

# 2022 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**

25222067.00 | January 31, 2023

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 2022 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
<b>Monitoring Status – Start of Year</b>	(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
<b>Monitoring Status – End of Year</b>	(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
<b>Statistically Significant Increases (SSIs)</b>	(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	<u>October/December 2021</u> None  <u>April 2022</u> None
	(B) Provide the date when the assessment monitoring program was initiated for the CCR unit.	Not applicable.  Assessment Monitoring not required.

Category	Rule Requirement	Site Status
<b>Statistically Significant Levels (SSL) Above Groundwater Protection Standard (GPS)</b>	(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.	
<b>Selection of Remedy</b>	(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
<b>Corrective Action</b>	(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

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## 1.0 INTRODUCTION

This 2022 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 2022 Annual Groundwater Monitoring and Corrective Action Report for the CCR Unit.

This report covers the period of groundwater monitoring from January 1, 2022, through December 31, 2022.

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 October 2022 water levels and apparent flow directions reflect the influence of a temporary dewatering system installed to lower groundwater levels in the area of the Secondary Pond as part of the closure project for that CCR Unit. The water table elevations and groundwater flow directions for the April 2022 monitoring event are shown on **Figure 3**, and the water table elevations and groundwater flow directions for the October 2022 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. Landfill development since 2015 warrants a potential update the existing monitoring network. A conversion to a multi-unit network will be considered in 2023. 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 2022.

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, October, and November 2022 at COL Dry Ash Disposal Module 4 as part of ongoing detection monitoring. As part of the October 2022 semiannual event, retest samples were collected at two monitoring wells in November 2022.

Groundwater samples collected during the semiannual events, in April and October 2022, were analyzed for the Appendix III constituents. The retest sampling event, in November 2022, was limited to a subset of the Appendix III constituent list. The November retesting was performed for select parameters that exceeded the upper prediction limits (UPLs) in the October sampling event. The November retesting was performed in conjunction with additional sampling performed for the State monitoring program; therefore, the laboratory report for the retesting includes additional wells and parameters that are not relevant to the Federal CCR Rule sampling. 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 validation and evaluation of the April 2022 monitoring event data was completed and transmitted to WPL on July 15, 2022. The validation and evaluation of the October 2022 monitoring

event and November 2022 retest sampling event data was in progress at the end of 2022 and will be transmitted to WPL in 2023; therefore, the October and November 2022 monitoring results and analytical report will be included in the 2023 annual report. The October and November 2022 groundwater elevation data is included in this report.

The sampling results for Appendix III parameters in April 2022 are summarized in **Table 5**. Field parameter results for the April 2022 sampling events are provided in **Table 6**. The analytical laboratory reports for April 2022 are provided in **Appendix C**. Historical results for each monitoring well through April 2022 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 2022. The COL Dry Ash Disposal Facility, Mod 4-6 remained in the detection monitoring program.

In 2022, the monitoring results for the October 2021 and April 2022 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 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 January 2020 statistical analysis was included as an appendix in the 2021 Annual Groundwater Monitoring Report. The Unified Guidance for Statistical Analysis of Groundwater Monitoring Data at Resource Conservation and Recovery Act (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 2023.

### **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 2022 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 2022.

**Summary of Key Actions Completed.**

- Statistical evaluation and determination of SSIs for the October/December 2021 and April 2022 monitoring events.
- Two semiannual groundwater sampling and analysis events (April and October 2022).
- One resampling event at MW-309 and MW-310 in November 2022.

**Description of Any Problems Encountered:** No problems were encountered in 2022.

**Discussion of Actions to Resolve the Problems.** Not applicable.

**Projection of Key Activities for the Upcoming Year (2023):**

- Statistical evaluation and determination of any SSIs for the October 2022 and April 2023 monitoring events, including any retesting 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 2023).

### **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.*

Not applicable. No Alternative Source Demonstrations conducted in 2022.

### **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

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- 3 Groundwater Elevation - State Monitoring Program  
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- 4 Horizontal Gradients and Flow Velocity
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**Table 1. Groundwater Monitoring Well Network  
Columbia Energy Center - Dry Ash Disposal Facility MOD 4-6  
SCS Engineers Project #25222067.00**

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

Created by:           NDK            
 Last revision by:           NDK            
 Checked by:           RM          

Date:           9/19/2022            
 Date:           9/19/2022            
 Date:           1/4/2023

**Table 2. Groundwater Samples Summary**  
**Columbia Energy Center-Dry Ash Disposal Facility MOD 4-6 LF /**  
**SCS Engineers Project #25222067.00**

Sample Dates	Downgradient Wells			Background Wells	
	MW-309	MW-310	MW-311	MW-84A	MW-301
April 12-13, 2022	D	D	D	D	D
October 26-27, 2022	D	D	D	D	D
November 30, 2022	D-R	D-R	--	--	--
Total Samples	3	3	2	2	2

Abbreviations:

D = Detection Monitoring

D-R = Detection Monitoring Retest Sample

-- = Not Sampled

Created by: NDK

Date: 9/19/2022

Last revision by: RM

Date: 1/5/2023

Checked by: BR

Date: 1/5/2023



**Table 3. Groundwater Elevation - State Monitoring Program and CCR Well Network  
Columbia Dry Ash and Ash Pond Disposal Facilities / SCS Engineers Project #25222067.00**

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
	<b>Top of Casing Elevation (feet amsl)</b>	806.89	813.00	815.72	805.42	806.32	806.10	808.29	805.95	814.28	807.63	806.89	806.9	813.27	813.62
<b>Screen Length (ft)</b>	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
<b>Total Depth (ft from top of casing)</b>	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
<b>Top of Well Screen Elevation (ft)</b>	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
<b>Measurement Date</b>															
December 21-22, 2015	785.56	784.78	784.11	786.13	788.96	787.58	783.77	783.50	785.31	NI	NI	NI	NI	NI	NI
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
February 24, 2022	NM	NM	782.34	NM	786.49	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
April 11-13, 2022	785.44	784.42	783.40	788.20	787.87	788.26	783.27	784.30	785.02	783.11	783.32	784.19	783.14	783.19	783.04
July 27, 2022	NM	NM	783.07	NM	787.03	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
October 25-27, 2022	784.91	784.62	778.94	781.79	784.97	783.85	781.94	783.61	784.57	778.32	777.89	784.16	781.50	780.96	781.23
November 30, 2022	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	781.62	781.14	781.15
December 2, 2022	785.12	784.48	NM	783.97	NM	NM	781.91	783.71	784.76	778.52	779.54	NM	NM	NM	NM
<b>Bottom of Well Elevation (ft)</b>	777.49	779.40	775.72	779.72	780.72	766.52	777.21	770.52	774.07	780.63	780.39	778.90	775.60	775.21	773.55

CCR Rule Wells

Notes: Created by: MDB Date: 5/6/2013  
 NM = not measured Last revision by: JR Date: 12/13/2022  
 Checked by: RM Date: 12/23/2022

- (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.
- (8) MW-303 was extended in 2022 due to regrading. Prior to October 2022, the TOC elevation was 811.52'. For events in October 2022 and later, the TOC elevation is 815.72'.

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**Table 4. Horizontal Gradients and Flow Velocity  
Columbia Energy Center - MOD 4-6 /  
SCS Engineers Project #25222067.00  
January - December 2022**

Flow Path A - Northwest					
Sampling Dates	h1 (ft)	h2 (ft)	Δl (ft)	Δh/Δl (ft/ft)	V (ft/d)
4/11-13/2022	784.00	783.19	895	0.0009	0.002
10/25-27/2022	783.00	780.96	625	0.0033	0.0067

Wells	K Values (cm/sec)	K Values (ft/d)	Assumed Porosity, n
MW-309	2.12E-04	0.60	0.40
MW-310	1.91E-04	0.54	
MW-311	6.12E-04	1.73	
Geometric	2.92E-04	0.83	

Groundwater flow velocity equation:  $V = [K*(\Delta h/\Delta l)] / n$

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

**Note:**

1. See Figures 3 and 4 for velocity calculation flow path locations.

Created by: NDK  
Last revision by: MDB  
Checked by: RM

Date: 8/2/2022  
Date: 1/10/2023  
Date: 1/10/2023

**Table 5. 2022 Groundwater Analytical Results Summary  
Columbia Dry Ash Disposal Facility - MOD 4-6 LF / SCS Engineers Project #25222067.00**

Parameter Name	Background Wells		Compliance Wells					
	MW-84A	MW-301		MW-309		MW-310		MW-311
	4/13/2022	4/13/2022	Intrawell UPL	4/12/2022	Intrawell UPL	4/12/2022	Intrawell UPL	4/12/2022
Boron, µg/L	10.5	28.7	42.2	32.5	81.9	72.0	49.8	32.7
Calcium, µg/L	75,100	97,300	99,900	80,200	56,000	31,900	84,200	61,800
Chloride, mg/L	5.2	1.9 J	901	319	205	35.2	4.41	1.0 J
Fluoride, mg/L	<0.095	<0.095	DQ	<0.095	DQ	<0.095	DQ	<0.095
Field pH, Std. Units	7.34	6.60	8.18	7.64	8.12	7.74	8.07	8.00
Sulfate, mg/L	1.4 J, M0	12.7	53.1	17.9	118	39.8	131	8.9
Total Dissolved Solids, mg/L	334	422	1,730	764	759	416	462	278

**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

SSI = Statistically Significant Increase  
LOD = Limit of Detection

DQ= Double Quantification  
LOQ = Limit of Quantitation

Lab Notes:

J = Estimated concentration at or above the LOD and below the LOQ.  
M0 = Matrix spike recovery and/or matrix spike duplicate recovery was outside laboratory control limits.

Note:

- 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.
- 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:	<u>NDK</u>	Date:	<u>9/19/2022</u>
Last revision by:	<u>RM</u>	Date:	<u>1/4/2023</u>
Checked by:	<u>BR</u>	Date:	<u>1/5/2023</u>
Scientist/PM QA/QC:	<u>TK</u>	Date:	<u>1/10/2023</u>

I:\25222067.00\Deliverables\2022 Fed Annual Report - COL Mod 4-6\Tables\[Table 5 - 2022 MOD4-6LF Annual Analytical Results Summary.xlsx]Table 5 - 2022 Analytical

**Table 6. Groundwater Field Data Summary**  
**Columbia Energy Center - Dry Ash Disposal Facility - MOD 4 / SCS Engineers Project #25222067.00**

<b>Well</b>	<b>Sample Date</b>	<b>Groundwater Elevation (feet)</b>	<b>Field Temperature (deg C)</b>	<b>Field pH (Std. Units)</b>	<b>Oxygen, Dissolved (mg/L)</b>	<b>Field Specific Conductance (umhos/cm)</b>	<b>Field Oxidation Potential (mV)</b>	<b>Turbidity (NTU)</b>
MW-84A	4/13/2022	785.02	9.9	7.34	9.33	600.2	200.6	0.00
MW-301	4/13/2022	785.44	7.1	6.60	2.47	747	207.5	0.00
MW-309	4/12/2022	783.14	11.5	7.64	7.66	1,420	111.7	7.83
MW-310	4/12/2022	783.19	10.6	7.74	10.03	711	200.5	1.17
MW-311	4/12/2022	783.04	11.1	8.00	7.74	482	110.2	2.50

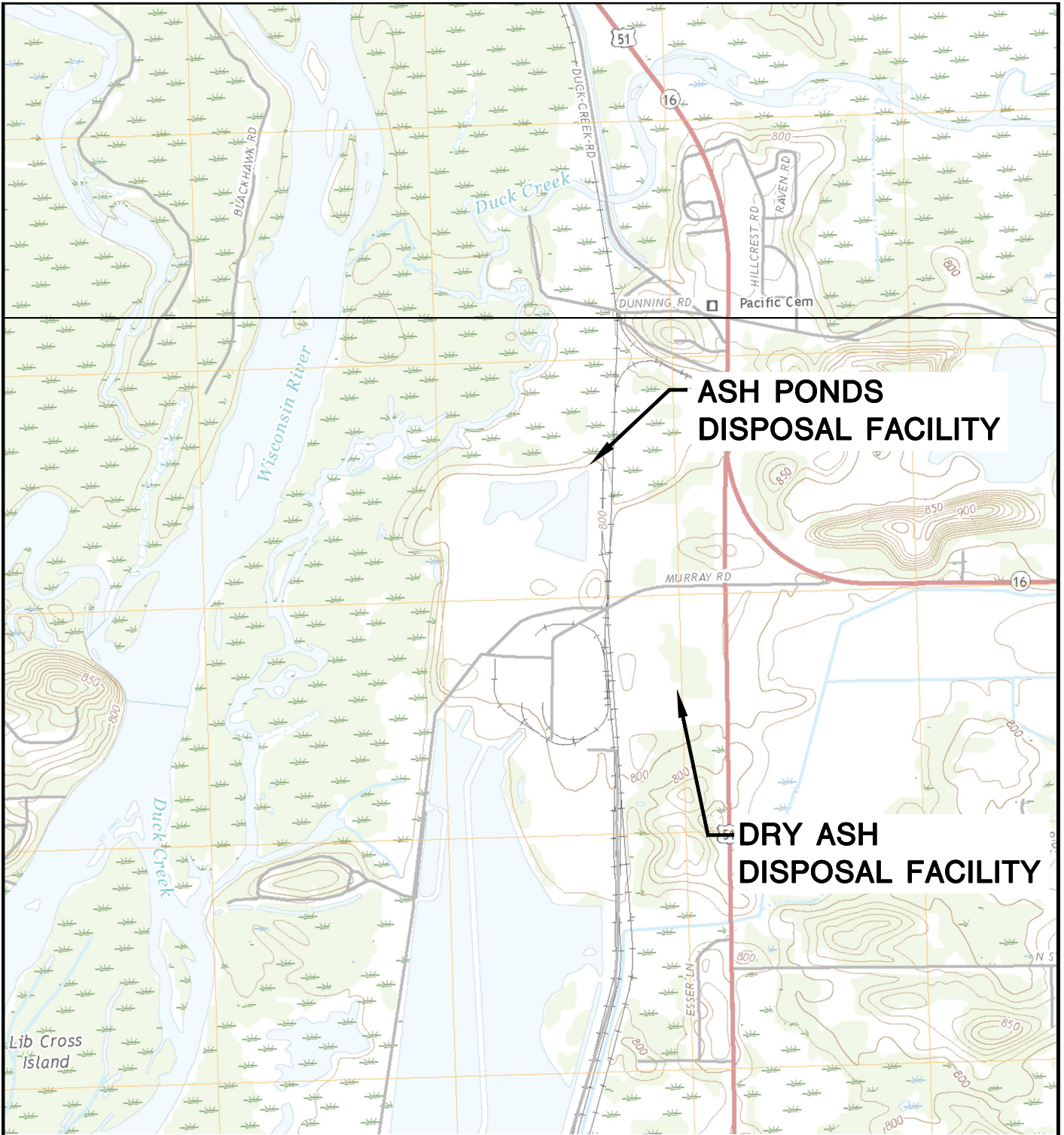
Created by: DK  
 Last revision by: AJR  
 Checked by: BLR

Date: 9/2/2022  
 Date: 12/5/2022  
 Date: 12/29/2022

## Figures

- 1 Site Location Map
- 2 Site Plan and Monitoring Well Locations
- 3 Water Table Map - April 2022
- 4 Water Table Map - October 2022



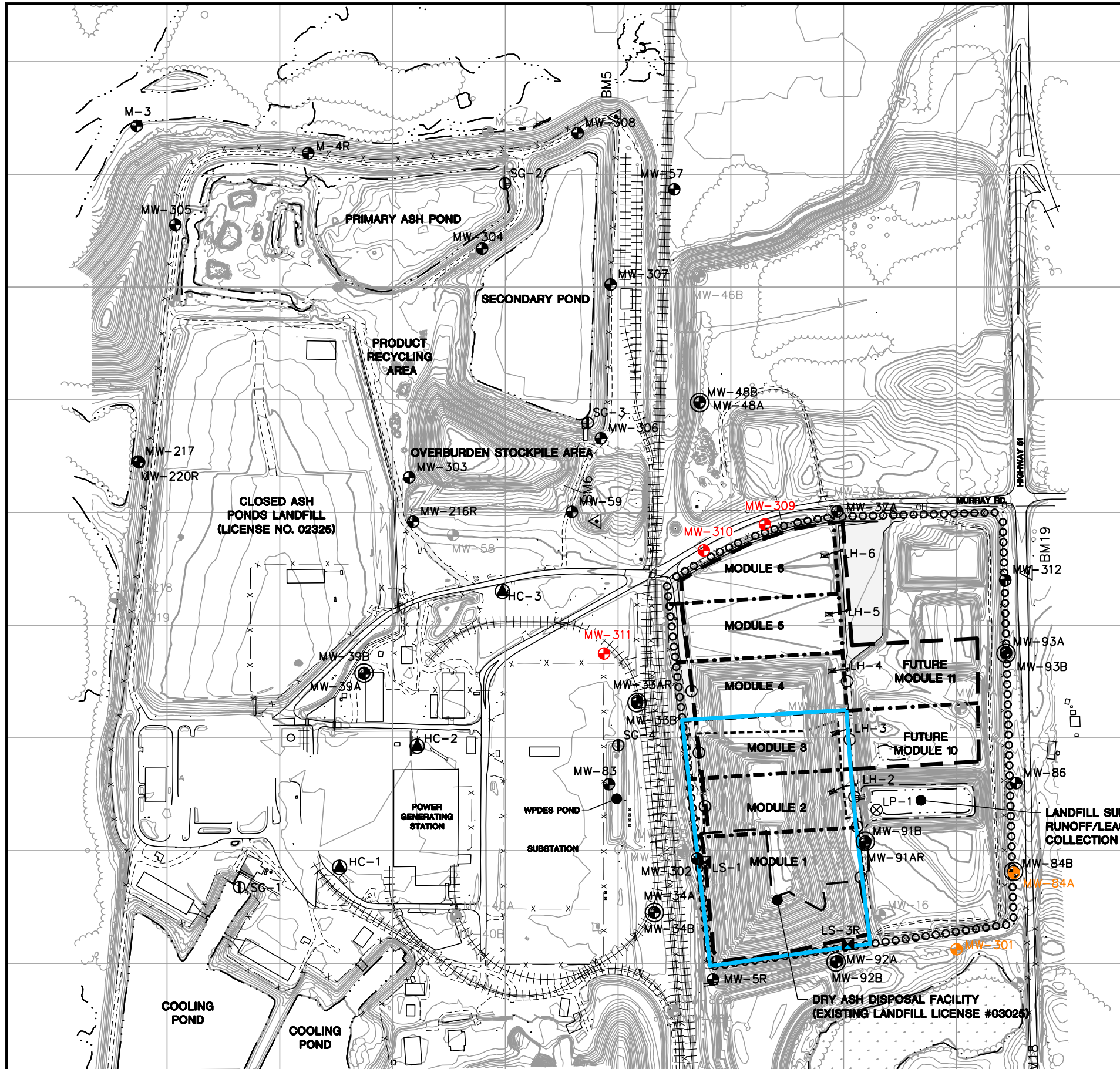


POYNETTE QUADRANGLE  
 WISCONSIN-COLUMBIA CO.  
 7.5 MINUTE SERIES (TOPOGRAPHIC)  
 2018  
 SCALE: 1" = 2,000'



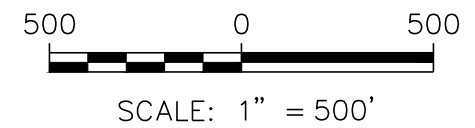
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	PROJECT NO.	25219067.00		DRAWN BY:	BSS		APPROVED BY:	TK 01/30/2020	
	DRAWN:	12/02/2019	CHECKED BY:	MDB					
	REVISED:	01/10/2020	APPROVED BY:	TK 01/30/2020					





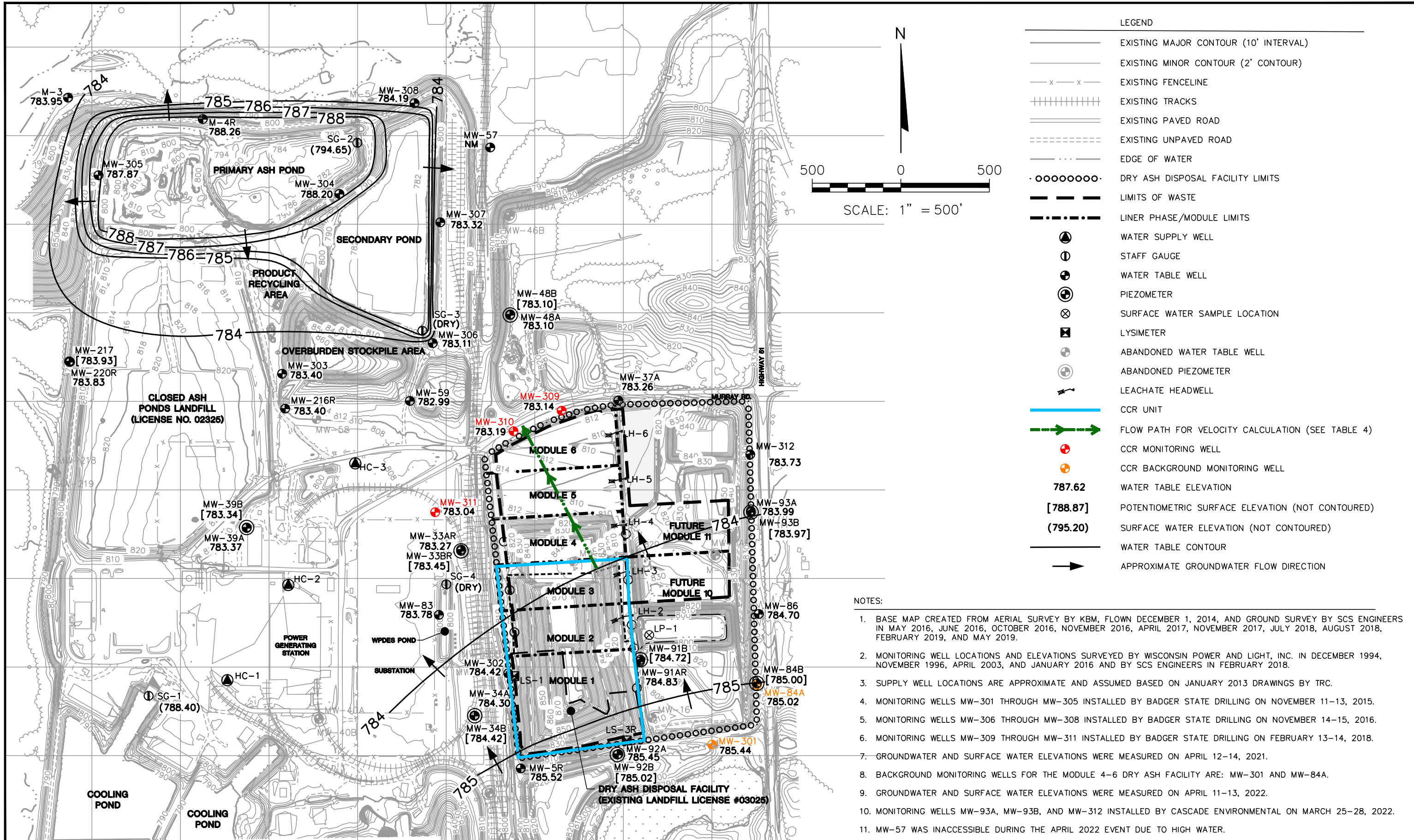
- LEGEND**
- EXISTING MAJOR CONTOUR (10' INTERVAL)
  - EXISTING MINOR CONTOUR (2' CONTOUR)
  - x - x - EXISTING FENCELINE
  - ||||| EXISTING TRACKS
  - ==== EXISTING PAVED ROAD
  - EXISTING UNPAVED ROAD
  - . - . - . EDGE OF WATER
  - · · · · · · · · · · · DRY ASH DISPOSAL FACILITY LIMITS
  - — — — — LIMITS OF WASTE
  - · — · — · — · — · — · LINER PHASE/MODULE LIMITS
  - ⊕ 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. MONITORING WELLS MW-93A, MW-93B, AND MW-312 WERE INSTALLED BY CASCADE ENVIRONMENTAL ON MARCH 23-28, 2022.
  8. BACKGROUND MONITORING WELLS FOR THE MODULE 4-6 DRY ASH DISPOSAL FACILITY ARE: MW-301 AND MW-84A.



PROJECT NO. 25222067.00	DRAWN BY: KP	ENGINEER	<b>SCS ENGINEERS</b> 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	FIGURE	2
DRAWN: 12/02/2019	CHECKED BY: MDB								
REVISED: 01/16/2023	APPROVED BY: TK, 1/16/2023								

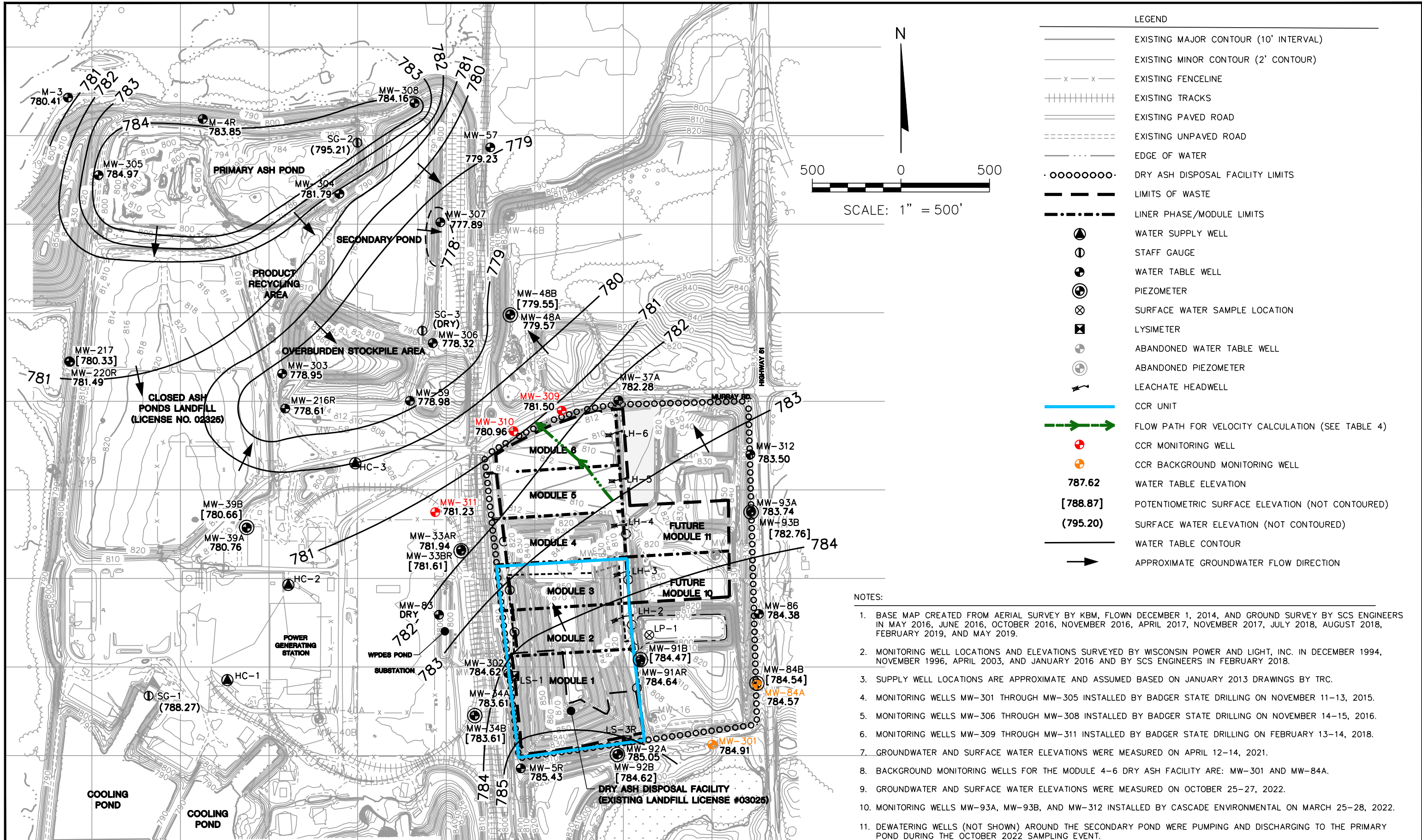




- NOTES:
1. BASE MAP CREATED FROM AERIAL SURVEY BY KBM, FLOWN DECEMBER 1, 2014, AND GROUND SURVEY BY SCS ENGINEERS IN MAY 2016, JUNE 2016, OCTOBER 2016, NOVEMBER 2016, APRIL 2017, NOVEMBER 2017, JULY 2018, AUGUST 2018, FEBRUARY 2019, AND MAY 2019.
  2. MONITORING WELL LOCATIONS AND ELEVATIONS SURVEYED 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 4-6 DRY ASH FACILITY ARE: MW-301 AND MW-84A.
  9. GROUNDWATER AND SURFACE WATER ELEVATIONS WERE MEASURED ON APRIL 11-13, 2022.
  10. MONITORING WELLS MW-93A, MW-93B, AND MW-312 INSTALLED BY CASCADE ENVIRONMENTAL ON MARCH 25-28, 2022.
  11. MW-57 WAS INACCESSIBLE DURING THE APRIL 2022 EVENT DUE TO HIGH WATER.

PROJECT NO.	25222067.00	DRAWN BY:	KP		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 2022	FIGURE 3
DRAWN:	12/02/2019	CHECKED BY:	MDB					
REVISED:	01/16/2023	APPROVED BY:	TK, 1/16/2023					






- LEGEND
- EXISTING MAJOR CONTOUR (10' INTERVAL)
  - EXISTING MINOR CONTOUR (2' CONTOUR)
  - x - x - EXISTING FENCELINE
  - ||||| EXISTING TRACKS
  - ==== EXISTING PAVED ROAD
  - EXISTING UNPAVED ROAD
  - · - · - · EDGE OF WATER
  - · · · · DRY ASH DISPOSAL FACILITY LIMITS
  - LIMITS OF WASTE
  - · - · - · LINER PHASE/MODULE LIMITS
  - ⊕ WATER SUPPLY WELL
  - ⊙ STAFF GAUGE
  - ⊕ WATER TABLE WELL
  - ⊕ PIEZOMETER
  - ⊗ SURFACE WATER SAMPLE LOCATION
  - ⊠ LYSIMETER
  - ⊕ ABANDONED WATER TABLE WELL
  - ⊕ ABANDONED PIEZOMETER
  - ⚡ LEACHATE HEADWELL
  - CCR UNIT
  - FLOW PATH FOR VELOCITY CALCULATION (SEE TABLE 4)
  - ⊕ 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.
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  7. GROUNDWATER AND SURFACE WATER ELEVATIONS WERE MEASURED ON APRIL 12-14, 2021.
  8. BACKGROUND MONITORING WELLS FOR THE MODULE 4-6 DRY ASH FACILITY ARE: MW-301 AND MW-84A.
  9. GROUNDWATER AND SURFACE WATER ELEVATIONS WERE MEASURED ON OCTOBER 25-27, 2022.
  10. MONITORING WELLS MW-93A, MW-93B, AND MW-312 INSTALLED BY CASCADE ENVIRONMENTAL ON MARCH 25-28, 2022.
  11. DEWATERING WELLS (NOT SHOWN) AROUND THE SECONDARY POND WERE PUMPING AND DISCHARGING TO THE PRIMARY POND DURING THE OCTOBER 2022 SAMPLING EVENT.

PROJECT NO. 25222067.00	DRAWN BY: KP	ENGINEER <b>SCS ENGINEERS</b> 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	FIGURE 4
DRAWN: 12/15/2022	CHECKED BY: MDB				
REVISED: 12/30/2022	APPROVED BY: TK, 1/16/2023				



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	<ul style="list-style-type: none"> <li>• Unconsolidated clay, silt, sand, gravel, cobbles, boulders, and organic matter</li> </ul>
Ordovician (460 to 490 million years old)	Sandstone Aquifer	0 to 800+	Galena Decorah Platteville St. Peter Prairie du Chien	<ul style="list-style-type: none"> <li>• Dolomite and shaley dolomite</li> <li>• Sandstone</li> </ul>
Cambrian (490 to 500 million years old)			Trempeleau Franconia Galesville Eau Claire Mt. Simon	<ul style="list-style-type: none"> <li>• Sandstone</li> </ul>
Precambrian (more than 1 billion years old)	Used for domestic supply in some areas	--	Precambrian	<ul style="list-style-type: none"> <li>• Igneous and metamorphic rocks</li> </ul>

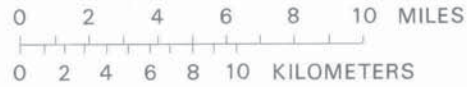
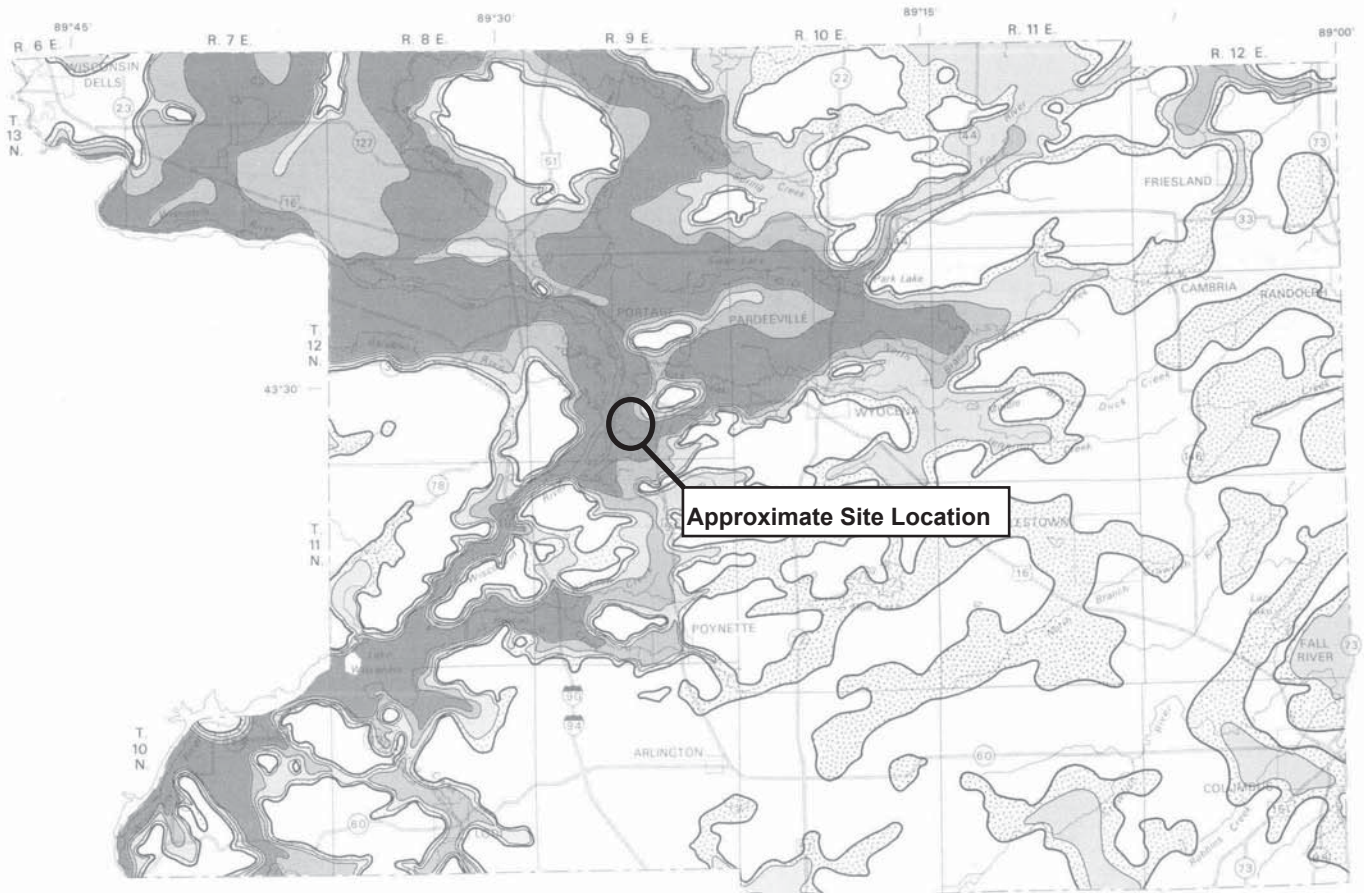
\*This nomenclature and classification of rock units in this report are those of the Wisconsin Geological and Natural History Survey and do not necessarily coincide with those accepted by the U.S. Geological Survey.

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.

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EXPLANATION

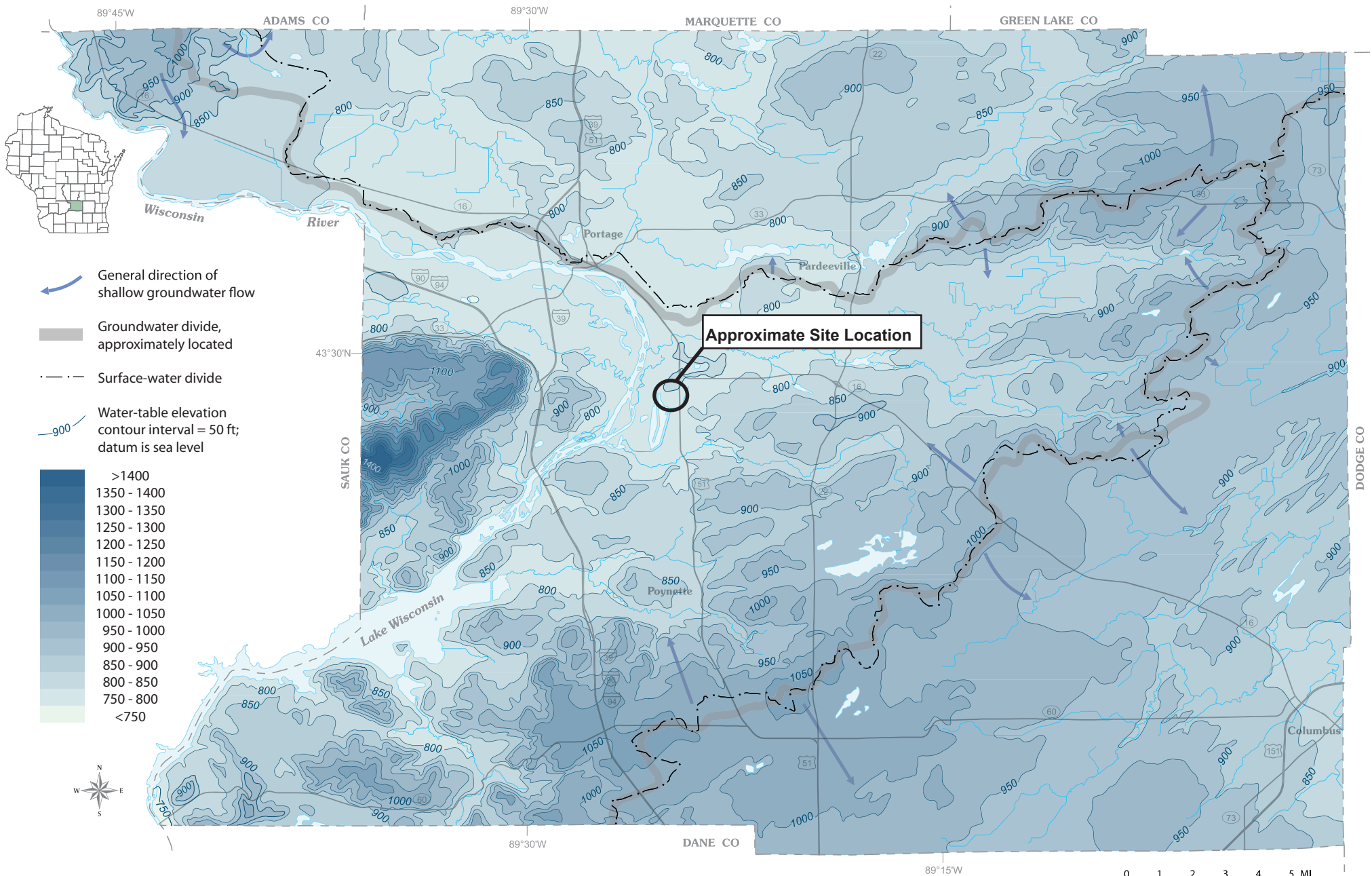
Probable well yields







Boundary of saturated sand-and-gravel aquifer

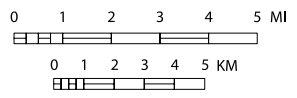
Figure 9. Probably well yields from the sand-and-gravel aquifer.

# Generalized water-table elevation in Columbia County, Wisconsin




-  General direction of shallow groundwater flow
-  Groundwater divide, approximately located
-  Surface-water divide
-  Water-table elevation contour interval = 50 ft; datum is sea level

>1400
1350 - 1400
1300 - 1350
1250 - 1300
1200 - 1250
1150 - 1200
1100 - 1150
1050 - 1100
1000 - 1050
950 - 1000
900 - 950
850 - 900
800 - 850
750 - 800
<750







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				
Recovery		Moisture		N	Depth		q <sub>c</sub>	W	LL	PL	D
No.	Type	↓	↓								
						Dark Brown Silty SAND (SM)					
					5	Brown Fine to Medium SAND, Little Silt, Trace to Little Gravel and Boulders (SM)					
					10						
					15						
					20						
					25						
					30						
					35						
					40						
							End Boring at 37'				
							Well Installed at 37'				

## WATER LEVEL OBSERVATIONS

## GENERAL NOTES

While Drilling \_\_\_\_\_  
 Upon Completion of Drilling \_\_\_\_\_  
 Time After Drilling \_\_\_\_\_  
 Depth to Water \_\_\_\_\_  
 Depth to Cave In \_\_\_\_\_

10/5/83 10/5/83  
 Start \_\_\_\_\_ Complete \_\_\_\_\_  
 Crew Chief JVS Rig B-40  
 Drilling Method ED 0-37'

WELL DETAIL INFORMATION SHEET

JOB NO. C 7134

BORING NO. MW-84A

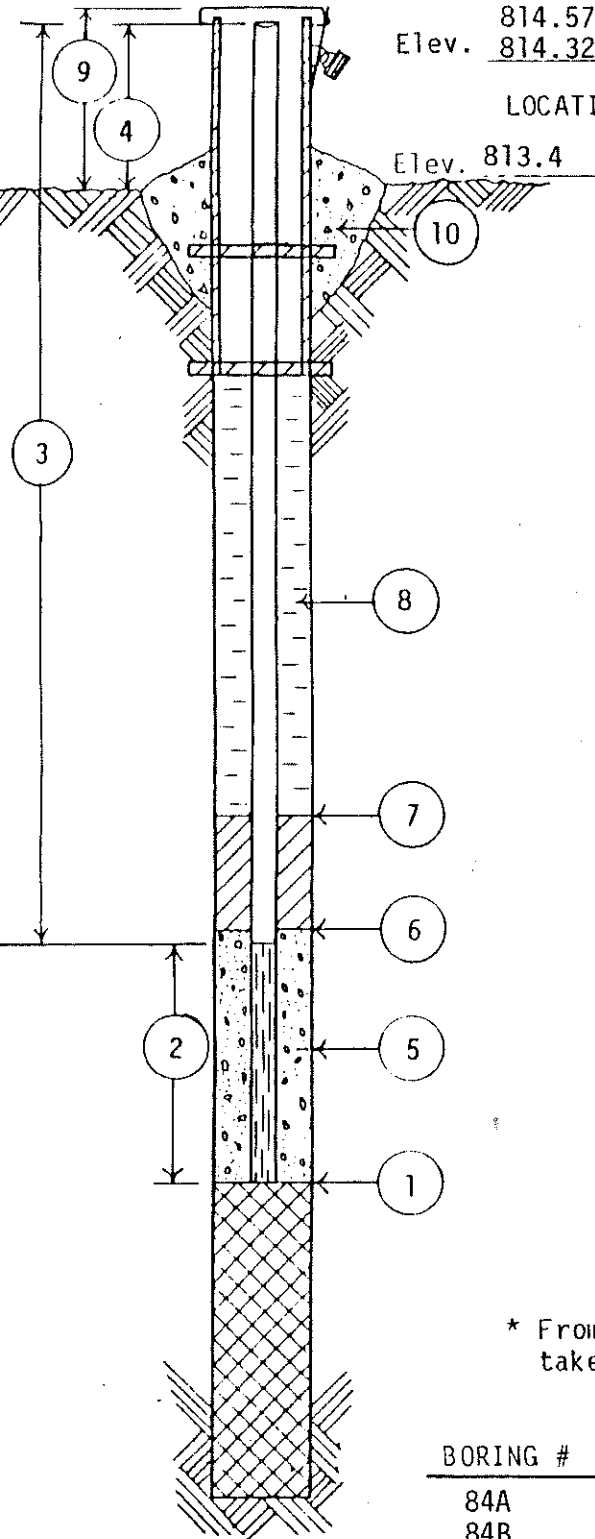
DATE 10/5/83

Elev. 814.57 Steel  
Elev. 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.

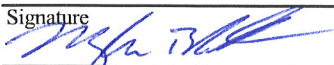
BORING #	DATE	TIME	DEPTH TO WATER	REMARKS
84A	10/7/83	3 days	21'	
84B	10/7/83	3 days	19'6"	

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

Facility/Project Name <b>WPL-Columbia</b> SCS#: 25215135.00		License/Permit/Monitoring Number		Boring Number <b>MW-301</b>	
Boring Drilled By: Name of crew chief (first, last) and Firm <b>Kevin Durst Badger State Drilling</b>			Date Drilling Started <b>11/11/2015</b>		Date Drilling Completed <b>11/11/2015</b>
WI Unique Well No. <b>VY701</b>	DNR Well ID No.	Common Well Name	Final Static Water Level <b>Feet</b>		Surface Elevation <b>803.69 Feet</b>
Local Grid Origin <input type="checkbox"/> (estimated: <input type="checkbox"/> ) or Boring Location <input checked="" type="checkbox"/>	State Plane <b>541562.2 N, 2025001.0 E</b> S/C/N		Lat _____ "	Local Grid Location	
1/4 of	1/4 of Section <b>27</b> ,	T <b>12</b> N, R <b>9</b> E	Long _____ "	Feet <input type="checkbox"/> N	Feet <input type="checkbox"/> E
Facility ID	County <b>Columbia</b>	County Code <b>11</b>	Civil Town/City/ or Village <b>Portage</b>		

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth in Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties					RQD/ Comments	
									Pocket Penetration (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200		
S1	21	7 6 9 10	1 2	SILTY SAND, yellowish brown (10YR 5/6), fine to medium grained.											
S2	20	6 7 9 10	3 4	Same as above except, 10YR 5/4 (top section), 10YR 3/6 (bottom section), trace gravel.											
S3	22	7 6 9 6	5 6	Same as above except, 10YR 3/4 (bottom), 10YR 5/4 (top), trace little roots and sticks, trace gravel.	SM										
S4	21	4 5 6 5	7 8	Same as above except, 10YR (top), 10YR 4/6 (bottom), trace clay at bottom.											
S5	18	2 2 4 5	9 10	Same as above except, fine to coarse grained sand, little gravel, trace clay in top half, 10YR 3/6.											
S6	20	2 3 3 3	11 12	Same as above except, 10YR 6/8.											

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

Signature 	Firm <b>SCS Engineers</b> 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 used for any other purpose. NOTE: See instructions for more information, including where the completed form should be sent.



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

Facility/Project Name WPL - Alliant Columbia Generating Station SCS#: 25217156.01		License/Permit/Monitoring Number		Boring Number MW-309	
Boring Drilled By: Name of crew chief (first, last) and Firm Mark Crampton Badger State Drilling, Co.		Date Drilling Started 2/13/2018		Date Drilling Completed 2/14/2018	
Drilling Method hollow stem auger		WI Unique Well No. VR111		DNR Well ID No.	
Common Well Name MW-309		Final Static Water Level 26.7 Feet MSL		Surface Elevation 809.88 Feet MSL	
Borehole Diameter 8.5 in.		Local Grid Origin <input type="checkbox"/> (estimated: <input type="checkbox"/> ) or Boring Location <input checked="" type="checkbox"/>		Local Grid Location	
State Plane 543,448 N, 2,124,151 E S/C/N		Lat _____ "		Feet <input type="checkbox"/> N <input type="checkbox"/> E	
NW 1/4 of SE 1/4 of Section 27, T 12 N, R 9 E		Long _____ "		Feet <input type="checkbox"/> S <input type="checkbox"/> W	
Facility ID		County Columbia		County Code 11	
				Civil Town/City/ or Village 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	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties						RQD/ Comments	
									Standard Penetration	Moisture Content	Liquid Limit	Plasticity Index	P 200			
			1	Hydrovaced boring to 8.5 below ground surface; open hole.												
			2													
			3													
			4													
			5													
			6													
			7													
			8													
S1	20	11 14 18	9	POORLY GRADED SAND, fine to coarse, yellow, (10YR 7/6), rounded grains.						N/A	M					
S2	20	12 15 20 28	12	Same but with trace gravel.	SP					N/A	M					
S3	24	16 20 26	14	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:
--	---	-----------------------------

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 used for any other purpose. NOTE: See instructions for more information, including where the completed form should be sent.

Boring Number **MW-309**

Use only as an attachment to Form 4400-122.

Page **2** of **2**

Sample		Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties					RQD/ Comments	
Number and Type	Length Att. & Recovered (in)								Standard Penetration	Moisture Content	Liquid Limit	Plasticity Index	P 200		
S4	22	11 17 32 41	16 17	POORLY GRADED SAND, fine to coarse, yellow, (10YR 7/6), rounded grains, trace silt.				N/A	M						
S5		22 29 36	19 20					N/A	M						
S6	24	18 20 28 36	22 23					N/A	M						
S7		18 24 32	24 25					N/A	M						
S8	22	14 18 30 40	27 28					SP	N/A	W				Depth to water at ~ 26 feet.	
S9	22	22 32 34	29 30					N/A	W						
			31 32 33 34 35 36												
								End of Boring at 36.5 feet bgs.							




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

Facility/Project Name WPL - Alliant Columbia Generating Station SCS#: 25217156.01		License/Permit/Monitoring Number		Boring Number MW-310	
Boring Drilled By: Name of crew chief (first, last) and Firm Dave Cruise Badger State Drilling, Co.		Date Drilling Started 2/13/2018		Date Drilling Completed 2/13/2018	
Drilling Method hollow stem auger		WI Unique Well No. VR110		DNR Well ID No.	
Common Well Name MW-310		Final Static Water Level 27.9 Feet MSL		Surface Elevation 810.96 Feet MSL	
Borehole Diameter 8.5 in.		Local Grid Origin <input type="checkbox"/> (estimated: <input type="checkbox"/> ) or Boring Location <input checked="" type="checkbox"/>		Local Grid Location	
State Plane 543,332 N, 2,123,880 E S/C/N		Lat _____ ° _____ ' _____ "		Feet <input type="checkbox"/> N <input type="checkbox"/> E	
NW 1/4 of SE 1/4 of Section 27, T 12 N, R 9 E		Long _____ ° _____ ' _____ "		Feet <input type="checkbox"/> S <input type="checkbox"/> W	
Facility ID		County Columbia		County Code 11	
				Civil Town/City/ or Village 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	Soil Properties						RQD/ Comments	
									Standard Penetration	Moisture Content	Liquid Limit	Plasticity Index	P 200			
			1	Hydrovaced boring to 8 feet below ground surface; open hole.												
			2													
			3													
			4													
			5													
			6													
			7													
			8													
S1	18	46 88	9	POORLY GRADED SAND AND GRAVEL, fine to medium sand, coarse gravel, brownish yellow, (10YR 6/6), angular gravel, round sand.						N/A	M					
			10													
			11	Same as above but trace gravel.												
S2	24	1827 3840	12		SP					N/A	M					
			13													
			14													
S3	24	2632 4038	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:

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

Facility/Project Name WPL - Alliant Columbia Generating Station SCS#: 25217156.01		License/Permit/Monitoring Number		Boring Number MW-311	
Boring Drilled By: Name of crew chief (first, last) and Firm Mark Crampton Badger State Drilling, Co.			Date Drilling Started 2/14/2018	Date Drilling Completed 2/14/2018	Drilling Method hollow stem auger
WI Unique Well No. VR112	DNR Well ID No.	Common Well Name MW-311	Final Static Water Level 23.5 Feet MSL	Surface Elevation 806.53 Feet MSL	Borehole Diameter 8.5 in.
Local Grid Origin <input type="checkbox"/> (estimated: <input type="checkbox"/> ) or Boring Location <input checked="" type="checkbox"/> 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 <input type="checkbox"/> N <input type="checkbox"/> E <input type="checkbox"/> S <input type="checkbox"/> W
Facility ID	County Columbia	County Code 11	Civil Town/City/ or Village 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	USCS	Graphic Log	Well Diagram	PID/FID	Soil Properties					RQD/ Comments	
									Standard Penetration	Moisture Content	Liquid Limit	Plasticity Index	P 200		
			1-8	Hydrovaced boring to 8 feet below ground surface; open hole.											
S1	24	12 16 20 24	9-10	POORLY GRADED SAND AND GRAVEL, fine to coarse sand, coarse gravel, yellow, (10YR 7/6), rounded sand, angular gravel.					N/A	M					
S2	24	17 27 30 38	12	Same as above but with trace silt.	SP				N/A	M					
S3	24	18 26 31	14						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:

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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. _____ ft. _____ ft. _____ ft.	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 <input checked="" type="checkbox"/> E <input type="checkbox"/> W	Well Installed By: Name (first, last) and Firm Kevin Duerst
Distance from Waste/Source _____ ft.	Location of Well Relative to Waste/Source u <input type="checkbox"/> Upgradient s <input type="checkbox"/> Sidegradient d <input type="checkbox"/> Downgradient n <input type="checkbox"/> Not Known	Badger State Drilling

- 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  SP   
 SM  SC  ML  MH  CL  CH   
 Bedrock

13. Sieve analysis performed?  Yes  No

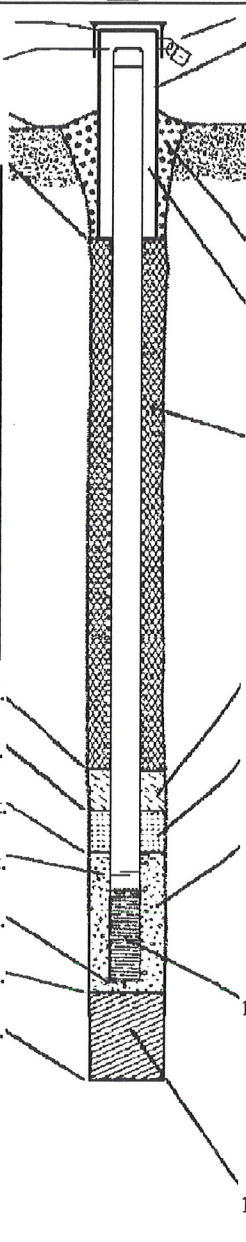
14. Drilling method used: Rotary  50  
 Hollow Stem Auger  41  
 Other

15. Drilling fluid used: Water  02 Air  01  
 Drilling Mud  03 None  99

16. Drilling additives used?  Yes  No

Describe \_\_\_\_\_

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



- 1. Cap and lock?  Yes  No
- 2. Protective cover pipe:
  - a. Inside diameter: -- 6 in.
  - b. Length: -- 5 ft.
  - c. Material: Steel  04  
Other
  - d. Additional protection?  Yes  No  
If yes, describe: bumper posts
- 3. Surface seal: Bentonite  30  
Concrete  01  
Other
- 4. Material between well casing and protective pipe: Bentonite  30  
Bentonite to grade, sand above Other
- 5. Annular space seal:
  - a. Granular/Chipped Bentonite  33
  - b. \_\_\_\_\_ Lbs/gal mud weight . . . Bentonite-sand slurry  35
  - c. \_\_\_\_\_ Lbs/gal mud weight . . . . . Bentonite slurry  31
  - d. \_\_\_\_\_ % Bentonite . . . . . Bentonite-cement grout  50
  - e. \_\_\_\_\_ Ft<sup>3</sup> volume added for any of the above
  - f. How installed: Tremie  01  
Tremie pumped  02  
Gravity  08
- 6. Bentonite seal:
  - a. Bentonite granules  33
  - b.  1/4 in.  3/8 in.  1/2 in. Bentonite chips  32
  - c. \_\_\_\_\_ 4 ft<sup>3</sup> Other
- 7. Fine sand material: Manufacturer, product name & mesh size  
a. RW Sidley Inc. #7
- b. Volume added 0.5 ft<sup>3</sup>
- 8. Filter pack material: Manufacturer, product name & mesh size  
a. RW Sidley #5
- b. Volume added 2 ft<sup>3</sup>
- 9. Well casing: Flush threaded PVC schedule 40  23  
Flush threaded PVC schedule 80  24  
Other
- 10. Screen material: PVC  
a. Screen type: Factory cut  11  
Continuous slot  01  
Other
- b. Manufacturer Johnson
- c. Slot size: 0.01 in.
- d. Slotted length: -- 10 ft.
- 11. Backfill material (below filter pack): None  14  
Native

- 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.

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

Signature *[Handwritten Signature]* Firm 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.



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

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

<p>A. Protective pipe, top elevation --- 813.59 ft. MSL</p> <p>B. Well casing, top elevation --- 813.28 ft. MSL</p> <p>C. Land surface elevation --- 809.88 ft. MSL</p> <p>D. Surface seal, bottom --- 807.61 ft. MSL or --- 2.27 ft.</p>	<p>1. Cap and lock? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>2. Protective cover pipe: a. Inside diameter: --- 6 in. b. Length: --- 5 ft. c. Material: Steel <input checked="" type="checkbox"/> 04 Other <input type="checkbox"/> d. Additional protection? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes, describe: _____</p> <p>3. Surface seal: Bentonite <input checked="" type="checkbox"/> 30 Concrete <input type="checkbox"/> 01 Other <input type="checkbox"/></p> <p>4. Material between well casing and protective pipe: Bentonite <input type="checkbox"/> 30 Filter Sand (#5) <input checked="" type="checkbox"/></p> <p>5. Annular space seal: a. Granular/Chipped Bentonite <input checked="" type="checkbox"/> 33 b. ___ Lbs/gal mud weight ... Bentonite-sand slurry <input type="checkbox"/> 35 c. ___ Lbs/gal mud weight ... Bentonite slurry <input type="checkbox"/> 31 d. ___ % Bentonite ... Bentonite-cement grout <input type="checkbox"/> 50 e. <u>0.342</u> Ft<sup>3</sup> volume added for any of the above f. How installed: Tremie <input type="checkbox"/> 01 Tremie pumped <input type="checkbox"/> 02 Gravity <input checked="" type="checkbox"/> 08</p> <p>6. Bentonite seal: a. Bentonite granules <input type="checkbox"/> 33 b. <input type="checkbox"/> 1/4 in. <input checked="" type="checkbox"/> 3/8 in. <input type="checkbox"/> 1/2 in. Bentonite chips <input checked="" type="checkbox"/> 32 c. Other <input type="checkbox"/></p> <p>7. Fine sand material: Manufacturer, product name &amp; mesh size a. <u>RW Sidley #7 (1 bag)</u> <input checked="" type="checkbox"/> b. Volume added _____ ft<sup>3</sup></p> <p>8. Filter pack material: Manufacturer, product name &amp; mesh size a. <u>RW Sidley #5 (6 bags)</u> <input checked="" type="checkbox"/> b. Volume added _____ ft<sup>3</sup></p> <p>9. Well casing: Flush threaded PVC schedule 40 <input checked="" type="checkbox"/> 23 Flush threaded PVC schedule 80 <input type="checkbox"/> 24 Other <input type="checkbox"/></p> <p>10. Screen material: <u>PVC</u> a. Screen type: Factory cut <input checked="" type="checkbox"/> 11 Continuous slot <input type="checkbox"/> 01 Other <input type="checkbox"/> b. Manufacturer <u>Monoflex</u> c. Slot size: <u>0.010</u> in. d. Slotted length: <u>10</u> ft.</p> <p>11. Backfill material (below filter pack): None <input checked="" type="checkbox"/> 14 Other <input type="checkbox"/></p>
---	---

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  50  
Hollow Stem Auger  41  
Other


15. Drilling fluid used: Water  02 Air  01  
Drilling Mud  03 None  99

16. Drilling additives used?  Yes  No  
Describe -- \_\_\_\_\_

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

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

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

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

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

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   
 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 --- 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?  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)

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. 0.369 Ft<sup>3</sup> 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<sup>3</sup>

8. Filter pack material: Manufacturer, product name & mesh size  
 a. RW Sidley #5 (7 bags)   
 b. Volume added \_\_\_\_\_ ft<sup>3</sup>

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

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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. <input checked="" type="checkbox"/> N. <input checked="" type="checkbox"/> S. <input type="checkbox"/> E. <input type="checkbox"/> W. 2123437.50 ft.	Well Name MW-311
Facility License, Permit or Monitoring No.	Local Grid Origin (estimated: <input type="checkbox"/> ) or Well Location <input type="checkbox"/> Lat. " Long. " or	Wis. Unique Well No. DNR Well ID No. VR112
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 <input checked="" type="checkbox"/> E <input checked="" type="checkbox"/> W	Well Installed By: Name (first, last) and Firm Mark Crampton
Distance from Waste/Source ft.	Enf. Stds. Apply <input checked="" type="checkbox"/> Location of Well Relative to Waste/Source u <input type="checkbox"/> Upgradient s <input type="checkbox"/> Sidegradient d <input checked="" type="checkbox"/> Downgradient n <input type="checkbox"/> Not Known	Gov. Lot Number Badger State Drilling Co., Inc.

A. Protective pipe, top elevation	810.05 ft. MSL	1. Cap and lock?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
B. Well casing, top elevation	809.74 ft. MSL	2. Protective cover pipe:	
C. Land surface elevation	806.53 ft. MSL	a. Inside diameter:	6 in.
D. Surface seal, bottom	803.55 ft. MSL or 2.98 ft.	b. Length:	5 ft.
		c. Material:	Steel <input checked="" type="checkbox"/> 04 Other <input type="checkbox"/>
		d. Additional protection?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
		If yes, describe:	
		3. Surface seal:	Bentonite <input checked="" type="checkbox"/> 30 Concrete <input type="checkbox"/> 01 Other <input type="checkbox"/>
		4. Material between well casing and protective pipe:	Bentonite <input type="checkbox"/> 30 Filter Sand (#5) <input checked="" type="checkbox"/>
		5. Annular space seal:	a. Granular/Chipped Bentonite <input checked="" type="checkbox"/> 33 b. Lbs/gal mud weight . . . Bentonite-sand slurry <input type="checkbox"/> 35 c. Lbs/gal mud weight . . . Bentonite slurry <input type="checkbox"/> 31 d. % Bentonite . . . . Bentonite-cement grout <input type="checkbox"/> 50 e. 0.288 Ft <sup>3</sup> volume added for any of the above
		f. How installed:	Tremie <input type="checkbox"/> 01 Tremie pumped <input type="checkbox"/> 02 Gravity <input checked="" type="checkbox"/> 08
		6. Bentonite seal:	a. Bentonite granules <input type="checkbox"/> 33 b. <input type="checkbox"/> 1/4 in. <input checked="" type="checkbox"/> 3/8 in. <input type="checkbox"/> 1/2 in. Bentonite chips <input checked="" type="checkbox"/> 32 c. Other <input type="checkbox"/>
		7. Fine sand material: Manufacturer, product name & mesh size	a. RW Sidley #7 (1 bag) <input checked="" type="checkbox"/>
		b. Volume added	ft <sup>3</sup>
		8. Filter pack material: Manufacturer, product name & mesh size	a. RW Sidley #5 (6 bags) <input checked="" type="checkbox"/>
		b. Volume added	ft <sup>3</sup>
		9. Well casing:	Flush threaded PVC schedule 40 <input checked="" type="checkbox"/> 23 Flush threaded PVC schedule 80 <input type="checkbox"/> 24 Other <input type="checkbox"/>
		10. Screen material:	PVC
		a. Screen type:	Factory cut <input checked="" type="checkbox"/> 11 Continuous slot <input type="checkbox"/> 01 Other <input type="checkbox"/>
		b. Manufacturer	Monoflex
		c. Slot size:	0.010 in.
		d. Slotted length:	10 ft.
		11. Backfill material (below filter pack):	None <input checked="" type="checkbox"/> 14 Other <input type="checkbox"/>

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  50  
 Hollow Stem Auger  41  
 Other

15. Drilling fluid used: Water  02 Air  01  
 Drilling Mud  03 None  99

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.

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.

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

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

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 \_\_\_\_\_ 75 min.

4. Depth of well (from top of well casing) \_\_\_\_\_ 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)

17. Additional comments on development:

Two cycles of well purging dry and recharging.

	Before Development	After Development
11. Depth to Water (from top of well casing)	a. _____ 30.07 ft.	_____ 32.29 ft.
Date	b. <u>02</u> / <u>16</u> / <u>2018</u>	<u>02</u> / <u>16</u> / <u>2018</u>
	m m d d y y	m m d d y y
Time	c. <u>12</u> : <u>47</u> <input type="checkbox"/> a.m. <input checked="" type="checkbox"/> p.m.	<u>13</u> : <u>50</u> <input type="checkbox"/> a.m. <input checked="" type="checkbox"/> p.m.

12. Sediment in well bottom \_\_\_\_\_ inches

13. Water clarity  
 Clear  1 0      Clear  2 0  
 Turbid  1 5      Turbid  2 5  
 (Describe)                      (Describe)

Brown	_____
Silty	_____
_____	_____
_____	_____

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

14. Total suspended \_\_\_\_\_ mg/l \_\_\_\_\_ mg/l  
solids

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

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



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

Facility/Project Name WPL - Alliant Columbia Generating Station	County Name Columbia	Well Name MW-310	
Facility License, Permit or Monitoring Number	County Code 11	Wis. Unique Well Number VR110	DNR Well ID Number

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 \_\_\_\_\_ 171 min.

4. Depth of well (from top of well casing) \_\_\_\_\_ 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)

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

	Before Development	After Development
11. Depth to Water (from top of well casing)	a. _____ 30 _____ 55 ft.	_____ 32 _____ 30 ft.
Date	b. <u>2</u> / <u>16</u> / <u>2018</u>	<u>2</u> / <u>16</u> / <u>2018</u>
Time	c. <u>9</u> : <u>45</u> <input checked="" type="checkbox"/> a.m. <input type="checkbox"/> p.m.	<u>12</u> : <u>36</u> <input type="checkbox"/> a.m. <input checked="" type="checkbox"/> p.m.
12. Sediment in well bottom	_____ inches	_____ inches
13. Water clarity	Clear <input type="checkbox"/> 1 0 Turbid <input checked="" type="checkbox"/> 1 5 (Describe) _____	Clear <input checked="" type="checkbox"/> 2 0 Turbid <input type="checkbox"/> 2 5 (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

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

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

Facility/Project Name WPL - Alliant Columbia Generating Station	County Name Columbia	Well Name MW-311	
Facility License, Permit or Monitoring Number	County Code 11	Wis. Unique Well Number VR112	DNR Well ID Number

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 casing) \_\_\_\_\_ 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)

17. Additional comments on development:

	Before Development	After Development
11. Depth to Water (from top of well casing)	a. _____ 26 . _____ 75 ft.	_____ 28 . _____ 51 ft.
Date	b. <u>2</u> / <u>16</u> / <u>2018</u>	<u>2</u> / <u>16</u> / <u>2018</u>
	m m d d y y y y	m m d d y y y y
Time	c. _____ 2 : 00 <input type="checkbox"/> a.m. <input checked="" type="checkbox"/> p.m.	_____ 4 : 48 <input type="checkbox"/> a.m. <input checked="" type="checkbox"/> p.m.
12. Sediment in well bottom	_____ inches	_____ inches
13. Water clarity	Clear <input type="checkbox"/> 1 0 Turbid <input checked="" type="checkbox"/> 1 5 (Describe) _____	Clear <input checked="" type="checkbox"/> 2 0 Turbid <input type="checkbox"/> 2 5 (Describe) _____
	brown _____ silly _____	_____

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

14. Total suspended \_\_\_\_\_ mg/l \_\_\_\_\_ mg/l  
solids

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

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: 

Print Name: Kyle Kramer

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



Appendix C  
Laboratory Reports

May 13, 2022

Meghan Blodgett  
SCS ENGINEERS  
2830 Dairy Drive  
Madison, WI 53718

RE: Project: 25222067.00 COLUMBIA CCR BACK  
Pace Project No.: 40243482

Dear Meghan Blodgett:

Enclosed are the analytical results for sample(s) received by the laboratory on April 15, 2022. 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: Matt Bizjack, Alliant Energy  
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

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## CERTIFICATIONS

Project: 25222067.00 COLUMBIA CCR BACK  
Pace Project No.: 40243482

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### **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 #: 460198  
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

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## REPORT OF LABORATORY ANALYSIS

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## SAMPLE SUMMARY

Project: 25222067.00 COLUMBIA CCR BACK  
Pace Project No.: 40243482

---

Lab ID	Sample ID	Matrix	Date Collected	Date Received
40243482001	MW-84A	Water	04/13/22 14:20	04/15/22 07:10
40243482002	MW-301	Water	04/13/22 15:40	04/15/22 07:10

## REPORT OF LABORATORY ANALYSIS

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### SAMPLE ANALYTE COUNT

Project: 25222067.00 COLUMBIA CCR BACK  
Pace Project No.: 40243482

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
40243482001	MW-84A	EPA 6020B	KXS	14	PASI-G
		EPA 7470	AJT	1	PASI-G
			MEA	7	PASI-G
		EPA 903.1	RPS	1	PASI-PA
		EPA 904.0	JSM	1	PASI-PA
		Total Radium Calculation	JAL	1	PASI-PA
		SM 2540C	SRK	1	PASI-G
		EPA 9040	YER	1	PASI-G
		EPA 300.0	HMB	3	PASI-G
		40243482002	MW-301	EPA 6020B	KXS
EPA 7470	AJT			1	PASI-G
	MEA			7	PASI-G
EPA 903.1	RPS			1	PASI-PA
EPA 904.0	JSM			1	PASI-PA
Total Radium Calculation	JAL			1	PASI-PA
SM 2540C	SRK			1	PASI-G
EPA 9040	YER			1	PASI-G
EPA 300.0	HMB			3	PASI-G

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

### REPORT OF LABORATORY ANALYSIS

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### ANALYTICAL RESULTS

Project: 25222067.00 COLUMBIA CCR BACK  
Pace Project No.: 40243482

**Sample: MW-84A**      **Lab ID: 40243482001**      Collected: 04/13/22 14:20      Received: 04/15/22 07:10      Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
<b>6020B MET ICPMS</b>									
Analytical Method: EPA 6020B    Preparation Method: EPA 3010A Pace Analytical Services - Green Bay									
Antimony	<0.15	ug/L	1.0	0.15	1	04/18/22 06:24	05/01/22 02:08	7440-36-0	
Arsenic	0.31J	ug/L	1.0	0.28	1	04/18/22 06:24	05/01/22 02:08	7440-38-2	
Barium	13.5	ug/L	2.3	0.70	1	04/18/22 06:24	05/01/22 02:08	7440-39-3	
Beryllium	<0.25	ug/L	1.0	0.25	1	04/18/22 06:24	05/01/22 02:08	7440-41-7	
Boron	10.5	ug/L	10.0	3.0	1	04/18/22 06:24	05/01/22 02:08	7440-42-8	
Cadmium	<0.15	ug/L	1.0	0.15	1	04/18/22 06:24	05/01/22 02:08	7440-43-9	
Calcium	75100	ug/L	254	76.2	1	04/18/22 06:24	05/01/22 02:08	7440-70-2	
Chromium	2.2J	ug/L	3.4	1.0	1	04/18/22 06:24	05/01/22 02:08	7440-47-3	
Cobalt	<0.12	ug/L	1.0	0.12	1	04/18/22 06:24	05/01/22 02:08	7440-48-4	
Lead	<0.24	ug/L	1.0	0.24	1	04/18/22 06:24	05/01/22 02:08	7439-92-1	
Lithium	0.36J	ug/L	1.0	0.22	1	04/18/22 06:24	05/01/22 02:08	7439-93-2	
Molybdenum	<0.44	ug/L	1.5	0.44	1	04/18/22 06:24	05/01/22 02:08	7439-98-7	
Selenium	<0.32	ug/L	1.1	0.32	1	04/18/22 06:24	05/01/22 02:08	7782-49-2	
Thallium	<0.14	ug/L	1.0	0.14	1	04/18/22 06:24	05/01/22 02:08	7440-28-0	
<b>7470 Mercury</b>									
Analytical Method: EPA 7470    Preparation Method: EPA 7470 Pace Analytical Services - Green Bay									
Mercury	<0.066	ug/L	0.20	0.066	1	04/20/22 09:45	04/21/22 07:52	7439-97-6	
<b>Field Data</b>									
Analytical Method: Pace Analytical Services - Green Bay									
Field pH	7.34	Std. Units			1		04/13/22 14:20		
Field Specific Conductance	600.2	umhos/cm			1		04/13/22 14:20		
Oxygen, Dissolved	9.33	mg/L			1		04/13/22 14:20	7782-44-7	
REDOX	200.6	mV			1		04/13/22 14:20		
Turbidity	0.00	NTU			1		04/13/22 14:20		
Static Water Level	785.02	feet			1		04/13/22 14:20		
Temperature, Water (C)	9.9	deg C			1		04/13/22 14:20		
<b>2540C Total Dissolved Solids</b>									
Analytical Method: SM 2540C Pace Analytical Services - Green Bay									
Total Dissolved Solids	334	mg/L	20.0	8.7	1		04/15/22 16:44		
<b>9040 pH</b>									
Analytical Method: EPA 9040 Pace Analytical Services - Green Bay									
pH at 25 Degrees C	7.6	Std. Units	0.10	0.010	1		04/18/22 10:50		H6
<b>300.0 IC Anions</b>									
Analytical Method: EPA 300.0 Pace Analytical Services - Green Bay									
Chloride	5.2	mg/L	2.0	0.43	1		05/10/22 22:07	16887-00-6	
Fluoride	<0.095	mg/L	0.32	0.095	1		05/10/22 22:07	16984-48-8	
Sulfate	1.4J	mg/L	2.0	0.44	1		05/10/22 22:07	14808-79-8	M0

### REPORT OF LABORATORY ANALYSIS

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### ANALYTICAL RESULTS

Project: 25222067.00 COLUMBIA CCR BACK  
Pace Project No.: 40243482

**Sample: MW-301**      **Lab ID: 40243482002**      Collected: 04/13/22 15:40      Received: 04/15/22 07:10      Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
<b>6020B MET ICPMS</b>									
Analytical Method: EPA 6020B    Preparation Method: EPA 3010A Pace Analytical Services - Green Bay									
Antimony	0.31J	ug/L	1.0	0.15	1	04/18/22 06:24	05/01/22 02:37	7440-36-0	
Arsenic	0.47J	ug/L	1.0	0.28	1	04/18/22 06:24	05/01/22 02:37	7440-38-2	
Barium	7.8	ug/L	2.3	0.70	1	04/18/22 06:24	05/01/22 02:37	7440-39-3	
Beryllium	<0.25	ug/L	1.0	0.25	1	04/18/22 06:24	05/01/22 02:37	7440-41-7	
Boron	28.7	ug/L	10.0	3.0	1	04/18/22 06:24	05/01/22 02:37	7440-42-8	
Cadmium	0.30J	ug/L	1.0	0.15	1	04/18/22 06:24	05/01/22 02:37	7440-43-9	
Calcium	97300	ug/L	254	76.2	1	04/18/22 06:24	05/01/22 02:37	7440-70-2	
Chromium	<1.0	ug/L	3.4	1.0	1	04/18/22 06:24	05/01/22 02:37	7440-47-3	
Cobalt	0.32J	ug/L	1.0	0.12	1	04/18/22 06:24	05/01/22 02:37	7440-48-4	
Lead	3.1	ug/L	1.0	0.24	1	04/18/22 06:24	05/01/22 02:37	7439-92-1	
Lithium	0.56J	ug/L	1.0	0.22	1	04/18/22 06:24	05/01/22 02:37	7439-93-2	
Molybdenum	<0.44	ug/L	1.5	0.44	1	04/18/22 06:24	05/01/22 02:37	7439-98-7	
Selenium	<0.32	ug/L	1.1	0.32	1	04/18/22 06:24	05/01/22 02:37	7782-49-2	
Thallium	0.32J	ug/L	1.0	0.14	1	04/18/22 06:24	05/01/22 02:37	7440-28-0	
<b>7470 Mercury</b>									
Analytical Method: EPA 7470    Preparation Method: EPA 7470 Pace Analytical Services - Green Bay									
Mercury	<0.066	ug/L	0.20	0.066	1	04/20/22 09:45	04/21/22 07:59	7439-97-6	
<b>Field Data</b>									
Analytical Method: Pace Analytical Services - Green Bay									
Field pH	6.60	Std. Units			1		04/13/22 15:40		
Field Specific Conductance	747.0	umhos/cm			1		04/13/22 15:40		
Oxygen, Dissolved	2.47	mg/L			1		04/13/22 15:40	7782-44-7	
REDOX	207.5	mV			1		04/13/22 15:40		
Turbidity	0.00	NTU			1		04/13/22 15:40		
Static Water Level	785.44	feet			1		04/13/22 15:40		
Temperature, Water (C)	7.1	deg C			1		04/13/22 15:40		
<b>2540C Total Dissolved Solids</b>									
Analytical Method: SM 2540C Pace Analytical Services - Green Bay									
Total Dissolved Solids	422	mg/L	20.0	8.7	1		04/15/22 16:44		
<b>9040 pH</b>									
Analytical Method: EPA 9040 Pace Analytical Services - Green Bay									
pH at 25 Degrees C	7.0	Std. Units	0.10	0.010	1		04/18/22 10:53		H6
<b>300.0 IC Anions</b>									
Analytical Method: EPA 300.0 Pace Analytical Services - Green Bay									
Chloride	1.9J	mg/L	2.0	0.43	1		05/10/22 23:43	16887-00-6	
Fluoride	<0.095	mg/L	0.32	0.095	1		05/10/22 23:43	16984-48-8	
Sulfate	12.7	mg/L	2.0	0.44	1		05/10/22 23:43	14808-79-8	

### REPORT OF LABORATORY ANALYSIS

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### QUALITY CONTROL DATA

Project: 25222067.00 COLUMBIA CCR BACK  
Pace Project No.: 40243482

QC Batch: 413634 Analysis Method: EPA 7470  
QC Batch Method: EPA 7470 Analysis Description: 7470 Mercury  
Laboratory: Pace Analytical Services - Green Bay  
Associated Lab Samples: 40243482001, 40243482002

METHOD BLANK: 2381580 Matrix: Water  
Associated Lab Samples: 40243482001, 40243482002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mercury	ug/L	<0.066	0.20	04/21/22 07:47	

LABORATORY CONTROL SAMPLE: 2381581

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury	ug/L	5	4.9	98	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2381582 2381583

Parameter	Units	40243482001		2381583		MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual	
		MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result							
Mercury	ug/L	<0.066	5	5	5.0	5.0	100	101	85-115	1	20	

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### REPORT OF LABORATORY ANALYSIS

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### QUALITY CONTROL DATA

Project: 25222067.00 COLUMBIA CCR BACK  
Pace Project No.: 40243482

QC Batch: 413354 Analysis Method: EPA 6020B  
QC Batch Method: EPA 3010A Analysis Description: 6020B MET  
Laboratory: Pace Analytical Services - Green Bay

Associated Lab Samples: 40243482001, 40243482002

METHOD BLANK: 2380530 Matrix: Water  
Associated Lab Samples: 40243482001, 40243482002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Antimony	ug/L	<0.15	1.0	05/01/22 00:40	
Arsenic	ug/L	<0.28	1.0	05/01/22 00:40	
Barium	ug/L	<0.70	2.3	05/01/22 00:40	
Beryllium	ug/L	<0.25	1.0	05/01/22 00:40	
Boron	ug/L	<3.0	10.0	05/01/22 00:40	
Cadmium	ug/L	<0.15	1.0	05/01/22 00:40	
Calcium	ug/L	<76.2	254	05/01/22 00:40	
Chromium	ug/L	<1.0	3.4	05/01/22 00:40	
Cobalt	ug/L	<0.12	1.0	05/01/22 00:40	
Lead	ug/L	<0.24	1.0	05/01/22 00:40	
Lithium	ug/L	<0.22	1.0	05/01/22 00:40	
Molybdenum	ug/L	<0.44	1.5	05/01/22 00:40	
Selenium	ug/L	<0.32	1.1	05/01/22 00:40	
Thallium	ug/L	<0.14	1.0	05/01/22 00:40	

LABORATORY CONTROL SAMPLE: 2380531

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Antimony	ug/L	250	261	104	80-120	
Arsenic	ug/L	250	263	105	80-120	
Barium	ug/L	250	249	99	80-120	
Beryllium	ug/L	250	270	108	80-120	
Boron	ug/L	250	250	100	80-120	
Cadmium	ug/L	250	268	107	80-120	
Calcium	ug/L	10000	9930	99	80-120	
Chromium	ug/L	250	254	102	80-120	
Cobalt	ug/L	250	248	99	80-120	
Lead	ug/L	250	266	106	80-120	
Lithium	ug/L	250	250	100	80-120	
Molybdenum	ug/L	250	249	100	80-120	
Selenium	ug/L	250	278	111	80-120	
Thallium	ug/L	250	252	101	80-120	

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### QUALITY CONTROL DATA

Project: 25222067.00 COLUMBIA CCR BACK

Pace Project No.: 40243482

Parameter	Units	2380532		2380533		MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	Max RPD	RPD	Qual
		40243482001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result								
Antimony	ug/L	<0.15	250	250	256	257	102	103	75-125	0	20		
Arsenic	ug/L	0.31J	250	250	256	259	102	103	75-125	1	20		
Barium	ug/L	13.5	250	250	260	258	99	98	75-125	1	20		
Beryllium	ug/L	<0.25	250	250	260	260	104	104	75-125	0	20		
Boron	ug/L	10.5	250	250	255	248	98	95	75-125	3	20		
Cadmium	ug/L	<0.15	250	250	258	259	103	104	75-125	0	20		
Calcium	ug/L	75100	10000	10000	86700	85700	116	106	75-125	1	20		
Chromium	ug/L	2.2J	250	250	256	252	102	100	75-125	2	20		
Cobalt	ug/L	<0.12	250	250	244	241	98	96	75-125	1	20		
Lead	ug/L	<0.24	250	250	267	267	107	107	75-125	0	20		
Lithium	ug/L	0.36J	250	250	250	249	100	99	75-125	0	20		
Molybdenum	ug/L	<0.44	250	250	252	250	101	100	75-125	1	20		
Selenium	ug/L	<0.32	250	250	264	268	106	107	75-125	1	20		
Thallium	ug/L	<0.14	250	250	257	256	103	103	75-125	0	20		

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### QUALITY CONTROL DATA

Project: 25222067.00 COLUMBIA CCR BACK

Pace Project No.: 40243482

QC Batch: 413340	Analysis Method: SM 2540C
QC Batch Method: SM 2540C	Analysis Description: 2540C Total Dissolved Solids
	Laboratory: Pace Analytical Services - Green Bay

Associated Lab Samples: 40243482001, 40243482002

METHOD BLANK: 2380206 Matrix: Water

Associated Lab Samples: 40243482001, 40243482002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	<8.7	20.0	04/15/22 16:44	

LABORATORY CONTROL SAMPLE: 2380207

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Dissolved Solids	mg/L	555	524	94	80-120	

SAMPLE DUPLICATE: 2380208

Parameter	Units	40243482001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	334	332	1	10	

SAMPLE DUPLICATE: 2380209

Parameter	Units	40243482002 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	422	412	2	10	

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### QUALITY CONTROL DATA

Project: 25222067.00 COLUMBIA CCR BACK  
Pace Project No.: 40243482

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QC Batch: 413406	Analysis Method: EPA 9040
QC Batch Method: EPA 9040	Analysis Description: 9040 pH
	Laboratory: Pace Analytical Services - Green Bay

Associated Lab Samples: 40243482001, 40243482002

---

SAMPLE DUPLICATE: 2380677

Parameter	Units	40243487001 Result	Dup Result	RPD	Max RPD	Qualifiers
pH at 25 Degrees C	Std. Units	10.7	10.7	0	20	H6

---

SAMPLE DUPLICATE: 2380701

Parameter	Units	40243447003 Result	Dup Result	RPD	Max RPD	Qualifiers
pH at 25 Degrees C	Std. Units	8.5	8.4	1	20	1q,H6

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### QUALITY CONTROL DATA

Project: 25222067.00 COLUMBIA CCR BACK  
Pace Project No.: 40243482

QC Batch: 414946 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: 40243482001, 40243482002

METHOD BLANK: 2389209 Matrix: Water

Associated Lab Samples: 40243482001, 40243482002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chloride	mg/L	<0.43	2.0	05/10/22 20:23	
Fluoride	mg/L	<0.095	0.32	05/10/22 20:23	
Sulfate	mg/L	<0.44	2.0	05/10/22 20:23	

LABORATORY CONTROL SAMPLE: 2389210

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	20	21.1	106	90-110	
Fluoride	mg/L	2	2.1	107	90-110	
Sulfate	mg/L	20	21.4	107	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2389211 2389212

Parameter	Units	MS		MSD		MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
		40243482001 Result	Conc.	Conc.	Conc.								
Chloride	mg/L	5.2	20	20	25.3	25.6	101	102	90-110	1	15		
Fluoride	mg/L	<0.095	2	2	2.1	2.2	106	108	90-110	2	15		
Sulfate	mg/L	1.4J	20	20	23.7	24.0	111	113	90-110	1	15	M0	

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### REPORT OF LABORATORY ANALYSIS

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### ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: 25222067.00 COLUMBIA CCR BACK

Pace Project No.: 40243482

**Sample: MW-84A**      **Lab ID: 40243482001**      Collected: 04/13/22 14:20      Received: 04/15/22 07:10      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	<b>0.254 ± 0.354 (0.590)</b> <b>C:NA T:97%</b>	pCi/L	05/03/22 12:00	13982-63-3	
	Pace Analytical Services - Greensburg					
Radium-228	EPA 904.0	<b>0.357 ± 0.315 (0.634)</b> <b>C:76% T:90%</b>	pCi/L	05/02/22 12:15	15262-20-1	
	Pace Analytical Services - Greensburg					
Total Radium	Total Radium Calculation	<b>0.611 ± 0.669 (1.22)</b>	pCi/L	05/04/22 22:02	7440-14-4	

### REPORT OF LABORATORY ANALYSIS

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### ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: 25222067.00 COLUMBIA CCR BACK

Pace Project No.: 40243482

**Sample: MW-301**      **Lab ID: 40243482002**      Collected: 04/13/22 15:40      Received: 04/15/22 07:10      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	<b>0.000 ± 0.289 (0.649)</b> <b>C:NA T:99%</b>	pCi/L	05/03/22 12:11	13982-63-3	
Pace Analytical Services - Greensburg						
Radium-228	EPA 904.0	<b>0.179 ± 0.282 (0.610)</b> <b>C:80% T:92%</b>	pCi/L	05/02/22 12:15	15262-20-1	
Pace Analytical Services - Greensburg						
Total Radium	Total Radium Calculation	<b>0.179 ± 0.571 (1.26)</b>	pCi/L	05/04/22 22:02	7440-14-4	

### REPORT OF LABORATORY ANALYSIS

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### QUALITY CONTROL - RADIOCHEMISTRY

Project: 25222067.00 COLUMBIA CCR BACK

Pace Project No.: 40243482

QC Batch: 498723

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: 40243482001, 40243482002

METHOD BLANK: 2413743

Matrix: Water

Associated Lab Samples: 40243482001, 40243482002

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-226	-0.232 ± 0.242 (0.655) C:NA T:96%	pCi/L	05/03/22 11:40	

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### QUALITY CONTROL - RADIOCHEMISTRY

Project: 25222067.00 COLUMBIA CCR BACK

Pace Project No.: 40243482

QC Batch: 498724

Analysis Method: EPA 904.0

QC Batch Method: EPA 904.0

Analysis Description: 904.0 Radium 228

Laboratory: Pace Analytical Services - Greensburg

Associated Lab Samples: 40243482001, 40243482002

METHOD BLANK: 2413744

Matrix: Water

Associated Lab Samples: 40243482001, 40243482002

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-228	0.105 ± 0.277 (0.621) C:77% T:92%	pCi/L	05/02/22 12:14	

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## QUALIFIERS

Project: 25222067.00 COLUMBIA CCR BACK  
Pace Project No.: 40243482

---

### 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

1q	Due to the sample matrix, DI water was added to this sample on a one to one basis and the sample was stirred before analysis.
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.

## REPORT OF LABORATORY ANALYSIS

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### QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 25222067.00 COLUMBIA CCR BACK  
Pace Project No.: 40243482

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
40243482001	MW-84A	EPA 3010A	413354	EPA 6020B	413520
40243482002	MW-301	EPA 3010A	413354	EPA 6020B	413520
40243482001	MW-84A	EPA 7470	413634	EPA 7470	413681
40243482002	MW-301	EPA 7470	413634	EPA 7470	413681
40243482001	MW-84A				
40243482002	MW-301				
40243482001	MW-84A	EPA 903.1	498723		
40243482002	MW-301	EPA 903.1	498723		
40243482001	MW-84A	EPA 904.0	498724		
40243482002	MW-301	EPA 904.0	498724		
40243482001	MW-84A	Total Radium Calculation	502166		
40243482002	MW-301	Total Radium Calculation	502166		
40243482001	MW-84A	SM 2540C	413340		
40243482002	MW-301	SM 2540C	413340		
40243482001	MW-84A	EPA 9040	413406		
40243482002	MW-301	EPA 9040	413406		
40243482001	MW-84A	EPA 300.0	414946		
40243482002	MW-301	EPA 300.0	414946		

### REPORT OF LABORATORY ANALYSIS

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**Sample Condition Upon Receipt Form (SCUR)**

Client Name: SCS Engineers

Project #:

**WO#: 40243482**



Courier:  CS Logistics  Fed Ex  Speedee  UPS  Walco  
 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-113 Type of Ice:  Blue  Dry  None

Samples on ice, cooling process has begun

Cooler Temperature Uncorr: 1 /Corr: 1.1

Person examining contents:

Temp Blank Present:  yes  no

Biological Tissue is Frozen:  yes  no

Date: 4/15/22 /Initials: TP

Temp should be above freezing to 6°C.

Biota Samples may be received at ≤ 0°C if shipped on Dry Ice.

Labeled By Initials: AP

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

May 06, 2022

Meghan Blodgett  
SCS ENGINEERS  
2830 Dairy Drive  
Madison, WI 53718

RE: Project: 25222067.00 COLUMBIA CCR MOD 4  
Pace Project No.: 40243483

Dear Meghan Blodgett:

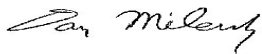
Enclosed are the analytical results for sample(s) received by the laboratory on April 15, 2022. The results relate only to the samples included in this report. Results reported herein conform to the applicable TNI/NELAC Standards and the laboratory's Quality Manual, where applicable, unless otherwise 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: Matt Bizjack, Alliant Energy  
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

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## CERTIFICATIONS

Project: 25222067.00 COLUMBIA CCR MOD 4

Pace Project No.: 40243483

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### **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

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## REPORT OF LABORATORY ANALYSIS

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## SAMPLE SUMMARY

Project: 25222067.00 COLUMBIA CCR MOD 4  
Pace Project No.: 40243483

Lab ID	Sample ID	Matrix	Date Collected	Date Received
40243483001	MW-309	Water	04/12/22 12:45	04/15/22 07:10
40243483002	MW-310	Water	04/12/22 12:25	04/15/22 07:10
40243483003	FIELD BLANK MOD-4	Water	04/12/22 12:25	04/15/22 07:10
40243483004	MW-311	Water	04/12/22 14:00	04/15/22 07:10

## REPORT OF LABORATORY ANALYSIS

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### SAMPLE ANALYTE COUNT

Project: 25222067.00 COLUMBIA CCR MOD 4

Pace Project No.: 40243483

Lab ID	Sample ID	Method	Analysts	Analytes Reported
40243483001	MW-309	EPA 6020B	KXS	2
			MEA	7
		SM 2540C	SRK	1
		EPA 9040	YER	1
		EPA 300.0	HMB	3
40243483002	MW-310	EPA 6020B	KXS	2
			MEA	7
		SM 2540C	SRK	1
		EPA 9040	YER	1
		EPA 300.0	HMB	3
40243483003	FIELD BLANK MOD-4	EPA 6020B	KXS	2
		SM 2540C	SRK	1
		EPA 9040	YER	1
		EPA 300.0	HMB	3
40243483004	MW-311	EPA 6020B	KXS	2
			MEA	7
		SM 2540C	SRK	1
		EPA 9040	YER	1
		EPA 300.0	HMB	3

PASI-G = Pace Analytical Services - Green Bay

### REPORT OF LABORATORY ANALYSIS

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## ANALYTICAL RESULTS

Project: 25222067.00 COLUMBIA CCR MOD 4  
Pace Project No.: 40243483

**Sample: MW-309**      **Lab ID: 40243483001**      Collected: 04/12/22 12:45      Received: 04/15/22 07:10      Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
<b>6020B MET ICPMS</b>		Analytical Method: EPA 6020B    Preparation Method: EPA 3010A Pace Analytical Services - Green Bay							
Boron	<b>32.5</b>	ug/L	10.0	3.0	1	04/18/22 06:24	05/01/22 02:52	7440-42-8	
Calcium	<b>80200</b>	ug/L	254	76.2	1	04/18/22 06:24	05/01/22 02:52	7440-70-2	
<b>Field Data</b>		Analytical Method: Pace Analytical Services - Green Bay							
Field pH	<b>7.64</b>	Std. Units			1		04/12/22 12:45		
Field Specific Conductance	<b>1420</b>	umhos/cm			1		04/12/22 12:45		
Oxygen, Dissolved	<b>7.66</b>	mg/L			1		04/12/22 12:45	7782-44-7	
REDOX	<b>111.7</b>	mV			1		04/12/22 12:45		
Turbidity	<b>7.83</b>	NTU			1		04/12/22 12:45		
Static Water Level	<b>783.14</b>	feet			1		04/12/22 12:45		
Temperature, Water (C)	<b>11.5</b>	deg C			1		04/12/22 12:45		
<b>2540C Total Dissolved Solids</b>		Analytical Method: SM 2540C Pace Analytical Services - Green Bay							
Total Dissolved Solids	<b>764</b>	mg/L	20.0	8.7	1		04/15/22 16:45		
<b>9040 pH</b>		Analytical Method: EPA 9040 Pace Analytical Services - Green Bay							
pH at 25 Degrees C	<b>7.6</b>	Std. Units	0.10	0.010	1		04/18/22 10:56		H6
<b>300.0 IC Anions</b>		Analytical Method: EPA 300.0 Pace Analytical Services - Green Bay							
Chloride	<b>319</b>	mg/L	20.0	4.3	10		04/26/22 23:57	16887-00-6	
Fluoride	<b>&lt;0.095</b>	mg/L	0.32	0.095	1		04/26/22 15:12	16984-48-8	
Sulfate	<b>17.9</b>	mg/L	2.0	0.44	1		04/26/22 15:12	14808-79-8	

## REPORT OF LABORATORY ANALYSIS

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### ANALYTICAL RESULTS

Project: 25222067.00 COLUMBIA CCR MOD 4  
Pace Project No.: 40243483

**Sample: MW-310**      **Lab ID: 40243483002**      Collected: 04/12/22 12:25      Received: 04/15/22 07:10      Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
<b>6020B MET ICPMS</b>		Analytical Method: EPA 6020B    Preparation Method: EPA 3010A Pace Analytical Services - Green Bay							
Boron	<b>72.0</b>	ug/L	10.0	3.0	1	04/18/22 06:24	05/01/22 02:59	7440-42-8	
Calcium	<b>31900</b>	ug/L	254	76.2	1	04/18/22 06:24	05/01/22 02:59	7440-70-2	
<b>Field Data</b>		Analytical Method: Pace Analytical Services - Green Bay							
Field pH	<b>7.74</b>	Std. Units			1		04/12/22 12:25		
Field Specific Conductance	<b>711</b>	umhos/cm			1		04/12/22 12:25		
Oxygen, Dissolved	<b>10.03</b>	mg/L			1		04/12/22 12:25	7782-44-7	
REDOX	<b>200.5</b>	mV			1		04/12/22 12:25		
Turbidity	<b>1.17</b>	NTU			1		04/12/22 12:25		
Static Water Level	<b>783.19</b>	feet			1		04/12/22 12:25		
Temperature, Water (C)	<b>10.6</b>	deg C			1		04/12/22 12:25		
<b>2540C Total Dissolved Solids</b>		Analytical Method: SM 2540C Pace Analytical Services - Green Bay							
Total Dissolved Solids	<b>416</b>	mg/L	20.0	8.7	1		04/15/22 16:45		
<b>9040 pH</b>		Analytical Method: EPA 9040 Pace Analytical Services - Green Bay							
pH at 25 Degrees C	<b>7.9</b>	Std. Units	0.10	0.010	1		04/18/22 10:59		H6
<b>300.0 IC Anions</b>		Analytical Method: EPA 300.0 Pace Analytical Services - Green Bay							
Chloride	<b>35.2</b>	mg/L	2.0	0.43	1		04/26/22 15:26	16887-00-6	
Fluoride	<b>&lt;0.095</b>	mg/L	0.32	0.095	1		04/26/22 15:26	16984-48-8	
Sulfate	<b>39.8</b>	mg/L	2.0	0.44	1		04/26/22 15:26	14808-79-8	

### REPORT OF LABORATORY ANALYSIS

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## ANALYTICAL RESULTS

Project: 25222067.00 COLUMBIA CCR MOD 4  
Pace Project No.: 40243483

**Sample: FIELD BLANK MOD-4**      **Lab ID: 40243483003**      Collected: 04/12/22 12:25      Received: 04/15/22 07:10      Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
<b>6020B MET ICPMS</b>									
Analytical Method: EPA 6020B    Preparation Method: EPA 3010A Pace Analytical Services - Green Bay									
Boron	<3.0	ug/L	10.0	3.0	1	04/18/22 06:24	05/01/22 00:47	7440-42-8	
Calcium	<76.2	ug/L	254	76.2	1	04/18/22 06:24	05/01/22 00:47	7440-70-2	
<b>2540C Total Dissolved Solids</b>									
Analytical Method: SM 2540C Pace Analytical Services - Green Bay									
Total Dissolved Solids	14.0J	mg/L	20.0	8.7	1		04/15/22 16:45		
<b>9040 pH</b>									
Analytical Method: EPA 9040 Pace Analytical Services - Green Bay									
pH at 25 Degrees C	5.8	Std. Units	0.10	0.010	1		04/18/22 11:14		H6
<b>300.0 IC Anions</b>									
Analytical Method: EPA 300.0 Pace Analytical Services - Green Bay									
Chloride	<0.43	mg/L	2.0	0.43	1		04/26/22 15:41	16887-00-6	
Fluoride	<0.095	mg/L	0.32	0.095	1		04/26/22 15:41	16984-48-8	
Sulfate	<0.44	mg/L	2.0	0.44	1		04/26/22 15:41	14808-79-8	

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### ANALYTICAL RESULTS

Project: 25222067.00 COLUMBIA CCR MOD 4  
Pace Project No.: 40243483

**Sample: MW-311**      **Lab ID: 40243483004**      Collected: 04/12/22 14:00      Received: 04/15/22 07:10      Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
<b>6020B MET ICPMS</b>									
Analytical Method: EPA 6020B    Preparation Method: EPA 3010A Pace Analytical Services - Green Bay									
Boron	<b>32.7</b>	ug/L	10.0	3.0	1	04/18/22 06:24	05/01/22 03:06	7440-42-8	
Calcium	<b>61800</b>	ug/L	254	76.2	1	04/18/22 06:24	05/01/22 03:06	7440-70-2	
<b>Field Data</b>									
Analytical Method: Pace Analytical Services - Green Bay									
Field pH	<b>8.00</b>	Std. Units			1		04/12/22 14:00		
Field Specific Conductance	<b>482.0</b>	umhos/cm			1		04/12/22 14:00		
Oxygen, Dissolved	<b>7.74</b>	mg/L			1		04/12/22 14:00	7782-44-7	
REDOX	<b>110.2</b>	mV			1		04/12/22 14:00		
Turbidity	<b>2.50</b>	NTU			1		04/12/22 14:00		
Static Water Level	<b>783.04</b>	feet			1		04/12/22 14:00		
Temperature, Water (C)	<b>11.1</b>	deg C			1		04/12/22 14:00		
<b>2540C Total Dissolved Solids</b>									
Analytical Method: SM 2540C Pace Analytical Services - Green Bay									
Total Dissolved Solids	<b>278</b>	mg/L	20.0	8.7	1		04/15/22 16:45		
<b>9040 pH</b>									
Analytical Method: EPA 9040 Pace Analytical Services - Green Bay									
pH at 25 Degrees C	<b>7.7</b>	Std. Units	0.10	0.010	1		04/18/22 11:20		H6
<b>300.0 IC Anions</b>									
Analytical Method: EPA 300.0 Pace Analytical Services - Green Bay									
Chloride	<b>1.0J</b>	mg/L	2.0	0.43	1		04/26/22 15:55	16887-00-6	
Fluoride	<b>&lt;0.095</b>	mg/L	0.32	0.095	1		04/26/22 15:55	16984-48-8	
Sulfate	<b>8.9</b>	mg/L	2.0	0.44	1		04/26/22 15:55	14808-79-8	

### REPORT OF LABORATORY ANALYSIS

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### QUALITY CONTROL DATA

Project: 25222067.00 COLUMBIA CCR MOD 4

Pace Project No.: 40243483

QC Batch: 413354	Analysis Method: EPA 6020B
QC Batch Method: EPA 3010A	Analysis Description: 6020B MET
	Laboratory: Pace Analytical Services - Green Bay

Associated Lab Samples: 40243483001, 40243483002, 40243483003, 40243483004

METHOD BLANK: 2380530 Matrix: Water  
Associated Lab Samples: 40243483001, 40243483002, 40243483003, 40243483004

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Boron	ug/L	<3.0	10.0	05/01/22 00:40	
Calcium	ug/L	<76.2	254	05/01/22 00:40	

LABORATORY CONTROL SAMPLE: 2380531

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Boron	ug/L	250	250	100	80-120	
Calcium	ug/L	10000	9930	99	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2380532 2380533

Parameter	Units	40243482001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Boron	ug/L	10.5	250	250	255	248	98	95	75-125	3	20	
Calcium	ug/L	75100	10000	10000	86700	85700	116	106	75-125	1	20	

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### REPORT OF LABORATORY ANALYSIS

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### QUALITY CONTROL DATA

Project: 25222067.00 COLUMBIA CCR MOD 4  
Pace Project No.: 40243483

QC Batch: 413340 Analysis Method: SM 2540C  
QC Batch Method: SM 2540C Analysis Description: 2540C Total Dissolved Solids  
Laboratory: Pace Analytical Services - Green Bay  
Associated Lab Samples: 40243483001, 40243483002, 40243483003, 40243483004

METHOD BLANK: 2380206 Matrix: Water  
Associated Lab Samples: 40243483001, 40243483002, 40243483003, 40243483004

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	<8.7	20.0	04/15/22 16:44	

LABORATORY CONTROL SAMPLE: 2380207

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Dissolved Solids	mg/L	555	524	94	80-120	

SAMPLE DUPLICATE: 2380208

Parameter	Units	40243482001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	334	332	1	10	

SAMPLE DUPLICATE: 2380209

Parameter	Units	40243482002 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	422	412	2	10	

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### QUALITY CONTROL DATA

Project: 25222067.00 COLUMBIA CCR MOD 4

Pace Project No.: 40243483

QC Batch: 413406

Analysis Method: EPA 9040

QC Batch Method: EPA 9040

Analysis Description: 9040 pH

Laboratory: Pace Analytical Services - Green Bay

Associated Lab Samples: 40243483001, 40243483002, 40243483003, 40243483004

SAMPLE DUPLICATE: 2380677

Parameter	Units	40243487001 Result	Dup Result	RPD	Max RPD	Qualifiers
pH at 25 Degrees C	Std. Units	10.7	10.7	0	20	H6

SAMPLE DUPLICATE: 2380701

Parameter	Units	40243447003 Result	Dup Result	RPD	Max RPD	Qualifiers
pH at 25 Degrees C	Std. Units	8.5	8.4	1	20	1q,H6

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### REPORT OF LABORATORY ANALYSIS

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### QUALITY CONTROL DATA

Project: 25222067.00 COLUMBIA CCR MOD 4  
Pace Project No.: 40243483

QC Batch: 414020 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: 40243483001, 40243483002, 40243483003, 40243483004

METHOD BLANK: 2384067 Matrix: Water  
Associated Lab Samples: 40243483001, 40243483002, 40243483003, 40243483004

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chloride	mg/L	<0.43	2.0	04/26/22 11:37	
Fluoride	mg/L	<0.095	0.32	04/26/22 11:37	
Sulfate	mg/L	<0.44	2.0	04/26/22 11:37	

LABORATORY CONTROL SAMPLE: 2384068

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	20	20.5	102	90-110	
Fluoride	mg/L	2	2.2	109	90-110	
Sulfate	mg/L	20	20.5	102	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2384069 2384070

Parameter	Units	40243469004		MS		MSD		% Rec	% Rec	% Rec	Limits	RPD	Max RPD	Qual
		Result	Conc.	Spike Conc.	Conc.	Result	Result							
Chloride	mg/L	10.4	20	20	32.4	32.6	110	111	90-110	0	15	M0		
Fluoride	mg/L	1.1	2	2	3.4	3.4	113	114	90-110	1	15	M0		
Sulfate	mg/L	139	200	200	352	351	107	106	90-110	0	15			

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2384071 2384072

Parameter	Units	40243484003		MS		MSD		% Rec	% Rec	% Rec	Limits	RPD	Max RPD	Qual
		Result	Conc.	Spike Conc.	Conc.	Result	Result							
Chloride	mg/L	9620	10000	10000	20400	20500	108	109	90-110	1	15			
Fluoride	mg/L	74.4J	1000	1000	339	338	26	26	90-110	0	15	M0		
Sulfate	mg/L	1610	10000	10000	12600	12700	110	111	90-110	1	15	M0		

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## QUALIFIERS

Project: 25222067.00 COLUMBIA CCR MOD 4

Pace Project No.: 40243483

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### 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

- |    |   |
|----|---|
| 1q | Due to the sample matrix, DI water was added to this sample on a one to one basis and the sample was stirred before analysis. |
| 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.                           |

## REPORT OF LABORATORY ANALYSIS

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### QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 25222067.00 COLUMBIA CCR MOD 4  
Pace Project No.: 40243483

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
40243483001	MW-309	EPA 3010A	413354	EPA 6020B	413520
40243483002	MW-310	EPA 3010A	413354	EPA 6020B	413520
40243483003	FIELD BLANK MOD-4	EPA 3010A	413354	EPA 6020B	413520
40243483004	MW-311	EPA 3010A	413354	EPA 6020B	413520
40243483001	MW-309				
40243483002	MW-310				
40243483004	MW-311				
40243483001	MW-309	SM 2540C	413340		
40243483002	MW-310	SM 2540C	413340		
40243483003	FIELD BLANK MOD-4	SM 2540C	413340		
40243483004	MW-311	SM 2540C	413340		
40243483001	MW-309	EPA 9040	413406		
40243483002	MW-310	EPA 9040	413406		
40243483003	FIELD BLANK MOD-4	EPA 9040	413406		
40243483004	MW-311	EPA 9040	413406		
40243483001	MW-309	EPA 300.0	414020		
40243483002	MW-310	EPA 300.0	414020		
40243483003	FIELD BLANK MOD-4	EPA 300.0	414020		
40243483004	MW-311	EPA 300.0	414020		

### REPORT OF LABORATORY ANALYSIS

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**Sample Condition Upon Receipt Form (SCUR)**

Project #:

Client Name: SCS Engineers

**WO#: 40243483**

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 - 113 Type of Ice:  Wet  Blue  Dry  None

Samples on ice, cooling process has begun

Cooler Temperature Uncorr: 2 / Corr: 2.1

Person examining contents:

Temp Blank Present:  yes  no

Biological Tissue is Frozen:  yes  no

Date: 4/15/22 Initials: TP

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

Labeled By Initials: CLJ


Chain of Custody Present:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	1.
Chain of Custody Filled Out:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	2. <u>pg #</u> <u>TP 4/15/11</u>
Chain of Custody Relinquished:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	3.
Sampler Name & Signature on COC:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	4.
Samples Arrived within Hold Time:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	5.
- VOA Samples frozen upon receipt	<input type="checkbox"/> Yes <input type="checkbox"/> No	Date/Time:
Short Hold Time Analysis (<72hr):	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	6.
Rush Turn Around Time Requested:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	7.
Sufficient Volume:		8.
For Analysis: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No MS/MSD: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A		
Correct Containers Used:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	9.
-Pace Containers Used:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
-Pace IR Containers Used:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Containers Intact:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	10.
Filtered volume received for Dissolved tests	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	11.
Sample Labels match COC:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	12.
-Includes date/time/ID/Analysis Matrix: <u>W</u>		
Trip Blank Present:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	13.
Trip Blank Custody Seals Present	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> 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 login



Appendix D  
Historical Monitoring Results

# Single Location

Name: WPL - Columbia

Location ID: MW-84A																							
Number of Sampling Dates: 22																							
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	4/3/2019	10/9/2019	2/3/2020	5/29/2020	10/8/2020	4/14/2021	10/14/2021	4/13/2022
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	13.6	12	15.7	10	9.7	14.3	11.1	10.5
Calcium	ug/L	74000	72200	67600	--	74000	76000	70800	73200	76100	74900	77500	76600	76000	74000	80100	73500	72700	77600	69200	69100	75300	75100
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	3.6	3.9	3.7	3.7	4.3	4.4	3.5	5.2
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	<0.1	<0.1	--	<0.095	<0.095	<0.095	<0.095	<0.095
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	7.03	7.23	7.51	7.34	7.49	7.34	7.42	7.34
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	1.4	1.3	<2.2	1.5	1.3	1.4	1.3	1.4
Total Dissolved Solids	mg/L	316	322	316	--	324	316	328	342	344	342	314	328	372	330	318	310	316	340	320	328	326	334
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	<0.15	<0.15	--	<0.15	<0.15	0.55	<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	<0.28	0.46	0.38	0.34	0.49	0.91	0.41	0.31
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	14.7	13.2	14	13.9	12.6	13.4	12.9	13.5
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	<0.18	<0.25	--	<0.25	<0.25	0.47	<0.25	<0.25
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	<0.15	<0.15	--	<0.15	<0.15	0.53	<0.15	<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	1.8	1.6	1.6	1.7	1.6	2.6	1.9	2.2
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	<0.12	<0.12	<0.12	<0.12	<0.12	0.52	0.12	<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	<0.24	<0.24	--	<0.24	<0.24	0.55	<0.24	<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	0.56	0.52	0.58	0.4	0.39	1	0.28	0.36
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	<0.084	--	<0.084	<0.066	<0.066	<0.093	<0.066
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	<0.44	<0.44	<0.44	<0.44	<0.44	0.62	<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	<0.32	<0.32	<0.32	<0.32	<0.32	0.48	<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	<0.14	<0.14	<0.14	<0.14	<0.14	0.66	0.19	<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	0.681	0.247	0.1	0.395	0.39	0.285	0.243	0.611
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	0.199	0.247	0.1	0.368	0	-0.289	0	0.254
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	0.482	-0.024	-0.153	0.0273	0.39	0.285	0.243	0.357
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	637.2	614.1	618.4	613.7	610.1	610.9	598.9	600.2
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	9.49	11.36	8.43	9.81	9.39	9.8	9.25	9.33
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	103.4	181.7	121.5	135	153.2	95.6	89.7	200.6
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	787.35	787.79	786.5	787.02	786.1	785.84	784.96	785.02
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	10.2	11.8	10.3	10.6	11.9	10.2	12.5	9.9
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	1.9	2.41	1.23	2.15	0	2.45	3.41	0
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	7.4	7.5	7.4	7.6	7.6	7.6	7.8	7.6

# Single Location

Name: WPL - Columbia

Location ID: MW-301																						
Number of Sampling Dates: 21																						
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	10/9/2019	2/3/2020	5/29/2020	10/8/2020	4/14/2021	10/14/2021	4/13/2022
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	35.9	27.9	21.3	28.8	22.2	31.4	28.7
Calcium	ug/L	126000	115000	108000	118000	129000	124000	120000	111000	108000	87200	112000	105000	101000	126000	114000	113000	112000	93000	117000	67800	97300
Chloride	mg/L	3.7	4	3.5	2.2	2	1.5	2	3.5	5.5	4	2.3	5.2	0.79	1.7	1.3	2	3.4	1.5	2.7	1.9	
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	--	<0.095	<0.095	<0.095	<0.095	<0.095	
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	6.67	6.89	6.73	6.95	6.66	7.01	6.6
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	8.4	7.2	11.5	25.1	8.5	17.4	12.7
Total Dissolved Solids	mg/L	478	486	464	490	444	514	502	458	462	362	464	502	424	462	418	462	452	412	472	334	422
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	<0.15	--	<0.15	0.33	<0.15	<0.15	0.31
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	0.42	<0.28	0.33	0.62	<0.28	0.35	0.47
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	10	10.9	9.8	9.4	8.9	7.7	7.8
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	<0.25	--	<0.25	<0.25	<0.25	<0.25	<0.25
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	<0.15	--	<0.15	0.19	<0.15	<0.15	0.3
Chromium	ug/L	2.1	0.58	0.59	<0.39	0.7	0.53	0.7	2.3	<1	--	<1	<1	<1	<1	<1	<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	<0.12	0.17	<0.12	0.29	<0.12	0.34	0.32
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	<0.24	--	<0.24	0.25	<0.24	<0.24	3.1
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	0.61	0.67	0.47	0.46	0.58	0.46	0.56
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	<0.084	--	<0.084	<0.066	<0.066	<0.093	<0.066
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	<0.44	<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	<0.32	<0.32	<0.32	<0.32	<0.32	<0.32	<0.32
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	<0.14	<0.14	<0.14	0.3	<0.14	0.17	0.32
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	0.701	0.502	0.193	0.38	1.16	0.172	0.179
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	0.252	0.136	0	0.0511	0.418	0.172	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	0.449	0.366	0.193	0.329	0.739	-0.0327	0.179
Field Specific Conductance	umhos/cm	897	573	796	1464	859	1018	1354	698.4	691.7	561	774	799	767	883	801	868	797	760	857	597.2	747
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	1.67	1.07	2	1.22	3.9	0.25	2.47
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	173	132.3	118.7	183.9	102.9	57.8	207.5
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	788.47	787.24	787.77	786.53	786.5	785.28	785.44
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	11.3	8.5	8.1	11	7.4	11.1	7.1
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	2.12	1.41	0	0	2.41	3.21	0
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	7	6.8	7	7.2	6.9	7.3	7

# Single Location

Name: WPL - Columbia

Location ID: MW-309																						
Number of Sampling Dates: 21																						
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	4/12/2022
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	32.5
Calcium	ug/L	42700	41800	39600	52700	67600	63800	93600	55200	--	45300	46900	51600	--	--	65300	--	62300	--	83100	--	80200
Chloride	mg/L	147	157	157	141	203	557	811	329	--	145	43.2	350	--	--	575	--	390	--	519	--	319
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	--	<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	7.64
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	--	17.9
Total Dissolved Solids	mg/L	576	552	562	478	548	1210	1570	830	--	548	370	960	--	--	1160	--	916	--	1110	--	764
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	--	--	<0.2	--	--	--	<0.2	--	--	--	--	--	--
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	1420
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	7.66
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	111.7
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	783.14
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	11.5
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	7.83
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	--	7.6

# Single Location

Name: WPL - Columbia

Location ID: MW-310																					
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	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	4/12/2022
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	72
Calcium	ug/L	32400	33400	32100	32100	34300	39700	38800	54100	--	38800	--	57600	55400	41100	62000	56800	49300	--	38900	31900
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	35.2
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	<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	7.74
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	39.8
Total Dissolved Solids	mg/L	406	398	396	436	438	532	526	736	--	470	--	650	--	582	846	700	654	--	498	416
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	--	--	<0.2	--	--	--	--	--	--	--	--	--
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	711
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	10.03
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	200.5
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	783.19
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	10.6
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	1.17
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	7.9



# Single Location

Name: WPL - Columbia

Location ID: MW-311																	
Number of Sampling Dates: 16																	
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	4/12/2022
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	32.7
Calcium	ug/L	58000	61000	56600	62500	70700	76800	65700	75400	--	65600	63900	62200	73400	59000	61000	61800
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	1
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	<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	8
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	8.9
Total Dissolved Solids	mg/L	260	274	262	304	352	372	332	424	--	276	272	326	380	270	276	278
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	--	--	--	--	--	--	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	482
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	7.74
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	110.2
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	783.04
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	11.1
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	2.5
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	7.7