   Analysis Run 12/12/2019 4:30 PM

Columbia Energy Center   Client: SCS Engineers   Data: Input -191203

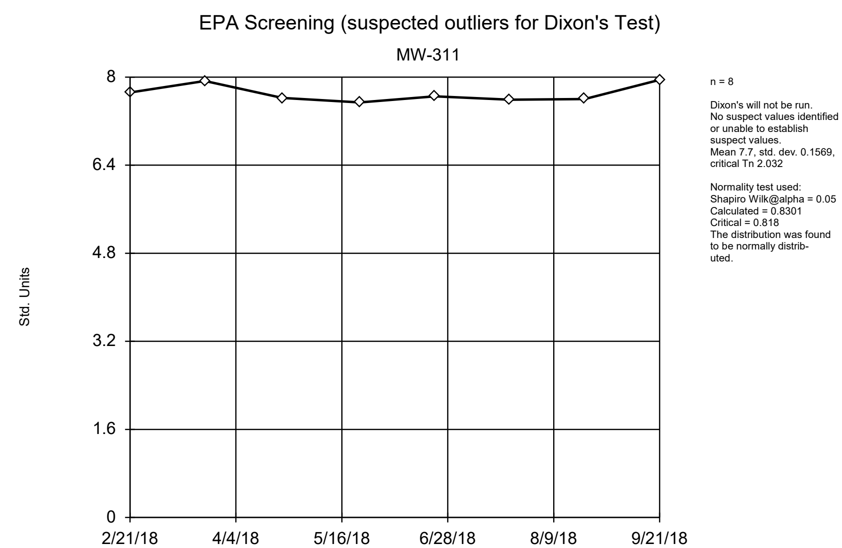
Sanitas™ v.9.6.24 Software licensed to SCS Engineers. EPA



Constituent: Field pH   Analysis Run 12/12/2019 4:30 PM

Columbia Energy Center   Client: SCS Engineers   Data: Input -191203

Sanitas™ v.9.6.24 Software licensed to SCS Engineers. EPA



Constituent: Field pH   Analysis Run 12/12/2019 4:30 PM

Columbia Energy Center   Client: SCS Engineers   Data: Input -191203

EPA 1989 Outlier Screening

Constituent: Chloride (mg/L) Analysis Run 12/12/2019 4:31 PM

Columbia Energy Center Client: SCS Engineers Data: Input -191203

	MW-311
2/21/2018	2.9
3/23/2018	2.7
4/23/2018	2.6
5/24/2018	3.5
6/23/2018	3
7/23/2018	2 (J)
8/22/2018	2 (J)
9/21/2018	3.9

EPA 1989 Outlier Screening

Constituent: Field pH (Std. Units)   Analysis Run 12/12/2019 4:31 PM

Columbia Energy Center   Client: SCS Engineers   Data: Input -191203

	MW-309
2/21/2018	7.84
3/23/2018	8.08
4/23/2018	7.71
5/24/2018	7.59
6/23/2018	7.5
7/23/2018	7.55
8/22/2018	7.53
9/21/2018	7.83

EPA 1989 Outlier Screening

Constituent: Field pH (Std. Units)   Analysis Run 12/12/2019 4:31 PM

Columbia Energy Center   Client: SCS Engineers   Data: Input -191203

	MW-310
2/21/2018	7.85
3/23/2018	8.06
4/23/2018	7.75
5/24/2018	7.74
6/23/2018	7.82
7/23/2018	7.81
8/22/2018	7.77
9/21/2018	7.98

EPA 1989 Outlier Screening

Constituent: Field pH (Std. Units)   Analysis Run 12/12/2019 4:31 PM

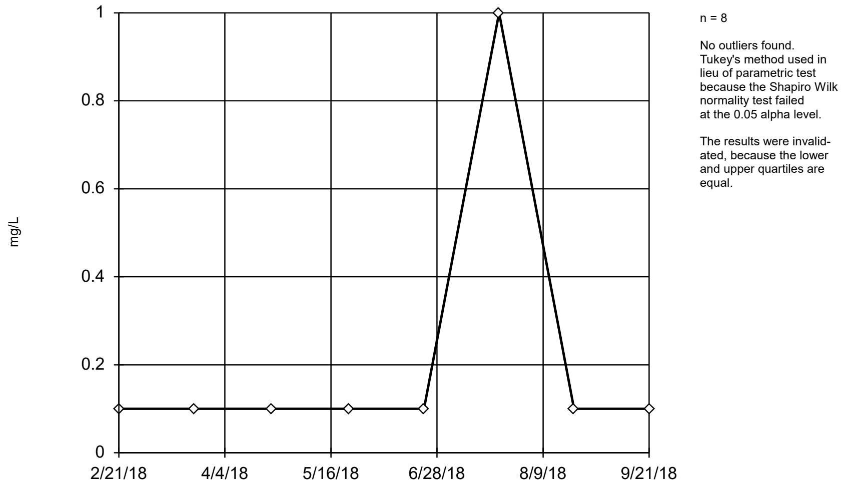
Columbia Energy Center   Client: SCS Engineers   Data: Input -191203

	MW-311
2/21/2018	7.72
3/23/2018	7.93
4/23/2018	7.62
5/24/2018	7.54
6/23/2018	7.65
7/23/2018	7.59
8/22/2018	7.6
9/21/2018	7.95

Sanitas™ v.9.6.24 Software licensed to SCS Engineers. EPA

Tukey's Outlier Screening

MW-309



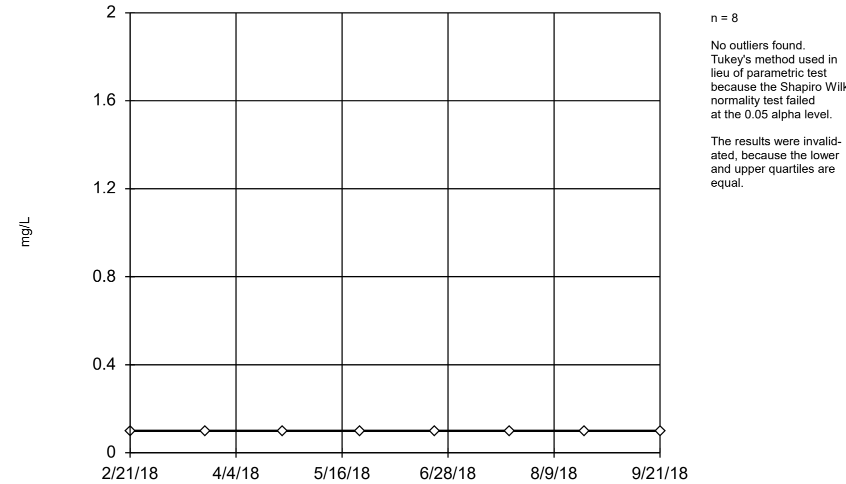
Constituent: Fluoride Analysis Run 12/12/2019 4:30 PM

Columbia Energy Center Client: SCS Engineers Data: Input -191203

Sanitas™ v.9.6.24 Software licensed to SCS Engineers. EPA

Tukey's Outlier Screening

MW-310



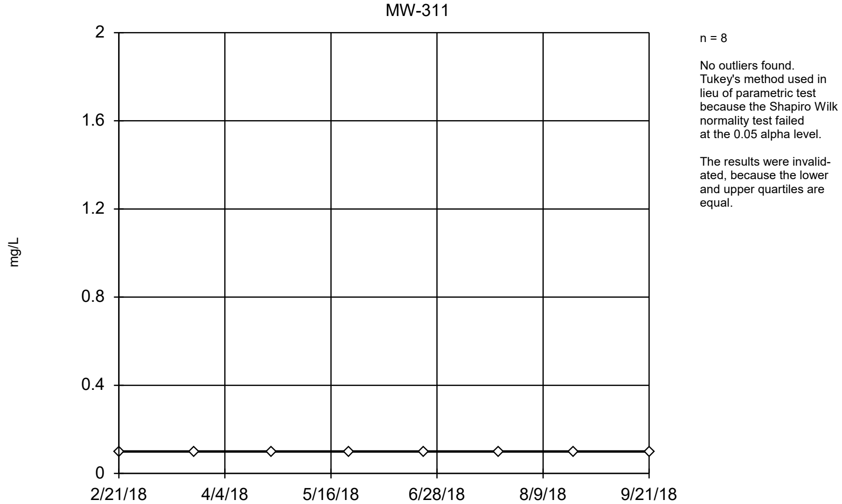
Constituent: Fluoride Analysis Run 12/12/2019 4:30 PM

Columbia Energy Center Client: SCS Engineers Data: Input -191203

Sanitas™ v.9.6.24 Software licensed to SCS Engineers. EPA

Tukey's Outlier Screening

MW-311



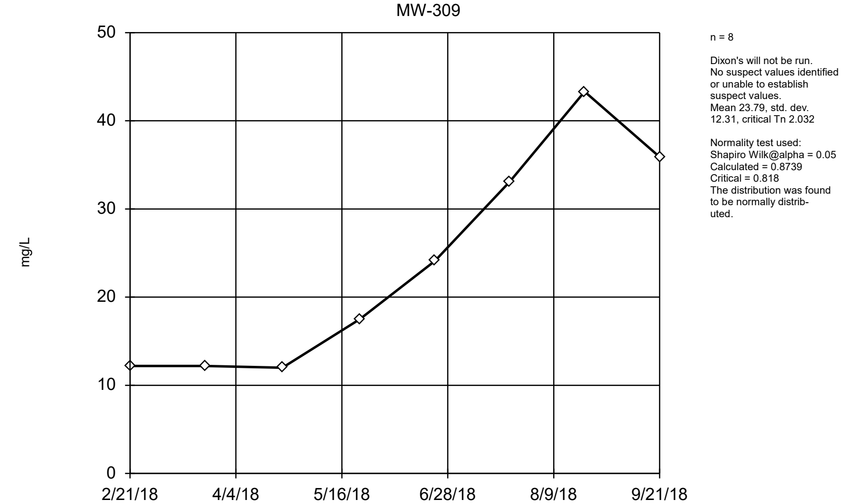
Constituent: Fluoride Analysis Run 12/12/2019 4:30 PM

Columbia Energy Center Client: SCS Engineers Data: Input -191203

Sanitas™ v.9.6.24 Software licensed to SCS Engineers. EPA

EPA Screening (suspected outliers for Dixon's Test)

MW-309



Constituent: Sulfate Analysis Run 12/12/2019 4:30 PM

Columbia Energy Center Client: SCS Engineers Data: Input -191203

Tukey's Outlier Screening

Constituent: Fluoride (mg/L)   Analysis Run 12/12/2019 4:31 PM

Columbia Energy Center   Client: SCS Engineers   Data: Input -191203

	MW-309
2/21/2018	<0.1
3/23/2018	<0.1
4/23/2018	<0.1
5/24/2018	<0.1
6/23/2018	<0.1
7/23/2018	<1
8/22/2018	<0.1
9/21/2018	<0.1

Tukey's Outlier Screening

Constituent: Fluoride (mg/L)   Analysis Run 12/12/2019 4:31 PM

Columbia Energy Center   Client: SCS Engineers   Data: Input -191203

	MW-310
2/21/2018	<0.1
3/23/2018	<0.1
4/23/2018	<0.1
5/24/2018	<0.1
6/23/2018	<0.1
7/23/2018	<0.1
8/22/2018	<0.1
9/21/2018	<0.1

Tukey's Outlier Screening

Constituent: Fluoride (mg/L)   Analysis Run 12/12/2019 4:31 PM

Columbia Energy Center   Client: SCS Engineers   Data: Input -191203

	MW-311
2/21/2018	<0.1
3/23/2018	<0.1
4/23/2018	<0.1
5/24/2018	<0.1
6/23/2018	<0.1
7/23/2018	<0.1
8/22/2018	<0.1
9/21/2018	<0.1

EPA 1989 Outlier Screening

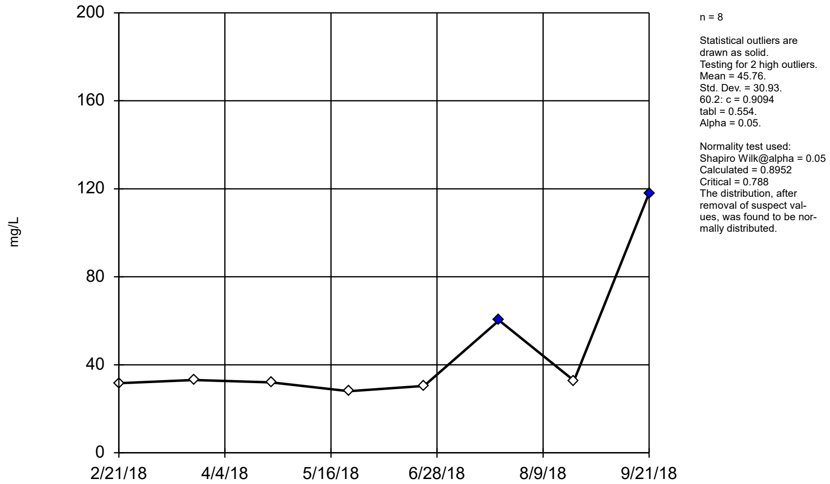
Constituent: Sulfate (mg/L)   Analysis Run 12/12/2019 4:31 PM

Columbia Energy Center   Client: SCS Engineers   Data: Input -191203

	MW-309
2/21/2018	12.2
3/23/2018	12.2
4/23/2018	12
5/24/2018	17.5
6/23/2018	24.1
7/23/2018	33.1
8/22/2018	43.3
9/21/2018	35.9

Dixon's Outlier Test

MW-310

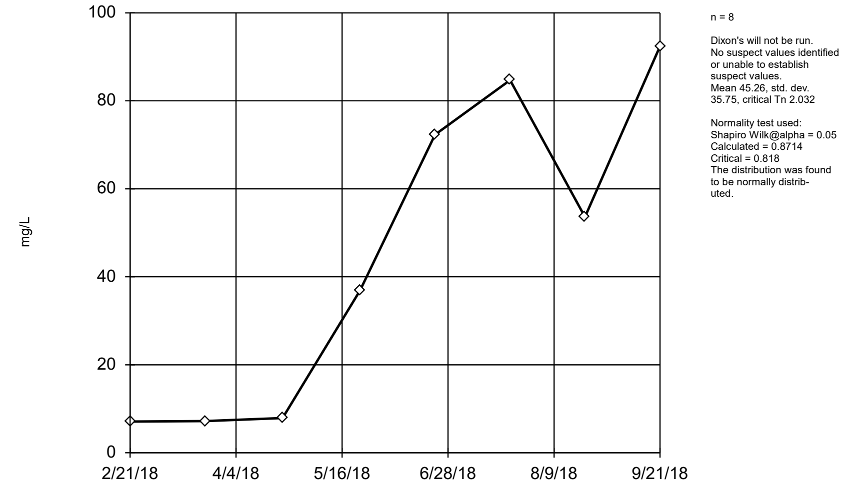


Constituent: Sulfate   Analysis Run 12/12/2019 4:30 PM

Columbia Energy Center   Client: SCS Engineers   Data: Input -191203

EPA Screening (suspected outliers for Dixon's Test)

MW-311

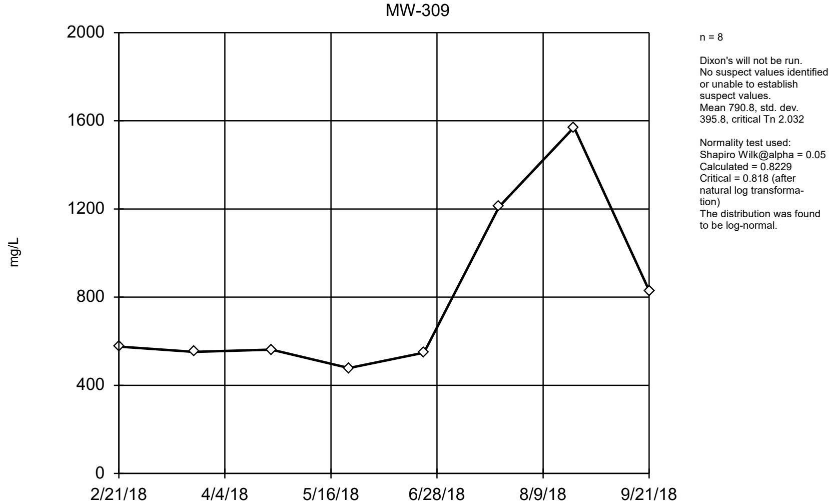


Constituent: Sulfate   Analysis Run 12/12/2019 4:30 PM

Columbia Energy Center   Client: SCS Engineers   Data: Input -191203

EPA Screening (suspected outliers for Dixon's Test)

MW-309

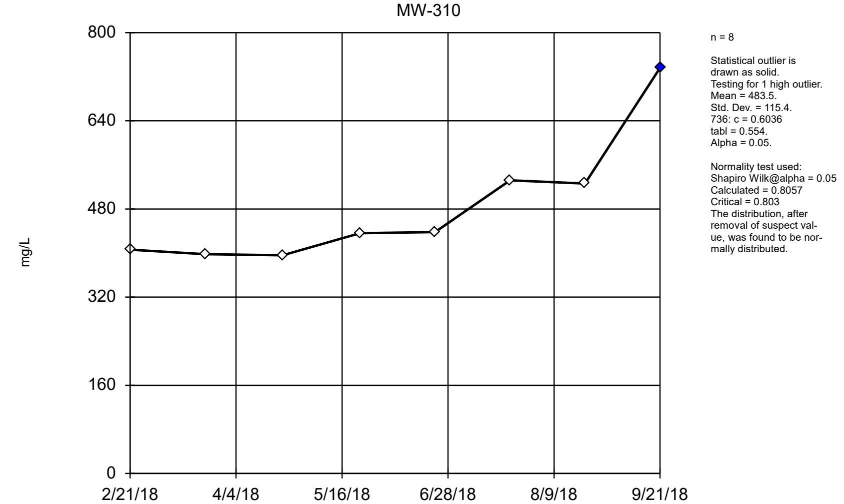


Constituent: Total Dissolved Solids   Analysis Run 12/12/2019 4:30 PM

Columbia Energy Center   Client: SCS Engineers   Data: Input -191203

Dixon's Outlier Test

MW-310



Constituent: Total Dissolved Solids   Analysis Run 12/12/2019 4:30 PM

Columbia Energy Center   Client: SCS Engineers   Data: Input -191203

Dixon's Outlier Test

Constituent: Sulfate (mg/L)   Analysis Run 12/12/2019 4:31 PM

Columbia Energy Center   Client: SCS Engineers   Data: Input -191203

	MW-310
2/21/2018	31.6
3/23/2018	33.1
4/23/2018	32
5/24/2018	28
6/23/2018	30.4
7/23/2018	60.2 (O)
8/22/2018	32.8
9/21/2018	118 (O)

EPA 1989 Outlier Screening

Constituent: Sulfate (mg/L)   Analysis Run 12/12/2019 4:31 PM

Columbia Energy Center   Client: SCS Engineers   Data: Input -191203

	MW-311
2/21/2018	7.1
3/23/2018	7.2
4/23/2018	7.9
5/24/2018	36.9
6/23/2018	72.3
7/23/2018	84.7
8/22/2018	53.6
9/21/2018	92.4

EPA 1989 Outlier Screening

Constituent: Total Dissolved Solids (mg/L)   Analysis Run 12/12/2019 4:31 PM

Columbia Energy Center   Client: SCS Engineers   Data: Input -191203

	MW-309
2/21/2018	576
3/23/2018	552
4/23/2018	562
5/24/2018	478
6/23/2018	548
7/23/2018	1210
8/22/2018	1570
9/21/2018	830

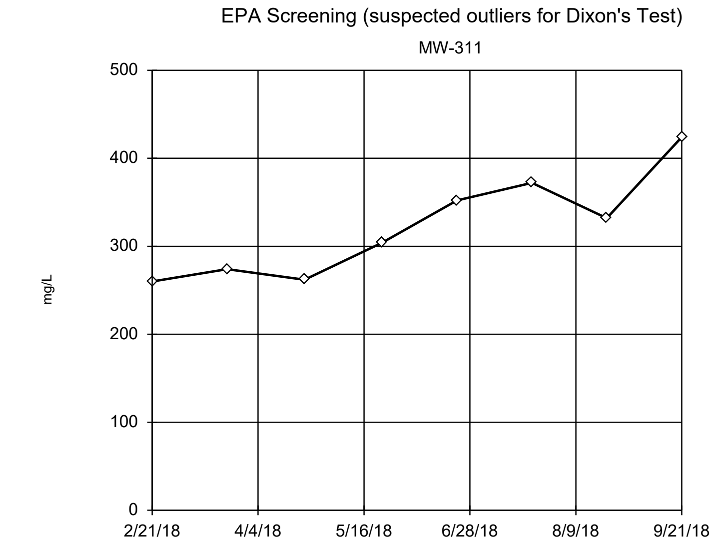
Dixon's Outlier Test

Constituent: Total Dissolved Solids (mg/L)   Analysis Run 12/12/2019 4:31 PM

Columbia Energy Center   Client: SCS Engineers   Data: Input -191203

	MW-310
2/21/2018	406
3/23/2018	398
4/23/2018	396
5/24/2018	436
6/23/2018	438
7/23/2018	532
8/22/2018	526
9/21/2018	736 (O)

Sanitas™ v.9.6.24 Software licensed to SCS Engineers. EPA



n = 8

Dixon's will not be run.
No suspect values identified or unable to establish suspect values.
Mean 322.5, std. dev. 58.52, critical Tn 2.032

Normality test used:
Shapiro Wilk@alpha = 0.05
Calculated = 0.9288
Critical = 0.818
The distribution was found to be normally distributed.

Constituent: Total Dissolved Solids Analysis Run 12/12/2019 4:30 PM
Columbia Energy Center Client: SCS Engineers Data: Input -191203

EPA 1989 Outlier Screening

Constituent: Total Dissolved Solids (mg/L)   Analysis Run 12/12/2019 4:31 PM

Columbia Energy Center   Client: SCS Engineers   Data: Input -191203

	MW-311
2/21/2018	260
3/23/2018	274
4/23/2018	262
5/24/2018	304
6/23/2018	352
7/23/2018	372
8/22/2018	332
9/21/2018	424

Attachment C

Intrawell Prediction Limit Analysis

Intrawell Prediction Limit

Columbia Energy Center Client: SCS Engineers Data: Input -191203 Printed 1/8/2020, 2:08 PM

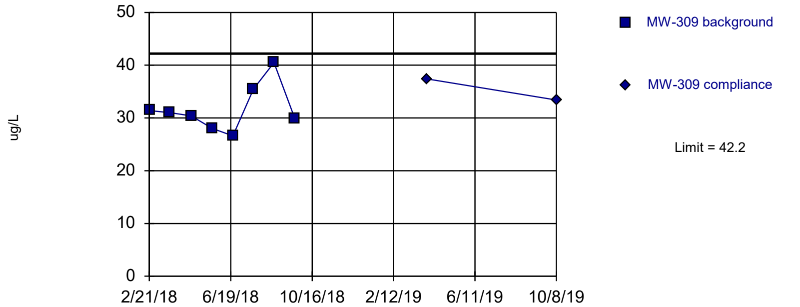
Constituent	Well	Upper Lim.	Lower Lim.	Date	Observ.	Sig.	Bg N	Bg Wells	Bg Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Boron (ug/L)	MW-309	42.2	n/a	10/8/2019	33.4	No	8	n/a	31.68	4.42	0	None	No	0.002922	Param 1 of 2
Boron (ug/L)	MW-310	81.9	n/a	10/8/2019	81.8	No	8	n/a	65.56	6.87	0	None	No	0.002922	Param 1 of 2
Boron (ug/L)	MW-311	49.8	n/a	10/8/2019	33.5	No	8	n/a	35.23	6.1	0	None	No	0.002922	Param 1 of 2
Calcium (ug/L)	MW-309	99900	n/a	10/8/2019	46900	No	8	n/a	57125	17960	0	None	No	0.002922	Param 1 of 2
Calcium (ug/L)	MW-310	56000	n/a	12/23/2019	55400	No	8	n/a	10.51	0.1791	0	None	ln(x)	0.002922	Param 1 of 2
Calcium (ug/L)	MW-311	84200	n/a	10/8/2019	63900	No	8	n/a	65838	7714	0	None	No	0.002922	Param 1 of 2
Chloride (mg/L)	MW-309	901	n/a	10/8/2019	43.2	No	8	n/a	312.8	246.6	0	None	No	0.002922	Param 1 of 2
Chloride (mg/L)	MW-310	205	n/a	10/8/2019	190	No	8	n/a	75.13	54.55	0	None	No	0.002922	Param 1 of 2
Chloride (mg/L)	MW-311	4.41	n/a	10/8/2019	1.5	No	8	n/a	2.825	0.6628	0	None	No	0.002922	Param 1 of 2
Field pH (Std. Units)	MW-309	8.18	7.22	10/8/2019	7.75	No	8	n/a	7.704	0.2016	0	None	No	0.001461	Param 1 of 2
Field pH (Std. Units)	MW-310	8.12	7.57	12/23/2019	7.7	No	8	n/a	7.848	0.1146	0	None	No	0.001461	Param 1 of 2
Field pH (Std. Units)	MW-311	8.07	7.33	10/8/2019	7.69	No	8	n/a	7.7	0.1569	0	None	No	0.001461	Param 1 of 2
Fluoride (mg/L)	MW-309	0.100	n/a	10/8/2019	0.1ND	No	8	n/a	n/a	n/a	100	n/a	n/a	0.02144	NP (NDs) 1 of 2
Fluoride (mg/L)	MW-310	0.100	n/a	10/8/2019	0.1ND	No	8	n/a	n/a	n/a	100	n/a	n/a	0.02144	NP (NDs) 1 of 2
Fluoride (mg/L)	MW-311	0.100	n/a	10/8/2019	0.1ND	No	8	n/a	n/a	n/a	100	n/a	n/a	0.02144	NP (NDs) 1 of 2
Sulfate (mg/L)	MW-309	53.1	n/a	10/8/2019	21.9	No	8	n/a	23.79	12.31	0	None	No	0.002922	Param 1 of 2
Sulfate (mg/L)	MW-310	118	n/a	10/8/2019	85.9	No	8	n/a	n/a	n/a	0	n/a	n/a	0.02144	NP (normality) 1 of 2
Sulfate (mg/L)	MW-311	131	n/a	10/8/2019	21.2	No	8	n/a	45.26	35.75	0	None	No	0.002922	Param 1 of 2
Total Dissolved Solids (mg/L)	MW-309	1730	n/a	10/8/2019	370	No	8	n/a	790.8	395.8	0	None	No	0.002922	Param 1 of 2
Total Dissolved Solids (mg/L)	MW-310	759	n/a	10/8/2019	650	No	8	n/a	483.5	115.4	0	None	No	0.002922	Param 1 of 2
Total Dissolved Solids (mg/L)	MW-311	462	n/a	10/8/2019	272	No	8	n/a	322.5	58.52	0	None	No	0.002922	Param 1 of 2

Sanitas™ v.9.6.24 Software licensed to SCS Engineers. UG

Within Limit

Boron

Intrawell Parametric



Background Data Summary: Mean=31.68, Std. Dev.=4.42, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8951, critical = 0.749. Kappa = 2.384 (c=6, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002922.

Prediction Limit Analysis Run 1/8/2020 2:05 PM

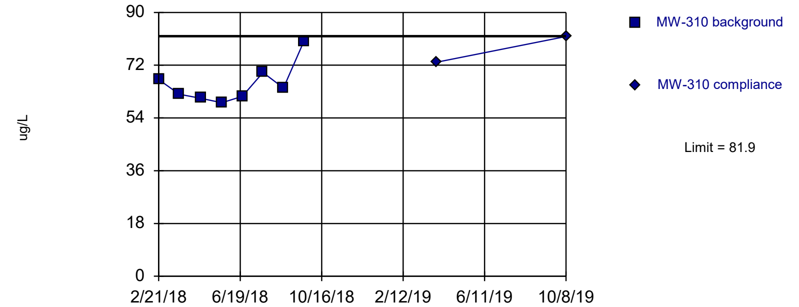
Columbia Energy Center Client: SCS Engineers Data: Input -191203

Sanitas™ v.9.6.24 Software licensed to SCS Engineers. UG

Within Limit

Boron

Intrawell Parametric



Background Data Summary: Mean=65.56, Std. Dev.=6.87, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8407, critical = 0.749. Kappa = 2.384 (c=6, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002922.

Prediction Limit Analysis Run 1/8/2020 2:05 PM

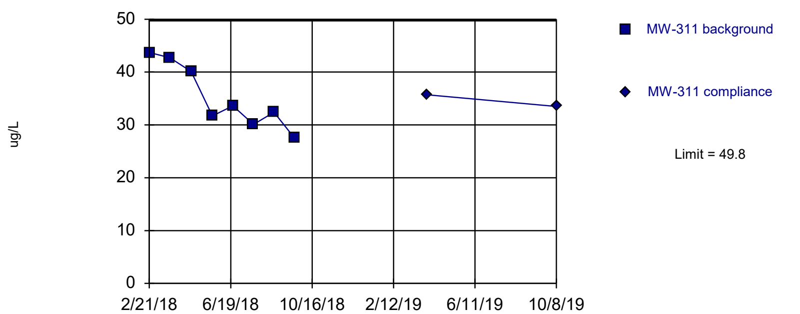
Columbia Energy Center Client: SCS Engineers Data: Input -191203

Sanitas™ v.9.6.24 Software licensed to SCS Engineers. UG

Within Limit

Boron

Intrawell Parametric



Background Data Summary: Mean=35.23, Std. Dev.=6.1, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9014, critical = 0.749. Kappa = 2.384 (c=6, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002922.

Prediction Limit Analysis Run 1/8/2020 2:05 PM

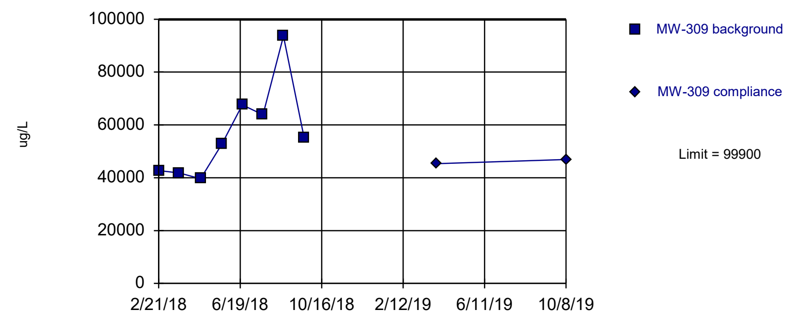
Columbia Energy Center Client: SCS Engineers Data: Input -191203

Sanitas™ v.9.6.24 Software licensed to SCS Engineers. UG

Within Limit

Calcium

Intrawell Parametric



Background Data Summary: Mean=57125, Std. Dev.=17960, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8834, critical = 0.749. Kappa = 2.384 (c=6, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002922.

Prediction Limit Analysis Run 1/8/2020 2:05 PM

Columbia Energy Center Client: SCS Engineers Data: Input -191203

Prediction Limit

Constituent: Boron (ug/L) Analysis Run 1/8/2020 2:08 PM

Columbia Energy Center Client: SCS Engineers Data: Input -191203

	MW-309	MW-309
2/21/2018	31.4	
3/23/2018	31	
4/23/2018	30.4	
5/24/2018	28	
6/23/2018	26.6	
7/23/2018	35.5	
8/22/2018	40.5	
9/21/2018	30	
4/2/2019		37.4
10/8/2019		33.4

Prediction Limit

Constituent: Boron (ug/L)   Analysis Run 1/8/2020 2:08 PM

Columbia Energy Center   Client: SCS Engineers   Data: Input -191203

	MW-310	MW-310
2/21/2018	67.1	
3/23/2018	62.1	
4/23/2018	60.7	
5/24/2018	59.2	
6/23/2018	61.4	
7/23/2018	69.5	
8/22/2018	64.2	
9/21/2018	80.3	
4/2/2019		73
10/8/2019		81.8

Prediction Limit

Constituent: Boron (ug/L)   Analysis Run 1/8/2020 2:08 PM

Columbia Energy Center   Client: SCS Engineers   Data: Input -191203

	MW-311	MW-311
2/21/2018	43.7	
3/23/2018	42.7	
4/23/2018	40.1	
5/24/2018	31.7	
6/23/2018	33.6	
7/23/2018	30.1	
8/22/2018	32.4	
9/21/2018	27.5	
4/2/2019		35.7
10/8/2019		33.5

Prediction Limit

Constituent: Calcium (ug/L)   Analysis Run 1/8/2020 2:08 PM

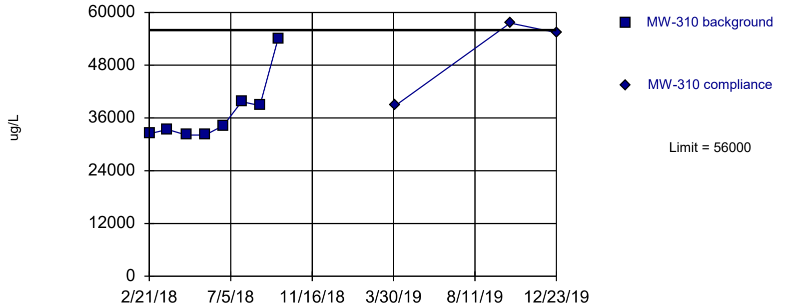
Columbia Energy Center   Client: SCS Engineers   Data: Input -191203

	MW-309	MW-309
2/21/2018	42700	
3/23/2018	41800	
4/23/2018	39600	
5/24/2018	52700	
6/23/2018	67600	
7/23/2018	63800	
8/22/2018	93600	
9/21/2018	55200	
4/2/2019		45300
10/8/2019		46900

Within Limit

Calcium

Intrawell Parametric



Background Data Summary (based on natural log transformation): Mean=10.51, Std. Dev.=0.1791, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.7707, critical = 0.749. Kappa = 2.384 (c=6, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002922.

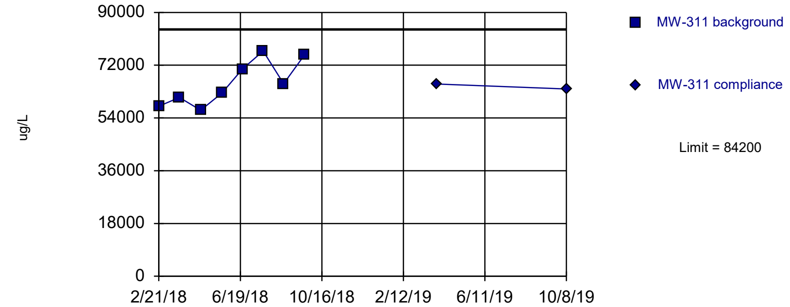
Prediction Limit Analysis Run 1/8/2020 2:05 PM

Columbia Energy Center Client: SCS Engineers Data: Input -191203

Within Limit

Calcium

Intrawell Parametric



Background Data Summary: Mean=65838, Std. Dev.=7714, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9222, critical = 0.749. Kappa = 2.384 (c=6, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002922.

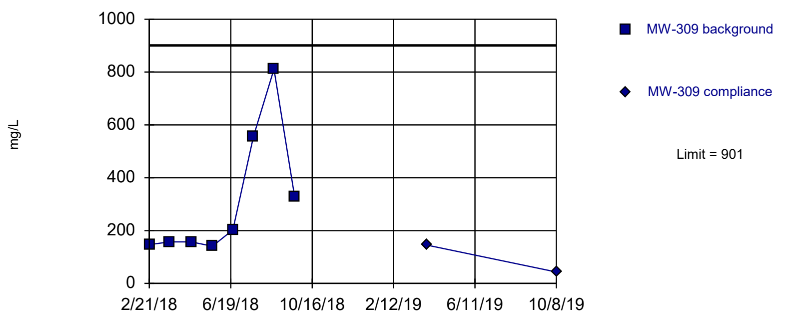
Prediction Limit Analysis Run 1/8/2020 2:05 PM

Columbia Energy Center Client: SCS Engineers Data: Input -191203

Within Limit

Chloride

Intrawell Parametric



Background Data Summary: Mean=312.8, Std. Dev.=246.6, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.7572, critical = 0.749. Kappa = 2.384 (c=6, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002922.

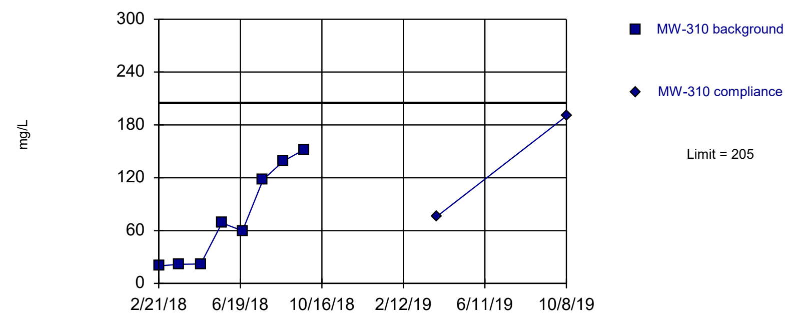
Prediction Limit Analysis Run 1/8/2020 2:05 PM

Columbia Energy Center Client: SCS Engineers Data: Input -191203

Within Limit

Chloride

Intrawell Parametric



Background Data Summary: Mean=75.13, Std. Dev.=54.55, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8662, critical = 0.749. Kappa = 2.384 (c=6, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002922.

Prediction Limit Analysis Run 1/8/2020 2:05 PM

Columbia Energy Center Client: SCS Engineers Data: Input -191203

Prediction Limit

Constituent: Calcium (ug/L)   Analysis Run 1/8/2020 2:08 PM

Columbia Energy Center   Client: SCS Engineers   Data: Input -191203

	MW-310	MW-310
2/21/2018	32400	
3/23/2018	33400	
4/23/2018	32100	
5/24/2018	32100	
6/23/2018	34300	
7/23/2018	39700	
8/22/2018	38800	
9/21/2018	54100	
4/2/2019		38800
10/8/2019		57600
12/23/2019		55400 (P6)

Prediction Limit

Constituent: Calcium (ug/L) Analysis Run 1/8/2020 2:08 PM

Columbia Energy Center Client: SCS Engineers Data: Input -191203

	MW-311	MW-311
2/21/2018	58000	
3/23/2018	61000	
4/23/2018	56600	
5/24/2018	62500	
6/23/2018	70700	
7/23/2018	76800	
8/22/2018	65700	
9/21/2018	75400	
4/2/2019		65600
10/8/2019		63900

Prediction Limit

Constituent: Chloride (mg/L)   Analysis Run 1/8/2020 2:08 PM

Columbia Energy Center   Client: SCS Engineers   Data: Input -191203

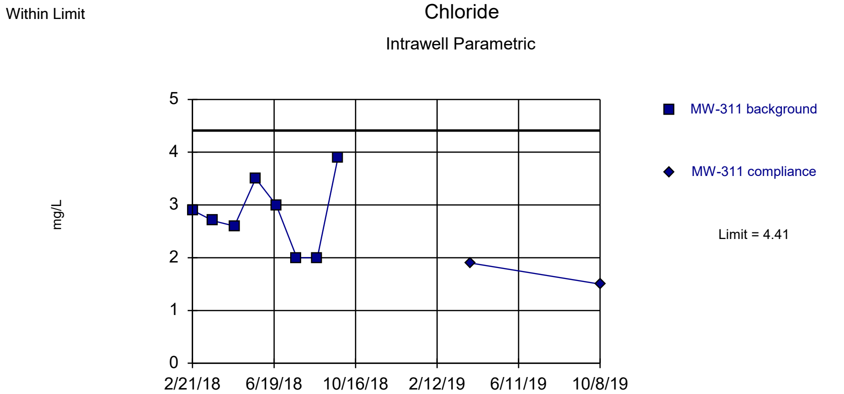
	MW-309	MW-309
2/21/2018	147	
3/23/2018	157	
4/23/2018	157	
5/24/2018	141	
6/23/2018	203	
7/23/2018	557	
8/22/2018	811	
9/21/2018	329	
4/2/2019		145
10/8/2019		43.2

Prediction Limit

Constituent: Chloride (mg/L) Analysis Run 1/8/2020 2:08 PM

Columbia Energy Center Client: SCS Engineers Data: Input -191203

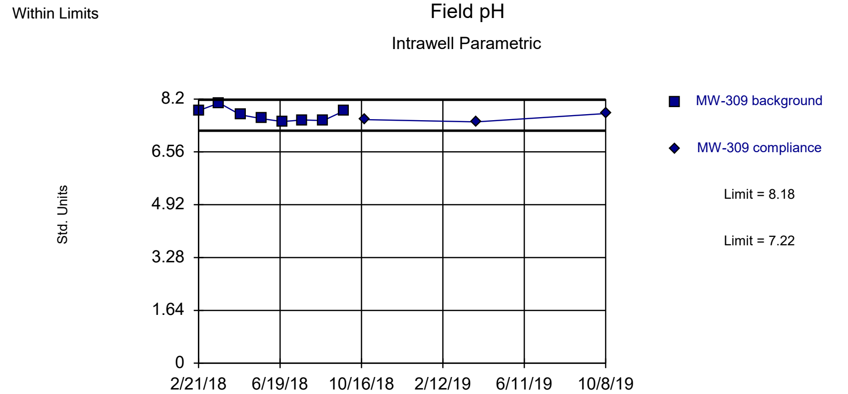
	MW-310	MW-310
2/21/2018	19.8	
3/23/2018	21.7	
4/23/2018	22.1	
5/24/2018	68.6	
6/23/2018	59.8	
7/23/2018	118	
8/22/2018	139	
9/21/2018	152	
4/2/2019		76
10/8/2019		190



Background Data Summary: Mean=2.825, Std. Dev.=0.6628, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9458, critical = 0.749. Kappa = 2.384 (c=6, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002922.

Prediction Limit Analysis Run 1/8/2020 2:05 PM
Columbia Energy Center Client: SCS Engineers Data: Input -191203

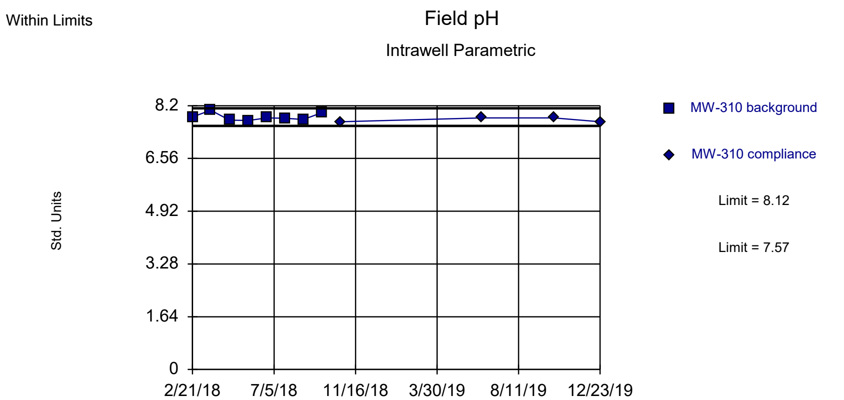
Sanitas™ v.9.6.24 Software licensed to SCS Engineers. UG



Background Data Summary: Mean=7.704, Std. Dev.=0.2016, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8955, critical = 0.749. Kappa = 2.384 (c=6, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002922.

Prediction Limit Analysis Run 1/8/2020 2:05 PM
Columbia Energy Center Client: SCS Engineers Data: Input -191203

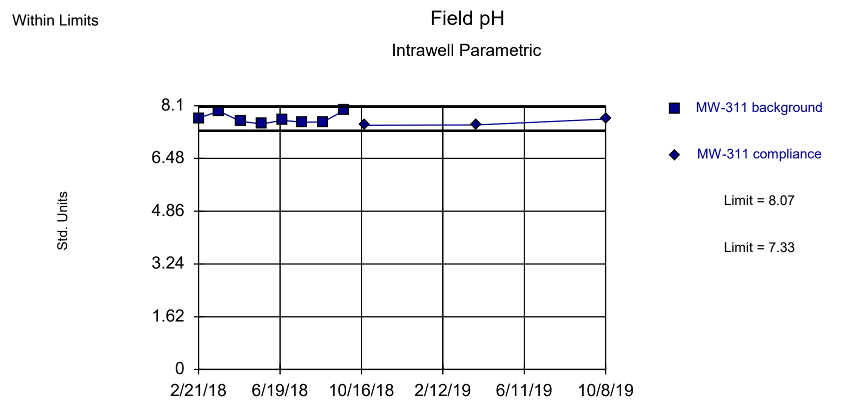
Sanitas™ v.9.6.24 Software licensed to SCS Engineers. UG



Background Data Summary: Mean=7.848, Std. Dev.=0.1146, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8584, critical = 0.749. Kappa = 2.384 (c=6, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002922.

Prediction Limit Analysis Run 1/8/2020 2:05 PM
Columbia Energy Center Client: SCS Engineers Data: Input -191203

Sanitas™ v.9.6.24 Software licensed to SCS Engineers. UG



Background Data Summary: Mean=7.7, Std. Dev.=0.1569, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8301, critical = 0.749. Kappa = 2.384 (c=6, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002922.

Prediction Limit Analysis Run 1/8/2020 2:05 PM
Columbia Energy Center Client: SCS Engineers Data: Input -191203

Prediction Limit

Constituent: Chloride (mg/L)   Analysis Run 1/8/2020 2:08 PM

Columbia Energy Center   Client: SCS Engineers   Data: Input -191203

	MW-311	MW-311
2/21/2018	2.9	
3/23/2018	2.7	
4/23/2018	2.6	
5/24/2018	3.5	
6/23/2018	3	
7/23/2018	2 (J)	
8/22/2018	2 (J)	
9/21/2018	3.9	
4/2/2019		1.9 (J)
10/8/2019		1.5 (J)

Prediction Limit

Constituent: Field pH (Std. Units)   Analysis Run 1/8/2020 2:08 PM

Columbia Energy Center   Client: SCS Engineers   Data: Input -191203

	MW-309	MW-309
2/21/2018	7.84	
3/23/2018	8.08	
4/23/2018	7.71	
5/24/2018	7.59	
6/23/2018	7.5	
7/23/2018	7.55	
8/22/2018	7.53	
9/21/2018	7.83	
10/22/2018		7.56
4/2/2019		7.49
10/8/2019		7.75

Prediction Limit

Constituent: Field pH (Std. Units)   Analysis Run 1/8/2020 2:08 PM

Columbia Energy Center   Client: SCS Engineers   Data: Input -191203

	MW-310	MW-310
2/21/2018	7.85	
3/23/2018	8.06	
4/23/2018	7.75	
5/24/2018	7.74	
6/23/2018	7.82	
7/23/2018	7.81	
8/22/2018	7.77	
9/21/2018	7.98	
10/22/2018		7.7
4/2/2019		9.79 (R)
6/12/2019		7.82
10/8/2019		7.82
12/23/2019		7.7

Prediction Limit

Constituent: Field pH (Std. Units)   Analysis Run 1/8/2020 2:08 PM

Columbia Energy Center   Client: SCS Engineers   Data: Input -191203

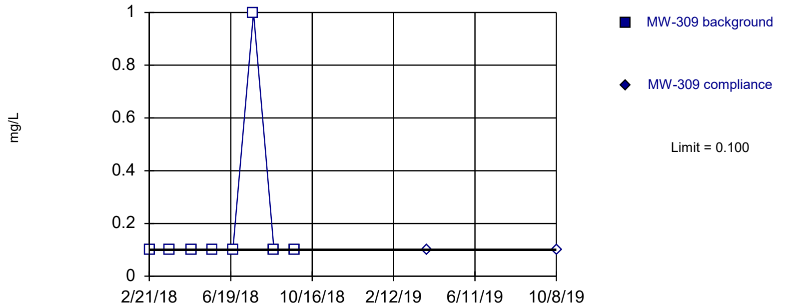
	MW-311	MW-311
2/21/2018	7.72	
3/23/2018	7.93	
4/23/2018	7.62	
5/24/2018	7.54	
6/23/2018	7.65	
7/23/2018	7.59	
8/22/2018	7.6	
9/21/2018	7.95	
10/22/2018		7.5
4/2/2019		7.51
10/8/2019		7.69

Sanitas™ v.9.6.24 Software licensed to SCS Engineers. UG
Hollow symbols indicate censored values.

Within Limit

Fluoride

Intrawell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 50%. All background values (n = 8) were censored; limit is most recent reporting limit. Well-constituent pair annual alpha = 0.04242. Individual comparison alpha = 0.02144 (1 of 2). Insufficient data to test for seasonality: data were not deseasonalized.

Prediction Limit Analysis Run 1/8/2020 2:05 PM

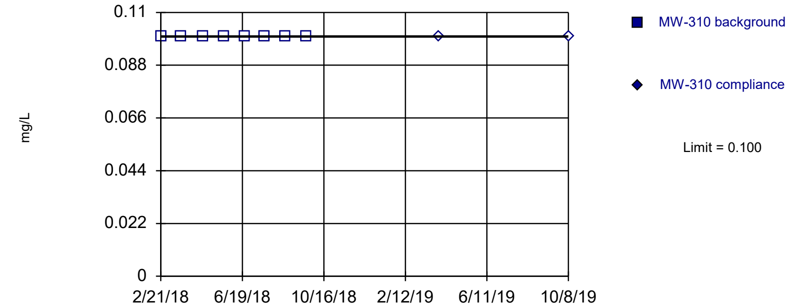
Columbia Energy Center Client: SCS Engineers Data: Input -191203

Sanitas™ v.9.6.24 Software licensed to SCS Engineers. UG
Hollow symbols indicate censored values.

Within Limit

Fluoride

Intrawell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 50%. All background values (n = 8) were censored; limit is most recent reporting limit. Well-constituent pair annual alpha = 0.04242. Individual comparison alpha = 0.02144 (1 of 2). Insufficient data to test for seasonality: data were not deseasonalized.

Prediction Limit Analysis Run 1/8/2020 2:05 PM

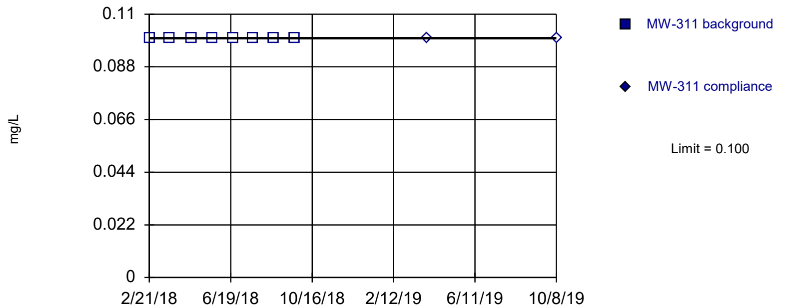
Columbia Energy Center Client: SCS Engineers Data: Input -191203

Sanitas™ v.9.6.24 Software licensed to SCS Engineers. UG
Hollow symbols indicate censored values.

Within Limit

Fluoride

Intrawell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because censored data exceeded 50%. All background values (n = 8) were censored; limit is most recent reporting limit. Well-constituent pair annual alpha = 0.04242. Individual comparison alpha = 0.02144 (1 of 2). Insufficient data to test for seasonality: data were not deseasonalized.

Prediction Limit Analysis Run 1/8/2020 2:05 PM

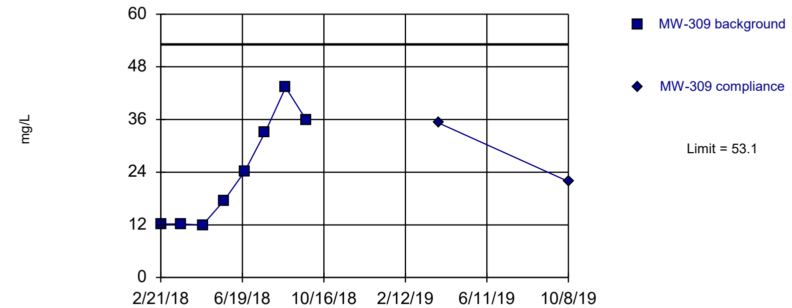
Columbia Energy Center Client: SCS Engineers Data: Input -191203

Sanitas™ v.9.6.24 Software licensed to SCS Engineers. UG

Within Limit

Sulfate

Intrawell Parametric



Background Data Summary: Mean=23.79, Std. Dev.=12.31, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8739, critical = 0.749. Kappa = 2.384 (c=6, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002922.

Prediction Limit Analysis Run 1/8/2020 2:05 PM

Columbia Energy Center Client: SCS Engineers Data: Input -191203

Prediction Limit

Constituent: Fluoride (mg/L)   Analysis Run 1/8/2020 2:08 PM

Columbia Energy Center   Client: SCS Engineers   Data: Input -191203

	MW-309	MW-309
2/21/2018	<0.1	
3/23/2018	<0.1	
4/23/2018	<0.1	
5/24/2018	<0.1	
6/23/2018	<0.1	
7/23/2018	<1	
8/22/2018	<0.1	
9/21/2018	<0.1	
4/2/2019		<0.1
10/8/2019		<0.1

Prediction Limit

Constituent: Fluoride (mg/L) Analysis Run 1/8/2020 2:08 PM

Columbia Energy Center Client: SCS Engineers Data: Input -191203

	MW-310	MW-310
2/21/2018	<0.1	
3/23/2018	<0.1	
4/23/2018	<0.1	
5/24/2018	<0.1	
6/23/2018	<0.1	
7/23/2018	<0.1	
8/22/2018	<0.1	
9/21/2018	<0.1	
4/2/2019		<0.1
10/8/2019		<0.1

Prediction Limit

Constituent: Fluoride (mg/L)   Analysis Run 1/8/2020 2:08 PM

Columbia Energy Center   Client: SCS Engineers   Data: Input -191203

	MW-311	MW-311
2/21/2018	<0.1	
3/23/2018	<0.1	
4/23/2018	<0.1	
5/24/2018	<0.1	
6/23/2018	<0.1	
7/23/2018	<0.1	
8/22/2018	<0.1	
9/21/2018	<0.1	
4/2/2019		<0.1
10/8/2019		<0.1

Prediction Limit

Constituent: Sulfate (mg/L)   Analysis Run 1/8/2020 2:08 PM

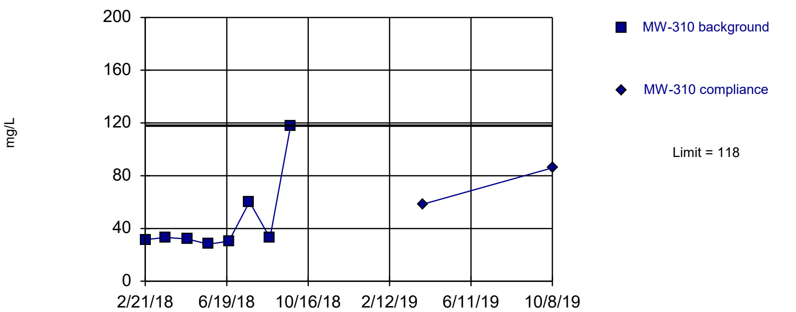
Columbia Energy Center   Client: SCS Engineers   Data: Input -191203

	MW-309	MW-309
2/21/2018	12.2	
3/23/2018	12.2	
4/23/2018	12	
5/24/2018	17.5	
6/23/2018	24.1	
7/23/2018	33.1	
8/22/2018	43.3	
9/21/2018	35.9	
4/2/2019		35.2
10/8/2019		21.9

Within Limit

Sulfate

Intrawell Non-parametric



Non-parametric test used in lieu of parametric prediction limit because the Shapiro Wilk normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 8 background values. Well-constituent pair annual alpha = 0.04242. Individual comparison alpha = 0.02144 (1 of 2). Insufficient data to test for seasonality: data were not deseasonalized.

Prediction Limit Analysis Run 1/8/2020 2:05 PM

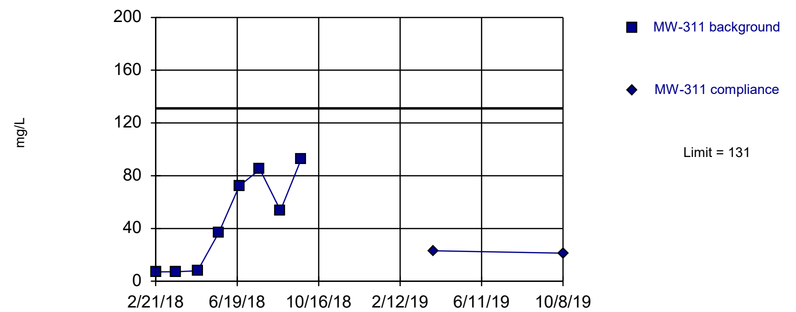
Columbia Energy Center Client: SCS Engineers Data: Input -191203

Sanitas™ v.9.6.24 Software licensed to SCS Engineers. UG

Within Limit

Sulfate

Intrawell Parametric



Background Data Summary: Mean=45.26, Std. Dev.=35.75, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8714, critical = 0.749. Kappa = 2.384 (c=6, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002922.

Prediction Limit Analysis Run 1/8/2020 2:05 PM

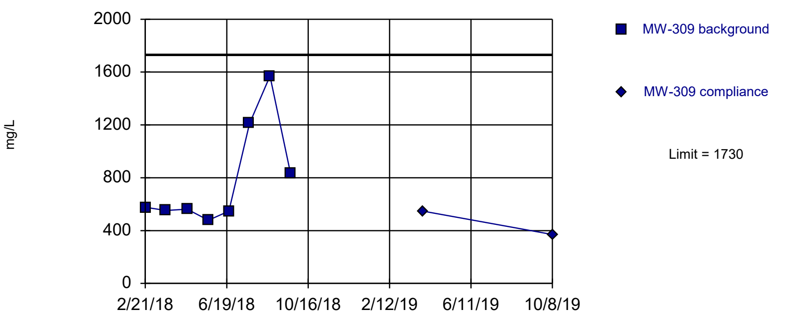
Columbia Energy Center Client: SCS Engineers Data: Input -191203

Sanitas™ v.9.6.24 Software licensed to SCS Engineers. UG

Within Limit

Total Dissolved Solids

Intrawell Parametric



Background Data Summary: Mean=790.8, Std. Dev.=395.8, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.771, critical = 0.749. Kappa = 2.384 (c=6, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002922.

Prediction Limit Analysis Run 1/8/2020 2:05 PM

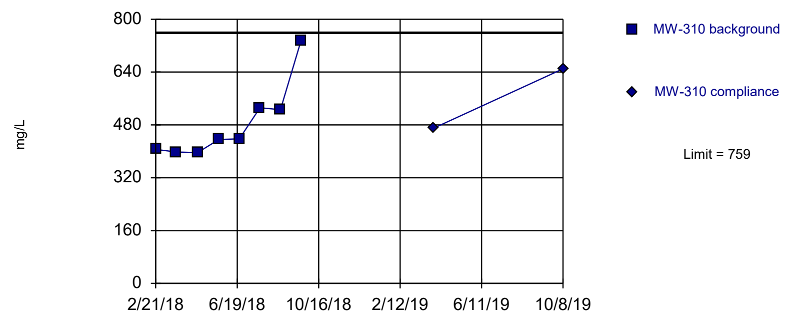
Columbia Energy Center Client: SCS Engineers Data: Input -191203

Sanitas™ v.9.6.24 Software licensed to SCS Engineers. UG

Within Limit

Total Dissolved Solids

Intrawell Parametric



Background Data Summary: Mean=483.5, Std. Dev.=115.4, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.7774, critical = 0.749. Kappa = 2.384 (c=6, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002922.

Prediction Limit Analysis Run 1/8/2020 2:05 PM

Columbia Energy Center Client: SCS Engineers Data: Input -191203

Prediction Limit

Constituent: Sulfate (mg/L)   Analysis Run 1/8/2020 2:08 PM

Columbia Energy Center   Client: SCS Engineers   Data: Input -191203

	MW-310	MW-310
2/21/2018	31.6	
3/23/2018	33.1	
4/23/2018	32	
5/24/2018	28	
6/23/2018	30.4	
7/23/2018	60.2	
8/22/2018	32.8	
9/21/2018	118	
4/2/2019		58.4
10/8/2019		85.9

Prediction Limit

Constituent: Sulfate (mg/L)   Analysis Run 1/8/2020 2:08 PM

Columbia Energy Center   Client: SCS Engineers   Data: Input -191203

	MW-311	MW-311
2/21/2018	7.1	
3/23/2018	7.2	
4/23/2018	7.9	
5/24/2018	36.9	
6/23/2018	72.3	
7/23/2018	84.7	
8/22/2018	53.6	
9/21/2018	92.4	
4/2/2019		23.1
10/8/2019		21.2

Prediction Limit

Constituent: Total Dissolved Solids (mg/L)   Analysis Run 1/8/2020 2:08 PM

Columbia Energy Center   Client: SCS Engineers   Data: Input -191203

	MW-309	MW-309
2/21/2018	576	
3/23/2018	552	
4/23/2018	562	
5/24/2018	478	
6/23/2018	548	
7/23/2018	1210	
8/22/2018	1570	
9/21/2018	830	
4/2/2019		548
10/8/2019		370

Prediction Limit

Constituent: Total Dissolved Solids (mg/L) Analysis Run 1/8/2020 2:08 PM

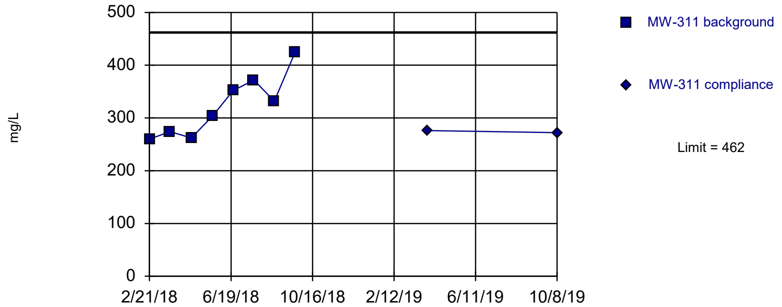
Columbia Energy Center Client: SCS Engineers Data: Input -191203

	MW-310	MW-310
2/21/2018	406	
3/23/2018	398	
4/23/2018	396	
5/24/2018	436	
6/23/2018	438	
7/23/2018	532	
8/22/2018	526	
9/21/2018	736	
4/2/2019		470
10/8/2019		650

Within Limit

Total Dissolved Solids

Intrawell Parametric



Background Data Summary: Mean=322.5, Std. Dev.=58.52, n=8. Insufficient data to test for seasonality: data were not deseasonalized. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.9288, critical = 0.749. Kappa = 2.384 (c=6, w=3, 1 of 2, event alpha = 0.05132). Report alpha = 0.002922.

Prediction Limit Analysis Run 1/8/2020 2:05 PM

Columbia Energy Center Client: SCS Engineers Data: Input -191203

Prediction Limit

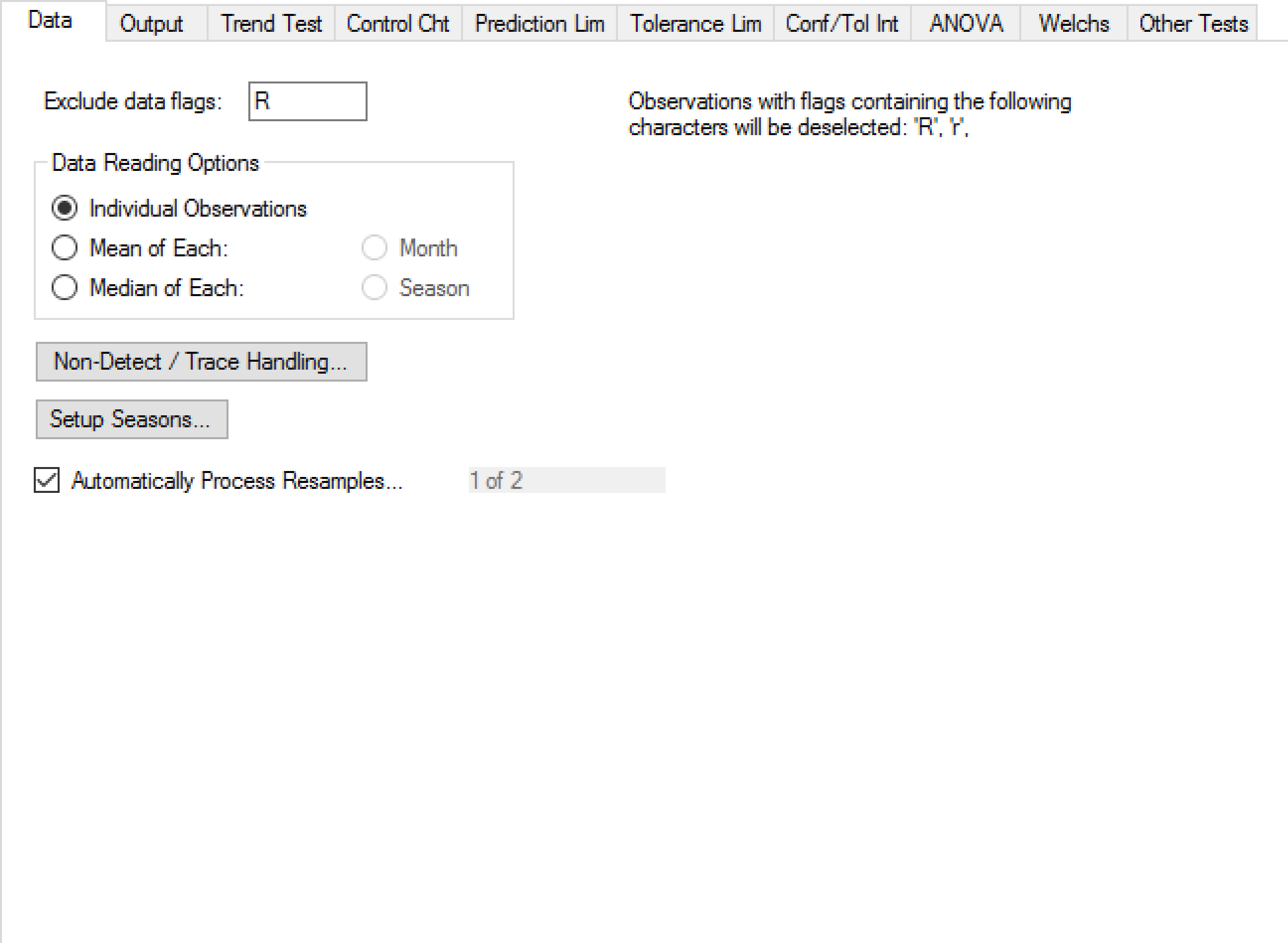
Constituent: Total Dissolved Solids (mg/L)   Analysis Run 1/8/2020 2:08 PM

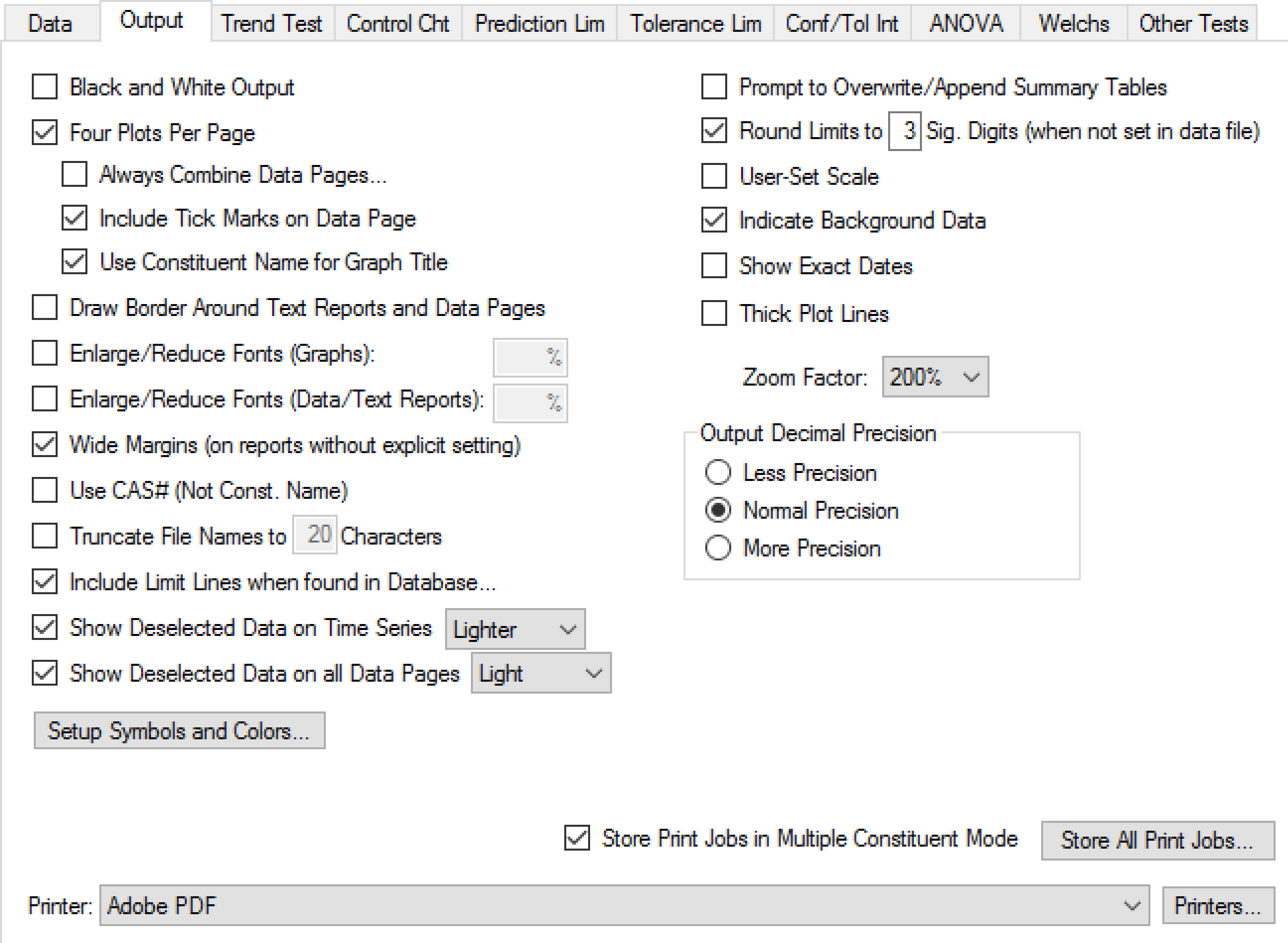
Columbia Energy Center   Client: SCS Engineers   Data: Input -191203

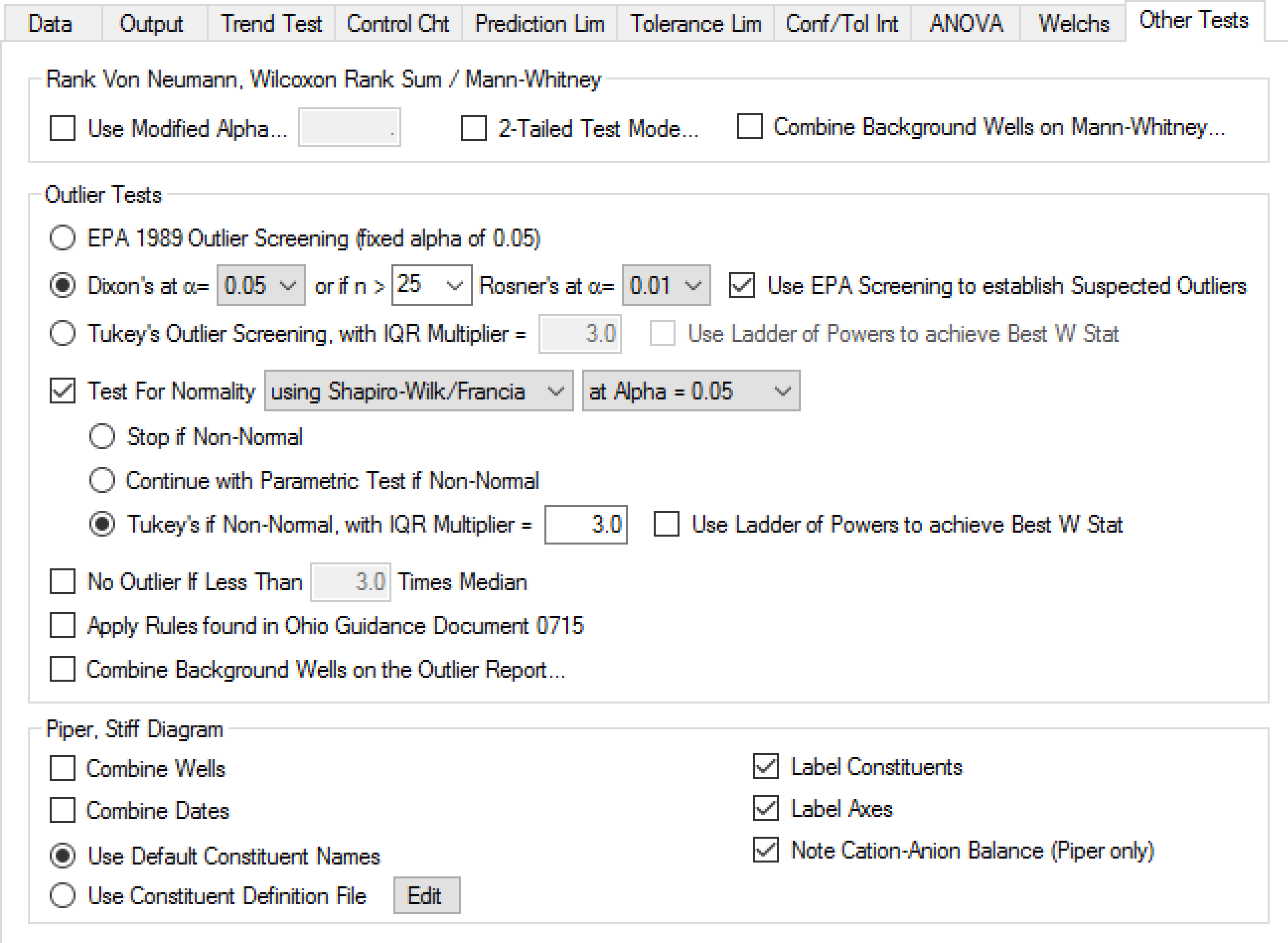
	MW-311	MW-311
2/21/2018	260	
3/23/2018	274	
4/23/2018	262	
5/24/2018	304	
6/23/2018	352	
7/23/2018	372	
8/22/2018	332	
9/21/2018	424	
4/2/2019		276
10/8/2019		272

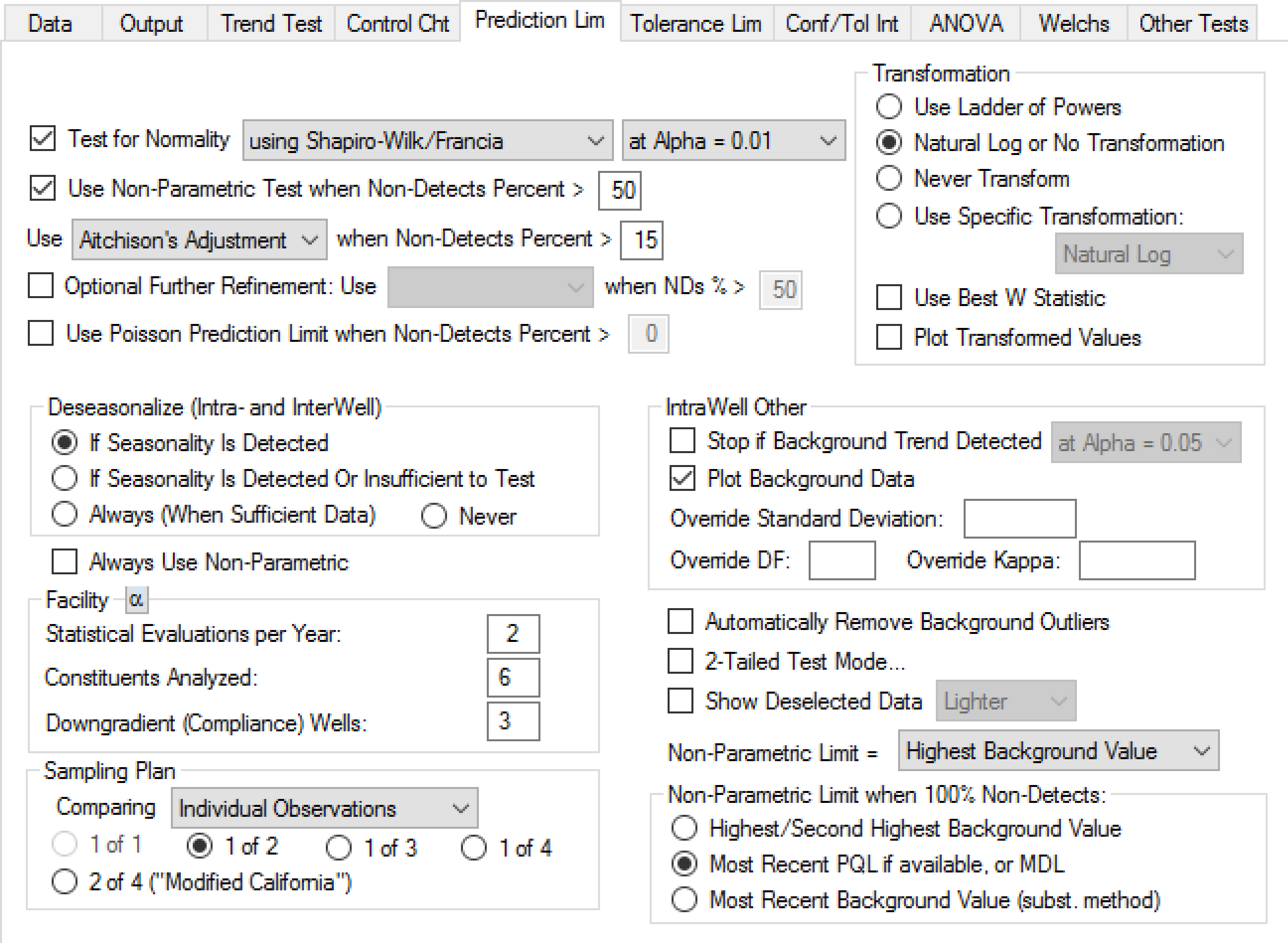
Attachment D

Sanitas Settings


Data
Output
Trend Test
Control Cht
Prediction Lim
Tolerance Lim
Conf/Tol Int
ANOVA
Welchs
Other Tests
Exclude data flags:
R
Observations with flags containing the following characters will be deselected: 'R', 'r',
Data Reading Options
Individual Observations
Mean of Each:
Month
Median of Each:
Season
Non-Detect / Trace Handling...
Setup Seasons...
Automatically Process Resamples...
1 of 2


Data
Output
Trend Test
Control Cht
Prediction Lim
Tolerance Lim
Conf/Tol Int
ANOVA
Welchs
Other Tests
Black and White Output
Four Plots Per Page
Always Combine Data Pages...
Include Tick Marks on Data Page
Use Constituent Name for Graph Title
Draw Border Around Text Reports and Data Pages
Enlarge/Reduce Fonts (Graphs):
%
Enlarge/Reduce Fonts (Data/Text Reports):
%
Wide Margins (on reports without explicit setting)
Use CAS# (Not Const. Name)
Truncate File Names to 20 Characters
Include Limit Lines when found in Database...
Show Deselected Data on Time Series
Lighter
Show Deselected Data on all Data Pages
Light
Setup Symbols and Colors...
Prompt to Overwrite/Append Summary Tables
Round Limits to 3 Sig. Digits (when not set in data file)
User-Set Scale
Indicate Background Data
Show Exact Dates
Thick Plot Lines
Zoom Factor: 200%
Output Decimal Precision
Less Precision
Normal Precision
More Precision
Store Print Jobs in Multiple Constituent Mode
Store All Print Jobs...
Printer: Adobe PDF
Printers...


Data
Output
Trend Test
Control Cht
Prediction Lim
Tolerance Lim
Conf/Tol Int
ANOVA
Welchs
Other Tests
Rank Von Neumann, Wilcoxon Rank Sum / Mann-Whitney
Use Modified Alpha...
2-Tailed Test Mode...
Combine Background Wells on Mann-Whitney...
Outlier Tests
EPA 1989 Outlier Screening (fixed alpha of 0.05)
Dixon's at α= 0.05 or if n > 25 Rosner's at α= 0.01
Use EPA Screening to establish Suspected Outliers
Tukey's Outlier Screening, with IQR Multiplier = 3.0
Use Ladder of Powers to achieve Best W Stat
Test For Normality using Shapiro-Wilk/Francia at Alpha = 0.05
Stop if Non-Normal
Continue with Parametric Test if Non-Normal
Tukey's if Non-Normal, with IQR Multiplier = 3.0
Use Ladder of Powers to achieve Best W Stat
No Outlier If Less Than 3.0 Times Median
Apply Rules found in Ohio Guidance Document 0715
Combine Background Wells on the Outlier Report...
Piper, Stiff Diagram
Combine Wells
Combine Dates
Use Default Constituent Names
Use Constituent Definition File
Edit
Label Constituents
Label Axes
Note Cation-Anion Balance (Piper only)


Data
Output
Trend Test
Control Cht
Prediction Lim
Tolerance Lim
Conf/Tol Int
ANOVA
Welchs
Other Tests
Test for Normality
using Shapiro-Wilk/Francia
at Alpha = 0.01
Use Non-Parametric Test when Non-Detects Percent >
50
Use
Aitchison's Adjustment
when Non-Detects Percent >
15
Optional Further Refinement: Use
when NDs % >
50
Use Poisson Prediction Limit when Non-Detects Percent >
0
Transformation
Use Ladder of Powers
Natural Log or No Transformation
Never Transform
Use Specific Transformation:
Natural Log
Use Best W Statistic
Plot Transformed Values
Deseasonalize (Intra- and InterWell)
If Seasonality Is Detected
If Seasonality Is Detected Or Insufficient to Test
Always (When Sufficient Data)
Never
Always Use Non-Parametric
Facility
α
Statistical Evaluations per Year:
2
Constituents Analyzed:
6
Downgradient (Compliance) Wells:
3
Sampling Plan
Comparing
Individual Observations
1 of 1
1 of 2
1 of 3
1 of 4
2 of 4 ("Modified California")
IntraWell Other
Stop if Background Trend Detected
at Alpha = 0.05
Plot Background Data
Override Standard Deviation:
Override DF:
Override Kappa:
Automatically Remove Background Outliers
2-Tailed Test Mode...
Show Deselected Data
Lighter
Non-Parametric Limit =
Highest Background Value
Non-Parametric Limit when 100% Non-Detects:
Highest/Second Highest Background Value
Most Recent PQL if available, or MDL
Most Recent Background Value (subst. method)

Appendix F

Alternative Source Demonstrations (ASDs)

F1 Alternative Source Demonstration – October 2020
F2 Alternative Source Demonstration – April 2021

F1 Alternative Source Demonstration – October 2020

Alternative Source Demonstration October 2020 Detection Monitoring

Dry Ash Disposal Facility, Module 4
Columbia Energy Center
Pardeeville, Wisconsin

Prepared for:

Alliant Energy

SCS ENGINEERS

25221067.00 | April 15, 2021

2830 Dairy Drive
Madison, WI 53718-6751
608-224-2830

Table of Contents

Section	Page
PE Certification	**iii**
1.0 Introduction	**1**
1.1 §257.94(e)(2) Alternative Source Demonstration Requirements	1
1.2 Site Information and Map	1
1.3 Statistically Significant Increases Identified	2
1.4 Overview of Alternative Source Demonstration	2
2.0 Background	**3**
2.1 Regional Geology and Hydrogeology	3
2.1.1 Regional Information	3
2.1.2 Site Information	3
2.2 CCR Rule Monitoring System	3
2.3 Other Monitoring Wells	3
3.0 Methodology and Analysis Review	**4**
3.1 Sampling and Field Analysis	4
3.2 Laboratory Analysis Review	4
3.3 Statistical Evaluation Review	4
3.4 Summary of Methodology and Analysis Review Findings	5
4.0 Alternative Sources	**5**
4.1 Potential Causes of SSI	5
4.1.1 Natural Variation	5
4.1.2 Man-Made Alternative Sources	6
4.2 Lines of Evidence	6
4.2.1 Background Concentrations	7
4.2.2 Historical Groundwater Flow Directions	7
4.2.3 Location Adjacent to Entrance Road	7
4.2.4 Mod 4 Composite Liner	7
5.0 Alternative Source Demonstration Conclusions	**8**
6.0 Site Groundwater Monitoring Recommendations	**8**
7.0 References	**8**

Tables

Table 1. Groundwater Analytical Results Summary – October and December 2020 Events

Table 2. Historical Analytical Results for Parameters with SSIs

Table 3. Groundwater Elevation – State Monitoring Program and CCR Well Network

Figures

Figure 1. Site Location Map
Figure 2. Site Plan and Monitoring Well Locations
Figure 3. Water Table Map – October 2020

Appendices

Appendix A Trend Plots for CCR Wells
Appendix B Historical Groundwater Flow Maps

I:\25221067.00\Deliverables\2020 Oct ASD MOD 4 LF\210415_COL_4 LF_Oct20 ASD.docx

PE CERTIFICATION

WISCONSIN
Sherren C. Clark
E-29863
Madison,
Wis.
PROFESSIONAL ENGINEER

4-15-21

I, Sherren Clark, hereby certify that that the information in this alternate source demonstration is accurate and meets the requirements of 40 CFR 257.94(e)(2). This certification is based on my review of the groundwater data and related site information available for the Columbia Energy Center Dry Ash Disposal Facility. I am a duly licensed Professional Engineer under the laws of the State of Wisconsin.

4-15-2021

(signature) (date)

Sherren Clark

(printed or typed name)

License number E-29863

My license renewal date is July 31, 2022.

Pages or sheets covered by this seal:
Alternative Source Demonstration, October 2020 Detection Monitoring, Dry Ash Disposal Facility, Module 4 Columbia Energy Center, Pardeeville, Wisconsin (Entire Document)

[This page left blank intentionally]

1.0 INTRODUCTION

This Alternative Source Demonstration (ASD) was prepared to support compliance with the groundwater monitoring requirements of the "Coal Combustion Residuals (CCR) Final Rule" published by the U.S. 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 amendments. Specifically, this report was prepared to fulfill the requirements of 40 CFR 257.94(e)(2). The applicable sections of the Rule are provided below in *italics*.

This ASD also provides the results for a supplemental resampling event completed in December 2020.

1.1 §257.94(E)(2) ALTERNATIVE SOURCE DEMONSTRATION REQUIREMENTS

The owner and operator may demonstrate that a source other than the CCR Unit caused the statistically significant increase over background levels for a constituent or that the statistically significant increase 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 statistically significant increase over background levels.

An ASD is completed when there are exceedances of one or more benchmarks established within the groundwater monitoring program. The ASD is completed to determine if any other sources are likely causes of the identified exceedance(s) of established benchmark(s) at the site. This ASD was performed in response to results indicating a statistically significant increase (SSI) over background levels during detection monitoring under the CCR Rule.

This ASD report is evaluating the SSIs observed in the statistical evaluation of the October 2020 detection monitoring event at the Columbia Energy Center (COL) Dry Ash Disposal Facility, Module 4 CCR Unit (Mod 4). The first ASD was prepared for this facility evaluating the SSIs observed in the statistical evaluation of the April 2019 detection monitoring event.

This ASD report is evaluating the SSIs for boron, calcium, and chloride that were observed in the statistical evaluation of the October 2020 detection monitoring event, including the December 2020 resampling. The October 2020 result for total dissolved solids (TDS) at MW-310 exceeded the upper prediction limit (UPL), but the December retest result was below the UPL; therefore, there is no SSI for TDS at MW-310.

1.2 SITE INFORMATION AND MAP

The COL site is located at W8375 Murray Road, Pardeeville, Columbia County, Wisconsin (**Figure 1**). The COL site is an active coal-burning generating station, which has been burning coal and disposing of CCR on site since the mid-1970s. The layout of the site is shown on **Figure 2**. The COL property includes two areas of CCR storage and disposal. These are the Dry Ash Disposal Facility (ADF) and the Ash Ponds Facility. This ASD evaluates the conditions at the site for Module 4 of the ADF only. The Mod 4 CCR Unit became operational in 2018. The ADF is operated under the Wisconsin Department of Natural Resources (WDNR) License No. 3025.

The groundwater monitoring system at the COL Mod 4 facility monitors a single CCR Unit:

- COL Dry Ash Disposal Facility – Module 4 (new landfill)

A map showing the CCR Unit and all background (or upgradient) and downgradient monitoring wells with identification numbers for the CCR groundwater monitoring program and the state monitoring program is provided as **Figure 2.** Separate monitoring systems have been established for the other CCR Units at COL, which include Modules 1-3 of the COL ADF, the primary ash pond, and the secondary ash pond.

1.3 STATISTICALLY SIGNIFICANT INCREASES IDENTIFIED

The statistical evaluation was completed in accordance with 40 CFR 257.93(f)(3) using a prediction interval procedure, in which an interval for each constituent is established from the distribution of the background data, and the level of each constituent in each compliance well is compared to the UPL to evaluate whether an SSI has occurred. The evaluation was based on an intrawell UPL with 1-of-2 retesting, calculated using Sanitas software. The retesting approach results in a slightly lower UPL, but only 1 of 2 samples collected for the event (original and retest) must meet the UPL to demonstrate compliance. The intrawell UPLs, and the October 2020 and December 2020 sampling results, are summarized in the attached **Table 1.**

The October 2020 SSIs include the following parameters and wells:

- Boron: MW-309
- Calcium: MW-310
- Chloride: MW-310

The October 2020 result for TDS at MW-310 exceeded the UPL, but the December retest result was below the UPL; therefore, there is no SSI for TDS at MW-310.

Concentration trends for the parameters with SSIs are shown in **Appendix A.**

1.4 OVERVIEW OF ALTERNATIVE SOURCE DEMONSTRATION

This ASD report includes:

- Background information (**Section 2.0**)
- Evaluation of potential that SSIs are due to methodology or analysis (**Section 3.0**)
- Evaluation of potential that SSIs are due to natural sources or man-made sources other than the CCR Units (**Section 4.0**)
- ASD conclusions (**Section 5.0**)
- Monitoring recommendations (**Section 6.0**)

Historical monitoring results from background and compliance sampling for the CCR Rule constituent results with SSIs are provided in **Table 2.** The laboratory reports for the October 2020 detection monitoring event were included in the 2020 Annual Groundwater Monitoring and Corrective Action Report submitted in January 2021. Complete laboratory reports for the background monitoring events and the previous detection monitoring events were included in previous annual groundwater monitoring and corrective action reports.

2.0 BACKGROUND

To provide context for the ASD evaluation, the following background information is provided in this section of the report, prior to the ASD evaluation sections:

- Geologic and hydrogeologic setting
- CCR Rule monitoring system
- Other monitoring wells

2.1 REGIONAL GEOLOGY AND HYDROGEOLOGY

2.1.1 Regional Information

For the purposes of groundwater monitoring, the surficial sand and gravel aquifer is considered to be the uppermost aquifer unit, as defined under 40 CFR 257.53, at the COL ADF. Immediately underlying the surficial sand and gravel aquifer is the Cambrian-Ordovician sandstone aquifer.

Additional details on the regional geology and hydrogeology were provided in the May 2020 ASD (SCS Engineers [SCS], 2020).

2.1.2 Site Information

Soils at the site are primarily sand to a depth of approximately 50 to 100 feet and overlie sandstone bedrock. Soils encountered during the site feasibility study for the COL ADF were described as generally sandy with interbedded silty clay lenses up to 20 feet thick (Warzyn Engineering, Inc. [Warzyn], 1978). During drilling of CCR well MW-301, the unconsolidated materials were identified as consisting primarily of silty sand. The boring log for previously installed monitoring well MW-84A shows silty sand and sand as the primary unconsolidated materials at these locations. All CCR monitoring wells are screened within the unconsolidated sand unit.

Shallow groundwater at the site generally flows to the northwest across the existing landfill area, then generally flows west toward the Wisconsin River, with localized mounding associated with the ash ponds. A groundwater flow map for October 2020 is shown on **Figure 3**. The groundwater elevation data for the state and CCR and state monitoring program wells are provided in **Table 3.**

2.2 CCR RULE MONITORING SYSTEM

The groundwater monitoring system established in accordance with the CCR Rule consists of two upgradient (background) monitoring wells and three downgradient monitoring wells. The background wells include MW-301 and MW-84A. The downgradient wells include MW-309, MW-310, and MW-311. The background wells are shared with the other COL CCR Units. The CCR Rule wells are installed within the sand and gravel aquifer. Well depths range from approximately 36 to 38 feet, measured from the top of the well casing.

2.3 OTHER MONITORING WELLS

Additional groundwater monitoring wells currently exist at COL as part of the monitoring systems developed for the state monitoring program and for the other CCR Units.

Monitoring wells for the state monitoring program are installed in the unconsolidated sand and gravel unit, which is the uppermost aquifer as defined under 40 CFR 257.53. This shallow monitoring system includes water table wells and mid-depth piezometers. Well depths range from approximately 14 to 76 feet, measured from the top of the well casing.

3.0 METHODOLOGY AND ANALYSIS REVIEW

To evaluate the potential that an SSI is due to a source other than the regulated CCR Unit, SCS used a two-step evaluation process. First, the sample collection, field and laboratory analysis, and statistical evaluation were reviewed to identify any potential error or analysis that led to exceedance of the benchmark. Second, potential alternative sources, including natural variation and man-made sources other than the CCR Unit, were evaluated. This section of the report provides the findings of the methodology and analysis review. Section 4.0 of the report addresses the potential alternative sources.

3.1 SAMPLING AND FIELD ANALYSIS

Field notes and sampling results were reviewed to determine if any sampling error may have caused or contributed to the observed SSIs. Potential field sampling errors or issues could include mislabeling of samples, improper sample handling, missed holding times, cross contamination during sampling, or other field error. Field blank sample results were also reviewed for any indication of potential contamination from sampling equipment or containers.

SCS did not identify any other issues with the field analysis based on review of the data and field notes. Because boron, calcium, chloride, and sulfate are laboratory parameters, there is little potential for a field analysis error to contribute to an SSI.

3.2 LABORATORY ANALYSIS REVIEW

The laboratory reports for the October 2020 detection monitoring event as well as the December 2020 retest event were reviewed to determine if any laboratory analysis error or issue may have caused or contributed to an observed SSIs for boron, calcium, or chloride. The laboratory report review included reviewing the laboratory quality control flags and narrative, verifying that correct methods were used and desired detection limits were achieved, and checking the field and laboratory blank sample results.

Based on the review of the laboratory reports, SCS did not identify any additional issues due to a laboratory analysis error in the other laboratory reports. There were no laboratory quality control flags or issues identified in the laboratory reports that affect the usability of the data for detection monitoring.

Time series plots of the SSI constituent analytical data were also reviewed for any anomalous results that might indicate a possible sampling or laboratory error (e.g., dilution error or incorrect sample labeling). The time series plots are provided in Appendix A. The concentrations observed are similar to historical concentrations.

3.3 STATISTICAL EVALUATION REVIEW

The review of the statistical results and methods included a quality control check of the following:

- Input analytical data vs. laboratory analytical reports
- Statistical method and process for each SSI

Based on the October 2020 sample and December 2020 retest results, an SSI for boron occurred for MW-309, and calcium and chloride SSIs occurred for MW-310 for the October 2020 semiannual event, because both results exceeded the intrawell UPL.

Based on the review of the statistical evaluation, SCS did not identify any errors in the statistical evaluation that caused or contributed to the determination of an intrawell SSI for boron, calcium, and chloride at wells MW-309 and MW-310. However, the small size of the intrawell background data set (8 samples per well) and the short timeframe over which they were collected (8 months) may have contributed to the identification of the October 2020 result as SSIs. The small background data set collected from February through September 2018 likely does not represent the full range of variability in background concentrations at the compliance monitoring wells. The intrawell UPLs will be updated in the future with additional data.

3.4 SUMMARY OF METHODOLOGY AND ANALYSIS REVIEW FINDINGS

In summary, no changes to the SSI determinations for the October 2020 monitoring event based on the methodology and analysis review, and no errors or issues caused or contributed to the reported SSIs identified.

4.0 ALTERNATIVE SOURCES

This section discusses the potential alternative sources for the boron, calcium, and chloride SSIs at the downgradient monitoring well, identifies the most likely alternative source(s), and presents the lines of evidence indicating that an alternative source is the most likely cause of the observed SSIs.

4.1 POTENTIAL CAUSES OF SSI

4.1.1 Natural Variation

The statistical analysis was completed using an intrawell approach, comparing the October 2020 detection monitoring results to the UPLs calculated based on background sampling of the compliance wells (MW-309, MW-310, and MW-311). If concentrations of a constituent that is naturally present in the aquifer vary with time, then the potential exists that the compliance sampling concentrations may be higher than background concentrations due to natural temporal variation. Temporal variation can occur seasonally or due to longer-term events such as changes in infiltration patterns and groundwater flow directions caused by wet or dry years.

As shown on the time series plots in **Appendix A**, the concentrations of boron in the May through October samples from MW-309 were higher than the background results at MW-309, but do not exceed the range of background sampling results for MW-310, located approximately 300 feet to the west along Murray Road. Lower boron concentrations were detected in background sampling at upgradient wells MW-84A and MW-301.

For calcium, the October and December results at MW-310 slightly exceeded the intrawell UPL based on the 2018 background sampling at this well, but the calcium concentrations were lower than those detected at both upgradient wells as well as the other two compliance wells. The Feasibility Report prepared prior to the initial construction of the dry ash disposal facility indicated that calcium concentrations ranged from 30 mg/L to 66 mg/l for monitoring wells located within the site boundaries (Warzyn, 1978), and the recent calcium concentrations at MW-310 fall within this range.

For chloride, the October and December results at MW-310 exceeded the intrawell UPL based on the 2018 background sampling at this well, but the chloride concentrations were lower than those detected in background and current monitoring at MW-309 (**Appendix A**).

Because the background sampling at the three compliance wells were performed after other potential man-made sources of boron, calcium, and chloride had been in operation for many years, it is difficult to determine how much of the variation in boron, calcium, and chloride concentrations is due to natural sources versus man-made alternative sources associated with the long-term use of the property, as discussed in **Section 4.1.2**. Based on comparison to the two upgradient wells, it appears likely that calcium variability may reflect natural variation, while boron and chloride may reflect man-made sources. Regardless of the source, natural temporal variations in infiltration and groundwater flow direction may have contributed to the SSIs for boron at MW-309 and for calcium and chloride at MW-310.

4.1.2 Man-Made Alternative Sources

Man-made alternative sources that could potentially contribute to the boron, calcium, and chloride SSIs could include the closed ash pond landfill, the active ash ponds, Modules 1-3 of the ADF, the surface water/leachate collection pond for the ADF, the former ash pond effluent ditch, the coal storage area, railroad operations, road salt use, and/or other plant operations.

Based on the historic groundwater flow directions and on previous investigations at the site, the ash ponds and the former ash pond effluent ditch appear to be the most likely cause of the boron SSI for well MW-309. Road salt use appears to be the most likely cause of the chloride SSI for MW-310.

4.2 LINES OF EVIDENCE

The lines of evidence indicating that the SSIs for boron, calcium, and chloride in compliance wells MW-309 and MW-310, relative to the intrawell background sampling, are due to one or more alternative sources include:

1. The detected concentrations exceeding intrawell UPLs are below the background concentrations at other wells in the monitoring network. These results indicate that concentrations in these ranges were present in the groundwater in this area prior to initiation of CCR disposal in the Mod 4 CCR Unit.

2. Historical groundwater flow maps show that this area of the site was downgradient from the unlined ash ponds and ash pond effluent ditch for a significant portion of the site history.

3. MW-309 and MW-310 are located adjacent to the plant entrance road, where road salt impacts are likely.

4. The Mod 4 CCR Unit was constructed with a composite liner system and leachate collection system, and has only been receiving CCR since late 2018; therefore, it is very unlikely that a release from Mod 4 could have reached MW-309 and MW-310 by October 2020.

Each of these lines of evidence and the supporting data are discussed in more detail in the following sections.

4.2.1 Background Concentrations

As discussed above in **Section 4.1.1**, the detected concentrations exceeding intrawell UPLs are below the background concentrations at other wells in the monitoring network. These results indicate that concentrations in these ranges were present in the groundwater in this area prior to initiation of CCR disposal in the Mod 4 CCR Unit. Historical boron, calcium, and chloride concentrations for all five Mod 4 wells are shown in **Table 2** and in the time series plots in **Appendix A**. Based on these results, it is likely that the boron, calcium, and chloride concentrations from natural and/or man-made alternative sources have varied in concentration at MW-309 and MW-310 in response to changes in groundwater flow and infiltration.

4.2.2 Historical Groundwater Flow Directions

Historical groundwater flow maps show that this area of the site was downgradient from the unlined ash ponds and ash pond effluent ditch for a significant portion of the site history. Groundwater flow directions have changed through time due to changes in water management at the plant. The 1981 Plan of Operation, prepared by Warzyn in 1981, indicates that flow in the vicinity of the Mod 4 compliance wells was to the southeast, from the ash pond area. A water table map prepared by RMT, based on October 2002 water level measurements, shows flow from the ash pond area and the ash pond effluent ditch toward the current location of MW-309, MW-310, and MW-311. The 1981 and 2002 water table maps are provided in **Appendix B**.

Under current conditions, groundwater flow below the active Mod 4 is generally to the north and west. The flow changes with time reflect reduction in water level in the Secondary Pond and the WPDES pond, as well as the termination of discharge to the ash pond effluent ditch in the mid-2000s. When discharge via this ditch was active, the ditch and WPDES pond were sources of recharge to the groundwater and created a high groundwater area with flow moving away from the ditch to the east. After discharge to the ditch was terminated, water levels in this area decreased significantly and the groundwater flow direction changed.

The background concentrations of boron in the area of the Mod 4 compliance wells, likely reflect historical ash management activities at the site under different groundwater flow conditions.

4.2.3 Location Adjacent to Entrance Road

Monitoring wells MW-309 and MW-310 are located adjacent to the plant entrance road, where road salt impacts are likely. To be located as close as possible to the waste boundary of the CCR Unit (including the future Mod 5/6 additions to be constructed in 2021), these wells are installed between the entrance road and the storm water ditch on the south side of the road. At this location, there is a high potential for road salt application to result in increased chloride concentrations in groundwater.

4.2.4 Mod 4 Composite Liner

The Mod 4 CCR Unit was constructed with a composite liner system and leachate collection system, and has only been receiving CCR since late 2018; therefore, it is very unlikely that a release from Mod 4 could have reached MW-309 and MW-310 by October 2020. The liner system includes the following:

- 2 feet of compacted clay
- GCL

- 60-mil high density polyethylene (HDPE) geomembrane
- Leachate collection drainage layer
- Leachate collection piping

The liner was constructed in 2018, and CCR placement in Mod 4 began in November 2018.

Given the liner system in place, a release from Mod 4 would have to penetrate the HDPE liner at a flaw, flow vertically through the compacted clay liner, and travel with the groundwater approximately 600 feet north to MW-309 and MW-310 in less than 2 years. Based on the hydraulic conductivity of the liner clay (10^{-8}) and the very low estimated average groundwater velocity (0.2 to 4 feet per year, [SCS, 2021]), it is very unlikely that changes in boron, calcium, and chloride concentrations at MW-309 and MW-310 reflect a release from Mod 4.

5.0 ALTERNATIVE SOURCE DEMONSTRATION CONCLUSIONS

The lines of evidence discussed above regarding the SSIs reported for boron at MW-309 and for calcium and chloride at MW-310 demonstrate that the SSIs are likely due to sources other than the Mod 4 CCR Unit. Similar boron, calcium, and chloride concentrations were present in the area prior to disposal of CCR in Mod 4. The SSIs likely reflect natural variability (calcium), road salt impacts (chloride), and impacts associated with historical discharges from the ash ponds via the effluent ditch located west of the landfill (boron).

6.0 SITE GROUNDWATER MONITORING RECOMMENDATIONS

In accordance with section 257.94(e)(2) of the CCR Rule, the COL MOD 4 CCR Unit may continue with detection monitoring based on this ASD. The ASD report will be included in the 2021 Annual Report due January 31, 2022.

7.0 REFERENCES

RMT, 2003, Water Table Map (October 2002), Figure 3.

SCS Engineers, 2020, Alternative Source Demonstration, May 2020 Detection Monitoring, Dry Ash Disposal Facility, Module 4, Columbia Energy Center, Pardeeville, WI, November 12, 2020.

SCS Engineers, 2021, 2020 Annual Groundwater Monitoring and Corrective Action Report, Columbia Energy Center, Dry Ash Disposal Facility, Module 4, Pardeeville, WI, January 29, 2021.

USEPA, 2015, Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule, April 2015.

Warzyn Engineering, Inc., 1978, Feasibility Study, Proposed Fly Ash and/or Scrubber Sludge Disposal Facility – Columbia Site, Wisconsin Power and Light Company, Town of Pacific, Columbia County, WI, January 1978.

Warzyn Engineering, Inc., 1981, Water Table Contour Map 2/4/81, Drawing No. C7134-94.

Tables

1 Groundwater Analytical Results Summary – October and December 2020 Events
2 Historical Analytical Results for Parameters with SSIs
3 Groundwater Elevation – State Monitoring Program and CCR Well Network

Table 1. Groundwater Analytical Results Summary - October and December 2020 Events
Columbia Dry Ash Disposal Facility - Module 4 / SCS Engineers Project #25221067.00

	Background Wells		Compliance Wells							
Parameter Name	MW-84A	MW-301	MW-309			MW-310			MW-311	
	10/8/2020	10/8/2020	Intrawell UPL	10/8/2020	12/11/2020	Intrawell UPL	10/8/2020	12/11/2020	Intrawell UPL	10/8/2020
Boron, µg/L	9.7 J	28.8	42.2	57.7	65.9	81.9	77.6	NA	49.8	26.2
Calcium, µg/L	69,200	93,000	99,900	65,300	NA	56,000	62,000	56,800	84,200	73,400
Chloride, mg/L	4.3	3.4	901	575	NA	205	310	227	4.41	1.4 J
Fluoride, mg/L	<0.095	<0.095	DQ	<0.095	NA	DQ	<0.095	NA	DQ	<0.095
Field pH, Std. Units	7.49	6.95	8.18	7.33	7.42	8.12	7.52	7.62	8.07	7.66
Sulfate, mg/L	1.3 J	25.1	53.1	21.8	NA	118	60	NA	131	72.1
Total Dissolved Solids, mg/L	320	412	1,730	1,160	NA	759	846	700	462	380

4.4 — Blue shaded cell indicates the compliance well result exceeds the UPL (background) and the Limit of Quantitation (LOQ).

Abbreviations:
UPL = Upper Prediction Limit
DQ = Double Quantification
NA = Not Analyzed
LOQ = Limit of Quantitation
LOD = Limit of Detection
mg/L = milligrams per liter
µg/L = micrograms per liter
SSI = Statistically Significant Increase

Lab Notes:
J = Estimated concentration at or above the LOD and below the LOQ.

Notes:
1. Intrawell UPLs based on 1-of-2 retesting approach; therefore, there is no SSI if either the original sample result or the resample are below the UPL.
2. Intrawell UPL for fluoride is based on the double quantification rule, because fluoride was not detected above the LOQ in the background samples.
3. Intrawell UPLs calculated from background sampling results for the compliance wells from February 2018 through October 2018.

Created by:	AJR	Date:	1/21/2020
Last revision by:	NDK	Date:	12/23/2020
Checked by:	JSN	Date:	12/28/2020
Scientist/PM QA/QC:	SCC	Date:	1/3/2021

I:\25221067.00\Deliverables\2020 Oct ASD MOD 4 LF\Tables\[Table 1 - CCR GW Screening Summary_COL LF Mod 4.xlsx]Current Event Table-original

Table 2. Historical Analytical Results for Parameters with SSIs
Columbia Dry ADF, Module 4

Well Group	Well	Collection Date	Boron (µg/L)	Calcium (µg/L)	Chloride (mg/L)
Background	MW-301	12/22/2015	26.5	126,000	3.70 J
		4/5/2016	25.2	115,000	4.00
		7/8/2016	23.6	108,000	3.50 J
		10/13/2016	30.6	118,000	2.20
		12/29/2016	32.8	129,000	2.00 J
		1/25/2017	32.6	124,000	1.50 J
		4/11/2017	28.8	120,000	2.00
		6/6/2017	21.3	111,000	3.50
		8/8/2017	30.6	108,000	5.50
		10/23/2017	34.3	87,200	4.00
		4/25/2018	24.3	112,000	2.30
		8/8/2018	22.8	105,000	5.20
		10/24/2018	27.8	101,000	3.20
		4/2/2019	26.9	126,000	0.79 J
		10/9/2019	35.9	114,000	1.70
		2/3/2020	27.9	113,000	1.30 J
		5/29/2020	21.3	112,000	2.00 J
		10/8/2020	28.8	93,000	3.40
	MW-84A	12/22/2015	11.9	74,000	4.90
		4/5/2016	14.0	72,200	4.70
		7/8/2016	14.7	67,600	5.10
		10/13/2016	11.1	74,000	4.30
		12/29/2016	14.7	76,000	4.70
		1/25/2017	16.1	70,800	4.60
		4/11/2017	12.9	73,200	4.90
		6/6/2017	14.8	76,100	5.50
		8/8/2017	22.9	74,900	5.50
		10/24/2017	13.8	77,500	5.10
		4/25/2018	25.0	76,600	4.80
		8/8/2018	12.8	76,000	4.90
		10/24/2018	10.1 J	74,000	4.20
		4/3/2019	13.6	80,100	3.60
		10/9/2019	12.0	73,500	3.90
		2/3/2020	15.7	72,700	3.70
		5/29/2020	10.0	77,600	3.70
		10/8/2020	9.7 J	69,200	4.30
Compliance	MW-309	2/21/2018	31.4	42,700	147
		3/23/2018	31.0	41,800	157
		4/23/2018	30.4	39,600	157
		5/24/2018	28.0	52,700	141
		6/23/2018	26.6	67,600	203
		7/23/2018	35.5	63,800	557
		8/22/2018	40.5	93,600	811
		9/21/2018	30.0	55,200	329
		4/2/2019	37.4	45,300	145
		10/8/2019	33.4	46,900	43.2
		5/29/2020	54.6	51,600	350
		6/30/2020	50.7	--	--
		8/6/2020	55.3	--	--
		10/8/2020	57.7	65,300	575
		12/11/2020	65.9	--	--

Table 2. Historical Analytical Results for Parameters with SSIs
Columbia Dry ADF, Module 4

Well Group	Well	Collection Date	Boron (µg/L)	Calcium (µg/L)	Chloride (mg/L)
Compliance	MW-310	2/21/2018	67.1	32,400	19.8
		3/23/2018	62.1	33,400	21.7
		4/23/2018	60.7	32,100	22.1
		5/24/2018	59.2	32,100	68.6
		6/23/2018	61.4	34,300	59.8
		7/23/2018	69.5	39,700	118
		8/22/2018	64.2	38,800	139
		9/21/2018	80.3	54,100	152
		4/2/2019	73.0	38,800	76.0
		10/8/2019	81.8	57,600	190
		12/23/2019	--	55,400	--
		5/29/2020	74.4	41,100	128
		10/8/2020	77.6	62,000	310
		12/11/2020	--	56,800	227
	MW-311	2/21/2018	43.7	58,000	2.90
		3/23/2018	42.7	61,000	2.70
		4/23/2018	40.1	56,600	2.60
		5/24/2018	31.7	62,500	3.50
		6/23/2018	33.6	70,700	3.00
		7/23/2018	30.1	76,800	2.00 J
		8/22/2018	32.4	65,700	2.00 J
		9/21/2018	27.5	75,400	3.90
		4/2/2019	35.7	65,600	1.90 J
		10/8/2019	33.5	63,900	1.50 J
		5/29/2020	25.7	62,200	1.50 J
		10/8/2020	26.2	73,400	1.40 J

Abbreviations:
µg/L = micrograms per liter or parts per billion (ppb)
mg/L = milligrams per liter or parts per million (ppm)
-- = Not sampled
J = Estimated value below the laboratory's limit of quantitation

Note:
(1) Complete laboratory reports included in the Annual Groundwater Monitoring and Corrective Action Reports.

Created by:	NDK	Date:	3/18/2021
Last revision by:	NDK	Date:	3/18/2021
Checked by:	JR	Date:	3/22/2021
Scientist Check:	TK	Date:	4/4/2021

I:\25221067.00\Deliverables\2020 Oct ASD MOD 4 LF\Tables\[Table 2 - Historical Analytical Results with SSIs.xlsx]Table 2. Analy. Rslts- CCR

Table 3. Groundwater Elevation - State Monitoring Program and CCR Well Network

Columbia Dry Ash and Ash Pond Disposal Facilities / SCS Engineers Project #25221067.00

	Well Number	MW-1AR	MW-4	MW-5R	MW-33AR	MW-33BR	MW-34A	MW-34B	MW-37A	MW-83	MW-84A	MW-84B	MW-86	MW-91AR	MW-91B	MW-92A	MW-92B
Dry Ash Facility (Facility ID #03025)	**Top of Casing Elevation (feet amsl)**	822.55	819.74	805.44	808.29	808.39	805.95	806.05	813.04	807.96	814.28	814.26	824.79	809.03	808.45	808.47	808.41
	Screen Length (ft)																
	Total Depth (ft from top of casing)	44.40	39.58	25.97	31.08	57.50	35.43	56.95	31.80	25.42	40.21	52.02	45.43	32.90	52.38	28.94	51.75
	Top of Well Screen Elevation (ft)	778.15	780.16	779.47	777.21	750.89	770.52	749.10	781.24	782.54	774.07	762.24	779.36	776.13	756.07	779.53	756.66
	Measurement Date																
	October 2, 2012	783.41	783.70	784.96	782.38	782.23	783.03	782.99	782.66	dry	783.84	783.94	783.81	784.09	783.90	784.49	784.06
	April 15, 2013	785.44	784.02	786.09	784.16	784.14	784.74	784.79	783.87	784.49	785.83	785.76	785.22	785.14	785.01	785.75	785.34
	October 8, 2013													785.66	785.42	785.97	785.52
	October 15, 2013	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	785.66	785.42	785.97	785.52
	April 14, 2014	784.95	784.09	785.63	783.74	783.91	784.63	784.70	783.45	783.73	785.58	785.52	784.96	785.04	784.96	785.99	785.54
	October 2-3, 2014	785.03	785.39	786.08	784.37	784.28	784.57	784.54	784.56	dry	785.24	785.18	785.19	785.47	785.28	785.75	785.33
	April 13-14, 2015	783.96	783.63	785.25	783.01	782.74	783.65	783.95	782.87	dry	784.43	784.51	784.17	784.48	784.37	785.07	784.66
	October 6-7, 2015	784.28	784.44	785.72	783.68	783.33	784.05	784.02	783.66	dry	784.80	784.76	784.66	784.89	784.70	785.20	784.76
	April 4-6, 2016	785.82	aband	787.02	785.29	785.07	785.63	785.67	784.76	785.43	786.37	786.26	785.89	786.05	785.95	786.61	786.21
	October 11-13, 2016	786.64	aband	788.00	787.36	786.46	786.45	786.32	786.40	786.81	787.22	787.11	786.96	787.17	786.81	787.68	787.25
	April 10-13, 2017	786.96	aband	788.13	786.39	785.99	786.30	786.28	786.34	786.23	787.16	787.06	786.96	787.24	787.03	787.90	787.60
	October 3-5, 2017	785.48	aband	786.66	784.51	784.22	784.67	784.63	784.86	784.29	NM	786.49	785.58	786.08	785.83	786.47	786.02
	October 9-10, 2017	NM	aband	NM	NM	NM	NM	NM	NM	NM	785.56 [6]	NM	NM	NM	NM	NM	NM
	February 21, 2018	783.97	aband	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	784.68	784.46	NM	NM
	April 23-25, 2018	783.99	aband	785.36	783.09	786.36	781.77	780.79	783.28	783.32	785.88	784.91	782.54	784.71	784.53	785.23	784.81
	October 23-25, 2018	788.25	aband	789.71	788.77	787.96	787.88	787.73	787.62	788.26	788.32	788.19	788.21	788.59	788.31	789.32	788.87
	April 1-4, 2019	787.05	aband	788.64	786.63	786.54	786.82	786.92	786.47	786.78	787.35	787.34	787.16	787.45	787.18	788.04	787.63
	October 7-9, 2019	787.26	aband	789.23	788.26	787.64	787.92	787.74	786.77	788.90	787.79	787.73	787.44	787.78	787.62	788.63	788.17
	May 27-28, 2020	786.92	aband	788.34	786.01	785.75	785.98	785.99	786.22	786.03	787.02	786.99	786.94	787.26	787.05	787.86	787.47
	October 7-8, 2020	785.95	aband	787.76	785.91	785.45	785.70	785.68	785.52	785.72	786.10	786.06	786.10	786.55	786.33	786.85	786.38
	February 25, 2021	NM	aband	NM	NM	NM	784.75	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	Bottom of Well Elevation (ft)	778.15	780.16	779.47	777.21	750.89	770.52	749.10	781.24	782.54	774.07	762.24	779.36	776.13	756.07	779.53	756.66

	Well Number	M-3	M-4R	MW-39A	MW-39B	MW-48A	MW-48B	MW-57	MW-59	MW-216R	MW-217	MW-220RR	SG-1	SG-2	SG-3	SG-4
Ash Pond Facility (Facility ID #02325)	**Top of Casing Elevation (feet amsl)**	788.23	806.10	809.62	809.50	828.86	828.84	786.29	815.48	814.21	791.55	792.90	792.06	795.25	808.60	805.36
	Screen Length (ft)															
	Total Depth (ft from top of casing)	16.90	25.55	34.80	76.07	51.88	75.80	14.40	38.50	37.85	37.37	18.96	--	--	--	--
	Top of Well Screen Elevation (ft)	771.33	780.55	774.82	733.43	776.98	753.04	771.89	776.98	776.36	754.18	773.94	--	--	--	--
	Measurement Date															
	October 2, 2012	780.13	786.76	781.49	781.34	782.03	781.93	780.58	779.88	781.91	780.95	780.55	789.14	793.85	dry	dry
	April 15, 2013	785.16	788.39	783.97	784.00	783.77	783.78	784.69	783.66	784.09	784.75	785.02	789.5[1]	NM	dry	dry
	October 8, 2013	781.22	786.67	NM	NM	783.69	783.58	NM	NM	783.39	782.27	782.36	789.5[1]	791.33	dry	dry
	October 15, 2013	NM	NM	782.94	782.81	NM	NM	782.47	783.49	NM	NM	NM	NM	NM	NM	NM
	April 14, 2014	786.04	788.96	783.57	783.68	783.56	783.57	785.51	783.41	783.73	785.25	785.87	788.90	dry	dry	dry
	October 1-3, 2014	781.16	787.55	783.42	783.32	784.05	783.94	782.32	783.55	783.79	782.63	783.03	NM	dry	dry	dry
	April 13-14, 2015	783.08	786.83	782.77	782.68	782.80	782.82	782.81	782.83	782.93	783.34	783.42	789.3	791.70	dry	dry
	October 6-7, 2015	780.66	786.12	782.97	782.81	783.10	783.01	781.82	783.25	783.18	781.95	782.26	788.48	791.58	dry	dry
	April 4-6, 2016	784.21	789.09	785.27	785.27	784.79	784.76	783.21	784.97	785.68	785.02	784.36	NM	793.40	dry	dry
	October 11-13, 2016	781.88	787.88	785.75	785.52	785.73	785.61	783.12	786.51	786.16	783.75	784.09	788.32	792.52	dry	dry
	April 10-13, 2017	782.94	787.95	785.44	785.20	785.82	785.69	782.77	786.09	785.95	784.29	784.09	788.31	793.85	dry	dry
	October 3-5, 2017	780.93	787.04	783.35	783.18	784.30	784.19	782.37	784.23	783.89	782.48	782.61	788.3	793.45	dry	dry
	April 23-25, 2018	782.89	790.43	782.86	782.87	783.14	783.09	783.04	783.02	783.23	783.26	783.45	788.38	>795.25	dry	dry
	October 23-25, 2018	782.95	788.47	787.12	786.88	787.12	786.99	783.48	787.73	787.49	784.90	784.52	787.76	793.25	dry	dry
	April 1-4, 2019	785.68	789.44	786.28	786.31	786.56	786.45	785.27	787.39	786.53	786.33	785.46	--	794.60	dry	dry
	October 7-9, 2019	785.33	790.65	787.10	787.02	786.68	786.65	785.29	786.68	787.07	786.01	785.42	748.48	795.20	dry	dry
	May 27-29, 2020	781.80	787.73	785.12	784.92	785.74	785.59	783.11	785.89	785.60	783.41	783.89	748.48	>795.25	dry	dry
	October 7-8 &17, 2020	781.42	787.74	784.74	784.64	785.03	784.96	782.83	785.43	785.10	783.06	783.49	788.34	793.32	dry	NM
	Bottom of Well Elevation (ft)	771.33	780.55	774.82	733.43	776.98	753.04	771.89	776.98	776.36	754.18	773.94	--	--	--	--

Table 3. Groundwater Elevation - State Monitoring Program and CCR Well Network

Columbia Dry Ash and Ash Pond Disposal Facilities / SCS Engineers Project #25221067.00

	Well Number	MW-301	MW-302	MW-303	MW-304	MW-305	M-4R	MW-33AR	MW-34A	MW-84A	MW-306	MW-307	MW-308	MW-309	MW-310	MW-311
	Top of Casing Elevation (feet amsl)	806.89	813.00	811.52	805.42	806.32	806.10	808.29	805.95	814.28	807.63	806.89	806.9	813.27	813.62	809.74
	Screen Length (ft)	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	Total Depth (ft from top of casing)	29.40	33.6	35.80	25.7	25.6	39.58	31.08	35.43	40.21	27	26.5	28	37.67	38.41	36.19
	Top of Well Screen Elevation (ft)	787.49	789.40	785.72	789.72	790.72	776.52	787.21	780.52	784.07	790.63	790.39	788.90	785.60	785.21	783.55
	Measurement Date													--	--	--
	December 21-22, 2015	NM	784.78	784.11	786.13	788.96	787.58	783.77	783.50	785.31	--	--	--	--	--	--
	April 4-5, 2016	786.78	785.81	785.48	788.08	789.61	789.09	785.29	785.63	786.37	--	--	--	--	--	--
	July 7-8, 2016	786.31	786.28	784.60	787.36	789.26	787.43	785.19	785.05	785.89	--	--	--	--	--	--
	July 28, 2016	NM	NM	784.35	NM	NM	NM	NM	784.86	785.61	--	--	--	--	--	--
	October 11-13, 2016	787.64	787.76	786.18	788.18	789.78	787.88	787.36	786.45	787.22	--	--	--	--	--	--
	December 29, 2016	787.37	787.05	NM	NM	NM	NM	785.66	785.72	786.63	--	--	--	--	--	--
	January 25-26, 2017	787.27	786.89	785.28	789.34	789.36	789.64	785.88	785.98	786.70	785.50	785.36	785.73	--	--	--
	April 10 & 11, 2017	787.89	787.55	786.00	788.22	789.57	787.95	786.39	786.30	787.16	786.22	785.64	786.51	--	--	--
	June 6, 2017	788.25	788.37	786.49	788.58	789.79	787.83	787.27	786.66	787.63	786.85	786.07	786.46	--	--	--
	August 7-9, 2017	787.34	787.55	785.42	789.52	789.30	788.54	786.11	785.81	786.68	785.69	785.19	785.37	--	--	--
	October 23-24, 2017	785.89	785.94	783.92	788.97	788.14	788.00	784.13	784.50	785.32	783.97	784.79	784.17	--	--	--
	February 21, 2018	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	783.19	783.05	783.02
	March 23, 2018	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	783.10	783.10	783.00
	April 23-25, 2018	785.29	784.37	783.27	789.69	787.67	790.43	783.09	781.77	785.88	783.24	783.65	782.65	783.07	782.97	781.83
CCR Rule Wells	May 24, 2018	NM	NM	NM	NM	NM	NM	NM	NM	NM	785.79	785.09	NM	785.45	785.97	786.11
	June 23, 2018	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	786.03	786.64	786.47
	July 23, 2018	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	786.27	786.35	786.55
	August 7, 2018	787.06	NM	785.20	788.25	788.56	787.63	NM	NM	786.55	NM	NM	NM	NM	NM	NM
	August 22, 2018	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	785.54	785.40	785.46
	September 21, 2018	NM	788.37	786.50	NM	NM	NM	787.90	787.01	NM	NM	NM	NM	787.08	787.24	787.66
	October 22-24, 2018	788.98	789.16	787.51	789.05	790.04	788.47	788.77	787.88	788.32	787.66	786.57	787.81	787.99	788.18	788.64
	April 1-4, 2019	787.04	787.56	786.52	789.72	790.07	789.44	786.63	786.82	787.35	786.72	786.71	787.53	786.30	786.38	786.38
	June 12, 2019	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	787.25	NM
	June 19, 2019	NM	NM	786.81	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	October 7-9,2019	788.47	788.31	787.02	790.41	790.36	790.65	NM	NM	NM	787.47	786.99	787.18	787.26	787.94	787.64
	December 13, 2019	--	--	--	--	--	--	--	--	--	787.03	785.68	786.43	--	--	--
	December 23, 2019	--	--	--	--	--	--	--	--	--	--	--	--	--	775.22	--
	January 17, 2020	--	--	785.58	--	--	--	--	--	--	--	--	--	--	--	--
	February 3, 2020	787.24	NM	NM	NM	NM	NM	NM	NM	786.50	785.77	785.57	786.48	NM	NM	NM
	May 27-29, 2020	787.77	787.29	785.56	789.30	787.78	787.73	786.01	785.98	787.02	785.77	785.35	786.28	785.98	785.81	785.85
	June 30, 2020	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	786.18	NM	NM
	August 6, 2020	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	785.93	NM	NM
	October 7-8, 2020	786.53	786.74	785.16	788.52	787.96	787.74	785.91	785.70	786.10	785.39	784.71	785.68	785.47	785.56	785.83
	December 11, 2020	--	--	--	--	788.19	--	--	--	--	--	--	--	785.26	785.26	--
	February 25, 2021	NM	NM	784.27	NM	788.36	NM	NM	784.75	NM	NM	NM	NM	NM	NM	NM
	Bottom of Well Elevation (ft)	771.33	780.55	774.82	733.43	776.98	753.04	771.89	776.98	776.36	780.63	780.39	778.90	775.60	775.21	773.55

Notes:
NM = not measured

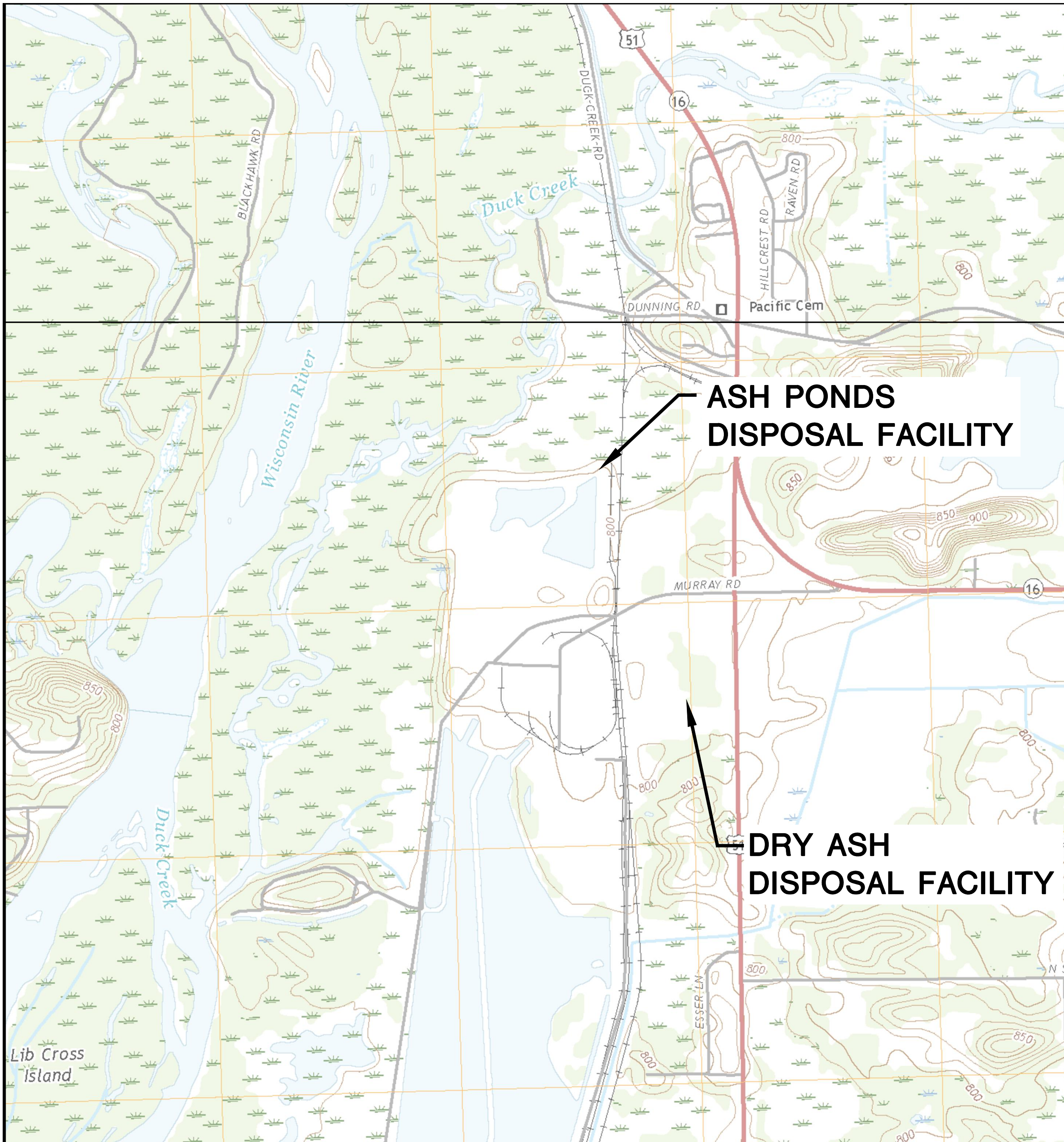
Created by:	MDB	Date:	5/6/2013
Last revision by:	ZTW	Date:	2/25/2021
Checked by:	RM	Date:	4/5/2021
Proj Mgr QA/QC:	TK	Date:	4/5/2021

(1) The elevation for SG-1 is read off of the staff gauge (rather than measured from the top of the gauge).
(2) SG-2 could not be located during the April 2013 event.
(3) SG-3 could not be located during the October 2013 event. SG-1 could not be safely accessed during the October 2013 event.
(4) LH-2 measurements are given as leachate depth, measured by a transducer.
(5) LH-2 and LH-3 measurements were collected by WPL staff on October 9, 2017.
(6) The depth to water at MW-84A was not measured prior to purging for sampling during the October 3-5 sampling event. The level was allowed to return to static and was measured on 10/10/2017.

I:\25221067.00\Deliverables\2020 Oct ASD MOD 4 LF\Tables\[Table 3 - Groundwater Elevation Summary.xls]levels

Figures

1 Site Location Map
2 Site Plan and Monitoring Well Locations
3 Water Table Map – October 2020

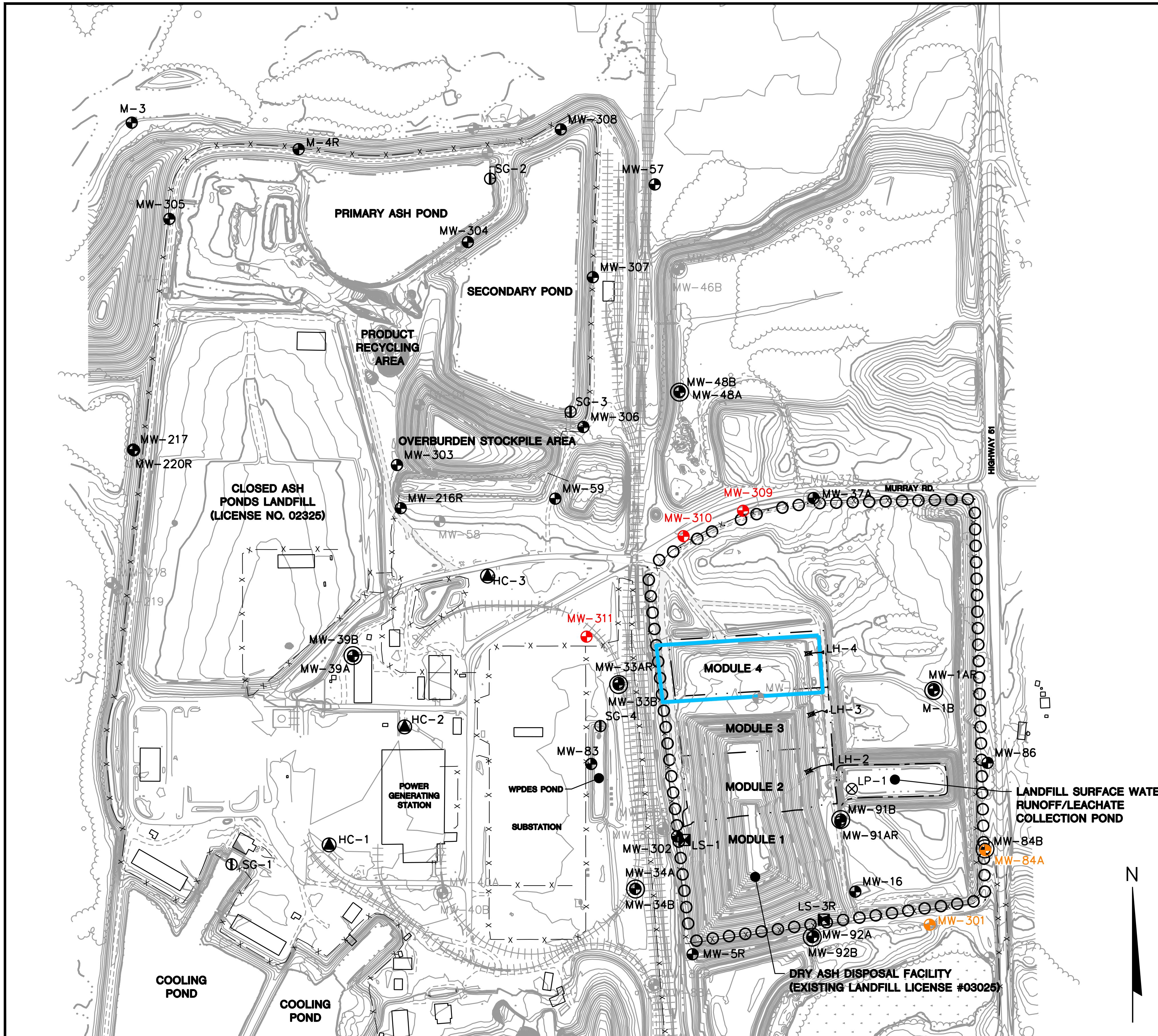


POYNETTE QUADRANGLE
WISCONSIN–COLUMBIA CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)
2018
SCALE: 1" = 2,000'

CLIENT	SITE	
ALLIANT ENERGY COLUMBIA ENERGY CENTER W8375 MURRAY ROAD PARDEEVILLE, WI 53954	ALLIANT ENERGY COLUMBIA ENERGY CENTER PARDEEVILLE, WI	SITE LOCATION MAP

				ENGINEER	FIGURE
PROJECT NO.	25219067.00	DRAWN BY:	BSS	SCS ENGINEERS 2830 DAIRY DRIVE MADISON, WI 53718-6751 PHONE: (608) 224-2830	1
DRAWN:	12/02/2019	CHECKED BY:	MDB		
REVISED:	01/10/2020	APPROVED BY:	TK 01/30/2020		

I:\25219067.00\Drawings\CCR 2019 Annual Report\Site Location Map.dwg, 1/30/2020 3:38:21 PM



N

500 0 500

SCALE: 1" = 500'

LEGEND

- EXISTING MAJOR CONTOUR (10' INTERVAL)
- EXISTING MINOR CONTOUR (2' CONTOUR)
- EXISTING FENCELINE
- EXISTING TRACKS
- EXISTING PAVED ROAD
- EXISTING UNPAVED ROAD
- EDGE OF WATER
- APPROVED LIMITS OF WASTE (DRY ASH LANDFILL)
- CONSTRUCTED LIMITS OF WASTE (DRY ASH LANDFILL)
- WATER SUPPLY WELL
- STAFF GAUGE
- WATER TABLE WELL
- PIEZOMETER
- SURFACE WATER SAMPLE LOCATION
- LYSIMETER
- ABANDONED WATER TABLE WELL
- ABANDONED PIEZOMETER
- LEACHATE HEADWELL
- CCR UNIT
- CCR MONITORING WELL
- CCR BACKGROUND MONITORING WELL

NOTES:

1. BASE MAP CREATED FROM AERIAL SURVEY BY KBM, FLOWN DECEMBER 1, 2014, AND GROUND SURVEY BY SCS ENGINEERS IN MAY 2016, JUNE 2016, OCTOBER 2016, NOVEMBER 2016, APRIL 2017, NOVEMBER 2017, JULY 2018, AUGUST 2018, FEBRUARY 2019, MAY 2019 AND SEPTEMBER 2020.
2. MONITORING WELL LOCATIONS AND ELEVATIONS SURVEYED BY WISCONSIN POWER AND LIGHT, INC. IN DECEMBER 1994, NOVEMBER 1996, APRIL 2003, AND JANUARY 2016, AND BY SCS ENGINEERS IN FEBRUARY 2018.
3. SUPPLY WELL LOCATIONS ARE APPROXIMATE AND ASSUMED BASED ON JANUARY 2013 DRAWINGS BY TRC.
4. MONITORING WELLS MW-301 THROUGH MW-305 INSTALLED BY BADGER STATE DRILLING ON NOVEMBER 11-13, 2015.
5. MONITORING WELLS MW-306 THROUGH MW-308 INSTALLED BY BADGER STATE DRILLING ON NOVEMBER 14-15, 2016.
6. MONITORING WELLS MW-309 THROUGH MW-311 INSTALLED BY BADGER STATE DRILLING ON FEBRUARY 13-14, 2018.
7. BACKGROUND MONITORING WELLS FOR THE MODULE 4 DRY ASH DISPOSAL FACILITY ARE: MW-301 AND MW-84A.

PROJECT NO.	25219067.00	DRAWN BY:	BSS/ZTW
DRAWN:	12/02/2019	CHECKED BY:	TK
REVISED:	01/05/2021	APPROVED BY:	TK 01/28/2021

ENGINEER: SCS ENGINEERS
2830 DAIRY DRIVE MADISON, WI 53718-6751
PHONE: (608) 224-2830

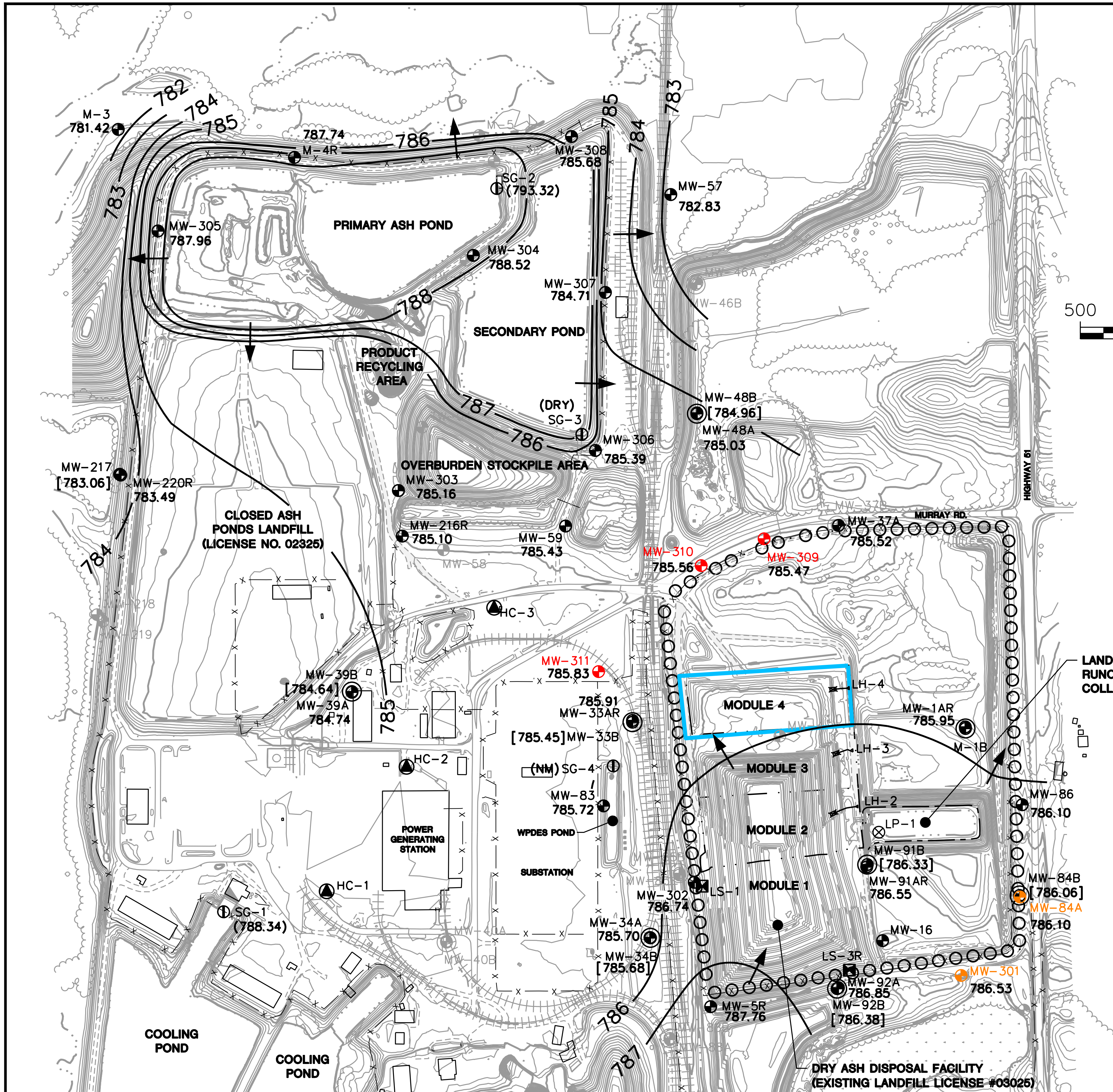
CLIENT: ALLIANT ENERGY
COLUMBIA ENERGY CENTER
W8375 MURRAY ROAD
PARDEEVILLE, WI 53954

SITE: ALLIANT ENERGY
COLUMBIA ENERGY CENTER
MODULE 4 DRY ASH DISPOSAL FACILITY
PARDEEVILLE, WI

SITE PLAN AND MONITORING WELL LOCATIONS

FIGURE 2

I:\25220067.00\Drawings\Mod \Site Plan and Monitoring ell Locations.dwg, 1/20/2021 1: 6:12 PM



N

500 0 500

SCALE: 1" = 500'

LEGEND

- EXISTING MAJOR CONTOUR (10' INTERVAL)
- EXISTING MINOR CONTOUR (2' CONTOUR)
- EXISTING FENCE LINE
- EXISTING TRACKS
- EXISTING PAVED ROAD
- EXISTING UNPAVED ROAD
- EDGE OF WATER
- APPROVED LIMITS OF WASTE (DRY ASH LANDFILL)
- CONSTRUCTED LIMITS OF WASTE (DRY ASH LANDFILL)
- WATER SUPPLY WELL
- STAFF GAUGE
- WATER TABLE WELL
- PIEZOMETER
- SURFACE WATER SAMPLE LOCATION
- LYSIMETER
- ABANDONED WATER TABLE WELL
- ABANDONED PIEZOMETER
- LEACHATE HEADWELL
- CCR UNIT
- CCR MONITORING WELL
- CCR BACKGROUND MONITORING WELL
- 787.62 WATER TABLE ELEVATION MEASURED OCTOBER 2020
- [788.87] POTENTIOMETRIC SURFACE ELEVATION MEASURED OCTOBER 2020 (NOT CONTOURED)
- (795.20) SURFACE WATER ELEVATION MEASURED OCTOBER 2020 (NOT CONTOURED)
- WATER TABLE CONTOUR
- APPROXIMATE GROUNDWATER FLOW DIRECTION
- (NM) NOT MEASURED

NOTES:

1. BASE MAP CREATED FROM AERIAL SURVEY BY KBM, FLOWN DECEMBER 1, 2014, AND GROUND SURVEY BY SCS ENGINEERS IN MAY 2016, JUNE 2016, OCTOBER 2016, NOVEMBER 2016, APRIL 2017, NOVEMBER 2017, JULY 2018, AUGUST 2018, FEBRUARY 2019, MAY 2019, AND SEPTEMBER 2020.
2. MONITORING WELL LOCATIONS AND ELEVATIONS SURVEYED BY WISCONSIN POWER AND LIGHT, INC. IN DECEMBER 1994, NOVEMBER 1996, APRIL 2003, AND JANUARY 2016 AND BY SCS ENGINEERS IN FEBRUARY 2018.
3. SUPPLY WELL LOCATIONS ARE APPROXIMATE AND ASSUMED BASED ON JANUARY 2013 DRAWINGS BY TRC.
4. MONITORING WELLS MW-301 THROUGH MW-305 INSTALLED BY BADGER STATE DRILLING ON NOVEMBER 11-13, 2015.
5. MONITORING WELLS MW-306 THROUGH MW-308 INSTALLED BY BADGER STATE DRILLING ON NOVEMBER 14-15, 2016.
6. MONITORING WELLS MW-309 THROUGH MW-311 INSTALLED BY BADGER STATE DRILLING ON FEBRUARY 13-14, 2018.
7. GROUNDWATER ELEVATIONS WERE COLLECTED FROM MONITORING WELLS AND PIEZOMETERS ON OCTOBER 7, 8, and 17, 2020.
8. BACKGROUND MONITORING WELLS FOR THE MODULE 4 DRY ASH DISPOSAL FACILITY ARE: MW-301 AND MW-84A.

PROJECT NO.	25220067.00	DRAWN BY:	KP/ZTW
DRAWN:	08/07/2020	CHECKED BY:	TK
REVISED:	01/05/2021	APPROVED BY:	TK 01/28/2021

ENGINEER: SCS ENGINEERS
2830 DAIRY DRIVE MADISON, WI 53718-6751
PHONE: (608) 224-2830

CLIENT: ALLIANT ENERGY
COLUMBIA ENERGY CENTER
W8375 MURRAY ROAD
PARDEEVILLE, WI 53954

SITE: ALLIANT ENERGY
COLUMBIA ENERGY CENTER
MODULE 4 DRY ASH DISPOSAL FACILITY
PARDEEVILLE, WI

WATER TABLE MAP
OCTOBER 2020

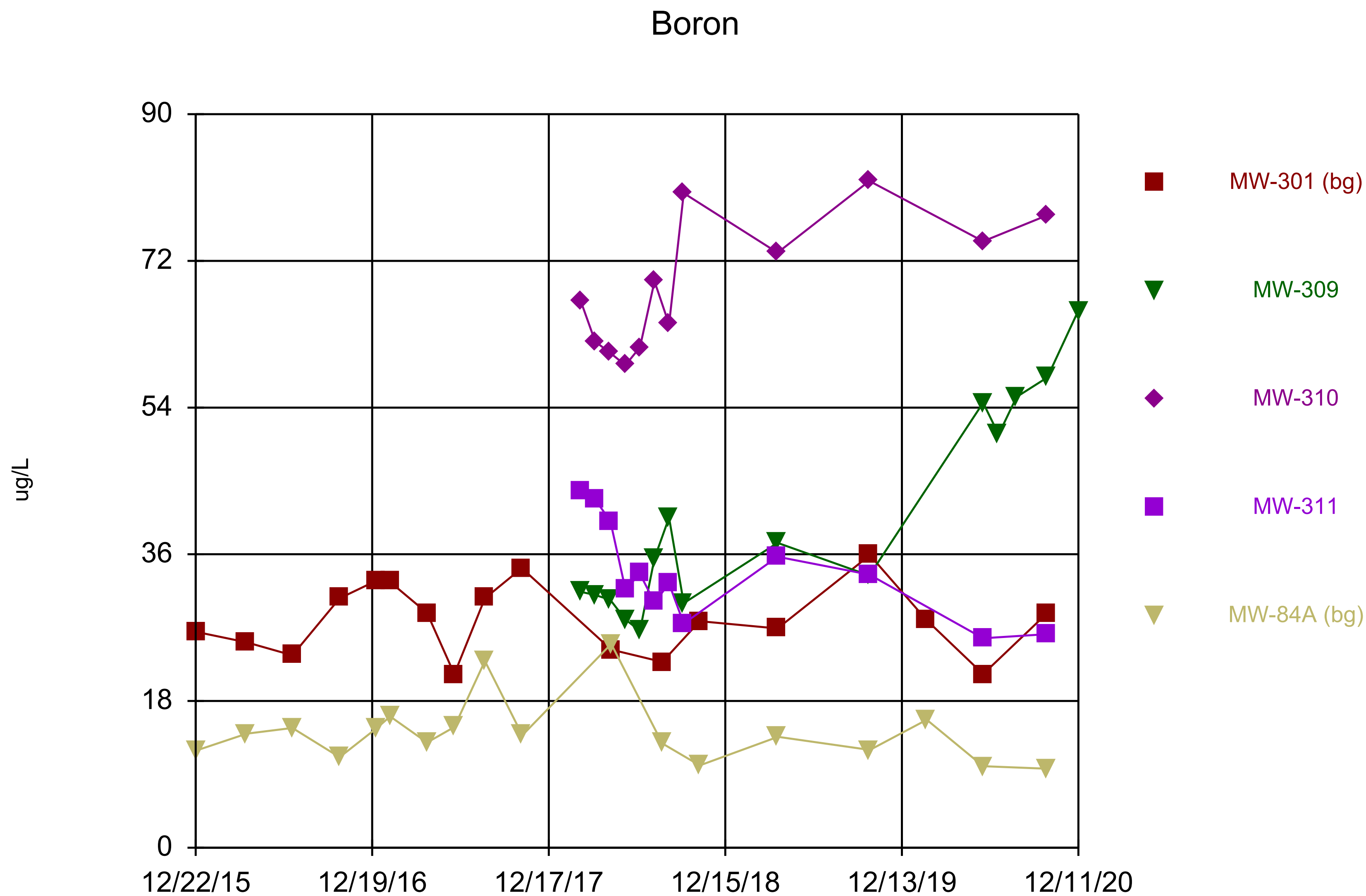
FIGURE
3

I:\25220067.00\Drawings\ASD Mod 1-3 L\ ater a le Map ct 2020 M D .dwg, 1/28/2021 11: 2:03 AM

Appendix A

Trend Plots for CCR Wells

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



Time Series Analysis Run 4/5/2021 6:00 PM View: MOD 4 LF

Columbia Energy Center Client: SCS Engineers Data: December - Chem- export-Dec2020

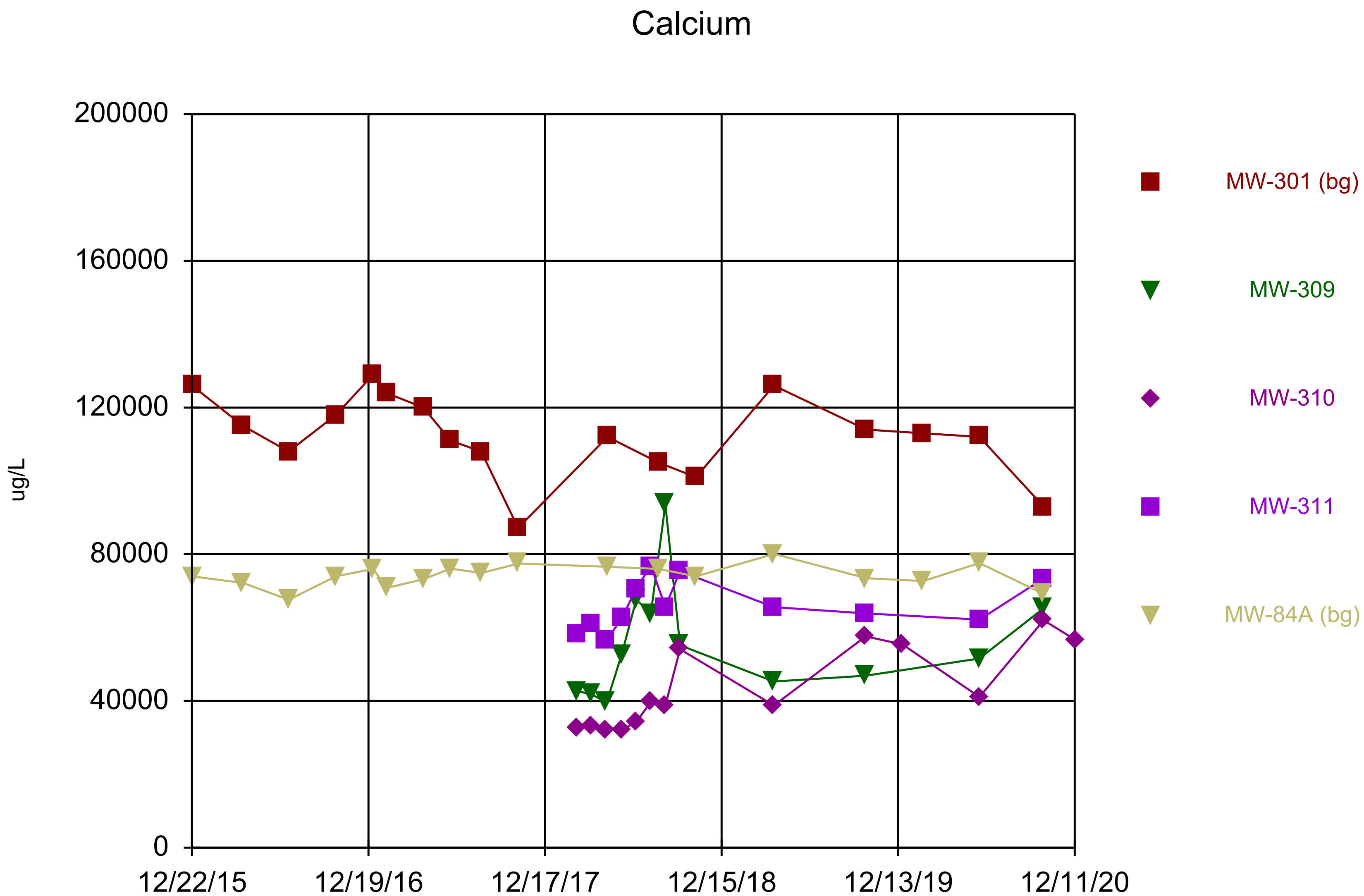
Time Series

Constituent: Boron (ug/L) Analysis Run 4/5/2021 6:03 PM View: MOD 4 LF

Columbia Energy Center Client: SCS Engineers Data: December - Chem- export-Dec2020

	MW-301 (bg)	MW-309	MW-310	MW-311	MW-84A (bg)
12/22/2015	26.5				11.9
4/5/2016	25.2				14
7/8/2016	23.6				14.7
10/13/2016	30.6				11.1
12/29/2016	32.8				14.7
1/25/2017	32.6				16.1
4/11/2017	28.8				12.9
6/6/2017	21.3				14.8
8/8/2017	30.6				22.9
10/23/2017	34.3				
10/24/2017					13.8
2/21/2018		31.4	67.1	43.7	
3/23/2018		31	62.1	42.7	
4/23/2018		30.4	60.7	40.1	
4/25/2018	24.3				25
5/24/2018		28	59.2	31.7	
6/23/2018		26.6	61.4	33.6	
7/23/2018		35.5	69.5	30.1	
8/8/2018	22.8				12.8
8/22/2018		40.5	64.2	32.4	
9/21/2018		30	80.3	27.5	
10/24/2018	27.8				10.1 (J)
4/2/2019	26.9	37.4	73	35.7	
4/3/2019					13.6
10/8/2019		33.4	81.8	33.5	
10/9/2019	35.9				12
2/3/2020	27.9				15.7
5/29/2020	21.3	54.6	74.4	25.7	10
6/30/2020		50.7			
8/6/2020		55.3			
10/8/2020	28.8	57.7	77.6	26.2	9.7 (J)
12/11/2020		65.9 (R)			

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



Time Series Analysis Run 4/5/2021 6:00 PM View: MOD 4 LF

Columbia Energy Center Client: SCS Engineers Data: December - Chem- export-Dec2020

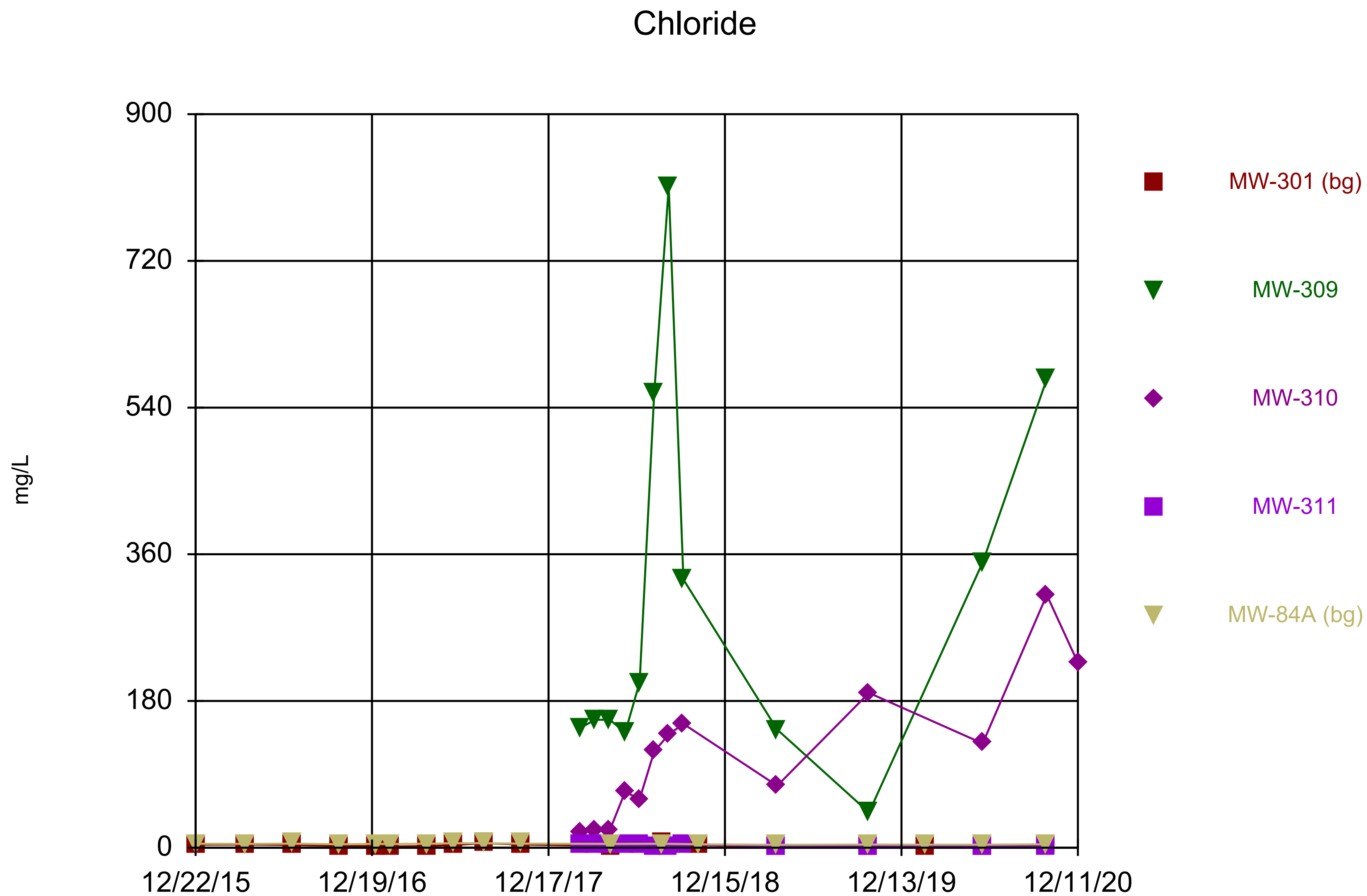
Time Series

Constituent: Calcium (ug/L)   Analysis Run 4/5/2021 6:03 PM   View: MOD 4 LF

Columbia Energy Center   Client: SCS Engineers   Data: December - Chem- export-Dec2020

	MW-301 (bg)	MW-309	MW-310	MW-311	MW-84A (bg)
12/22/2015	126000				74000
4/5/2016	115000				72200
7/8/2016	108000				67600
10/13/2016	118000				74000
12/29/2016	129000				76000
1/25/2017	124000				70800
4/11/2017	120000				73200
6/6/2017	111000				76100
8/8/2017	108000				74900
10/23/2017	87200				
10/24/2017					77500
2/21/2018		42700	32400	58000	
3/23/2018		41800	33400	61000	
4/23/2018		39600	32100	56600	
4/25/2018	112000				76600
5/24/2018		52700	32100	62500	
6/23/2018		67600	34300	70700	
7/23/2018		63800	39700	76800	
8/8/2018	105000				76000
8/22/2018		93600	38800	65700	
9/21/2018		55200	54100	75400	
10/24/2018	101000				74000
4/2/2019	126000	45300	38800	65600	
4/3/2019					80100
10/8/2019		46900	57600	63900	
10/9/2019	114000				73500
12/23/2019			55400		
2/3/2020	113000				72700
5/29/2020	112000	51600	41100	62200	77600
10/8/2020	93000	65300	62000	73400	69200
12/11/2020			56800 (R)		

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



Time Series Analysis Run 4/5/2021 6:00 PM View: MOD 4 LF

Columbia Energy Center Client: SCS Engineers Data: December - Chem- export-Dec2020

Time Series

Constituent: Chloride (mg/L)   Analysis Run 4/5/2021 6:03 PM   View: MOD 4 LF

Columbia Energy Center   Client: SCS Engineers   Data: December - Chem- export-Dec2020

	MW-301 (bg)	MW-309	MW-310	MW-311	MW-84A (bg)
12/22/2015	3.7 (J)				4.9
4/5/2016	4				4.7
7/8/2016	3.5 (J)				5.1
10/13/2016	2.2				4.3
12/29/2016	2 (J)				4.7
1/25/2017	1.5 (J)				4.6
4/11/2017	2				4.9
6/6/2017	3.5				5.5
8/8/2017	5.5				5.5
10/23/2017	4				
10/24/2017					5.1
2/21/2018		147	19.8	2.9	
3/23/2018		157	21.7	2.7	
4/23/2018		157	22.1	2.6	
4/25/2018	2.3				4.8
5/24/2018		141	68.6	3.5	
6/23/2018		203	59.8	3	
7/23/2018		557	118	2 (J)	
8/8/2018	5.2				4.9
8/22/2018		811	139	2 (J)	
9/21/2018		329	152	3.9	
10/24/2018	3.2				4.2
4/2/2019	0.79 (J)	145	76	1.9 (J)	
4/3/2019					3.6
10/8/2019		43.2	190	1.5 (J)	
10/9/2019	1.7 (J)				3.9
2/3/2020	1.3 (J)				3.7
5/29/2020	2 (J)	350	128	1.5 (J)	3.7
10/8/2020	3.4	575	310	1.4 (J)	4.3
12/11/2020			227 (R)		

Appendix B

Historical Groundwater Flow Maps

LEGEND

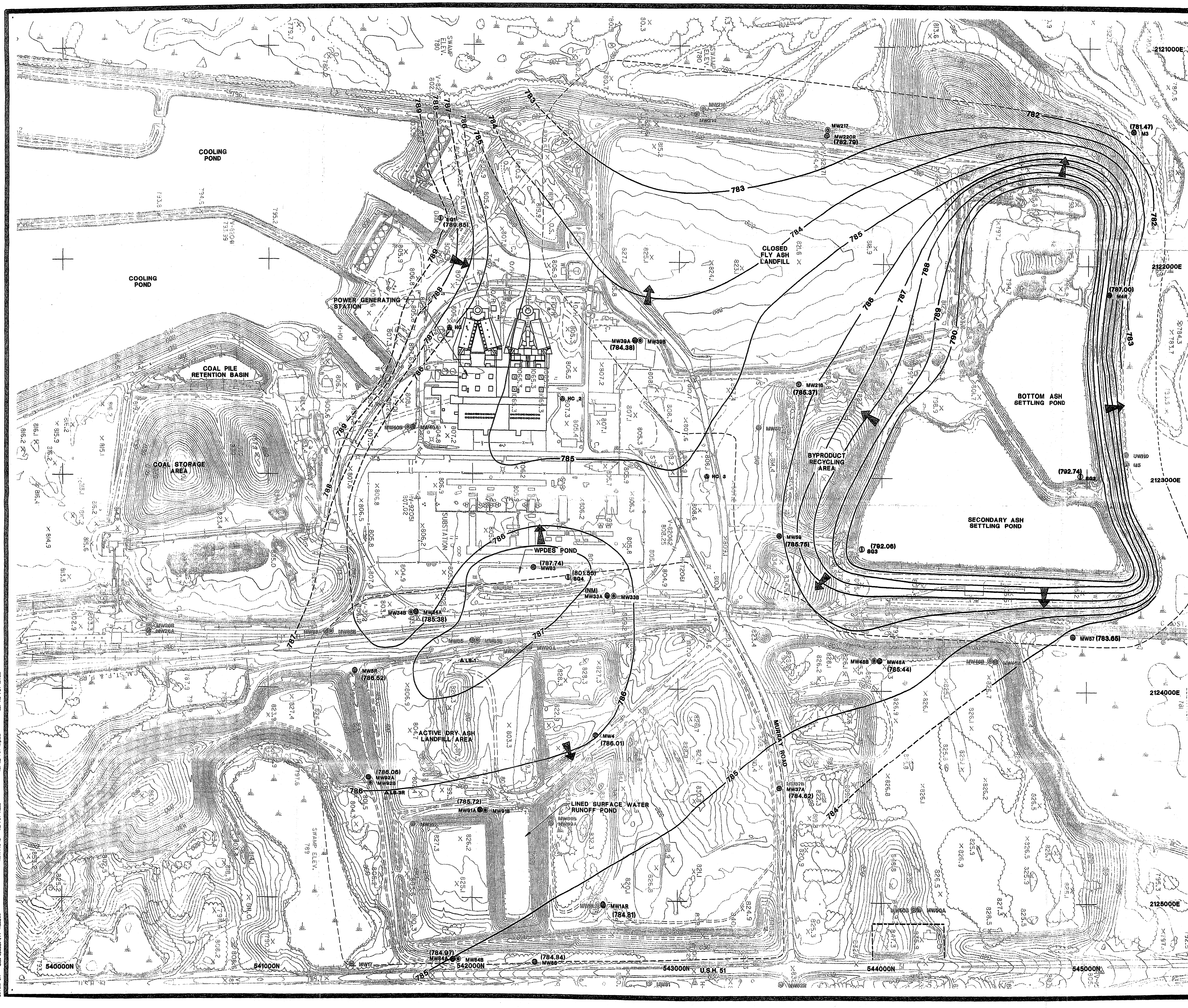
- PROPOSED PROJECT AREA
- OBSERVATION WELL LOCATION, NUMBER, AND WATER TABLE ELEVATION
- BORING LOCATION AND NUMBER
- WETLANDS
- TOPOGRAPHIC CONTOURS (CONTOUR INTERVAL: 20 FT.)
- PRIVATE RESIDENCES (ASSUMED LOCATIONS OF PRIVATE WATER SUPPLY WELLS)
- COMMERCIAL BUILDINGS (ASSUMED LOCATIONS OF POSSIBLE PUBLIC WATER SUPPLY WELLS)
- SURFACE WATERS (STREAMS OR DRAINAGE DITCHES) ARROWS INDICATE DIRECTION OF FLOW
- OTHER BUILDINGS (GARAGES, BARNS, ETC.)
- HIGH CAPICITY WELLS
- 790 WATER TABLE CONTOURS (CONTOUR INTERVAL: 1 FT.)
- DIRECTION OF GROUNDWATER FLOW

NO.	BY	DATE	REVISION	APP'D

WATER TABLE CONTOUR MAP 2/4/81

PLAN OF OPERATION - ASH DISPOSAL FACILITY
COLUMBIA SITE
WISCONSIN POWER & LIGHT COMPANY
PART OF SECTIONS 27 & 34, T12N, R9E
TOWN OF PACIFIC COLUMBIA CO. WISCONSIN

WARZYN ENGINEERING INC	DRAWN TDH	SCALE 1" = 300'	SHEET 39 OF 39
	CHECKED RJK	DATE 2/10/81	DRAWING NO. C7134-94
	APPROVED		
	REFERENCE		PRINTED 8/3/88



LEGEND

- PROPERTY LINE
- EXISTING RAILROAD TRACKS
- EXISTING GROUND CONTOUR
- CONTOUR DEPRESSION
- EXISTING PAVED ROAD
- EXISTING UNPAVED ROAD
- EXISTING FENCE
- EXISTING BUILDING
- EXISTING SPOT ELEVATION
- TREES AND/OR BRUSH
- WETLAND AREA
- EDGE OF WATER
- HC 1 — WATER SUPPLY WELL
- MW91A — WATER TABLE WELL
- MW91B — PIEZOMETER
- ABANDONED WATER TABLE WELL
- ABANDONED PIEZOMETER
- SG1 — STAFF GAUGE
- LS-1 — LYSIMETER
- DESIGN MANAGEMENT ZONE
- PROPERTY LINE
- O.S. — OPEN STORAGE
- O.H. — OVERHEAD STRUCTURE
- E.P.S. — ELECTRICAL POWER STATION
- T — TANK
- W — WALL
- (785.31) — WATER TABLE ELEVATION (FT-MSL) (N.M. = NOT MEASURED)
- 786 — GROUNDWATER CONTOUR LINE (1FT INTERVAL- FT. M.S.L.) (DASHED WHERE INFERRED)
- GROUNDWATER FLOW DIRECTION

NOTES

1. BASE MAP IS PROVIDED BY WISCONSIN POWER & LIGHT CO. AND IS BASED ON PHOTOS TAKEN ON APRIL 6, 1995 BY AERO-METRIC ENGINEERING, SHEBOYGAN, WI.
2. HORIZONTAL DATUM IS BASED ON THE WISCONSIN STATE PLANE COORDINATE SYSTEM, SOUTH ZONE - DATUM: NAD 83(91).
3. VERTICAL DATUM IS REFERENCED TO U.S.G.S. MEAN SEA LEVEL (MSL). TOPOGRAPHIC CONTOUR INTERVAL IS TWO FEET.
4. MONITORING WELL LOCATIONS AND ELEVATIONS SURVEYED BY WISCONSIN POWER & LIGHT CO. IN DECEMBER 1994 & NOVEMBER 1996.
5. THE LOCATION OF THE DESIGN MANAGEMENT ZONE DEMARCATION LINE IS APPROXIMATE.
6. WATER ELEVATION USED TO PREPARE THIS MAP WERE MEASURED ON OCTOBER 24, 2002.
7. THE WATER LEVEL AT MW 33A AND MW 33B COULD NOT BE MEASURED DURING OCTOBER 2002 DUE TO AN OBSTRUCTION IN THE WELL CASING.

NO.	BY	DATE	REVISION	APP'D.
3.				
2.				
1.				

PROJECT: ALLIANT ENERGY - WP&L COLUMBIA ASH PONDS & DRY ASH DISPOSAL FACILITY

SHEET TITLE: WATER TABLE MAP (OCTOBER 2002)

DRAWN BY: defoej	SCALE: 1"=200'	PROJ. NO. 3024.28
CHECKED BY: JMR		FILE NO. WATERTBL.PLT
APPROVED BY: JCO	DATE PRINTED:	FIGURE 3
DATE: JANUARY 2003		

RMT®
744 Heartland Trail
Madison, WI 53717-1934
P.O. Box 8923
Madison, WI 53708-8923
Phone: 608-831-4444

F2 Alternative Source Demonstration – April 2021

Alternative Source Demonstration April 2021 Detection Monitoring

Dry Ash Disposal Facility, Module 4
Columbia Energy Center
Pardeeville, Wisconsin

Prepared for:

Alliant Energy

SCS ENGINEERS

25221067.00 | October 13, 2021

2830 Dairy Drive
Madison, WI 53718-6751
608-224-2830

Table of Contents

Section Page

PE Certification iii
1.0 Introduction 1
1.1 §257.94(e)(2) Alternative Source Demonstration Requirements 1
1.2 Site Information and Map 1
1.3 Statistically Significant Increases Identified 2
1.4 Overview of Alternative Source Demonstration 2
2.0 Background 2
2.1 Regional Geology and Hydrogeology 3
2.1.1 Regional Information 3
2.1.2 Site Information 3
2.2 CCR Rule Monitoring System 3
2.3 Other Monitoring Wells 3
3.0 Methodology and Analysis Review 3
3.1 Sampling and Field Analysis 4
3.2 Laboratory Analysis Review 4
3.3 Statistical Evaluation Review 4
3.4 Summary of Methodology and Analysis Review Findings 5
4.0 Alternative Sources 5
4.1 Potential Causes of SSI 5
4.1.1 Natural Variation 5
4.1.2 Man-Made Alternative Sources 6
4.2 Lines of Evidence 6
4.2.1 Background Concentrations 6
4.2.2 Location Adjacent to Entrance Road 6
4.2.3 Mod 4 Composite Liner 7
5.0 Alternative Source Demonstration Conclusions 7
6.0 Site Groundwater Monitoring Recommendations 7
7.0 References 8

Tables

Table 1. Groundwater Analytical Results Summary
Table 2. Historical Analytical Results for Parameters with SSIs
Table 3. Groundwater Elevation – State Monitoring Program and CCR Well Network

Figures

Figure 1. Site Location Map
Figure 2. Site Plan and Monitoring Well Locations
Figure 3. Water Table Map – April 2021

Appendices

Appendix A Trend Plots for CCR Wells

I:\25221067.00\Deliverables\2021 April ASD MOD 4 LF\211013_COL_4 LF_Apr21 ASD_Final.docx

PE CERTIFICATION

WISCONSIN
Sherren C. Clark
E-29863
Madison, Wis.
PROFESSIONAL ENGINEER
10-12-21

I, Sherren Clark, hereby certify that that the information in this alternate source demonstration is accurate and meets the requirements of 40 CFR 257.94(e)(2). This certification is based on my review of the groundwater data and related site information available for the Columbia Energy Center Dry Ash Disposal Facility. I am a duly licensed Professional Engineer under the laws of the State of Wisconsin.

SC Clark	10-12-2021
(signature)	(date)

Sherren Clark
(printed or typed name)

License number E-29863

My license renewal date is July 31, 2022.

Pages or sheets covered by this seal:
Alternative Source Demonstration, April 2021 Detection Monitoring, Dry Ash Disposal Facility, Module 4
Columbia Energy Center, Pardeeville, Wisconsin (Entire Document)

[This page left blank intentionally]

1.0 INTRODUCTION

This Alternative Source Demonstration (ASD) was prepared to support compliance with the groundwater monitoring requirements of the "Coal Combustion Residuals (CCR) Final Rule" published by the U.S. Environmental Protection Agency (U.S. EPA) in the *Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule*, dated April 17, 2015 (U.S. EPA, 2015), and subsequent amendments. Specifically, this report was prepared to fulfill the requirements of 40 CFR 257.94(e)(2). The applicable sections of the Rule are provided below in *italics*.

This ASD also provides the results for a supplemental resampling event completed in June 2021.

1.1 §257.94(E)(2) ALTERNATIVE SOURCE DEMONSTRATION REQUIREMENTS

The owner and operator may demonstrate that a source other than the CCR Unit caused the statistically significant increase over background levels for a constituent or that the statistically significant increase 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 statistically significant increase over background levels.

An ASD is completed when there are exceedances of one or more benchmarks established within the groundwater monitoring program. The ASD is completed to determine if any other sources are likely causes of the identified exceedance(s) of established benchmark(s) at the site. This ASD was performed in response to results indicating a statistically significant increase (SSI) over background levels during detection monitoring under the CCR Rule.

This ASD report is evaluating the SSIs observed in the statistical evaluation of the April 2021 detection monitoring event at the Columbia Energy Center (COL) Dry Ash Disposal Facility, Module 4 CCR Unit (Mod 4). The first ASD was prepared for this facility evaluating the SSIs observed in the statistical evaluation of the April 2019 detection monitoring event.

This ASD report is evaluating the SSIs for boron and chloride that were observed in the statistical evaluation of the April 2021 sampling and June 2021 resampling events.

1.2 SITE INFORMATION AND MAP

The COL site is located at W8375 Murray Road, Pardeeville, Columbia County, Wisconsin (**Figure 1**). The COL site is an active coal-burning generating station, which has been burning coal and disposing of CCR on site since the mid-1970s. The layout of the site is shown on **Figure 2**. The COL property includes two areas of CCR storage and disposal. These are the Dry Ash Disposal Facility (ADF) and the Ash Ponds Facility. This ASD evaluates the conditions at the site for Mod 4 of the ADF only. The Mod 4 CCR Unit became operational in 2018. The ADF is operated under the Wisconsin Department of Natural Resources (WDNR) License No. 3025.

The groundwater monitoring system at the COL Mod 4 facility monitors a single CCR Unit:

- COL Dry Ash Disposal Facility – Module 4 (new landfill)

A map showing the CCR Unit and all background (or upgradient) and downgradient monitoring wells with identification numbers for the CCR groundwater monitoring program and the state monitoring program is provided as **Figure 2.** Separate monitoring systems have been established for the other CCR Units at COL, which include Modules 1-3 of the COL ADF, the primary ash pond, and the secondary ash pond.

1.3 STATISTICALLY SIGNIFICANT INCREASES IDENTIFIED

The statistical evaluation was completed in accordance with 40 CFR 257.93(f)(3) using a prediction interval procedure, in which an interval for each constituent is established from the distribution of the background data, and the level of each constituent in each compliance well is compared to the Upper Prediction Limit (UPL) to evaluate whether an SSI has occurred. The evaluation was based on an intrawell UPL with 1-of-2 retesting, calculated using Sanitas software. The retesting approach results in a slightly lower UPL, but only 1 of 2 samples collected for the event (original and retest) must meet the UPL to demonstrate compliance. The intrawell UPLs, and the April 2021 and June 2021 sampling results, are summarized in the attached **Table 1.**

The April 2021 SSIs include the following parameters and wells:

- Boron: MW-309
- Chloride: MW-310

Concentration trends for the parameters with SSIs are shown in **Appendix A.**

1.4 OVERVIEW OF ALTERNATIVE SOURCE DEMONSTRATION

This ASD report includes:

- Background information (**Section 2.0**)
- Evaluation of potential that SSIs are due to methodology or analysis (**Section 3.0**)
- Evaluation of potential that SSIs are due to natural sources or man-made sources other than the CCR Units (**Section 4.0**)
- ASD conclusions (**Section 5.0**)
- Monitoring recommendations (**Section 6.0**)

Historical monitoring results from background and compliance sampling for the CCR Rule constituent results with SSIs are provided in **Table 2.** The laboratory reports for the April 2021 detection monitoring event will be included in the 2021 Annual Groundwater Monitoring and Corrective Action Report to be submitted in January 2022. Complete laboratory reports for the background monitoring events and the previous detection monitoring events were included in previous annual groundwater monitoring and corrective action reports.

2.0 BACKGROUND

To provide context for the ASD evaluation, the following background information is provided in this section of the report, prior to the ASD evaluation sections:

- Geologic and hydrogeologic setting
- CCR Rule monitoring system
- Other monitoring wells

2.1 REGIONAL GEOLOGY AND HYDROGEOLOGY

2.1.1 Regional Information

For the purposes of groundwater monitoring, the surficial sand and gravel aquifer is considered to be the uppermost aquifer unit, as defined under 40 CFR 257.53, at the COL ADF. Immediately underlying the surficial sand and gravel aquifer is the Cambrian-Ordovician sandstone aquifer.

Additional details on the regional geology and hydrogeology were provided in the May 2020 ASD (SCS Engineers [SCS], 2020).

2.1.2 Site Information

Soils at the site are primarily sand to a depth of approximately 50 to 100 feet and overlie sandstone bedrock. Soils encountered during the site feasibility study for the COL ADF were described as generally sandy with interbedded silty clay lenses up to 20 feet thick (Warzyn Engineering, Inc. [Warzyn], 1978). During drilling of CCR well MW-301, the unconsolidated materials were identified as consisting primarily of silty sand. The boring log for previously installed monitoring well MW-84A shows silty sand and sand as the primary unconsolidated materials at these locations. All CCR monitoring wells are screened within the unconsolidated sand unit.

Shallow groundwater at the site generally flows to the northwest across the existing landfill area, then generally flows west toward the Wisconsin River, with localized mounding associated with the ash ponds. A groundwater flow map for April 2021 is shown on **Figure 3**. The groundwater elevation data for the state and CCR and state monitoring program wells are provided in **Table 3**.

2.2 CCR RULE MONITORING SYSTEM

The groundwater monitoring system established in accordance with the CCR Rule consists of two upgradient (background) monitoring wells and three downgradient monitoring wells. The background wells include MW-301 and MW-84A. The downgradient wells include MW-309, MW-310, and MW-311. The background wells are shared with the other COL CCR Units. The CCR Rule wells are installed within the sand and gravel aquifer. Well depths range from approximately 36 to 38 feet, measured from the top of the well casing.

2.3 OTHER MONITORING WELLS

Additional groundwater monitoring wells currently exist at COL as part of the monitoring systems developed for the state monitoring program and for the other CCR Units.

Monitoring wells for the state monitoring program are installed in the unconsolidated sand and gravel unit, which is the uppermost aquifer as defined under 40 CFR 257.53. This shallow monitoring system includes water table wells and mid-depth piezometers. Well depths range from approximately 14 to 76 feet, measured from the top of the well casing.

3.0 METHODOLOGY AND ANALYSIS REVIEW

To evaluate the potential that an SSI is due to a source other than the regulated CCR Unit, SCS used a two-step evaluation process. First, the sample collection, field and laboratory analysis, and statistical evaluation were reviewed to identify any potential error or analysis that led to exceedance of the benchmark. Second, potential alternative sources, including natural variation and man-made sources other than the CCR Unit, were evaluated. This section of the report provides the findings of the methodology and analysis review. Section 4.0 of the report addresses the potential alternative sources.

3.1 SAMPLING AND FIELD ANALYSIS

Field notes and sampling results were reviewed to determine if any sampling error may have caused or contributed to the observed SSIs. Potential field sampling errors or issues could include mislabeling of samples, improper sample handling, missed holding times, cross contamination during sampling, or other field error. Field blank sample results were also reviewed for any indication of potential contamination from sampling equipment or containers.

SCS did not identify any other issues with the field analysis based on review of the data and field notes. Because boron and chloride are laboratory parameters, there is little potential for a field analysis error to contribute to an SSI.

3.2 LABORATORY ANALYSIS REVIEW

The laboratory reports for the April 2021 detection monitoring event and the June 2021 retest event were reviewed to determine if any laboratory analysis error or issue may have caused or contributed to an observed SSIs for boron or chloride. The laboratory report review included reviewing the laboratory quality control flags and narrative, verifying that correct methods were used and desired detection limits were achieved, and checking the field and laboratory blank sample results.

Based on the review of the laboratory reports, SCS did not identify any additional issues due to a laboratory analysis error in the other laboratory reports. There were no laboratory quality control flags or issues identified in the laboratory reports that affect the usability of the data for detection monitoring.

Time series plots of the SSI constituent analytical data were also reviewed for any anomalous results that might indicate a possible sampling or laboratory error (e.g., dilution error or incorrect sample labeling). The time series plots are provided in Appendix A. The concentrations observed are similar to historical concentrations.

3.3 STATISTICAL EVALUATION REVIEW

The review of the statistical results and methods included a quality control check of the following:

- Input analytical data vs. laboratory analytical reports
- Statistical method and process for each SSI

Based on the April 2021 sample and June 2021 retest results, an SSI for boron occurred for MW-309, and a chloride SSI occurred for MW-310 for the April 2021 semiannual event, because both results exceeded the intrawell UPL.

Based on the review of the statistical evaluation, SCS did not identify any errors in the statistical evaluation that caused or contributed to the determination of intrawell SSIs for boron and chloride at wells MW-309 and MW-310. However, the small size of the intrawell background data set (eight samples per well) and the short timeframe over which they were collected (8 months) may have contributed to the identification of the April 2021 result as SSIs. The small background data set collected from February through September 2018 likely does not represent the full range of variability in background concentrations at the compliance monitoring wells. The intrawell UPLs will be updated in the future with additional data.

3.4 SUMMARY OF METHODOLOGY AND ANALYSIS REVIEW FINDINGS

In summary, no changes to the SSI determinations for the April 2021 monitoring event based on the methodology and analysis review, and no errors or issues caused or contributed to the reported SSIs identified.

4.0 ALTERNATIVE SOURCES

This section discusses the potential alternative sources for the boron and chloride SSIs at the downgradient monitoring well, identifies the most likely alternative source(s), and presents the lines of evidence indicating that an alternative source is the most likely cause of the observed SSIs.

4.1 POTENTIAL CAUSES OF SSI

4.1.1 Natural Variation

The statistical analysis was completed using an intrawell approach, comparing the April 2021 detection monitoring results to the UPLs calculated based on background sampling of the compliance wells (MW-309, MW-310, and MW-311). If concentrations of a constituent that is naturally present in the aquifer vary with time, then the potential exists that the compliance sampling concentrations may be higher than background concentrations due to natural temporal variation. Temporal variation can occur seasonally or due to longer-term events such as changes in infiltration patterns and groundwater flow directions caused by wet or dry years.

As shown on the time series plots in **Appendix A**, the concentrations of boron in the May 2020 through June 2021 samples from MW-309 were higher than the background results at MW-309, but do not exceed the range of background sampling results for MW-310, located approximately 300 feet to the west along Murray Road. Lower boron concentrations were detected in background sampling at upgradient wells MW-84A and MW-301.

For chloride, the April and June 2021 results at MW-310 exceeded the intrawell UPL based on the 2018 background sampling at this well, but the chloride concentrations were lower than those detected in background and current monitoring at MW-309 (**Appendix A**).

Because the background sampling at the three compliance wells was performed after other potential man-made sources of boron and chloride had been in operation for many years, it is difficult to determine how much of the variation in boron and chloride concentrations is due to natural sources versus man-made alternative sources associated with the long-term use of the property, as discussed in **Section 4.1.2**. Based on comparison to the two upgradient wells, it appears likely that boron and chloride may reflect man-made sources. Regardless of the source, natural temporal variations in infiltration and groundwater flow direction may have contributed to the SSIs for boron at MW-309 and for chloride at MW-310.

4.1.2 Man-Made Alternative Sources

Man-made alternative sources that could potentially contribute to the boron and chloride SSIs could include the closed ash pond landfill, the active and inactive ash ponds, Modules 1-3 of the ADF, the surface water/leachate collection pond for the ADF, the former ash pond effluent ditch, the coal storage area, railroad operations, road salt use, and/or other plant operations.

Based on the historic groundwater flow directions and on previous investigations at the site, the ash ponds and the former ash pond effluent ditch appear to be the most likely cause of the boron SSI for well MW-309. Road salt use appears to be the most likely cause of the chloride SSI for MW-310.

4.2 LINES OF EVIDENCE

The lines of evidence indicating that the SSIs for boron and chloride in compliance wells MW-309 and MW-310, relative to the intrawell background sampling, are due to one or more alternative sources include:

1. The detected concentrations exceeding intrawell UPLs are below the background concentrations at other wells in the monitoring network. These results indicate that concentrations in these ranges were present in the groundwater in this area prior to initiation of CCR disposal in the Mod 4 CCR Unit.

2. MW-309 and MW-310 are located adjacent to the plant entrance road, where road salt impacts are likely.

3. The Mod 4 CCR Unit was constructed with a composite liner system and leachate collection system, and has only been receiving CCR since late 2018; therefore, it is very unlikely that a release from Mod 4 could have reached MW-309 and MW-310 by April 2021.

Each of these lines of evidence and the supporting data are discussed in more detail in the following sections.

4.2.1 Background Concentrations

As discussed above in **Section 4.1.1**, the detected concentrations exceeding intrawell UPLs are below the background concentrations at other wells in the monitoring network. Historical boron and chloride concentrations for all five Mod 4 wells are shown in **Table 2** and in the time series plots in **Appendix A.** These results indicate that concentrations in these ranges were present in the groundwater in this area prior to initiation of CCR disposal in the Mod 4 CCR Unit. As discussed in more detail in the ASD for the May 2020 monitoring event (SCS, 2020), the background concentrations of boron in the area of the Mod 4 compliance wells likely reflect historical ash management activities at the site under different groundwater flow conditions.

Based on these results, it is likely that the boron and chloride concentrations from natural and/or man-made alternative sources have varied in concentration at MW-309 and MW-310 in response to changes in groundwater flow and infiltration.

4.2.2 Location Adjacent to Entrance Road

Monitoring wells MW-309 and MW-310 are located adjacent to the plant entrance road, where road salt impacts are likely. To be located as close as possible to the waste boundary of the CCR Unit (including the Mod 5/6 additions under construction in 2021), these wells are installed between the entrance road and the storm water ditch on the south side of the road. At this location, there is a high potential for road salt application to result in increased chloride concentrations in groundwater.

4.2.3 Mod 4 Composite Liner

The Mod 4 CCR Unit was constructed with a composite liner system and leachate collection system, and has only been receiving CCR since late 2018; therefore, it is very unlikely that a release from Mod 4 could have reached MW-309 and MW-310 by April or June 2021. The liner system includes the following:

- 2 feet of compacted clay
- Geosynthetic clay liner (GCL)
- 60-mil high density polyethylene (HDPE) geomembrane
- Leachate collection drainage layer
- Leachate collection piping

The liner was constructed in 2018, and CCR placement in Mod 4 began in November 2018.

Given the liner system in place, a release from Mod 4 would have to penetrate the HDPE liner at a flaw, flow vertically through the GCL and compacted clay liner, and travel with the groundwater approximately 600 feet north to MW-309 and MW-310 in less than 2 years. Based on the hydraulic conductivity of the liner clay (10^{-8} centimeters/second) and the very low estimated average groundwater velocity (0.2 to 4 feet per year, [SCS, 2021]), it is very unlikely that changes in boron and chloride concentrations at MW-309 and MW-310 reflect a release from Mod 4.

5.0 ALTERNATIVE SOURCE DEMONSTRATION CONCLUSIONS

The lines of evidence discussed above regarding the SSIs reported for boron at MW-309 and for chloride at MW-310 demonstrate that the SSIs are likely due to sources other than the Mod 4 CCR Unit. Similar boron and chloride concentrations were present in the area prior to disposal of CCR in Mod 4. The SSIs likely reflect road salt impacts (chloride) and impacts associated with historical discharges from the ash ponds via the effluent ditch located west of the landfill (boron).

6.0 SITE GROUNDWATER MONITORING RECOMMENDATIONS

In accordance with section 257.94(e)(2) of the CCR Rule, the COL Mod 4 CCR Unit may continue with detection monitoring based on this ASD. The ASD report will be included in the 2021 Annual Report due January 31, 2022.

7.0 REFERENCES

RMT, 2003, Water Table Map (October 2002), Figure 3.

SCS Engineers, 2020, Alternative Source Demonstration, May 2020 Detection Monitoring, Dry Ash Disposal Facility, Module 4, Columbia Energy Center, Pardeeville, WI, November 12, 2020.

SCS Engineers, 2021, 2020 Annual Groundwater Monitoring and Corrective Action Report, Columbia Energy Center, Dry Ash Disposal Facility, Module 4, Pardeeville, WI, January 29, 2021.

U.S. EPA, 2015, Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule, April 2015.

Warzyn Engineering, Inc., 1978, Feasibility Study, Proposed Fly Ash and/or Scrubber Sludge Disposal Facility – Columbia Site, Wisconsin Power and Light Company, Town of Pacific, Columbia County, WI, January 1978.

Warzyn Engineering, Inc., 1981, Water Table Contour Map 2/4/81, Drawing No. C7134-94.

Tables

1 Groundwater Analytical Results Summary
2 Historical Analytical Results for Parameters with SSIs
3 Groundwater Elevation – State Monitoring Program and CCR Well Network

Table 1. Groundwater Analytical Results Summary
Columbia Dry Ash Disposal Facility - Module 4 / SCS Engineers Project #25221067.00

Parameter Name	Background Wells		Compliance Wells							
	MW-84A	MW-301	MW-309			MW-310			MW-311	
	4/14/2021	4/14/2021	Intrawell UPL	4/13/2021	6/11/2021	Intrawell UPL	4/13/2021	6/11/2021	Intrawell UPL	4/14/2021
Boron, µg/L	14.3	22.2	42.2	48	49.9	81.9	69.6	--	49.8	33.6
Calcium, µg/L	69,100	117,000 P6	99,900	62,300	--	56,000	49,300	--	84,200	59,000
Chloride, mg/L	4.4	1.5 J	901	390	--	205	227	220	4.41	1.3 J
Fluoride, mg/L	<0.095	<0.095	DQ	<0.095	--	DQ	<0.095	--	DQ	<0.095
Field pH, Std. Units	7.34	6.66	8.18	7.68	7.71	8.12	7.73	7.73	8.07	7.46
Sulfate, mg/L	1.4 J	8.5	53.1	30.3	--	118	43.3	--	131	15.6
Total Dissolved Solids, mg/L	328	472	1,730	916	--	759	654	--	462	270

4.4 — Blue shaded cell indicates the compliance well result exceeds the UPL (background) and the Limit of Quantitation (LOQ).

Abbreviations:
UPL = Upper Prediction Limit
DQ = Double Quantification
-- = Not Analyzed
LOQ = Limit of Quantitation
LOD = Limit of Detection
mg/L = milligrams per liter
µg/L = micrograms per liter
SSI = Statistically Significant Increase

Lab Notes:
J = Estimated concentration at or above the LOD and below the LOQ.

Notes:
1. Intrawell UPLs based on 1-of-2 retesting approach; therefore, there is no SSI if either the original sample result or the resample are below the UPL.
2. Intrawell UPL for fluoride is based on the double quantification rule, because fluoride was not detected above the LOQ in the background samples.
3. Intrawell UPLs calculated from background sampling results for the compliance wells from February 2018 through October 2018.

Created by: NDK Date: 5/17/2021
Last revision by: NDK Date: 6/21/2021
Checked by: RM Date: 6/21/2021
Scientist/PM QA/QC: TK Date: 9/23/2021

I:\25221067.00\Deliverables\2021 April ASD MOD 4 LF\Tables\[Table 1 - COL LF Mod 4_Screening Summary.xlsx]Current Event Table-original

Table 2. Historical Analytical Results for Parameters with SSIs
Columbia Dry ADF, Module 4

Well Group	Well	Collection Date	Boron (µg/L)	Calcium (µg/L)	Chloride (mg/L)
Background	MW-301	12/22/2015	26.5	126,000	3.70 J
		4/5/2016	25.2	115,000	4.00
		7/8/2016	23.6	108,000	3.50 J
		10/13/2016	30.6	118,000	2.20
		12/29/2016	32.8	129,000	2.00 J
		1/25/2017	32.6	124,000	1.50 J
		4/11/2017	28.8	120,000	2.00
		6/6/2017	21.3	111,000	3.50
		8/8/2017	30.6	108,000	5.50
		10/23/2017	34.3	87,200	4.00
		4/25/2018	24.3	112,000	2.30
		8/8/2018	22.8	105,000	5.20
		10/24/2018	27.8	101,000	3.20
		4/2/2019	26.9	126,000	0.79 J
		10/9/2019	35.9	114,000	1.70
		2/3/2020	27.9	113,000	1.30 J
		5/29/2020	21.3	112,000	2.00 J
		10/8/2020	28.8	93,000	3.40
		4/14/2021	22.2	117,000	1.50 J
	MW-84A	12/22/2015	11.9	74,000	4.90
		4/5/2016	14.0	72,200	4.70
		7/8/2016	14.7	67,600	5.10
		10/13/2016	11.1	74,000	4.30
		12/29/2016	14.7	76,000	4.70
		1/25/2017	16.1	70,800	4.60
		4/11/2017	12.9	73,200	4.90
		6/6/2017	14.8	76,100	5.50
		8/8/2017	22.9	74,900	5.50
		10/24/2017	13.8	77,500	5.10
		4/25/2018	25.0	76,600	4.80
		8/8/2018	12.8	76,000	4.90
		10/24/2018	10.1 J	74,000	4.20
		4/3/2019	13.6	80,100	3.60
		10/9/2019	12.0	73,500	3.90
		2/3/2020	15.7	72,700	3.70
		5/29/2020	10.0	77,600	3.70
		10/8/2020	9.7 J	69,200	4.30
		4/14/2021	14.3	69,100	4.40
Compliance	MW-309	2/21/2018	31.4	42,700	147
		3/23/2018	31.0	41,800	157
		4/23/2018	30.4	39,600	157
		5/24/2018	28.0	52,700	141
		6/23/2018	26.6	67,600	203
		7/23/2018	35.5	63,800	557
		8/22/2018	40.5	93,600	811
		9/21/2018	30.0	55,200	329
		4/2/2019	37.4	45,300	145
		10/8/2019	33.4	46,900	43.2
		5/29/2020	54.6	51,600	350
		6/30/2020	50.7	--	--
		8/6/2020	55.3	--	--
		10/8/2020	57.7	65,300	575
		12/11/2020	65.9	--	--
		4/13/2021	48.0	62,300	390
		6/11/2021	49.9	--	--

Table 2. Historical Analytical Results for Parameters with SSIs
Columbia Dry ADF, Module 4

Well Group	Well	Collection Date	Boron (µg/L)	Calcium (µg/L)	Chloride (mg/L)
Compliance	MW-310	2/21/2018	67.1	32,400	19.8
		3/23/2018	62.1	33,400	21.7
		4/23/2018	60.7	32,100	22.1
		5/24/2018	59.2	32,100	68.6
		6/23/2018	61.4	34,300	59.8
		7/23/2018	69.5	39,700	118
		8/22/2018	64.2	38,800	139
		9/21/2018	80.3	54,100	152
		4/2/2019	73.0	38,800	76.0
		10/8/2019	81.8	57,600	190
		12/23/2019	--	55,400	--
		5/29/2020	74.4	41,100	128
		10/8/2020	77.6	62,000	310
		12/11/2020	--	56,800	227
		4/13/2021	69.6	49,300	227
		6/11/2021	--	--	220
	MW-311	2/21/2018	43.7	58,000	2.90
		3/23/2018	42.7	61,000	2.70
		4/23/2018	40.1	56,600	2.60
		5/24/2018	31.7	62,500	3.50
		6/23/2018	33.6	70,700	3.00
		7/23/2018	30.1	76,800	2.00 J
		8/22/2018	32.4	65,700	2.00 J
		9/21/2018	27.5	75,400	3.90
		4/2/2019	35.7	65,600	1.90 J
		10/8/2019	33.5	63,900	1.50 J
		5/29/2020	25.7	62,200	1.50 J
		10/8/2020	26.2	73,400	1.40 J
		4/14/2021	33.6	59,000	1.30 J

Abbreviations:
µg/L = micrograms per liter or parts per billion (ppb)
mg/L = milligrams per liter or parts per million (ppm)
-- = Not sampled
J = Estimated value below the laboratory's limit of quantitation

Note:
(1) Complete laboratory reports included in the Annual Groundwater Monitoring and Corrective Action Reports.

Created by:	NDK	Date:	3/18/2021
Last revision by:	RM	Date:	7/6/2021
Checked by:	ZTW	Date:	7/7/2021
PM QC Check:	TK	Date:	9/23/2021

I:\25221067.00\Deliverables\2021 April ASD MOD 4 LF\Tables\[Table 2 - Historical Analytical Results with SSIs.xlsx]Table 2. Analy. Rslts- CCR

Table 3. Groundwater Elevation - State Monitoring Program and CCR Well Network

Columbia Dry Ash and Ash Pond Disposal Facilities / SCS Engineers Project #25221067.00

	Well Number	**MW-1AR**	**MW-4**	**MW-5R**	**MW-33AR**	**MW-33BR**	**MW-34A**	**MW-34B**	**MW-37A**	**MW-83**	**MW-84A**	**MW-84B**	**MW-86**	**MW-91AR**	**MW-91B**	**MW-92A**	**MW-92B**	**LS-1**	**LS-3R**	**LH-2**	**LH-3**	**LH-4**
	Top of Casing Elevation (feet amsl)	822.55	819.74	805.44	808.29	808.39	805.95	806.05	813.04	807.96	814.28	814.26	824.79	809.03	808.45	808.47	808.41					
	Screen Length (ft)																					
	Total Depth (ft from top of casing)	44.40	39.58	25.97	31.08	57.50	35.43	56.95	31.80	25.42	40.21	52.02	45.43	32.90	52.38	28.94	51.75	17.42	17.10	19.90		
	Top of Well Screen Elevation (ft)	778.15	780.16	779.47	777.21	750.89	770.52	749.10	781.24	782.54	774.07	762.24	779.36	776.13	756.07	779.53	756.66	NM	NM	NM		
	Measurement Date																					
	October 2, 2012	783.41	783.70	784.96	782.38	782.23	783.03	782.99	782.66	dry	783.84	783.94	783.81	784.09	783.90	784.49	784.06			dry	--	
	April 15, 2013	785.44	784.02	786.09	784.16	784.14	784.74	784.79	783.87	784.49	785.83	785.76	785.22	785.14	785.01	785.75	785.34	NM	dry	dry	--	
	October 8, 2013													785.66	785.42	785.97	785.52	NM	NM	NM	--	
	October 15, 2013	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	785.66	785.42	785.97	785.52				--	
	April 14, 2014	784.95	784.09	785.63	783.74	783.91	784.63	784.70	783.45	783.73	785.58	785.52	784.96	785.04	784.96	785.99	785.54	NM	dry	eachate depth = 0.2 i	--	
	October 2-3, 2014	785.03	785.39	786.08	784.37	784.28	784.57	784.54	784.56	dry	785.24	785.18	785.19	785.47	785.28	785.75	785.33	NM	dry	eachate depth = 0.3 i	--	
Dry Ash Facility (Facility ID #03025)	April 13-14, 2015	783.96	783.63	785.25	783.01	782.74	783.65	783.95	782.87	dry	784.43	784.51	784.17	784.48	784.37	785.07	784.66	dry	--	dry	--	
	October 6-7, 2015	784.28	784.44	785.72	783.68	783.33	784.05	784.02	783.66	dry	784.80	784.76	784.66	784.89	784.70	785.20	784.76	broken	dry	achate depth = 14.8 i	--	
	April 4-6, 2016	785.82	aband	787.02	785.29	785.07	785.63	785.67	784.76	785.43	786.37	786.26	785.89	786.05	785.95	786.61	786.21	broken	dry	15.9"	--	
	October 11-13, 2016	786.64	aband	788.00	787.36	786.46	786.45	786.32	786.40	786.81	787.22	787.11	786.96	787.17	786.81	787.68	787.25	liquid depth = 3.5'	dry	0.8"	1.4"	
	April 10-13, 2017	786.96	aband	788.13	786.39	785.99	786.30	786.28	786.34	786.23	787.16	787.06	786.96	787.24	787.03	787.90	787.60	liquid depth = 3.0'	dry	-0.3	1.4"	
	October 3-5, 2017	785.48	aband	786.66	784.51	784.22	784.67	784.63	784.86	784.29	NM	786.49	785.58	786.08	785.83	786.47	786.02	liquid depth = 2.7'	dry	NM	NM	
	October 9-10, 2017	NM	aband	NM	NM	NM	NM	NM	NM	NM	785.56 [6]	NM	NM	NM	NM	NM	NM	NM	NM	1.4" [5]	1.6" [5]	
	February 21, 2018	783.97	aband	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	784.68	784.46	NM	NM	NM	NM	NM	NM	
	April 23-25, 2018	783.99	aband	785.36	783.09	786.36	781.77	780.79	783.28	783.32	785.88	784.91	782.54	784.71	784.53	785.23	784.81	liquid depth = 2.7'	NM	NM	NM	
	October 23-25, 2018	788.25	aband	789.71	788.77	787.96	787.88	787.73	787.62	788.26	788.32	788.19	788.21	788.59	788.31	789.32	788.87	dry	iid depth =	4.6	4	--
	April 1-4, 2019	787.05	aband	788.64	786.63	786.54	786.82	786.92	786.47	786.78	787.35	787.34	787.16	787.45	787.18	788.04	787.63	liquid depth = 3.9'	dry	--	--	
	October 7-9, 2019	787.26	aband	789.23	788.26	787.64	787.92	787.74	786.77	788.90	787.79	787.73	787.44	787.78	787.62	788.63	788.17	liquid depth = 3.8'	dry	-0.1"	11.7"	13.1"
	May 27-28, 2020	786.92	aband	788.34	786.01	785.75	785.98	785.99	786.22	786.03	787.02	786.99	786.94	787.26	787.05	787.86	787.47	liquid depth = 3.8'	dry	-0.1	2.4	2.4
	October 7-8, 2020	785.95	aband	787.76	785.91	785.45	785.70	785.68	785.52	785.72	786.10	786.06	786.10	786.55	786.33	786.85	786.38	liquid depth = 3.8'	dry	-0.1	2.7	2.4
	February 25, 2021	NM	aband	NM	NM	NM	784.75	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	-0.1	2.7	2.6
	April 14, 2021	785.11	aband	787.29	784.27	784.05	784.77	784.77	784.46	c	785.84	785.81	785.60	785.86	785.69	786.47	786.06	liquid depth = 3.7'		--	0.2333	0.2167
	June 11, 2021	NM	aband	NM	784.19	NM	784.66	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	--	--	--	--	
	Bottom of Well Elevation (ft)	778.15	780.16	779.47	777.21	750.89	770.52	749.10	781.24	782.54	774.07	762.24	779.36	776.13	756.07	779.53	756.66	NM	NM	NM	NM	

	Well Number	**M-3**	**M-4R**	**MW-39A**	**MW-39B**	**MW-48A**	**MW-48B**	**MW-57**	**MW-59**	**MW-216R**	**MW-217**	**MW-220RR**	**SG-1**	**SG-2**	**SG-3**	**SG-4**
	Top of Casing Elevation (feet amsl)	788.23	806.10	809.62	809.50	828.86	828.84	786.29	815.48	814.21	791.55	792.90	792.06	795.25	808.60	805.36
	Screen Length (ft)															
	Total Depth (ft from top of casing)	16.90	25.55	34.80	76.07	51.88	75.80	14.40	38.50	37.85	37.37	18.96	--	--	--	--
	Top of Well Screen Elevation (ft)	771.33	780.55	774.82	733.43	776.98	753.04	771.89	776.98	776.36	754.18	773.94	--	--	--	--
	Measurement Date															
	October 2, 2012	780.13	786.76	781.49	781.34	782.03	781.93	780.58	779.88	781.91	780.95	780.55	789.14	793.85	dry	dry
	April 15, 2013	785.16	788.39	783.97	784.00	783.77	783.78	784.69	783.66	784.09	784.75	785.02	789.5 [1]	NM	dry	dry
	October 8, 2013	781.22	786.67	NM	NM	783.69	783.58	NM	NM	783.39	782.27	782.36	789.5 [1]	791.33	dry	dry
	October 15, 2013	NM	NM	782.94	782.81	NM	NM	782.47	783.49	NM	NM	NM	NM	NM	NM	NM
	April 14, 2014	786.04	788.96	783.57	783.68	783.56	783.57	785.51	783.41	783.73	785.25	785.87	788.90	dry	dry	dry
	October 1-3, 2014	781.16	787.55	783.42	783.32	784.05	783.94	782.32	783.55	783.79	782.63	783.03	NM	dry	dry	dry
Ash Pond Facility (Facility ID #02325)	April 13-14, 2015	783.08	786.83	782.77	782.68	782.80	782.82	782.81	782.83	782.93	783.34	783.42	789.3	791.70	dry	dry
	October 6-7, 2015	780.66	786.12	782.97	782.81	783.10	783.01	781.82	783.25	783.18	781.95	782.26	788.48	791.58	dry	dry
	April 4-6, 2016	784.21	789.09	785.27	785.27	784.79	784.76	783.21	784.97	785.68	785.02	784.36	NM	793.40	dry	dry
	October 11-13, 2016	781.88	787.88	785.75	785.52	785.73	785.61	783.12	786.51	786.16	783.75	784.09	788.32	792.52	dry	dry
	April 10-13, 2017	782.94	787.95	785.44	785.20	785.82	785.69	782.77	786.09	785.95	784.29	784.09	788.31	793.85	dry	dry
	October 3-5, 2017	780.93	787.04	783.35	783.18	784.30	784.19	782.37	784.23	783.89	782.48	782.61	788.3	793.45	dry	dry
	April 23-25, 2018	782.89	790.43	782.86	782.87	783.14	783.09	783.04	783.02	783.23	783.26	783.45	788.38	>795.25	dry	dry
	October 23-25, 2018	782.95	788.47	787.12	786.88	787.12	786.99	783.48	787.73	787.49	784.90	784.52	787.76	793.25	dry	dry
	April 1-4, 2019	785.68	789.44	786.28	786.31	786.56	786.45	785.27	787.39	786.53	786.33	785.46	788.40	794.60	dry	dry
	October 7-9, 2019	785.33	790.65	787.10	787.02	786.68	786.65	785.29	786.68	787.07	786.01	785.42	748.48	795.20	dry	dry
	May 27-29, 2020	781.80	787.73	785.12	784.92	785.74	785.59	783.11	785.89	785.60	783.41	783.89	748.48	>795.25	dry	dry
	October 7-8 &17, 2020	781.42	787.74	784.74	784.64	785.03	784.96	782.83	785.43	785.10	783.06	783.49	788.34	793.32	dry	NM
	April 12, 2021	782.30	786.34	783.66	783.65	784.13	784.08	782.79	784.08	783.97	783.15	783.49	788.03	793.45	below gauge	dry
	Bottom of Well Elevation (ft)	771.33	780.55	774.82	733.43	776.98	753.04	771.89	776.98	776.36	754.18	773.94	--	--	--	--

Table 3. Groundwater Elevation - State Monitoring Program and CCR Well Network
Columbia Dry Ash and Ash Pond Disposal Facilities / SCS Engineers Project #25221067.00

	Well Number	MW-301	MW-302	MW-303	MW-304	MW-305	M-4R	MW-33AR	MW-34A	MW-84A	MW-306	MW-307	MW-308	MW-309	MW-310	MW-311
	Top of Casing Elevation (feet amsl)	806.89	813.00	811.52	805.42	806.32	806.10	808.29	805.95	814.28	807.63	806.89	806.9	813.27	813.62	809.74
	Screen Length (ft)	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	Total Depth (ft from top of casing)	29.40	33.6	35.80	25.7	25.6	39.58	31.08	35.43	40.21	27	26.5	28	37.67	38.41	36.19
	Top of Well Screen Elevation (ft)	787.49	789.40	785.72	789.72	790.72	776.52	787.21	780.52	784.07	790.63	790.39	788.90	785.60	785.21	783.55
	Measurement Date													--	--	--
	December 21-22, 2015	NM	784.78	784.11	786.13	788.96	787.58	783.77	783.50	785.31	--	--	--	--	--	--
	April 4-5, 2016	786.78	785.81	785.48	788.08	789.61	789.09	785.29	785.63	786.37	--	--	--	--	--	--
	July 7-8, 2016	786.31	786.28	784.60	787.36	789.26	787.43	785.19	785.05	785.89	--	--	--	--	--	--
	July 28, 2016	NM	NM	784.35	NM	NM	NM	NM	784.86	785.61	--	--	--	--	--	--
	October 11-13, 2016	787.64	787.76	786.18	788.18	789.78	787.88	787.36	786.45	787.22	--	--	--	--	--	--
	December 29, 2016	787.37	787.05	NM	NM	NM	NM	785.66	785.72	786.63	--	--	--	--	--	--
	January 25-26, 2017	787.27	786.89	785.28	789.34	789.36	789.64	785.88	785.98	786.70	785.50	785.36	785.73	--	--	--
	April 10 & 11, 2017	787.89	787.55	786.00	788.22	789.57	787.95	786.39	786.30	787.16	786.22	785.64	786.51	--	--	--
	June 6, 2017	788.25	788.37	786.49	788.58	789.79	787.83	787.27	786.66	787.63	786.85	786.07	786.46	--	--	--
	August 7-9, 2017	787.34	787.55	785.42	789.52	789.30	788.54	786.11	785.81	786.68	785.69	785.19	785.37	--	--	--
	October 23-24, 2017	785.89	785.94	783.92	788.97	788.14	788.00	784.13	784.50	785.32	783.97	784.79	784.17	--	--	--
	February 21, 2018	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	783.19	783.05	783.02
	March 23, 2018	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	783.10	783.10	783.00
	April 23-25, 2018	785.29	784.37	783.27	789.69	787.67	790.43	783.09	781.77	785.88	783.24	783.65	782.65	783.07	782.97	781.83
	May 24, 2018	NM	NM	NM	NM	NM	NM	NM	NM	NM	785.79	785.09	NM	785.45	785.97	786.11
CCR Rule Wells	June 23, 2018	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	786.03	786.64	786.47
	July 23, 2018	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	786.27	786.35	786.55
	August 7, 2018	787.06	NM	785.20	788.25	788.56	787.63	NM	NM	786.55	NM	NM	NM	NM	NM	NM
	August 22, 2018	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	785.54	785.40	785.46
	September 21, 2018	NM	788.37	786.50	NM	NM	NM	787.90	787.01	NM	NM	NM	NM	787.08	787.24	787.66
	October 22-24, 2018	788.98	789.16	787.51	789.05	790.04	788.47	788.77	787.88	788.32	787.66	786.57	787.81	787.99	788.18	788.64
	April 1-4, 2019	787.04	787.56	786.52	789.72	790.07	789.44	786.63	786.82	787.35	786.72	786.71	787.53	786.30	786.38	786.38
	June 12, 2019	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	787.25	NM
	June 19, 2019	NM	NM	786.81	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	October 7-9, 2019	788.47	788.31	787.02	790.41	790.36	790.65	NM	NM	NM	787.47	786.99	787.18	787.26	787.94	787.64
	December 13, 2019	--	--	--	--	--	--	--	--	--	787.03	785.68	786.43	--	--	--
	December 23, 2019	--	--	--	--	--	--	--	--	--	--	--	--	--	775.22	--
	January 17, 2020	--	--	785.58	--	--	--	--	--	--	--	--	--	--	--	--
	February 3, 2020	787.24	NM	NM	NM	NM	NM	NM	NM	786.50	785.77	785.57	786.48	NM	NM	NM
	May 27-29, 2020	787.77	787.29	785.56	789.30	787.78	787.73	786.01	785.98	787.02	785.77	785.35	786.28	785.98	785.81	785.85
	June 30, 2020	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	786.18	NM	NM
	August 6, 2020	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	785.93	NM	NM
	October 7-8, 2020	786.53	786.74	785.16	788.52	787.96	787.74	785.91	785.70	786.10	785.39	784.71	785.68	785.47	785.56	785.83
	December 11, 2020	--	--	--	--	788.19	--	--	--	--	--	--	--	785.26	785.26	--
	February 25, 2021	--	--	784.27	--	788.36	--	--	784.75	--	--	--	--	--	--	--
	April 12, 2021	786.50	785.77	784.07	787.99	788.11	786.34	784.27	784.77	785.84	784.32	784.21	785.55	784.29	784.24	784.15
	June 11, 2021	NM	NM	NM	NM	NM	NM	784.19	784.66	NM	NM	NM	NM	784.20	784.05	NM
	Bottom of Well Elevation (ft)	771.33	780.55	774.82	733.43	776.98	753.04	771.89	776.98	776.36	780.63	780.39	778.90	775.60	775.21	773.55

Notes:
NM = not measured

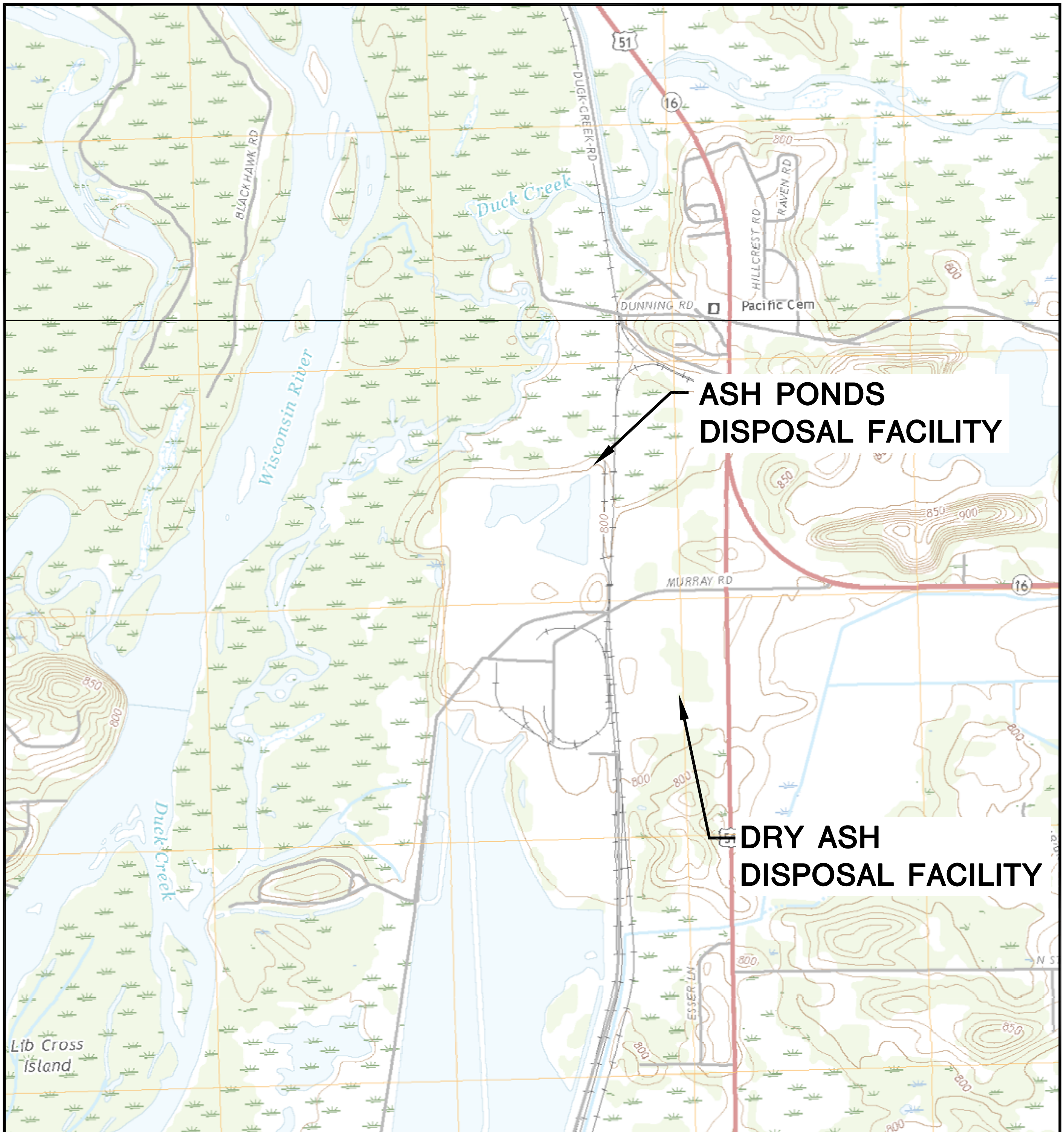
Created by:	MDB	Date:	5/6/2013
Last revision by:	RM	Date:	6/11/2021
Checked by:	JR	Date:	6/14/2021

(1) The elevation for SG-1 is read off of the staff gauge (rather than measured from the top of the gauge).
(2) SG-2 could not be located during the April 2013 event.
(3) SG-3 could not be located during the October 2013 event. SG-1 could not be safely accessed during the October 2013 event.
(4) LH-2 measurements are given as leachate depth, measured by a transducer.
(5) LH-2 and LH-3 measurements were collected by WPL staff on October 9, 2017.
(6) The depth to water at MW-84A was not measured prior to purging for sampling during the October 3-5 sampling event. The level was allowed to return to static and was measured on 10/10/2017.
(7) BC = Brian Clepper; NS= Nate Sievers - Columbia Site employees.

I:\25221067.00\Deliverables\2021 April ASD MOD 4 LF\Tables\[Table 3 - Groundwater Elevations.xls]levels

Figures

1 Site Location Map
2 Site Plan and Monitoring Well Locations
3 Water Table Map – April 2021



N

POYNETTE QUADRANGLE
WISCONSIN–COLUMBIA CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)
2018
SCALE: 1" = 2,000'

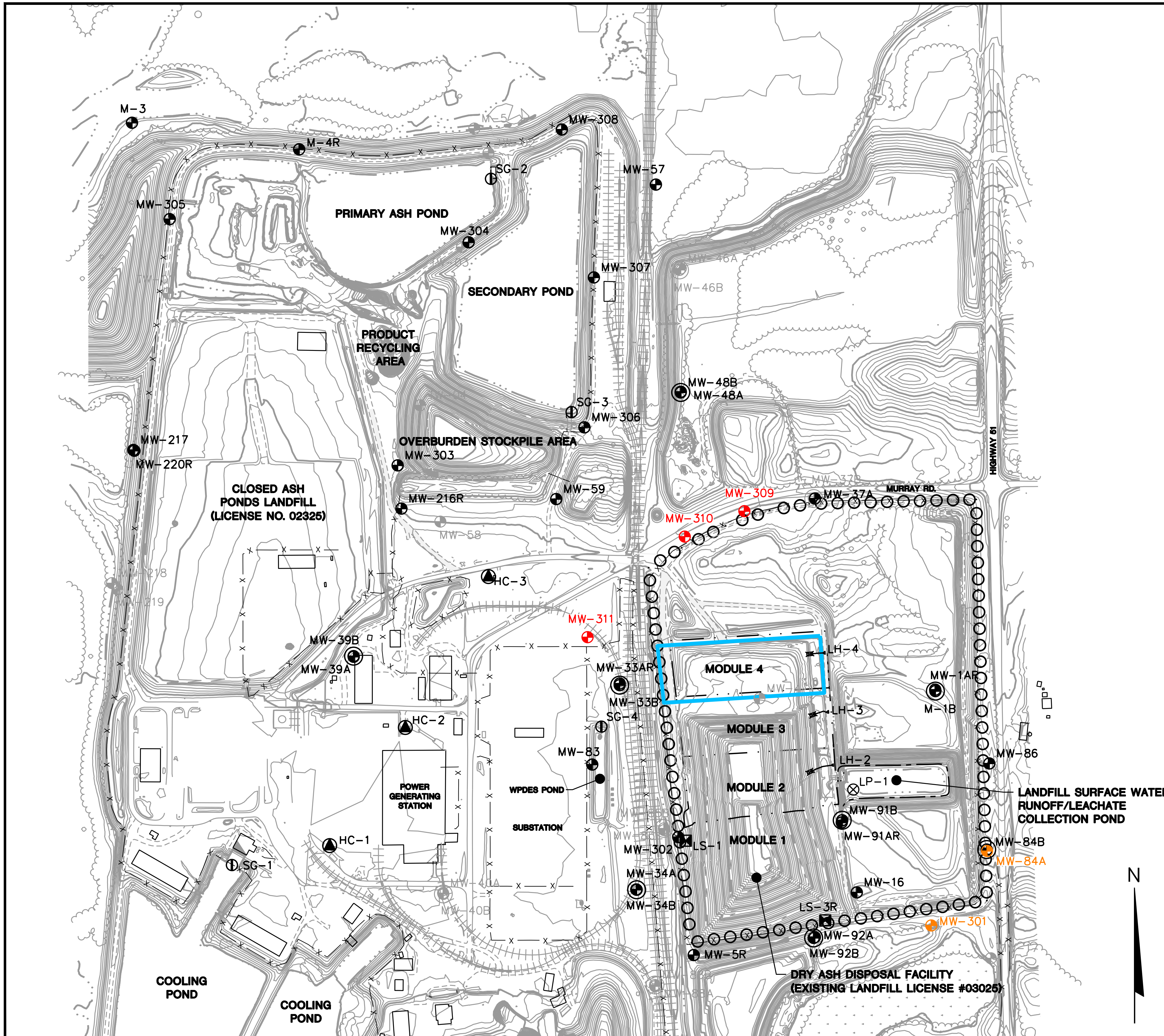
WISCONSIN

CLIENT	SITE	
ALLIANT ENERGY COLUMBIA ENERGY CENTER W8375 MURRAY ROAD PARDEEVILLE, WI 53954	ALLIANT ENERGY COLUMBIA ENERGY CENTER PARDEEVILLE, WI	SITE LOCATION MAP

PROJECT NO.	25220067.00	DRAWN BY:	BSS	FIGURE
DRAWN:	12/02/2019	CHECKED BY:	MDB	1
REVISED:	01/10/2020	APPROVED BY:	TK 04/10/2020	

ENGINEER: SCS ENGINEERS
2830 DAIRY DRIVE MADISON, WI 53718-6751
PHONE: (608) 224-2830

I:\25220067.00\Drawings\ASD Mod 1-3 LF\Site Location Map.dwg, 4/12/2020 7:05:09 PM



LEGEND

- EXISTING MAJOR CONTOUR (10' INTERVAL)
- EXISTING MINOR CONTOUR (2' CONTOUR)
- EXISTING FENCELINE
- EXISTING TRACKS
- EXISTING PAVED ROAD
- EXISTING UNPAVED ROAD
- EDGE OF WATER
- APPROVED LIMITS OF WASTE (DRY ASH LANDFILL)
- CONSTRUCTED LIMITS OF WASTE (DRY ASH LANDFILL)
- WATER SUPPLY WELL
- STAFF GAUGE
- WATER TABLE WELL
- PIEZOMETER
- SURFACE WATER SAMPLE LOCATION
- LYSIMETER
- ABANDONED WATER TABLE WELL
- ABANDONED PIEZOMETER
- LEACHATE HEADWELL
- CCR UNIT
- CCR MONITORING WELL
- CCR BACKGROUND MONITORING WELL

NOTES:

1. BASE MAP CREATED FROM AERIAL SURVEY BY KBM, FLOWN DECEMBER 1, 2014, AND GROUND SURVEY BY SCS ENGINEERS IN MAY 2016, JUNE 2016, OCTOBER 2016, NOVEMBER 2016, APRIL 2017, NOVEMBER 2017, JULY 2018, AUGUST 2018, FEBRUARY 2019, MAY 2019 AND SEPTEMBER 2020.
2. MONITORING WELL LOCATIONS AND ELEVATIONS SURVEYED BY WISCONSIN POWER AND LIGHT, INC. IN DECEMBER 1994, NOVEMBER 1996, APRIL 2003, AND JANUARY 2016, AND BY SCS ENGINEERS IN FEBRUARY 2018.
3. SUPPLY WELL LOCATIONS ARE APPROXIMATE AND ASSUMED BASED ON JANUARY 2013 DRAWINGS BY TRC.
4. MONITORING WELLS MW-301 THROUGH MW-305 INSTALLED BY BADGER STATE DRILLING ON NOVEMBER 11-13, 2015.
5. MONITORING WELLS MW-306 THROUGH MW-308 INSTALLED BY BADGER STATE DRILLING ON NOVEMBER 14-15, 2016.
6. MONITORING WELLS MW-309 THROUGH MW-311 INSTALLED BY BADGER STATE DRILLING ON FEBRUARY 13-14, 2018.
7. BACKGROUND MONITORING WELLS FOR THE MODULE 4 DRY ASH DISPOSAL FACILITY ARE: MW-301 AND MW-84A.

500 0 500

SCALE: 1" = 500'

PROJECT NO.	25219067.00	DRAWN BY:	BSS/ZTW
DRAWN:	12/02/2019	CHECKED BY:	TK
REVISED:	01/05/2021	APPROVED BY:	TK 01/28/2021

ENGINEER: SCS ENGINEERS
2830 DAIRY DRIVE MADISON, WI 53718-6751
PHONE: (608) 224-2830

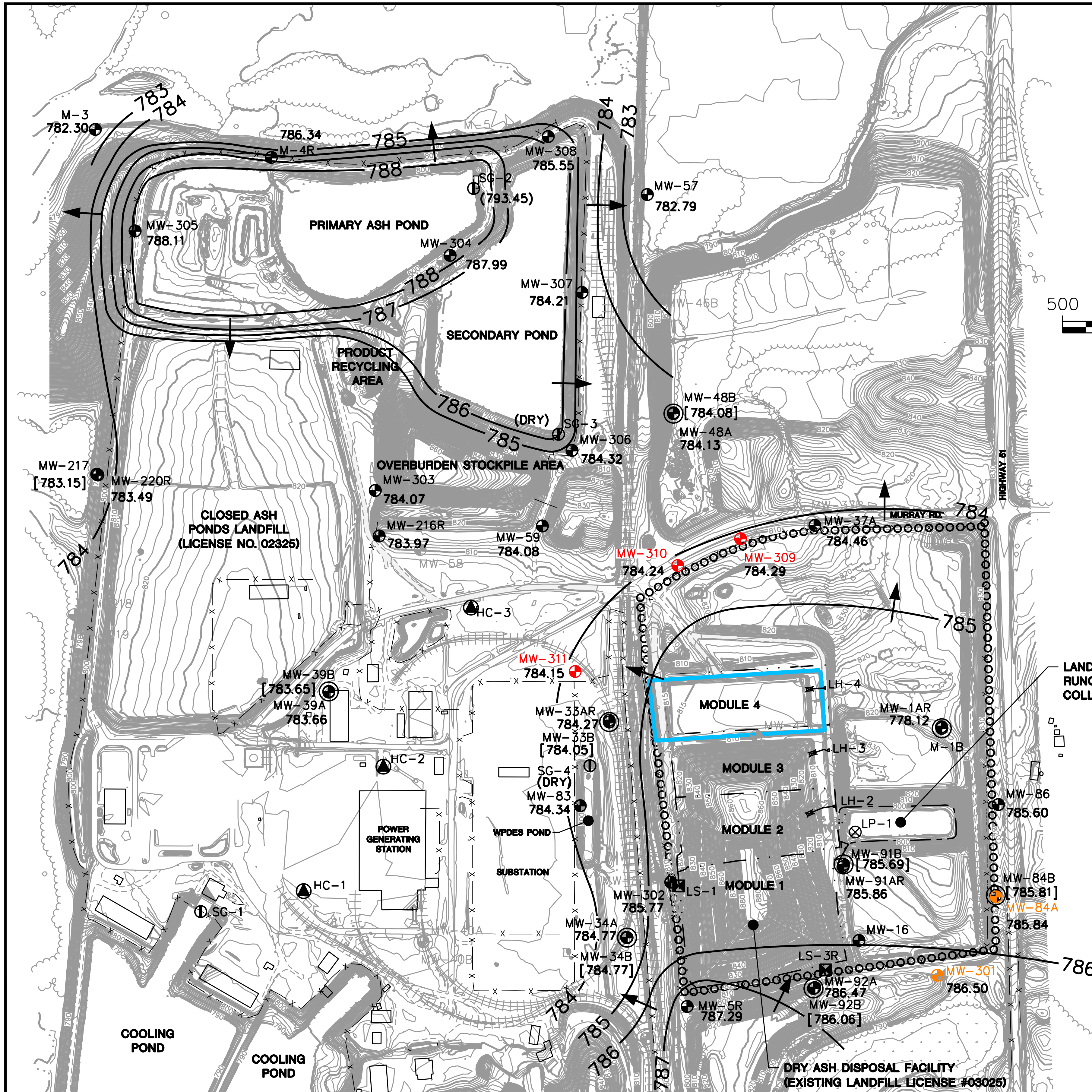
CLIENT: ALLIANT ENERGY
COLUMBIA ENERGY CENTER
W8375 MURRAY ROAD
PARDEEVILLE, WI 53954

SITE: ALLIANT ENERGY
COLUMBIA ENERGY CENTER
MODULE 4 DRY ASH DISPOSAL FACILITY
PARDEEVILLE, WI

SITE PLAN AND MONITORING WELL LOCATIONS

FIGURE 2

I:\25220067.00\Drawings\Mod \Site Plan and Monitoring ell Locations.dwg, 1/20/2021 1: 6:12 PM



N

500 0 500

SCALE: 1" = 500'

LEGEND

	EXISTING MAJOR CONTOUR (10' INTERVAL)
	EXISTING MINOR CONTOUR (2' CONTOUR)
—x—x—	EXISTING FENCE LINE
	EXISTING TRACKS
	EXISTING PAVED ROAD
	EXISTING UNPAVED ROAD
	EDGE OF WATER
	APPROVED LIMITS OF WASTE (DRY ASH LANDFILL)
	CONSTRUCTED LIMITS OF WASTE (DRY ASH LANDFILL)
	WATER SUPPLY WELL
	STAFF GAUGE
	WATER TABLE WELL
	PIEZOMETER
	SURFACE WATER SAMPLE LOCATION
	LYSIMETER
	ABANDONED WATER TABLE WELL
	ABANDONED PIEZOMETER
	LEACHATE HEADWELL
	CCR UNIT
	CCR MONITORING WELL
	CCR BACKGROUND MONITORING WELL
787.62	WATER TABLE ELEVATION
[788.87]	POTENTIOMETRIC SURFACE ELEVATION (NOT CONTOURED)
(795.20)	SURFACE WATER ELEVATION (NOT CONTOURED)
	WATER TABLE CONTOUR
	APPROXIMATE GROUNDWATER FLOW DIRECTION

NOTES:

1. BASE MAP CREATED FROM AERIAL SURVEY BY KBM, FLOWN DECEMBER 1, 2014, AND GROUND SURVEY BY SCS ENGINEERS IN MAY 2016, JUNE 2016, OCTOBER 2016, NOVEMBER 2016, APRIL 2017, NOVEMBER 2017, JULY 2018, AUGUST 2018, FEBRUARY 2019, AND MAY 2019.
2. MONITORING WELL LOCATIONS AND ELEVATIONS SURVEYED BY WISCONSIN POWER AND LIGHT, INC. IN DECEMBER 1994, NOVEMBER 1996, APRIL 2003, AND JANUARY 2016 AND BY SCS ENGINEERS IN FEBRUARY 2018.
3. SUPPLY WELL LOCATIONS ARE APPROXIMATE AND ASSUMED BASED ON JANUARY 2013 DRAWINGS BY TRC.
4. MONITORING WELLS MW-301 THROUGH MW-305 INSTALLED BY BADGER STATE DRILLING ON NOVEMBER 11-13, 2015.
5. MONITORING WELLS MW-306 THROUGH MW-308 INSTALLED BY BADGER STATE DRILLING ON NOVEMBER 14-15, 2016.
6. MONITORING WELLS MW-309 THROUGH MW-311 INSTALLED BY BADGER STATE DRILLING ON FEBRUARY 13-14, 2018.
7. GROUNDWATER AND SURFACE WATER ELEVATIONS WERE MEASURED ON APRIL 12-14, 2021.
8. BACKGROUND MONITORING WELLS FOR THE MODULE 4 DRY ASH FACILITY ARE: MW-301 AND MW-84A.

PROJECT NO.	25221067.00	DRAWN BY:	KP
DRAWN:	06/29/2021	CHECKED BY:	NDK
REVISED:	09/23/2021	APPROVED BY:	TK 10/12/2021

ENGINEER: SCS ENGINEERS
2830 DAIRY DRIVE MADISON, WI 53718-6751
PHONE: (608) 224-2830

CLIENT: ALLIANT ENERGY
COLUMBIA ENERGY CENTER
W8375 MURRAY ROAD
PARDEEVILLE, WI 53954

SITE: ALLIANT ENERGY
COLUMBIA ENERGY CENTER
MODULE 4 DRY ASH DISPOSAL FACILITY
PARDEEVILLE, WI

WATER TABLE MAP
APRIL 2021

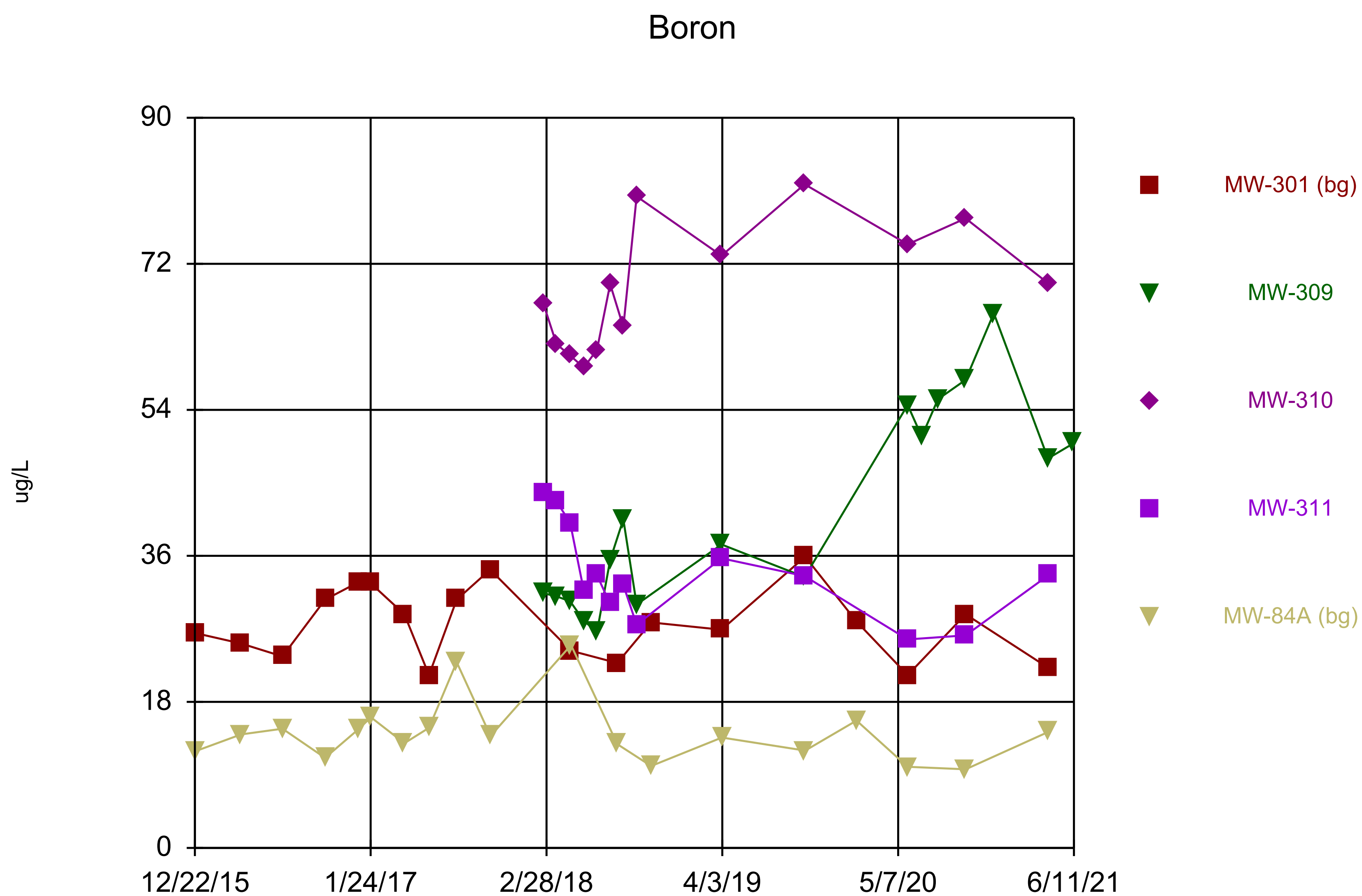
FIGURE 3

I:\25221067.00\Drawings\ ater a le Map April 2021 M D .dwg, 9/23/2021 3:23:18 PM

Appendix A

Trend Plots for CCR Wells

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



Time Series Analysis Run 9/10/2021 2:51 PM View: MOD 4 LF

Columbia Energy Center Client: SCS Engineers Data: December - Chem- export-Dec2020

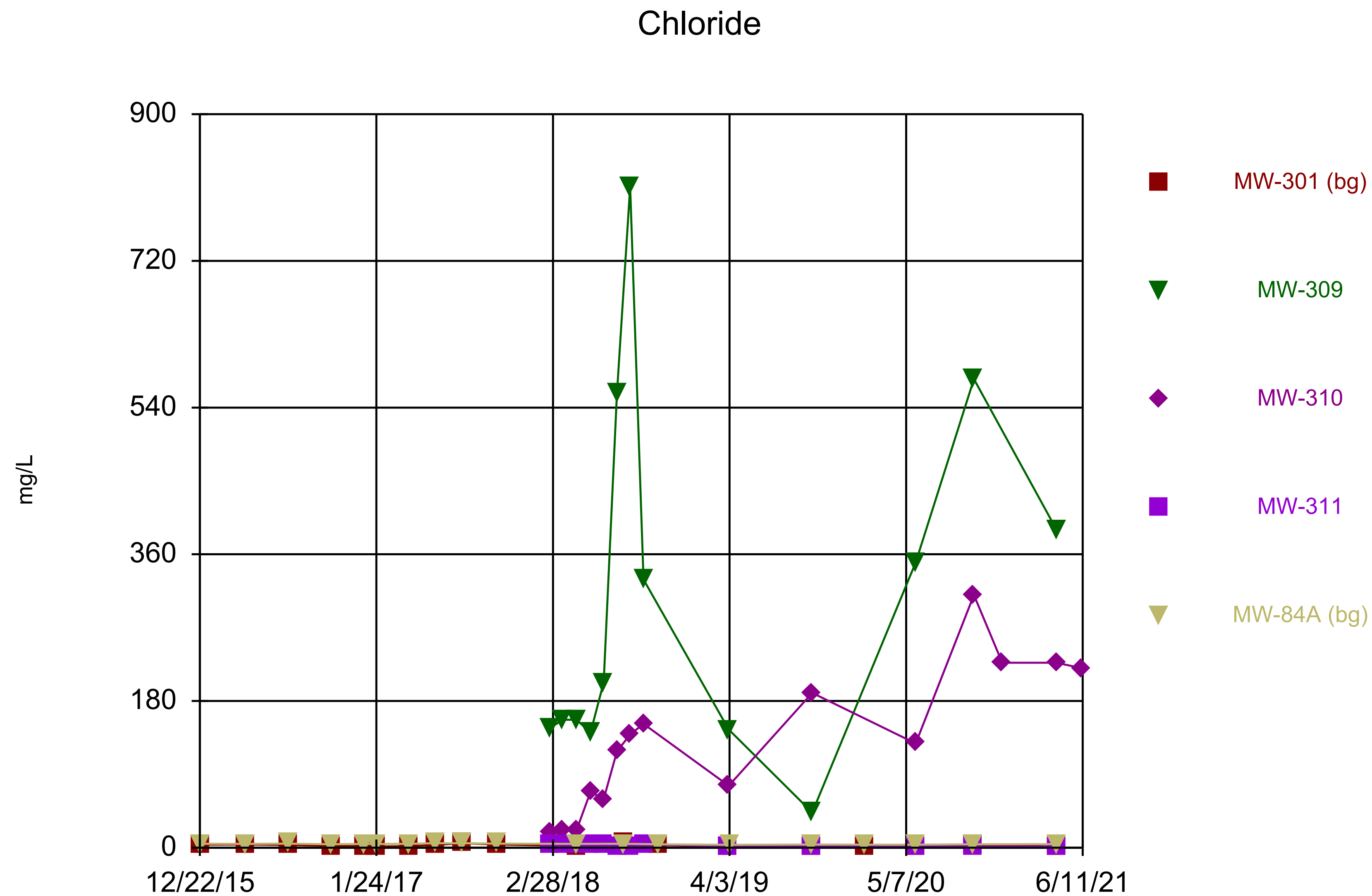
Time Series

Constituent: Boron (ug/L)   Analysis Run 9/10/2021 2:52 PM   View: MOD 4 LF

Columbia Energy Center   Client: SCS Engineers   Data: December - Chem- export-Dec2020

	MW-301 (bg)	MW-309	MW-310	MW-311	MW-84A (bg)
12/22/2015	26.5				11.9
4/5/2016	25.2				14
7/8/2016	23.6				14.7
10/13/2016	30.6				11.1
12/29/2016	32.8				14.7
1/25/2017	32.6				16.1
4/11/2017	28.8				12.9
6/6/2017	21.3				14.8
8/8/2017	30.6				22.9
10/23/2017	34.3				
10/24/2017					13.8
2/21/2018		31.4	67.1	43.7	
3/23/2018		31	62.1	42.7	
4/23/2018		30.4	60.7	40.1	
4/25/2018	24.3				25
5/24/2018		28	59.2	31.7	
6/23/2018		26.6	61.4	33.6	
7/23/2018		35.5	69.5	30.1	
8/8/2018	22.8				12.8
8/22/2018		40.5	64.2	32.4	
9/21/2018		30	80.3	27.5	
10/24/2018	27.8				10.1 (J)
4/2/2019	26.9	37.4	73	35.7	
4/3/2019					13.6
10/8/2019		33.4	81.8	33.5	
10/9/2019	35.9				12
2/3/2020	27.9				15.7
5/29/2020	21.3	54.6	74.4	25.7	10
6/30/2020		50.7			
8/6/2020		55.3			
10/8/2020	28.8	57.7	77.6	26.2	9.7 (J)
12/11/2020		65.9 (R)			
4/13/2021		48	69.6		
4/14/2021	22.2			33.6	14.3
6/11/2021		49.9 (R)			

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



Time Series Analysis Run 9/10/2021 2:51 PM View: MOD 4 LF

Columbia Energy Center Client: SCS Engineers Data: December - Chem- export-Dec2020

Time Series

Constituent: Chloride (mg/L) Analysis Run 9/10/2021 2:52 PM View: MOD 4 LF

Columbia Energy Center Client: SCS Engineers Data: December - Chem- export-Dec2020

	MW-301 (bg)	MW-309	MW-310	MW-311	MW-84A (bg)
12/22/2015	3.7 (J)				4.9
4/5/2016	4				4.7
7/8/2016	3.5 (J)				5.1
10/13/2016	2.2				4.3
12/29/2016	2 (J)				4.7
1/25/2017	1.5 (J)				4.6
4/11/2017	2				4.9
6/6/2017	3.5				5.5
8/8/2017	5.5				5.5
10/23/2017	4				
10/24/2017					5.1
2/21/2018		147	19.8	2.9	
3/23/2018		157	21.7	2.7	
4/23/2018		157	22.1	2.6	
4/25/2018	2.3				4.8
5/24/2018		141	68.6	3.5	
6/23/2018		203	59.8	3	
7/23/2018		557	118	2 (J)	
8/8/2018	5.2				4.9
8/22/2018		811	139	2 (J)	
9/21/2018		329	152	3.9	
10/24/2018	3.2				4.2
4/2/2019	0.79 (J)	145	76	1.9 (J)	
4/3/2019					3.6
10/8/2019		43.2	190	1.5 (J)	
10/9/2019	1.7 (J)				3.9
2/3/2020	1.3 (J)				3.7
5/29/2020	2 (J)	350	128	1.5 (J)	3.7
10/8/2020	3.4	575	310	1.4 (J)	4.3
12/11/2020			227 (R)		
4/13/2021		390	227		
4/14/2021	1.5 (J)			1.3 (J)	4.4
6/11/2021			220 (R)		