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January 31, 2023

Submitted via electronic mail

Ms. Ann Bekta
Wisconsin Department of Natural Resources
2514 Morse Street
Janesville, WI 53545

Subject: **Annual CCR Landfill Report**
Wisconsin Power and Light Company
Dry Ash Disposal Facility (WDNR License #3025)
Columbia Energy Center
Portage, WI

Dear Ms. Bekta,

On behalf of Wisconsin Power and Light Company (WPL), Alliant Energy is submitting this Annual CCR Landfill Report in accordance with NR 506.20(3). The annual report consists of the following required documents:

- Annual CCR Fugitive Dust Control Report
- Annual Inspection Report [NR 506.20(2)(b)]
- Annual Groundwater Monitoring and Corrective Action Report [NR 507.15(3)(m)]
    - Modules 1-3
    - Modules 4-6
- Leachate Pipe Cleaning and Inspection Report [NR 506.07(5)(g)]

Please note that many of these items are also required by the federal Coal Combustion Residuals (CCR) Rule and have been prepared to satisfy federal requirements. Please call me if you have any questions or concerns regarding these documents and Wisconsin-specific requirements so we can continue to improve this report and future annual reports.

Thank you very much for your consideration of this initial submittal. If you have any questions or comments regarding this information, please call me at (608) 458-3853.

Regards,

Jeff Maxted

Manager – Environmental Services
Alliant Energy

CC: Tyler Sullivan – Wisconsin DNR
Eric Sandvig, Director of Operations – Columbia Energy Center
Brian Clepper, Lead GENCO Environmental Specialist – Columbia Energy Center
Phil Gearing, Eric Nelson, Tom Karwoski – SCS Engineers

Annual CCR Fugitive Dust Control Report

Wisconsin Power and Light Company

Columbia Energy Center (COL)

Annual Coal Combustion Residuals (CCR) Fugitive Dust Control Report

November 18, 2022

This report applies to the following CCR units at this facility:

CCR Surface Impoundments

COL Primary Ash Pond

COL Secondary Ash Pond

CCR Landfill

COL Dry Ash Disposal Facility Modules 1-3 (Existing CCR Landfill)

COL Dry Ash Disposal Facility Modules 4-6 (New CCR Landfill)

Annual Coal Combustion Residuals (CCR) Fugitive Dust Control Report

November 18, 2022

Background

This report describes the actions taken to minimize fugitive CCR dust from CCR units at this facility, provides a record of citizen complaints received since the previous report, and summarizes any corrective actions taken to minimize CCR fugitive dust. This report has been developed in accordance with 40 CFR 257.80(c).

Description of the Actions Taken to Control CCR Fugitive Dust

In accordance with the CCR Fugitive Dust Control Plan developed for this facility, the following measures were taken when needed to minimize CCR from becoming airborne:

- Establishing and enforcing a vehicle speed limit of 10 mph or less. Reduced speeds minimize fugitive dust generated from vehicle traffic.
- Storing fly ash in silos and/or buildings prior to transport. Enclosing CCR in silos and/or buildings minimizes exposure to conditions that could lead to airborne CCR.
- Wet-sluicing CCR to existing CCR surface impoundments. Moistened CCR is less likely to become airborne. Note that wet-sluicing of CCR to the Primary Pond will be permanently discontinued in 2022 following commissioning of a new bottom ash handling system.
- Covering open-bodied vehicles that are transporting CCR as needed to minimize the generation of fugitive dust during transport of CCR.
- Minimizing fall distances when handling or transferring CCR. The use of telescoping chutes, best practices when handling CCR with end loaders, and other best management practices can be used to minimize the generation of fugitive dust.
- Promptly collecting CCR that is observed in vehicle loading/unloading areas to minimize the potential for CCR to become airborne.
- Applying water directly to CCR using a water truck or irrigation system. Moistened CCR is less likely to become airborne.
- Suspending CCR management activities, including placement of CCR, during excessively windy conditions to minimize CCR from becoming airborne.
- Placement of soil and/or vegetated cover to minimize exposure of CCR in inactive landfill areas to conditions that could lead to fugitive dust.

Record of Citizen Complaints

Citizen complaints pertaining to fugitive dust are managed in accordance with Alliant Corporate Policy ENV-107. Specifically, the complaint must be reported to Environmental Services (1) via phone call and (2) in writing by submitting a completed Environmental Incident Report to Environmental Services within 10 business days. Citizen complaints are tracked within the Alliant Environmental Management Information System ("ENVIANCE").

There were no citizen complaints at this facility related to CCR fugitive dust during this reporting period.

Summary of Corrective Measures Taken

Corrective actions in response to citizen complaints were not required during this reporting period.

Periodic Review of CCR Fugitive Dust Control Plan

The CCR Fugitive Dust Control Plan is reviewed annually, and updated as necessary, in conjunction with preparation of the Annual CCR Fugitive Dust Control Report [40 CFR 257.80(c)]. During the periodic review, staff evaluate each measure for controlling fugitive dust to ensure that it is still appropriate for minimizing CCR from becoming airborne at the facility, verify that the procedures for conditioning CCR prior to landfilling and the procedure for logging complaints are sufficient, and evaluate other operations changes at the facility to determine whether additional dust control measures should be added.

- END -

Annual Inspection Report

Annual CCR Landfill Inspection, Modules 1-3 and Modules 4-6

Columbia Dry Ash Disposal Facility

Prepared for:

Wisconsin Power and Light Company
W8375 Murray Road
Pardeeville, Wisconsin 53954

SCS ENGINEERS

25222067.00 | December 19, 2022

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

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PE CERTIFICATION

PHILLIP E. GEARING
E-45115

12/19/22

I, Phillip E. Gearing, hereby certify that this Annual CCR Landfill Inspection Report meets the requirements of 40 CFR 257.84(b)(2), was prepared by me or under my direct supervision, and that I am a duly licensed Professional Engineer under the laws of the State of Wisconsin.

12/19/22

(signature) (date)

Phillip Gearing

(printed or typed name)

License number E-45115

My license renewal date is July 31, 2024.

Pages or sheets covered by this seal:

All – Annual CCR Landfill Inspection – Columbia Dry Ash Disposal Facility

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1.0 INTRODUCTION

1.1 PURPOSE

On July 7, 2022, SCS Engineers (SCS) completed an annual inspection of the Wisconsin Power and Light Company (WPL) Columbia Dry Ash Disposal Facility (COL) in Pardeeville, Wisconsin. The annual inspection was completed in accordance with the U.S. Environmental Protection Agency (USEPA) coal combustion residuals (CCR) rule, 40 Code of Federal Regulations (CFR) 257 Subpart D, in particular 257.84(b)(1). According to 40 CFR 257.84(b)(1), an annual inspection by a qualified professional engineer is required for all existing and new CCR landfills, and any lateral expansion of a CCR landfill. The purpose of the annual inspection is to ensure that the design, construction, operation, and maintenance of the CCR unit is consistent with recognized and generally accepted good engineering standards. The inspection must, at a minimum, include:

- A review of available information regarding the status and condition of the CCR unit, including, but not limited to, files available in the operating record (e.g., the results of inspections by a qualified person, and results of previous annual inspections); and

- A visual inspection of the CCR unit to identify signs of distress or malfunction of the CCR unit.

This report has been prepared in accordance with 40 CFR 257.84(b)(2) to document the annual inspection.

1.2 BACKGROUND

The COL facility includes an active CCR landfill, which currently consists of two CCR units located in Phase 1 of the facility. The CCR landfill includes a second phase (Phase 2), which was in the process of Module 10 and 11 construction at the time of the annual inspection.

The active CCR landfill at COL is comprised of the two following CCR units:

- Module 1 through Module 3 (existing CCR landfill per 40 CFR 257.53)
- Module 4 through Module 6 (new CCR landfill per 40 CFR 257.53)

Modules 1 through 3 were previously described as separate existing CCR landfills, although they are contiguous and are managed as a single landfill by the facility and by the Wisconsin Department of Natural Resources. WPL previously clarified that Modules 1 through 3 are one existing CCR landfill under the federal CCR Rule, and this report reflects WPL's clarification. Modules 4 through 6 are a new CCR landfill that initiated construction after October 19, 2015, and is therefore managed as a separate CCR unit under the CCR Rule, even though it is contiguous to Modules 1 through 3.

The inspection requirements in 40 CFR 257.84(b)(1) apply to all of the CCR units listed above.

At the time of the inspection, the active CCR landfill units were in various stages of development or use, as described in the table below.

Disposal Phase	Unit	CCR Rule Status	Basis for Status
Phase 1	Modules 1 - 3	Existing CCR Landfill. Currently accepting CCR.	Final or interim grades have been reached. Final cover completed on portions of the CCR unit. Final closure per 257.102 will not be completed until final grades are reached throughout the CCR unit. Overlay from Module 4 was occurring on to Module 3.
	Modules 4 - 6	Modules 4-6. Currently accepting CCR.	CCR placement began on November 5, 2018.

2.0 SUMMARY OF RESULTS AND RECOMMENDATIONS

SCS identified no deficiencies or releases during the annual inspection of the CCR units at COL. Deficiencies and releases must be remedied by the owner or operator as soon as feasible and the remedy documented.

SCS did identify additional conditions during the annual inspection that are not considered deficiencies but have the potential to become a deficiency if left unaddressed. Each condition and the recommendations provided by SCS to address them are summarized in the table below. These conditions and recommendations are described in further detail in **Section 4.0**.

Condition	CCR Unit / Area	Recommendation(s)	Report Section
Small woody vegetation growth in riprap, which may affect riprap stabilization and liner system if allowed to continue to grow.	West Riprap Slope (Contact Water/ Leachate Pond)	Remove woody growth or other unwanted vegetation in riprap. Monitor during 7-day inspections.	4.3.2
Minor rilling and bare areas observed. Future erosion may eventually expose CCR if left un-vegetated.	Intermediate Cover (Modules 3/4)	Continue to backfill and regrade any future eroded areas. Add seed and erosion mat to bare areas to promote vegetation growth on intermediate cover. Monitor during 7-day inspections.	4.3.4
Tracking of CCR onto haul road.	West Haul Road (Entrance to Module 4)	Continue to remove tracked material from haul roads per the fugitive dust plan. Add rock tracking area for separation from landfill and haul road. Continue to grade road to drain into Module. Monitor during 7-day inspections.	4.4.2.1

3.0 ANNUAL INSPECTION

Mr. Phillip Gearing of SCS completed an annual inspection of active CCR landfill areas at COL, including Modules 1 through 3 and Modules 4 through 6 on July 7, 2022. Mr. Gearing is a licensed professional engineer in Wisconsin and holds a Bachelor of Science degree in Geological Engineering. He has over 15 years of experience in the design, construction, and operation of solid waste disposal facilities. The scope of the annual inspection is described in **Sections 3.1** and **3.2**. The results of the annual inspection are discussed in **Section 4.0**.

3.1 OPERATING RECORD REVIEW

SCS reviewed the available information in the operating record for COL. Information reviewed by SCS included operating record materials provided by WPL, and the information posted on Alliant Energy's CCR Rule Compliance Data and Information website for the COL facility.

3.2 VISUAL INSPECTION

SCS completed a visual inspection of Modules 1 through 3 and Modules 4 through 6 to identify signs of distress or malfunction of the CCR units.

The visual inspection included observations of the following:

- CCR placement areas including active filling areas, intermediate cover areas, final cover areas, and exterior non-CCR berms or slopes.
- Leachate collection and removal system components including visible leachate drainage layer materials.
- Leachate and contact water run-off management features including internal contact water drainage features, leachate collection system discharge pipe, and the leachate/surface water pond.
- Non-contact storm water run-on and run-off control features including swales located adjacent to active fill areas, on intermediate/final cover slopes, and outside the landfill limits and the south sedimentation basin.

4.0 INSPECTION RESULTS

The results of the annual inspection, along with a description of any deficiencies or releases identified during the visual inspection, are summarized in the following sections.

4.1 CHANGES IN GEOMETRY

No apparent changes in geometry were noted that would indicate distress or malfunction of the CCR units at the facility since the previous annual inspection of Modules 1 through 3 and Modules 4 through 6 at the COL facility completed under 40 CFR 257.84(b)(1). All changes in geometry observed during the annual inspection were the result of planned CCR filling in the current CCR units.

As noted in **Section 1.2**, both CCR units are currently accepting CCR. A majority of the CCR placement is occurring in Modules 3 and 4. Final cover or intermediate cover is established along portions of Modules 1 through 3, and vegetation is established or becoming established on all final and intermediate cover areas.

4.2 CCR VOLUMES

The approximate volume of CCR contained in each of the active units near the time of the inspection is summarized below. Note that the inspection was performed on July 7, 2022, and a survey of CCR was performed on July 18, 2022. A description of how the estimate was developed is summarized below.

Disposal Phase	Unit	Estimated Volume of CCR in Place	Basis for Estimate and Source
Phase 1	Modules 1-3	1,069,100 cubic yards	CCR continued to be placed due to overlay on to Modules 2 and 3. Estimated volume based on existing waste volumes and a survey performed on 7/18/2022. Volume includes material placed during the 2016 cover construction project.
	Modules 4-6	191,186 cubic yards	CCR continued to be placed in Module 4. CCR volume placed in Module 4 was estimated based on a survey conducted on 7/18/22. Initial placement of CCR in Modules 5 and 6 occurred between December 13 and 17, 2021. The initial CCR material for each module was bottom ash placed for frost protection. Following bottom ash placement in Modules 5 and 6, the modules were covered with a rain cover. CCR volume in Modules 5 and 6, was estimated based on a survey completed in December 2021 before rain cover installation.

4.3 APPEARANCE OF STRUCTURAL WEAKNESS

The inspection included a review of the appearance of an actual or potential structural weakness of the CCR unit. The visual inspection included a review of CCR fill areas including the top slopes, internal side slopes, external side slopes, and internal ramps/haul roads for the presence of the following conditions:

- Signs of surface movement or instability:
  - Sloughing, slumping, or sliding
  - Surface cracking
  - Slopes in excess of three horizontal to one vertical (3H:1V)
  - Toe of slope bench movement
  - Evidence of inadequate compaction of exposed CCR

- Inappropriate vegetation growth
- Animal burrows
- Erosion damage
- Unusual surface damage caused by vehicle traffic

4.3.1 Signs of Surface Movement or Instability

No signs of surface movement or instability were noted during the inspection.

4.3.2 Inappropriate Vegetation Growth

No inappropriate vegetation growth impacting the CCR unit was noted during the inspection, except as observed below:

- Vegetation was observed on the west riprap slope in the contact water/leachate pond. WPL should remove woody vegetation growth in the riprap before it becomes established and impacts the riprap stability or liner system. The vegetative growth was not impacting the stability of the CCR landfill at the time of the inspection. Continued vegetation removal from the riprap and monitoring during 7-day inspections is recommended.

- Vegetation made it difficult to observe the leachate outlet from Module 1. The location is staked, so it can be located. No issues with the current operation of the outlet were observed. WPL should monitor vegetation during 7-day inspections and keep the area maintained to allow for the effective observation of flow from the pipe outlet.

4.3.3 Animal Burrows

No animal burrows were noted during the inspection.

4.3.4 Erosion Damage

The following erosion damage was noted during the inspection:

- Rilling observed on the intermediate cover of Module 3 and Module 4 (CCR Unit Modules 1 through 3 and Modules 4 through 6). Future erosion may eventually expose CCR if not addressed. Bare areas should have seed and erosion mat added to promote vegetation growth on the intermediate cover. WPL should continue to backfill and regrade future eroded areas and monitor during 7-day inspections.

- The erosion conditions noted are not currently considered an operating deficiency since it is unlikely to have a significant impact on the function of the CCR unit. However, WPL should continue to observe these areas during 7-day inspections to confirm that the conditions observed during the visual inspection, or similar future conditions, are addressed.

No additional erosion damage was noted during the inspection. The erosion areas were discussed with plant staff after the inspection was performed.

4.3.5 Unusual Surface Damage Caused by Vehicle Traffic

No unusual surface damage caused by vehicle traffic was noted during the inspection.

4.4 DISRUPTIVE CONDITIONS

4.4.1 Existing Disruptive Conditions

4.4.1.1 Current Inspection

No existing conditions that were disrupting the operation and safety of the CCR units were noted during the annual inspection.

4.4.1.2 Previous Inspection

No existing conditions that were disrupting the operation and safety of the CCR units were noted during the previous inspection.

4.4.2 Potentially Disruptive Conditions

4.4.2.1 Current Inspection

Tracking of CCR onto landfill haul road. The tracking of CCR onto the landfill west haul road was noted as a potentially disruptive condition. Tracking of CCR from Module 4 was observed during the current inspection. The tracking and accumulation of CCR on the landfill haul roads has the potential to produce fugitive dust if not addressed through maintenance of the roads as described in the fugitive dust control plan. WPL should remove CCR from the roads as indicated in the fugitive dust control plan on an as-needed basis. WPL should grade the road to drain into the module if standing water is observed.

The tracking and accumulation of CCR on the landfill haul roads is not currently considered an operating deficiency since WPL has maintained, and plans to continue maintaining, the haul roads as described in the fugitive dust control plan. The observed tracking and accumulation of CCR on the landfill haul roads can be addressed through regular housekeeping practices described in the fugitive dust control plan. WPL should implement rock tracking areas as needed to create separation from active modules and the haul road. Monitoring of tracking and accumulation of CCR on the landfill haul road during 7-day inspections is recommended.

No other potentially disruptive conditions were noted during the inspection.

4.4.2.2 Previous Inspection

The tracking of CCR onto the landfill haul road was noted as a potentially disruptive condition. Tracking of CCR from Module 4 was observed during the current inspection.

4.5 OTHER CHANGES SINCE PREVIOUS ANNUAL INSPECTION

No changes to site conditions that appear to have the potential to affect the stability or operation of the facility were noted during the inspection.

5.0 FUTURE INSPECTIONS

5.1 EXISTING CCR LANDFILL

As stated in 40 CFR 257.84(b)(4), the owner or operator of the CCR unit must conduct the inspection required by paragraphs (b)(1) and (2) of this section on an annual basis. The date of completing the inspection report is the basis for establishing the deadline to complete the next subsequent inspection. Any required inspection may be conducted prior to the required deadline, provided the owner or operator places the completed inspection report into the facility's operating record within a reasonable amount of time. In all cases, the deadline for completing subsequent inspection reports is based on the date of completing the previous inspection report. The owner or operator has completed an inspection when the inspection report has been placed in the facility's operating record.

The next annual inspection of CCR units Modules 1 through 3 and Modules 4 through 6 must be completed within 1 year of the placement of this inspection report in the operating record for the COL facility.

5.2 NEW CCR LANDFILLS AND LATERAL EXPANSIONS

The initial annual inspection for modules constructed in the future must be completed within 14 months of the initial receipt of CCR in the module per 40 CFR 257.84(b)(4).

Annual Groundwater Monitoring and Corrective Action Reports

Modules 1-3

Modules 4-6

2022 Annual Groundwater Monitoring and Corrective Action Report

Columbia Energy Center
Dry Ash Disposal Facility, Modules 1 through 3
Pardeeville, Wisconsin

Prepared for:

Alliant Energy

SCS ENGINEERS

25222067.00 | January 31, 2023

2830 Dairy Drive
Madison, WI 53718-6751
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OVERVIEW OF CURRENT STATUS

Columbia Energy Center, Dry Ash Disposal Facility, Modules 1 through 3
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) unit. The groundwater monitoring system for the Columbia Energy Center (COL) Dry Ash Disposal Facility Modules 1 through 3 monitors a single CCR unit. Supporting information is provided in the text of the annual report.

Category	Rule Requirement	Site Status
Monitoring Status – Start of Year	(i) At the start of the current annual reporting period, whether the CCR unit was operating under the detection monitoring program in §257.94 or the assessment monitoring program in §257.95;	Detection
Monitoring Status – End of Year	(ii) At the end of the current annual reporting period, whether the CCR unit was operating under the detection monitoring program in §257.94 or the assessment monitoring program in §257.95;	Detection
Statistically Significant Increases (SSIs)	(iii) If it was determined that there was an SSI over background for one or more constituents listed in appendix III to this part pursuant to §257.94(e):	
	(A) Identify those constituents listed in appendix III to this part and the names of the monitoring wells associated with such an increase; and	October 2021 Boron: MW-33AR, MW-34A, MW-302 Chloride: MW-33AR Sulfate: MW-33AR, MW-34A, MW-302 April 2022 Boron: MW-33AR, MW-34A, MW-302 Chloride: MW-33AR Field pH: MW-34A Sulfate: MW-33AR, MW-34A
	(B) Provide the date when the assessment monitoring program was initiated for the CCR unit.	Alternative Source Demonstrations prepared for October 2021 and April 2022 events during 2022. Assessment monitoring not required.

Category	Rule Requirement	Site Status
Statistically Significant Levels (SSL) Above Groundwater Protection Standard (GPS)	(iv) If it was determined that there was an SSL above the GPS for one or more constituents listed in appendix IV to this part pursuant to §257.95(g) include all of the following:	Not applicable – Appendix IV sampling not required
	(A) Identify those constituents listed in appendix IV to this part and the names of the monitoring wells associated with such an increase;	
	(B) Provide the date when the assessment of corrective measures was initiated for the CCR unit;	
	(C) Provide the date when the public meeting was held for the assessment of corrective measures for the CCR unit; and	
	(D) Provide the date when the assessment of corrective measures was completed for the CCR unit.	
Selection of Remedy	(v) Whether a remedy was selected pursuant to §257.97 during the current annual reporting period, and if so, the date of remedy selection; and	Not applicable – Site is in detection monitoring
Corrective Action	(vi) Whether remedial activities were initiated or are ongoing pursuant to §257.98 during the current annual reporting period.	Not applicable – Site is in detection monitoring

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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 Units. The site location is shown on **Figure 1**.

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

The groundwater monitoring system for the Columbia Energy Center (COL) Dry Ash Disposal Facility Modules 1 through 3 monitors a single CCR unit:

- COL Dry Ash Disposal Facility – Modules 1-3 (existing CCR Landfill)

The system is designed to detect monitored constituents at the waste boundary of Modules 1 through 3 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 4 through 6 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 Modules 1 through 3. 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 Engineering, Inc., 1978). During drilling of CCR wells MW-301 and MW-302, the unconsolidated materials were identified as consisting primarily of silty sand and sand. Boring logs for previously installed monitoring wells MW-33AR, MW-34A, MW-84A, and M-4R show silty sand and sand as the primary unconsolidated materials at these locations. The boring logs for Ash Disposal Facility Modules 1 through 3 CCR monitoring wells are provided in **Appendix B**. All CCR monitoring wells are screened within the unconsolidated sand unit.

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-302, MW-33AR, and MW-34A. MW-1AR was added to the monitoring program in 2021 as a supplemental well because monitoring data have indicated that the groundwater flow direction in this part of the site is sometimes to the northeast. MW-1AR was abandoned in 2022 because it was within the footprint of the pending MOD 10-11 expansion area. The monitoring network certification was updated with the abandonment of MW-1AR in October 2022. Flow direction in this area of the site will continue to be monitored by additional wells in the State monitoring program, including new water level-only monitoring wells MW-312 and MW-93A, which will be part of the future Modules 10 and 11 monitoring well network. 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 43 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 Modules 1 through 3 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;

MW-1AR was added to the monitoring program in 2021 as a downgradient well. MW-1AR was installed in November 1994 and is also included in the state monitoring program at the site. MW-1AR was added to the CCR Rule monitoring program because it is located to the northeast of Modules 1 through 3 and monitoring data have indicated that the groundwater flow direction in the northeast portion of the CCR Unit is sometimes to the northeast. MW-1AR was decommissioned as part of the groundwater monitoring program for Modules 1 through 3 of the Dry Ash Disposal Facility in 2022 due to ongoing construction in the area in preparation for future Modules 10 and 11. A groundwater monitoring system certification update was prepared in October 2022 to document the removal of MW-1AR from the monitoring system.

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;

Two semiannual groundwater sampling events were completed in 2022 at the COL Dry Ash Disposal Modules 1 through 3 as part of ongoing detection monitoring.

Groundwater samples collected during the semiannual events in April and October 2022 were analyzed for Appendix III constituents. 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 August 11, 2022. The validation and evaluation of the October 2022 monitoring event data was in progress at the end of 2022 and will be transmitted to WPL in 2023;

therefore, the October 2022 monitoring results and analytical report will be included in the 2023 annual report. The October 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 event 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, Modules 1 through 3, 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 interwell upper prediction limits (UPLs) based on background monitoring results from the upgradient wells (MW-84A and MW-301). The interwell UPLs were most recently updated in January 2020 using background data collected through October 2019. 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. Environmental Protection Agency [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, the next UPL update is planned for 2023.

For the October 2021 and April 2022 events, SSIs for boron, chloride, and sulfate were identified. Additionally, during the April 2022 event an SSI for field pH was identified.

Alternative source demonstrations (ASDs) were completed for the October 2021 and April 2022 events, demonstrating that sources other than the CCR unit were the likely cause of the observed concentrations of boron, chloride, and sulfate. A sampling error was the likely cause of the observed SSI for field pH in April 2022. The ASD reports are provided in **Appendix E.**

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 Units.

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 2021 and April 2022 monitoring events.
- ASD reports for the SSIs identified from the October 2021 and April 2022 monitoring events.
- Two semiannual groundwater sampling and analysis events (April and October 2022).
- Abandoned MW-1AR and updated the monitoring network certification.

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.
- If an SSI is determined, then within 90 days either:
  - Complete ASD (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.

The ASD reports prepared to address the SSIs observed for the October 2021 and April 2022 sampling events are provided in **Appendix E.** The ASD reports are certified by a qualified professional engineer.

3.5.4 §257.95(c) Alternative Assessment Monitoring Frequency

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

Not applicable. Assessment monitoring has not been initiated.

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

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

Not applicable. Assessment monitoring has not been initiated.

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

The owner or operator must also include the demonstration in the annual groundwater monitoring and corrective action report required by § 257.90(e), in addition to the certification by a qualified professional engineer.

Not applicable. Assessment monitoring has not been initiated.

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

The assessment of corrective measures must be completed within 90 days, unless the owner or operator demonstrates the need for additional time to complete the assessment of corrective measure due to site-specific conditions or circumstances. The owner or operator must obtain a certification from a qualified professional engineer attesting that the demonstration is accurate. The 90-day deadline to complete the assessment of corrective measures may be extended for longer than 60 days. The owner or operator must also include the demonstration in the annual groundwater monitoring and corrective action report required by § 257.90(e), in addition to the certification by a qualified professional engineer.

Not applicable. Corrective measures assessment has not been initiated.

3.6 §257.90(E)(6) OVERVIEW

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

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

4.0 REFERENCES

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

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

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

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Tables

Table 1. Groundwater Monitoring Well Network
Columbia Energy Center Dry Ash Disposal Facility, Modules 1-3
SCS Engineers Project #25222067.00

Monitoring Well	Location in Monitoring Network	Role in Monitoring Network
MW-84A	Upgradient	Background
MW-301	Upgradient	Background
MW-302	Downgradient	Compliance
MW-34A	Downgradient	Compliance
MW-33AR	Downgradient	Compliance

Note:

1, Monitoring well MW-1AR was abandoned in 2022 because it was within the footprint of the pending MOD 10-11 expansion area . The monitoring network certification was updated with the abandonment of MW-1AR in October 2022.

Possibly also add NDK Date: 9/19/2022
Checked by: NDK Date: 9/19/2022
RM Date: 1/4/2023

Table 2. CCR Rule Groundwater Samples Summary
Columbia Energy Center Dry Ash Disposal Facility, Modules 1-3
SCS Engineers Project #25222067.00

Sample Dates	Compliance Wells			Background Wells	
	MW-302	MW-34A	MW-33AR	MW-84A	MW-301
4/12-13/2022	D	D	D	D	D
10/27-28/2022	D	D	D	D	D
Total Samples	2	2	2	2	2

Abbreviations:
D = Required by Detection Monitoring Program
D-R = Detection Monitoring Retest Sample

Created by:	NDK	Date:	9/19/2022
Last revision by:	RM	Date:	12/27/2022
Checked by:	MDB	Date:	1/10/2023

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-1AR	MW-4	MW-5R	MW-33AR	MW-33BR	MW-34A	MW-34B	MW-37A	MW-83	MW-84A	MW-84B	MW-86	MW-91AR	MW-91B	MW-92A	MW-92B	MW-93A	MW-93B	MW-312
Dry Ash Facility (Facility ID #03025)	**Top of Casing Elevation (feet amsl)**	822.55	819.74	805.44	808.29	808.39	805.95	806.05	813.04	807.96	814.28	814.26	824.79	809.03	808.45	808.47	808.41	827.89	827.71	826.79
	Screen Length (ft)																	10	5	10
	Total Depth (ft from top of casing)	44.40	39.58	25.97	31.08	57.50	35.43	56.95	31.80	25.42	40.21	52.02	45.43	32.90	52.38	28.94	51.75	50.7	82.5	52.5
	Top of Well Screen Elevation (ft)	778.15	780.16	779.47	777.21	750.89	770.52	749.10	781.24	782.54	774.07	762.24	779.36	776.13	756.07	779.53	756.66	787.19	750.21	784.29
	Measurement Date																			
	October 2, 2012	783.41	783.70	784.96	782.38	782.23	783.03	782.99	782.66	dry	783.84	783.94	783.81	784.09	783.90	784.49	784.06	NI	NI	NI
	April 15, 2013	785.44	784.02	786.09	784.16	784.14	784.74	784.79	783.87	784.49	785.83	785.76	785.22	785.14	785.01	785.75	785.34	NI	NI	NI
	October 8, 2013													785.66	785.42	785.97	785.52	NI	NI	NI
	October 15, 2013	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	785.66	785.42	785.97	785.52	NI	NI	NI
	April 14, 2014	784.95	784.09	785.63	783.74	783.91	784.63	784.70	783.45	783.73	785.58	785.52	784.96	785.04	784.96	785.99	785.54	NI	NI	NI
	October 2-3, 2014	785.03	785.39	786.08	784.37	784.28	784.57	784.54	784.56	dry	785.24	785.18	785.19	785.47	785.28	785.75	785.33	NI	NI	NI
	April 13-14, 2015	783.96	783.63	785.25	783.01	782.74	783.65	783.95	782.87	dry	784.43	784.51	784.17	784.48	784.37	785.07	784.66	NI	NI	NI
	October 6-7, 2015	784.28	784.44	785.72	783.68	783.33	784.05	784.02	783.66	dry	784.80	784.76	784.66	784.89	784.70	785.20	784.76	NI	NI	NI
	April 4-6, 2016	785.82	aband	787.02	785.29	785.07	785.63	785.67	784.76	785.43	786.37	786.26	785.89	786.05	785.95	786.61	786.21	NI	NI	NI
	October 11-13, 2016	786.64	aband	788.00	787.36	786.46	786.45	786.32	786.40	786.81	787.22	787.11	786.96	787.17	786.81	787.68	787.25	NI	NI	NI
	April 10-13, 2017	786.96	aband	788.13	786.39	785.99	786.30	786.28	786.34	786.23	787.16	787.06	786.96	787.24	787.03	787.90	787.60	NI	NI	NI
	October 3-5, 2017	785.48	aband	786.66	784.51	784.22	784.67	784.63	784.86	784.29	NM	786.49	785.58	786.08	785.83	786.47	786.02	NI	NI	NI
	October 9-10, 2017	NM	aband	NM	NM	NM	NM	NM	NM	NM	785.56 (6)	NM	NM	NM	NM	NM	NM	NI	NI	NI
	February 21, 2018	783.97	aband	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	784.68	784.46	NM	NM	NI	NI	NI
	April 23-25, 2018	783.99	aband	785.36	783.09	786.36	781.77	780.79	783.28	783.32	785.88	784.91	782.54	784.71	784.53	785.23	784.81	NI	NI	NI
	October 23-25, 2018	788.25	aband	789.71	788.77	787.96	787.88	787.73	787.62	788.26	788.32	788.19	788.21	788.59	788.31	789.32	788.87	NI	NI	NI
	April 1-4, 2019	787.05	aband	788.64	786.63	786.54	786.82	786.92	786.47	786.78	787.35	787.34	787.16	787.45	787.18	788.04	787.63	NI	NI	NI
	October 7-9, 2019	787.26	aband	789.23	788.26	787.64	787.92	787.74	786.77	788.90	787.79	787.73	787.44	787.78	787.62	788.63	788.17	NI	NI	NI
	May 27-28, 2020	786.92	aband	788.34	786.01	785.75	785.98	785.99	786.22	786.03	787.02	786.99	786.94	787.26	787.05	787.86	787.47	NI	NI	NI
	October 7-8, 2020	785.95	aband	787.76	785.91	785.45	785.70	785.68	785.52	785.72	786.10	786.06	786.10	786.55	786.33	786.85	786.38	NI	NI	NI
	February 25, 2021	NM	aband	NM	NM	NM	784.75	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NI	NI	NI
	April 14, 2021	785.11	aband	787.29	784.27	784.05	784.77	784.77	784.46	c	785.84	785.81	785.60	785.86	785.69	786.47	786.06	NI	NI	NI
	June 11, 2021	NM	aband	NM	784.19	NM	784.66	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NI	NI	NI
	October 11-12, 14, 2021	784.47	aband	786.78	783.73	783.60	784.42	784.41	783.88	783.87	784.96	784.88	784.79	785.14	784.94	785.55	785.11	NI	NI	NI
	October 17, 2021	NM	aband	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NI	NI	NI
	April 1, 2022	aband	aband	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	April 11-13, 2022	aband	aband	785.52	783.27	783.45	784.30	784.42	783.26	783.78	785.02	785.00	784.70	784.83	784.72	785.45	785.02	783.99	783.97	783.73
	October 24-28, 2022	aband	aband	785.43	781.94	781.61	783.61	783.61	782.28	dry	784.57	784.54	784.38	784.64	784.47	785.05	784.62	783.74	782.76	783.50
	Bottom of Well Elevation (ft)	778.15	780.16	779.47	777.21	750.89	770.52	749.10	781.24	782.54	774.07	762.24	779.36	776.13	756.07	779.53	756.66	777.19	745.21	774.29

	Well Number	M-3	M-4R	MW-39A	MW-39B	MW-48A	MW-48B	MW-57	MW-59	MW-216R	MW-217	MW-220RR	SG-1	SG-2	SG-3	SG-4
Ash Pond Facility (Facility ID #02325)	**Top of Casing Elevation (feet amsl)**	788.23	806.10	809.62	809.50	828.86	828.84	786.29	815.48	814.21	791.55	792.90	792.06	795.25	808.60	805.36
	Screen Length (ft)															
	Total Depth (ft from top of casing)	16.90	25.55	34.80	76.07	51.88	75.80	14.40	38.50	37.85	37.37	18.96	--	--	--	--
	Top of Well Screen Elevation (ft)	771.33	780.55	774.82	733.43	776.98	753.04	771.89	776.98	776.36	754.18	773.94	--	--	--	--
	Measurement Date															
	October 2, 2012	780.13	786.76	781.49	781.34	782.03	781.93	780.58	779.88	781.91	780.95	780.55	789.14	793.85	dry	dry
	April 15, 2013	785.16	788.39	783.97	784.00	783.77	783.78	784.69	783.66	784.09	784.75	785.02	789.5(1)	NM	dry	dry
	October 8, 2013	781.22	786.67	NM	NM	783.69	783.58	NM	NM	783.39	782.27	782.36	789.5(1)	791.33	dry	dry
	October 15, 2013	NM	NM	782.94	782.81	NM	NM	782.47	783.49	NM	NM	NM	NM	NM	NM	NM
	April 14, 2014	786.04	788.96	783.57	783.68	783.56	783.57	785.51	783.41	783.73	785.25	785.87	788.90	dry	dry	dry
	October 1-3, 2014	781.16	787.55	783.42	783.32	784.05	783.94	782.32	783.55	783.79	782.63	783.03	NM	dry	dry	dry
	April 13-14, 2015	783.08	786.83	782.77	782.68	782.80	782.82	782.81	782.83	782.93	783.34	783.42	789.3	791.70	dry	dry
	October 6-7, 2015	780.66	786.12	782.97	782.81	783.10	783.01	781.82	783.25	783.18	781.95	782.26	788.48	791.58	dry	dry
	April 4-6, 2016	784.21	789.09	785.27	785.27	784.79	784.76	783.21	784.97	785.68	785.02	784.36	NM	793.40	dry	dry
	October 11-13, 2016	781.88	787.88	785.75	785.52	785.73	785.61	783.12	786.51	786.16	783.75	784.09	788.32	792.52	dry	dry
	April 10-13, 2017	782.94	787.95	785.44	785.20	785.82	785.69	782.77	786.09	785.95	784.29	784.09	788.31	793.85	dry	dry
	October 3-5, 2017	780.93	787.04	783.35	783.18	784.30	784.19	782.37	784.23	783.89	782.48	782.61	788.3	793.45	dry	dry
	April 23-25, 2018	782.89	790.43	782.86	782.87	783.14	783.09	783.04	783.02	783.23	783.26	783.45	788.38	>795.25	dry	dry
	October 23-25, 2018	782.95	788.47	787.12	786.88	787.12	786.99	783.48	787.73	787.49	784.90	784.52	787.76	793.25	dry	dry
	April 1-4, 2019	785.68	789.44	786.28	786.31	786.56	786.45	785.27	787.39	786.53	786.33	785.46	788.40	794.60	dry	dry
	October 7-9, 2019	785.33	790.65	787.10	787.02	786.68	786.65	785.29	786.68	787.07	786.01	785.42	748.48	795.20	dry	dry
	May 27-29, 2020	781.80	787.73	785.12	784.92	785.74	785.59	783.11	785.89	785.60	783.41	783.89	748.48	>795.25	dry	dry
	October 7-8 &17, 2020	781.42	787.74	784.74	784.64	785.03	784.96	782.83	785.43	785.10	783.06	783.49	788.34	793.32	dry	NM
	April 12, 2021	782.30	786.34	783.66	783.65	784.13	784.08	782.79	784.08	783.97	783.15	783.49	788.03	793.45	below gauge	dry
	October 11-12, 14, 2021	781.03	786.33	782.94	782.85	783.09	783.03	781.94	783.11	783.04	782.15	782.66	788.59	795.13	dry	dry
	April 11-13, 2022	783.95	788.26	783.37	783.34	783.10	783.10	NM	782.99	783.40	783.93	783.83	788.4	794.65	dry	dry
	June 3, 2022	NM	NM	NM	NM	NM	NM	782.13	NM	NM	NM	NM	NM	NM	NM	NM
	October 25, 26, 28, 2022	780.41	783.85	780.76	780.66	779.57	779.55	779.23	778.98	778.61	780.33	781.49	NM	795.21	dry	dry
	Bottom of Well Elevation (ft)	771.33	780.55	774.82	733.43	776.98	753.04	771.89	776.98	776.36	754.18	773.94	--	--	--	--

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

CCR Rule Wells	**Well Number**	**MW-301**	**MW-302**	**MW-303**	**MW-304**	**MW-305**	**M-4R**	**MW-33AR**	**MW-34A**	**MW-84A**	**MW-306**	**MW-307**	**MW-308**	**MW-309**	**MW-310**	**MW-311**
	Top of Casing Elevation (feet amsl)	806.89	813.00	815.72	805.42	806.32	806.10	808.29	805.95	814.28	807.63	806.89	806.9	813.27	813.62	809.74
	Screen Length (ft)	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	Total Depth (ft from top of casing)	29.40	33.6	35.80	25.7	25.6	39.58	31.08	35.43	40.21	27	26.5	28	37.67	38.41	36.19
	Top of Well Screen Elevation (ft)	787.49	789.40	785.72	789.72	790.72	776.52	787.21	780.52	784.07	790.63	790.39	788.90	785.60	785.21	783.55
	Measurement Date															
	December 21-22, 2015	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
	Bottom of Well Elevation (ft)	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

Notes:
NM = not measured

Created by: MDB Date: 5/6/2013
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'.

I:\25222067.00\Deliverables\2022 Fed Annual Report - COL Mod 1-3\Tables\[Table 3 - Groundwater Elevation Summary.xls]levels

Table 4. Horizontal Gradients and Flow Velocity
Columbia Energy Center - MOD 1-3 /
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	785.00	783.27	1180	0.0015	0.037
10/25-27/2022	784.00	781.94	640	0.0032	0.082

Wells	**K Values (cm/sec)**	**K Values (ft/d)**
MW-34A	N/A	N/A
MW-302	3.22E-02	91.2
MW-33AR	4.01E-04	1.1
Geometric	3.59E-03	10.2

Assumed Porosity, n
0.40

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

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

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

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

Created by: NDK Date: 8/2/2022
Last revision by: MDB Date: 1/10/2023
Checked by: RM Date: 1/10/2023

Table 5. Groundwater Analytical Results Summary -
Columbia Landfill, Modules 1-3 / SCS Engineers Project #25222067.00

				Background Wells		Compliance Wells		
Parameter Name	**UPL Method**	**UPL**		**MW-84A**	**MW-301**	**MW-33AR**	**MW-34A**	**MW-302**
				4/13/2022	4/13/2022	4/12/2022	4/12/2022	4/12/2022
Appendix III								
Boron, ug/L	P	35.6		10.5	28.7	558	237	389
Calcium, ug/L	NP	129,000		75,100	97,300	80,000	77,000	91,600
Chloride, mg/L	P	6.2		5.2	1.9 J	59.0	2.2	0.79 J
Fluoride, mg/L	DQ	DQ		<0.095	<0.095	<0.095	<0.095	<0.095
Field pH, Std. Units	P	7.78		7.34	6.60	7.60	8.34	7.21
Sulfate, mg/L	P	30.3		1.4 J, M0	12.7	155	146	22.1 M0
Total Dissolved Solids, mg/L	NP	514		334	422	506	402	398

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
-- = Not Measured
GPS = Groundwater Protection Standard
UPL = Upper Prediction Limit
NP = Nonparametric UPL with 1-of-2 retesting
P = Parametric UPL with 1-of-2 retesting
LOD = Limit of Detection
LOQ = Limit of Quantitation
DQ = Double Quantification

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

Notes:

1. An individual result above the UPL does not constitute an SSI above background. See the accompanying report text for identification of statistically significant results.
2. Interwell UPLs calculated based on results from background wells MW-84A and MW-301. Interwell UPLs based on 1-of-2 retesting approach. UPLs updated in January 2020 based on background well results through October 2019.
3. Interwell UPLs calculated based on results from background wells MW-84 and MW-301.

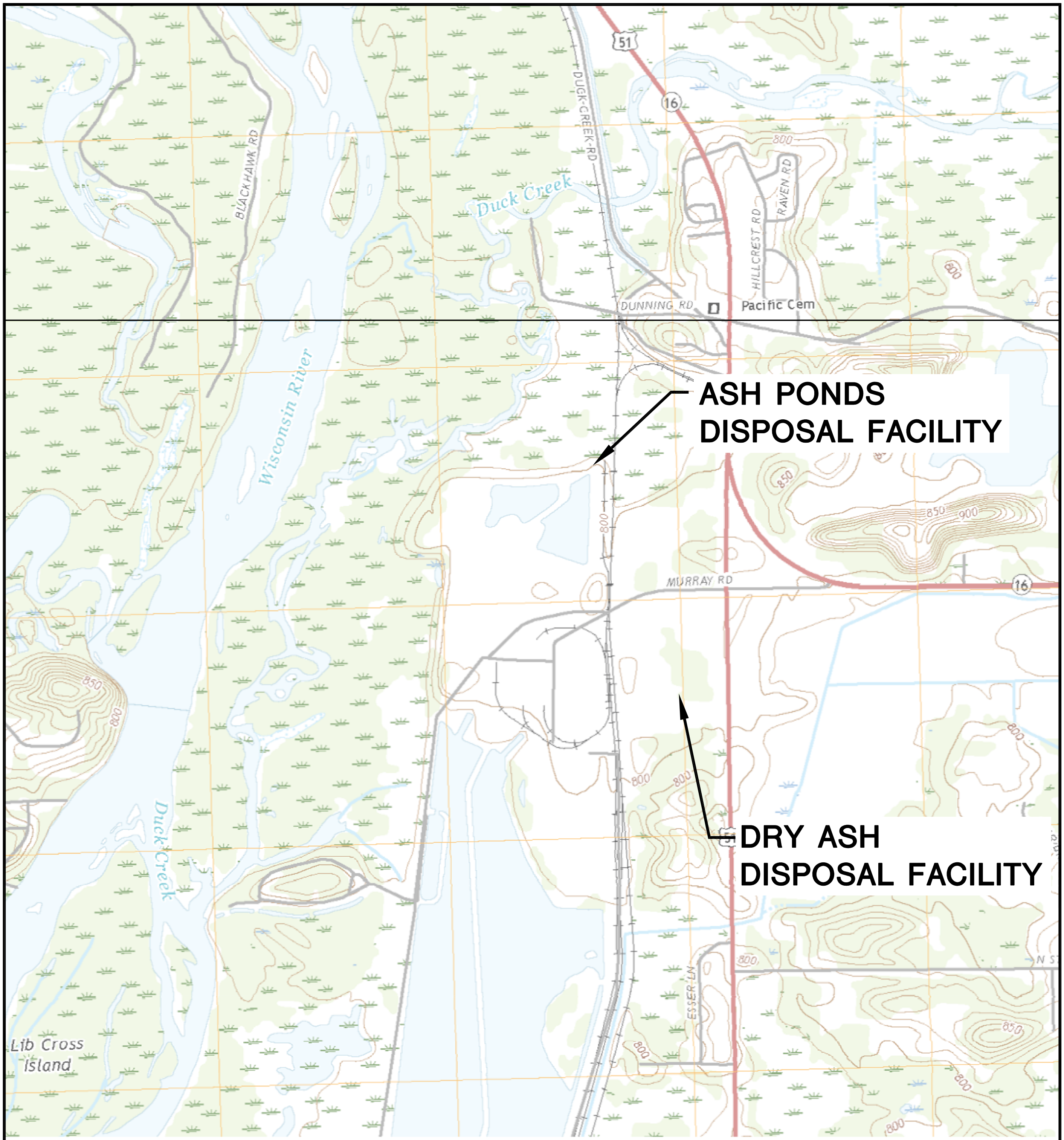
Created by: NDK Date: 9/19/2022
Last revision by: AJR Date: 12/5/2022
Checked by: RM Date: 12/29/2022
Scientist/Proj Mgr QA/QC: TK Date: 1/10/2023

Table 6. 2022 Groundwater Field Data Summary
Columbia Energy Center Dry Ash Disposal Facility - Modules 1-3 / SCS Engineers Project #25222067.00

Well	Sample Date	Groundwater Elevation (feet)	Field Temperature (deg C)	Field pH (Std. Units)	Oxygen, Dissolved (mg/L)	Field Specific Conductance (umhos/cm)	Field Oxidation Potential (mV)	Turbidity (NTU)
MW-84A	4/13/2022	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	747.0	207.5	0.00
MW-302	4/12/2022	784.42	9.5	7.21	8.74	677.1	197.1	3.92
MW-33AR	4/12/2022	783.27	10.6	7.60	9.62	847.0	198.2	0.00
MW-34A	4/12/2022	784.30	11.4	8.34	7.82	577.0	112.6	4.39

Created by: DK　Date: 9/2/2022
Last revision by: AJR　Date: 12/5/2022
Checked by: BLR　Date: 12/29/2022

Figures



N

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

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

SITE
ALLIANT ENERGY
COLUMBIA ENERGY CENTER
PARDEEVILLE, WI

SITE LOCATION MAP

PROJECT NO.	25220067.00	DRAWN BY:	BSS
DRAWN:	12/02/2019	CHECKED BY:	MDB
REVISED:	01/10/2020	APPROVED BY:	TK 04/10/2020

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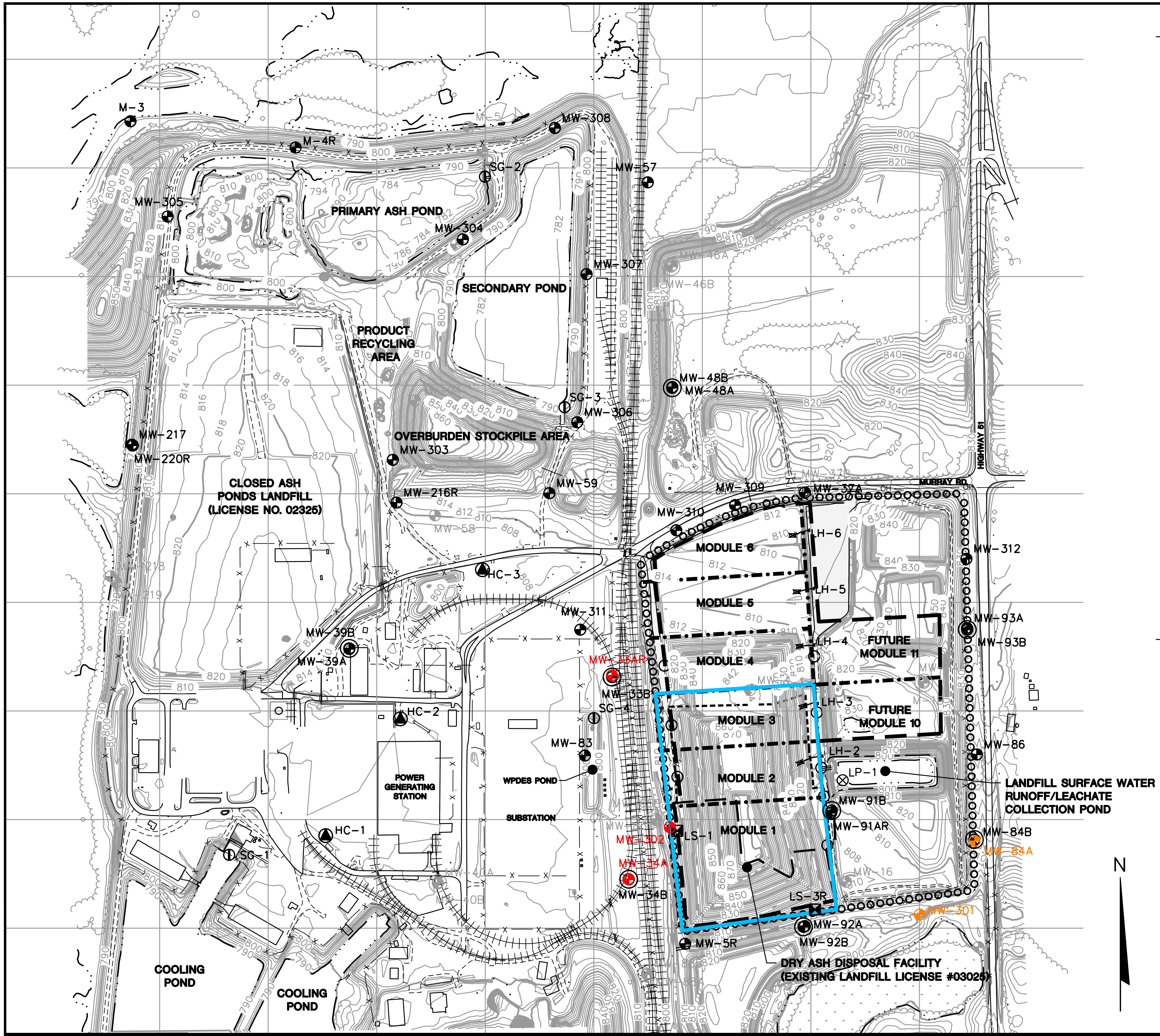
FIGURE
1

I:\25220067.00\Drawings\ASD Mod 1-3 LF\Site Location Map.dwg, 4/12/2020 7:05:09 PM



LEGEND

———	EXISTING MAJOR CONTOUR (10' INTERVAL)
———	EXISTING MINOR CONTOUR (2' CONTOUR)
—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 1-3 DRY ASH FACILITY ARE: MW-301 AND MW-84A.

500 0 500

SCALE: 1" = 500'

PROJECT NO.	25222067.00	DRAWN BY:	KP
DRAWN:	12/02/2019	CHECKED BY:	NDK/RM
REVISED:	01/16/2023	APPROVED BY:	TK 1/16/2023

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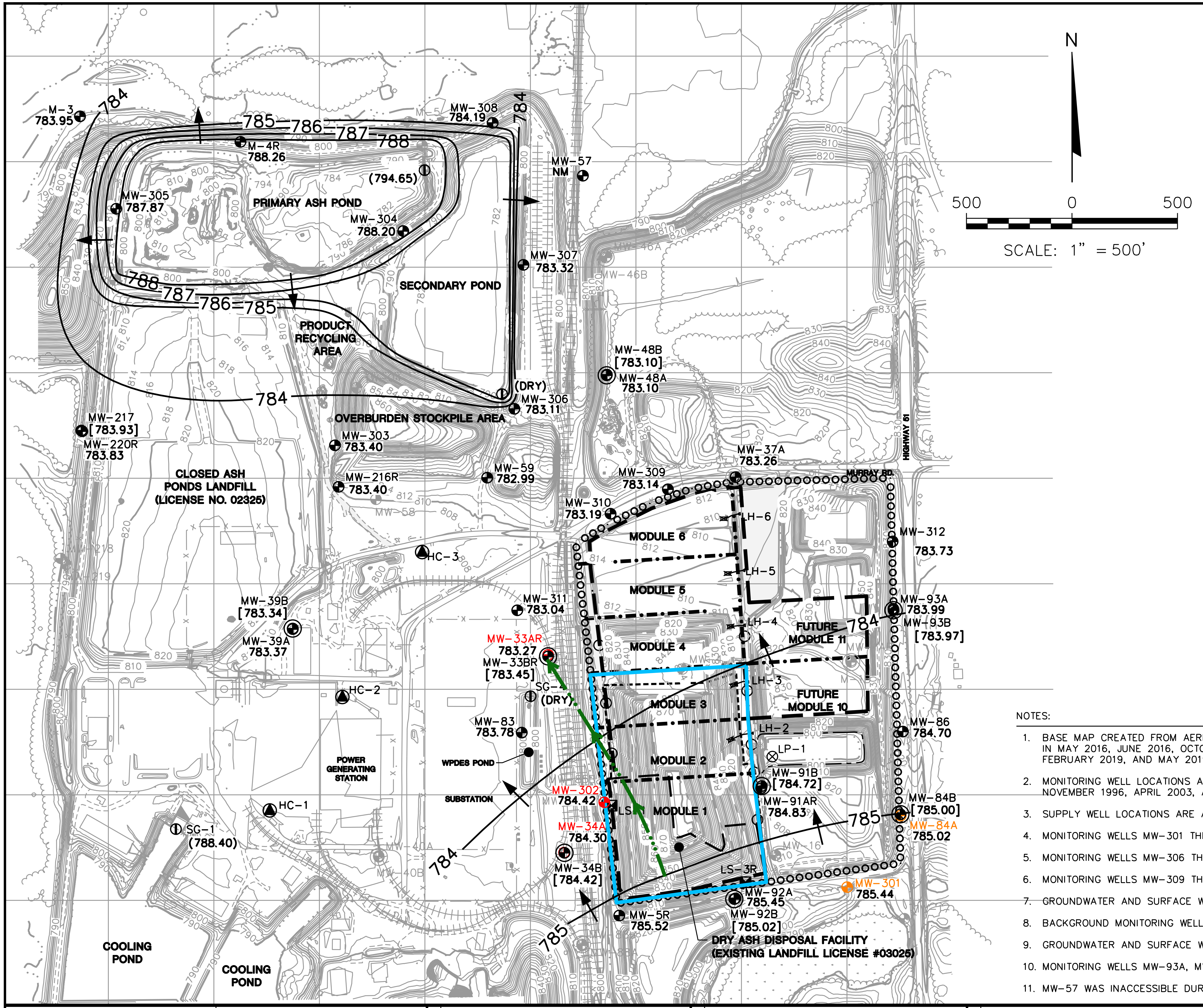
SITE

ALLIANT ENERGY
COLUMBIA ENERGY CENTER
MODULES 1-3 DRY ASH DISPOSAL FACILITY
PARDEEVILLE, WI

SITE PLAN AND MONITORING WELL LOCATIONS

FIGURE
2

I:\25222067.00\Drawings\Modules 1-3\Site Plan and Monitoring Well Locations.dwg, 1/16/2023 11:52:11 AM



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
·oooooooo·	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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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 1-3 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
DRAWN:	12/02/2019	CHECKED BY:	MDB
REVISED:	12/30/2022	APPROVED BY:	TK 1/16/2023

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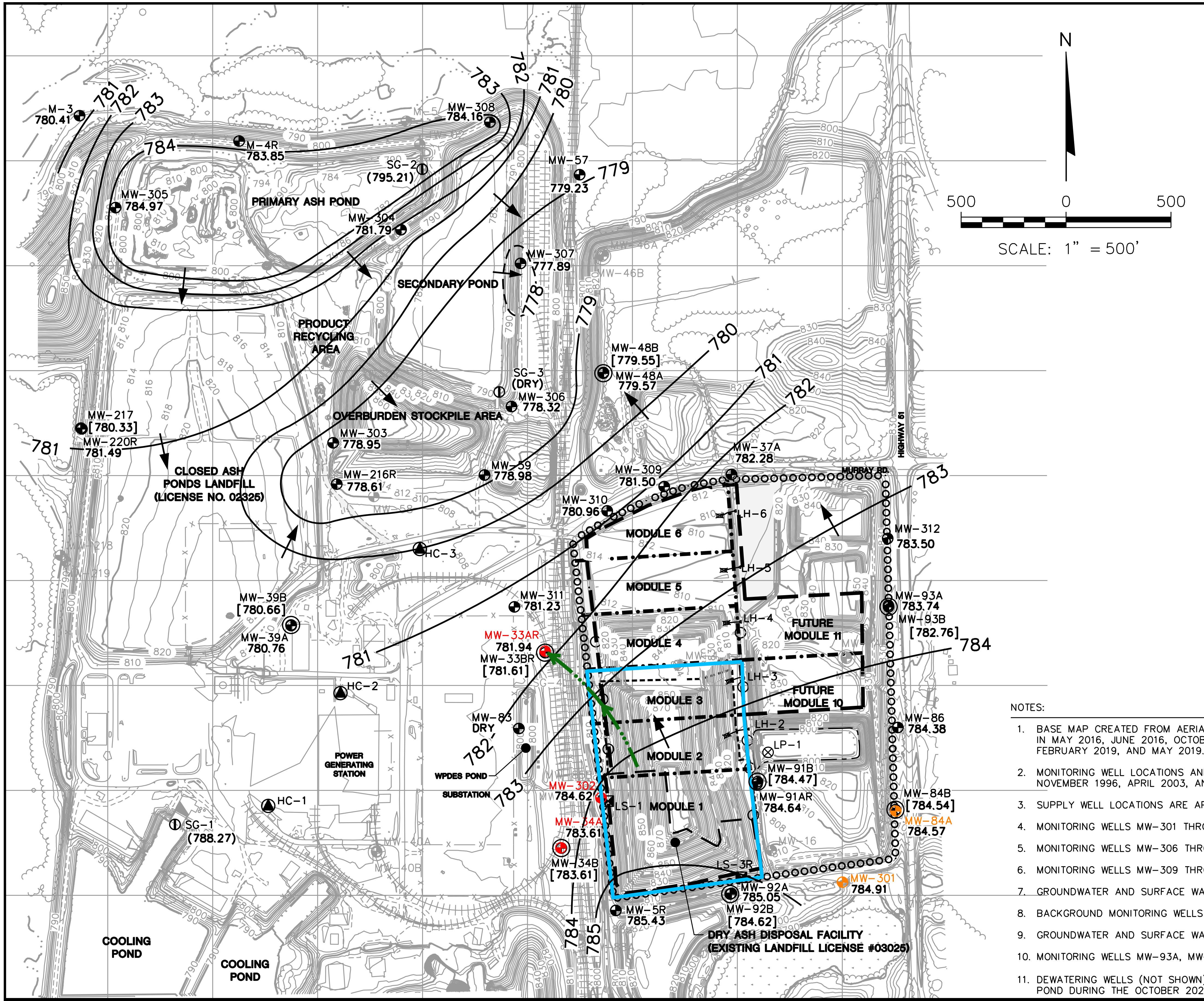
COLUMBIA ENERGY CENTER
MODULES 1-3 DRY ASH DISPOSAL FACILITY
PARDEEVILLE, WI

WATER TABLE MAP
APRIL 2022

FIGURE
3

I:\25222067.00\Drawings\Modules 1-3\Water Table Map-April 2022.dwg, 1/16/2023 11:58:11 AM



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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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 1-3 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
DRAWN:	12/15/2022	CHECKED BY:	MDB
REVISED:	12/30/2022	APPROVED BY:	TK 1/16/2023

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PARDEEVILLE, WI

WATER TABLE MAP
OCTOBER 2022

FIGURE
4

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Appendix A

Regional Hydrogeologic Information

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

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

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

Sources:

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

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

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

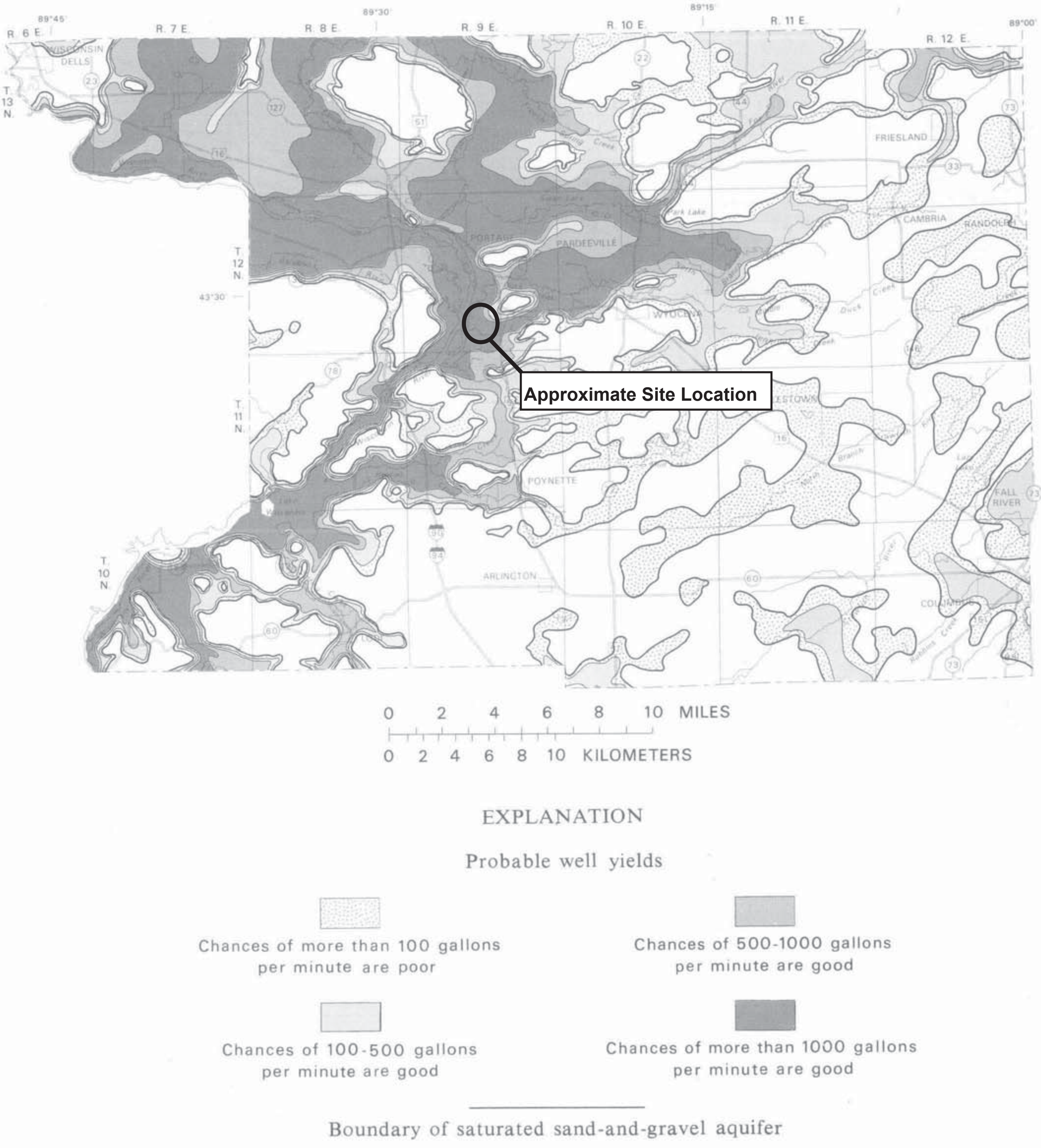
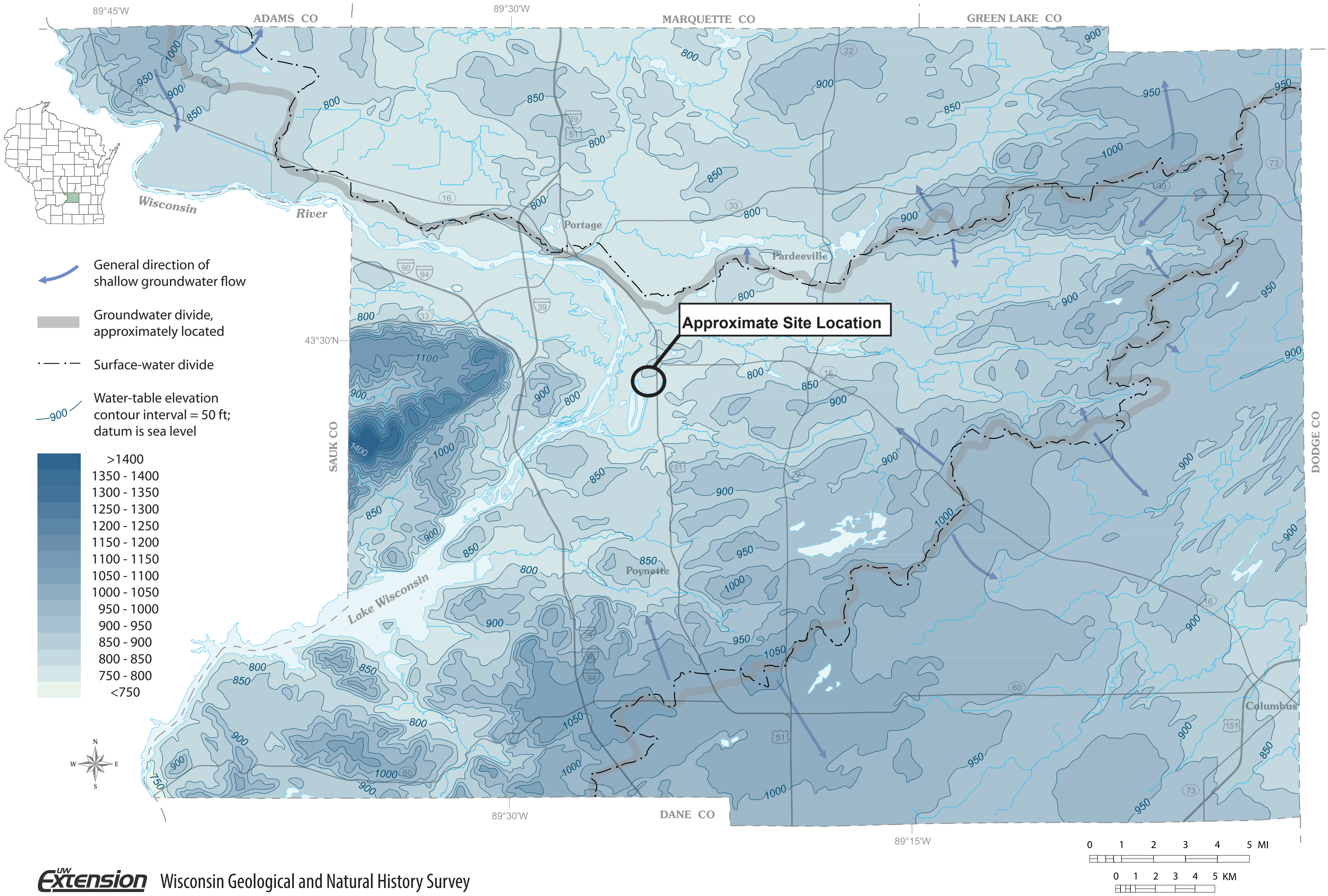


Figure 9. Probably well yields from the sand-and-gravel aquifer.

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

Generalized water-table elevation in Columbia County, Wisconsin



Extension Wisconsin Geological and Natural History Survey

03/09/2023 - Classification: Internal - ECRM13006973

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

Appendix B

Boring Logs and Well Construction Documentation

State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 7-98

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

Page 1 of 2

Facility/Project Name WPL-Columbia SCS#: 25215135.00	License/Permit/Monitoring Number	Boring Number MW-301	
Boring Drilled By: Name of crew chief (first, last) and Firm Kevin Durst Badger State Drilling	Date Drilling Started 11/11/2015	Date Drilling Completed 11/11/2015	Drilling Method hollow stem auger

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

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

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

Sample									Soil Properties					
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID/FID	Pocket Penetration (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
				SILTY SAND, yellowish brown (10YR 5/6), fine to medium grained.										
			1											
S1	21	7 6 9 10	2							M				
			3											
S2	20	6 7 9 10	4	Same as above except, 10YR 5/4 (top section), 10YR 3/6 (bottom section), trace gravel.						M				
			5											
			6	Same as above except, 10YR 3/4 (bottom), 10YR 5/4 (top), trace little roots and sticks, trace gravel.										
S3	22	7 6 9 6	7		SM					M				
			8											
S4	21	4 5 6 5	9	Same as above except, 10YR (top), 10YR 4/6 (bottom), trace clay at bottom.						M				
			10											
			11	Same as above except, fine to coarse grained sand, little gravel, trace clay in top half, 10YR 3/6.										
S5	18	2 2 4 5	12							M				
			13											
			14	Same as above except, 10YR 6/8.										
S6	20	2 3 3 3	15							M				

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

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

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

State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION SUPPLEMENT
Form 4400-122A

Boring Number MW-301 Use only as an attachment to Form 4400-122. Page 2 of 2

Sample		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
Number and Type	Length Att. & Recovered (in)								Pocket Penetration (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	
			16	SILTY SAND, yellowish brown (10YR 5/6), fine to medium grained.										
S7	20	5 4 4 3	17							M				
S8	20	2 4 4 5	20							W				
S9	23	4 4 3 6	22		SM					W				
S10	21	3 2 4 10	24	Same as above except, 10YR 6/4.						W				
			28	End of boring at 28 ft bgs.										

State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 7-98

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

Page 1 of 2

Facility/Project Name WPL-Columbia SCS#: 25215135.00		License/Permit/Monitoring Number	Boring Number MW-302
Boring Drilled By: Name of crew chief (first, last) and Firm Kevin Durst Badger State Drilling	Date Drilling Started 11/11/2015	Date Drilling Completed 11/12/2015	Drilling Method hollow stem auger
WI Unique Well No. VY702	DNR Well ID No.	Common Well Name	
Final Static Water Level Feet	Surface Elevation 809.93 Feet	Borehole Diameter 8.5 in.	

Local Grid Origin ☐ (estimated: ☐) or Boring Location ☒
State Pla 541964.7 N, 2123849 E S/C/N
1/4 of 1/4 of Section 27, T 12 N, R 9 E
Lat ° ' "
Long ° ' "
Local Grid Location ☐ N ☐ E
Feet ☐ S Feet ☐ W

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

Sample									Soil Properties					
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID/FID	Pocket Penetration (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
S1	12	10 13 17 16	1 2 3	SILTY SAND, fine to medium grained, trace gravel, 10YR 5/6.	SM					M				
S2	12	10 12 8 6	4 5	Same as above except, large gravel at bottom, trace to little gravel.						M				
S3	20	2 4 4 5	6 7 8	Same as above except, 10YR 4/6.						M				
S4	23	3 3 4 5	9 10	Same as above except, 10YR 5/8.						M				
S5	20	3 3 3 4	11 12 13	Same as above except, 10YR 6/6.						M				
S6	20	3 4 4 7	14 15	POORLY GRADED SAND, 10YR 6/6.	SP					M				

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

Signature for Zach Watson

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

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

State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION SUPPLEMENT

Form 4400-122A

Boring Number MW-302 Use only as an attachment to Form 4400-122. Page 2 of 2

Sample									Soil Properties					
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID/FID	Pocket Penetration (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			16	POORLY GRADED SAND, light tan 10YR 8/3.										
S7	20	6 8 10 12	17							M				
			18											
			19		SP									
S8	20	5 6 8 8	20							M				
			21											
S9	19	3 3 3 2	22							M				
			23											
			24	SILTY SAND, 10YR 5/6.	SM									
S10	20	3 3 8 8	25	POORLY GRADED SAND, 10YR 8/3.						W				
			26	Same as above except, light tan 10YR 6/6.										
S11	23	5 9 12 12	27							W				
			28											
			29											
			30		SP									
			31											
			32											
			33											
			34											
			35	End of boring at 35 ft bgs.										

State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 7-98

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

Page 1 of 1

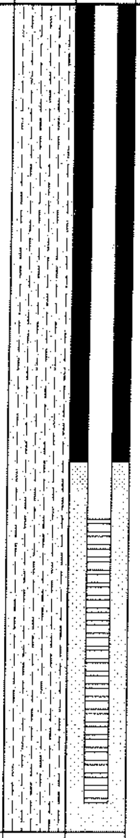
Facility/Project Name Alliant Energy - Columbia	License/Permit/Monitoring Number 03025	Boring Number MW-33AR

Boring Drilled By: Name of crew chief (first, last) and Firm Ryan Fisher Boart Longyear	Date Drilling Started 4/9/2003	Date Drilling Completed 4/9/2003	Drilling Method 4 1/4" HSA

WI Unique Well No. PE223	DNR Well ID No. 138	Common Well Name MW-33AR	Final Static Water Level Feet MSL	Surface Elevation 805.4 Feet MSL	Borehole Diameter 8.0 inches

Local Grid Origin ☐ (estimated: ☐) or Boring Location ☒ State Plane 542,663 N, 2,123,584 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 ☐ N ☐ E Feet ☐ S Feet ☐ W

Facility ID 111049180	County Columbia	County Code 11	Civil Town/City/ or Village Pacific

Sample									Soil Properties					
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	Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			2.5 5.0 7.5 10.0 12.5 15.0 17.5 20.0 22.5 25.0 27.5	**Blind drilled to 29 feet. See log of MW-33BR for lithology.**	SM									
				End of boring at 29 feet.										

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

Signature	Firm RMT, Inc.	Tel: Fax:

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

WDNR_SBL_98 03024WDRY.GPJ WI_DNR98.GDT 7/18/03

State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 7-98

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

Page 1 of 3

Facility/Project Name Alliant Energy - Columbia	License/Permit/Monitoring Number 03025	Boring Number MW-33BR

Boring Drilled By: Name of crew chief (first, last) and Firm Ryan Fisher Boart Longyear	Date Drilling Started 4/8/2003	Date Drilling Completed 4/9/2003	Drilling Method 4 1/4" HSA

WI Unique Well No. PE224	DNR Well ID No. 140	Common Well Name MW-33BR	Final Static Water Level 785.3 Feet MSL	Surface Elevation 805.3 Feet MSL	Borehole Diameter 8.0 inches

Local Grid Origin ☐ (estimated: ☐) or Boring Location ☒
State Plane 542,660 N, 2,123,585 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
☐ N ☐ E
Feet ☐ S Feet ☐ W

Facility ID 111049180	County Columbia	County Code 11	Civil Town/City/ or Village Pacific

Sample									Soil Properties					
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	Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
AUGER	60		1 2 3 4											
1 SS	24	4 4 4 4	5 6 7 8 9	**SILTY SAND (SM),** 85% fine to medium sand, 15% fines, nonplastic, 10YR 5/4 yellowish brown, no odor, moist.	SM									
2 SS	24	3 5 5 5	10 11 12 13 14 15											

WDNR_SBL_98 03024WDRY.GPJ WI_DNR98.GDT 7/18/03

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

Signature	Firm RMT, Inc.	Tel: Fax:

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

State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION SUPPLEMENT

Form 4400-122A

Boring Number MW-33BR Use only as an attachment to Form 4400-122. Page 2 of 3

Sample: Number and Type	Sample: Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
3 SS	24	4 5 4 5	16 17 18 19											
4 SS	24	4 3 4 4	20 21 22 23 24	Same as above, but wet.	SM		▼							
5 SS	24	50/0	25 26 27 28 29	Hit a rock, auger through.										
6 SS	24	8 20 19 27	30 31 32 33 34	**SILTY SAND WITH GRAVEL (SM),** 70% fine to medium sand, 15% gravel, 15% fines, nonplastic, 10YR 4/3 brown, wet, dense.										
7 SS	24	10 17 19 24	35 36 37 38 39 40		SM									

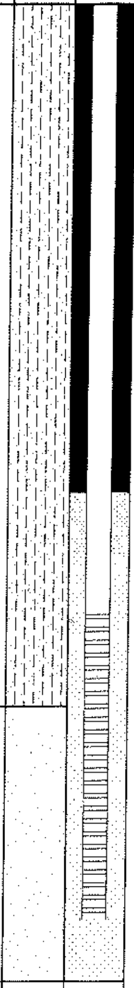
WDNR_SBL_98 03024WDRY.GPJ WI_DNR98.GDT 7/18/03

State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION SUPPLEMENT
Form 4400-122A

Boring Number MW-33BR Use only as an attachment to Form 4400-122. Page 3 of 3

Sample		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
Number and Type	Length Att. & Recovered (in)								Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	
8 SS	24	18 20 28 39	41 42 43 44	Same as above.										
9 SS	24	27 50/2	45 46 47 48 49 50 51		SM									
10 SS	24	7 50/1	52 53 54 55	**WEATHERED SANDSTONE,** 95% poorly graded medium sand, 5% fines, white to brown, well sorted and rounded, poorly cemented.										
			56	**End of boring at 56 feet.**										



WDNR_SBL_98 03024WDRY.GPJ WI_DNR98.GDT 7/18/03

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: Alliant Energy - Columbia

Local Grid Location of Well: ______ft. ☐ N. ☐ S. ______ft. ☐ E. ☐ W.

Well Name: MW-33AR

Facility License, Permit or Monitoring No.: 03025

Local Grid Origin ☐ (estimated: ☐) or Well Location ☒

Lat. ___ ° ___ ' ___ " Long. ___ ° ___ ' ___ " or

Wis. Unique Well No.: PE223

DNR Well Number: 138

Facility ID: 111049180

St. Plane 542,663 ft. N, 2,123,584 ft. E. S/C/N

Date Well Installed: 04/09/2003

Type of Well: Well Code 71/dw

Section Location of Waste/Source: NE 1/4 of SW 1/4 of Sec. 27, T. 12 N, R. 9 ☒ E ☐ W

Well Installed By: (Person's Name and Firm)
R. Fischer
Boart Longyear

Distance from Waste/Source: 500 ft.

Enf. Stds. Apply ☐

Location of Well Relative to Waste/Source:
u ☐ Upgradient s ☐ Sidegradient
d ☒ Downgradient n ☐ Not Known

Gov. Lot Number: ______

A. Protective pipe, top elevation 808.09 ft. MSL

B. Well casing, top elevation 808.29 ft. MSL

C. Land surface elevation 805.4 ft. MSL

D. Surface seal, bottom 804.4 ft. MSL or 1.0 ft.

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

13. Sieve analysis attached? ☐ 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 794.4 ft. MSL or 11.0 ft.

F. Fine sand, top 789.4 ft. MSL or 16.0 ft.

G. Filter pack, top 788.4 ft. MSL or 17.0 ft.

H. Screen joint, top 787.4 ft. MSL or 18.0 ft.

I. Well bottom 777.4 ft. MSL or 28.0 ft.

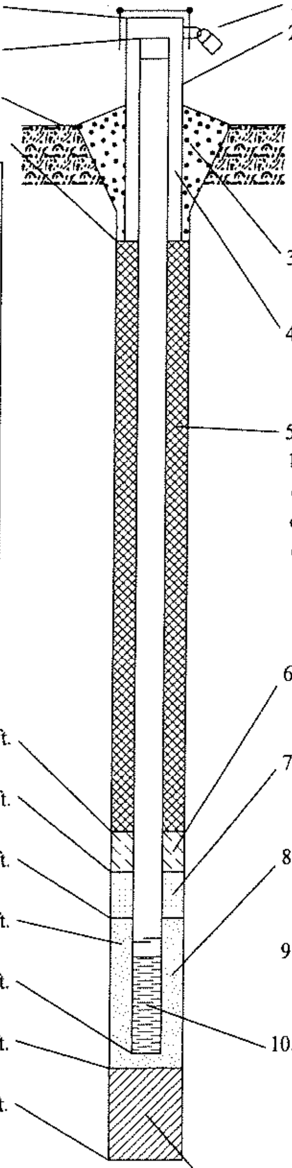
J. Filter pack, bottom 776.4 ft. MSL or 29.0 ft.

K. Borehole, bottom 776.4 ft. MSL or 29.0 ft.

L. Borehole, diameter 8.0 in.

M. O.D. well casing 2.37 in.

N. I.D. well casing 2.06 in.



1. Cap and lock? ☒ Yes ☐ No

2. Protective cover pipe:
a. Inside diameter: 4.0 in.
b. Length: 7.0 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
______ Other ☐

5. Annular space seal: a. Granular/Chipped Bentonite ☐ 3 3
b. ______Lbs/gal mud weight . . . Bentonite-sand slurry ☐ 3 5
c. 10.5 Lbs/gal mud weight . . . Bentonite slurry ☒ 3 1
d. ______% Bentonite . . . Bentonite-cement grout ☐ 5 0
e. 3.5 Ft^3 volume added for any of the above
f. How installed: Tremie ☐ 0 1
Tremie pumped ☒ 0 2
Gravity ☐ 0 8

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

7. Fine sand material: Manufacturer, product name & mesh size
a. #7 Badger
b. Volume added 0.5 ft^3

8. Filter pack material: Manufacturer, product name & mesh size
a. #40 Badger
b. Volume added 4.5 ft^3

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

10. Screen material: PVC
a. Screen Type: Factory cut ☒ 1 1
Continuous slot ☐ 0 1
______ Other ☐
b. Manufacturer Boart Longyear
c. Slot size: 0.010 in.
d. Slotted length: 10.0 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 RMT, Inc.

Tel:
Fax:

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.

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 9536, MADISON, WIS. 53715 • TEL. (608) 257-4848

SAMPLE						VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES				
No.	Type	Recovery ↓	Moisture ↓	N	Depth		Qu	W	LL	PL	D
						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						
						End Boring at 37'					
					40	Well Installed at 37'					

WATER LEVEL OBSERVATIONS

While Drilling

Upon Completion of Drilling

Time After Drilling

Depth to Water

Depth to Cave In

GENERAL NOTES

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

Crew Chief JVS Rig B-40

Drilling Method ED 0-37'

State of Wisconsin
Department of Natural Resources

MONITORING WELL DEVELOPMENT

Form 4400-113B Rev. 7-98

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

Facility/Project Name Alliant Energy - Columbia		County Columbia	Well Name MW-33AR
Facility License, Permit or Monitoring Number 03025	County Code 11	Wis. Unique Well Number PE223	DNR Well Number 138

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 60 min.

4. Depth of well (from top of well casing) 31.3 ft.

5. Inside diameter of well 2.06 in.

6. Volume of water in filter pack and well casing 6.0 gal.

7. Volume of water removed from well 35.0 gal.

8. Volume of water added (if any) 0.0 gal.

9. Source of water added ______

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

		Before Development	After Development
11. Depth to Water (from top of well casing)	a.	23.47 ft.	23.62 ft.
Date	b.	4/10/2003	4/10/2003
Time	c.	08:50 ☒ a.m. ☐ p.m.	11:50 ☒ a.m. ☐ p.m.
12. Sediment in well bottom		0.0 inches	0.0 inches
13. Water clarity		Clear ☐ 1 0 Turbid ☒ 1 5 (Describe) Opaque, brown	Clear ☐ 2 0 Turbid ☒ 2 5 (Describe) Slight, tan

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

14. Total suspended solids	mg/l	72 mg/l
15. COD	mg/l	mg/l

16. Well developed by: Person's Name and Firm
Peter M. Chase
RMT, Inc.

17. Additional comments on development:
Pumped dry 3 times.

Facility Address or Owner/Responsible Party Address
Name: Peter M. Chase
Firm: RMT, Inc.
Street: 744 Heartland Tr.
City/State/Zip: Madison, WI 53717

I hereby certify that the above information is true and correct to the best of my knowledge.
Signature:
Print Name: Peter M. Chase
Firm: RMT, Inc.

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

DEPARTMENT OF NATURAL RESOURCES

SAMPLING POINT ID FORM
FORM 4400-40 REV. 6-79

FACILITY NAME
Wisconsin Power and Light Co. / Dry Ash

SAMPLING REQUIRED (✓ ONE)
☐ YES
☐ NO

POINT (✓ ONE)
☐ CAN BE SAMPLED
☐ CANNOT BE SAMPLED

COMMON NAME OF SAMPLING POINT
mw 34A

PREVIOUS COMMON NAME OF SAMPLING POINT

FACILITY ID NO.

POINT ID NO.

TYPE OF POINT (✓ ONE)

1 (G) GROUND WATER
11 ☒ MONITOR WELL
12 ☐ PIEZOMETER
13 ☐ PRIVATE WELL
14 ☐ LYSIMETER
15 ☐ SPRING
16 ☐ RESISTIVITY PROBE

2 (L) LEACHATE
21 ☐ FLOW OR SEEP
22 ☐ POND
23 ☐ COLLECTION SYSTEM

3 (S) SURFACE WATER
31 ☐ UPSTREAM
32 ☐ MID-SITE
33 ☐ DOWNSTREAM
34 ☐ RUN-OFF
35 ☐ IMPOUNDED

POINT LOCATION
2,155 . 200 FT. (+) ☒ E. (−) ☐ W.
541 . 740 FT. (+) ☒ N. (−) ☐ S.
FROM ☒ GRID ORIGIN ☐ BENCHMARK

DATE POINT ESTABLISHED
09 / 28 / 77
MON DAY YEAR

6 COMMENTS ABOUT SAMPLING POINT:
Well depth - 38.6' Gradient from landfill - downgradient
Geologic formation of well screen - sand
Location of well seals/materials used - bentonite seal above well screen

WELL DESCRIPTION

PIPE DIAMETER 2 . 0 0 INCHES

PIPE TOP ELEVATION 806 . 0 0 FEET ☒ MSL ☐ SITE

GROUND SURFACE ELEVATION 802 . 7 0 FEET ☒ MSL ☐ SITE

TYPE OF CASING (✓ ONE)
☒ 1 PLASTIC ☐ 2 STEEL

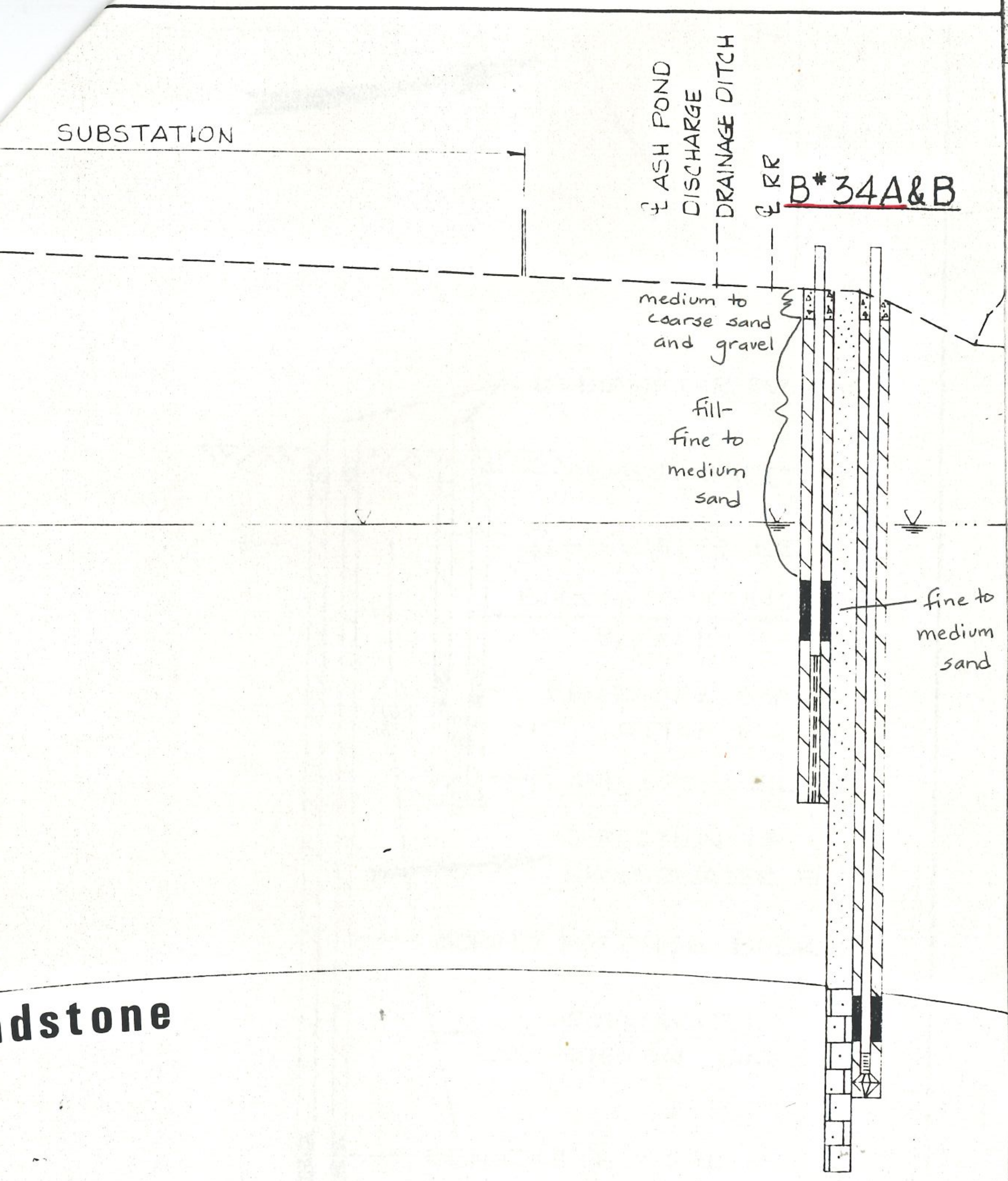
7 COMMENTS ABOUT REQUIRED SAMPLING:
Avg. vol. of water to be bailed:

Groundwater Flow - westerly

REQUIRED SAMPLING (MG/l except as noted)

	NO.	PARAMETERS	MONTHS OF REQUIRED SAMPLING
🟥	00410	ALKALINITY (AS CA CO_3)	1-2-[✓ 3]-4-5-[✓ 6]-7-8-[✓ 9]-10-11-[✓ 12]
☐	00310	BOD (5 DAY)	1-2-3-4-5-6-7-8-9-10-11-12
☐	00916	CALCIUM	1-2-3-4-5-6-7-8-9-10-11-12
☐	00307	CHLORIDES	1-2-3-4-5-6-7-8-9-10-11-12
☐	00340	COD	1-2-3-4-5-6-7-8-9-10-11-12
🟥	00872	CONDUCTIVITY (SU)	1-2-[✓ 3]-4-5-[✓ 6]-7-8-[✓ 9]-10-11-[✓ 12]
☐	00277	COPPER (DISSOLVED)	1-2-3-4-5-6-7-8-9-10-11-12
🟥	00900	HARDNESS (AS CA CO_3)	1-2-[✓ 3]-4-5-[✓ 6]-7-8-[✓ 9]-10-11-[✓ 12]
🟥	01046	IRON (DISSOLVED)	1-2-[✓ 3]-4-5-[✓ 6]-7-8-[✓ 9]-10-11-[✓ 12]
☐	00348	MAGNESIUM	1-2-3-4-5-6-7-8-9-10-11-12
☐	00620	NITRATES (AS NO_3)	1-2-3-4-5-6-7-8-9-10-11-12
☐	00640	NITROGEN (TOTAL INOGRANIC N)	1-2-3-4-5-6-7-8-9-10-11-12
🟥	00400	pH (SU)	1-2-[✓ 3]-4-5-[✓ 6]-7-8-[✓ 9]-10-11-[✓ 12]
☐	00129	PHENOLS	1-2-3-4-5-6-7-8-9-10-11-12
🟥	00929	SODIUM	1-2-[✓ 3]-4-5-[✓ 6]-7-8-[✓ 9]-10-11-[✓ 12]
🟥	00945	SULFATES	1-2-[✓ 3]-4-5-[✓ 6]-7-8-[✓ 9]-10-11-[✓ 12]
☐	00360	TOTAL DIS. SOLIDS	1-2-3-4-5-6-7-8-9-10-11-12
🟥	00842	WATER ELEVATION (FT. MSL)	1-2-[✓ 3]-4-5-[✓ 6]-7-8-[✓ 9]-10-11-[✓ 12]
☐	00275	ZINC (DISSOLVED)	1-2-3-4-5-6-7-8-9-10-11-12

	NO.	PARAMETERS (OTHERS)	MONTHS
🟥	01022	Boron	1-2-[✓ 3]-4-5-[✓ 6]-7-8-[✓ 9]-10-11-[✓ 12]
🟥		Color	1-2-[✓ 3]-4-5-[✓ 6]-7-8-[✓ 9]-10-11-[✓ 12]
🟥		Odor	1-2-[✓ 3]-4-5-[✓ 6]-7-8-[✓ 9]-10-11-[✓ 12]
🟥		Turbidity	1-2-[✓ 3]-4-5-[✓ 6]-7-8-[✓ 9]-10-11-[✓ 12]
🟥	01002	Arsenic	1-2-3-4-5-[✓ 6]-7-8-9-10-11-12
🟥	01007	Barium	1-2-3-4-5-[✓ 6]-7-8-9-10-11-12
🟥	00312	Cadmium	1-2-3-4-5-[✓ 6]-7-8-9-10-11-12
🟥	00273	Chromium	1-2-3-4-5-[✓ 6]-7-8-9-10-11-12
🟥	00240	Lead	1-2-3-4-5-[✓ 6]-7-8-9-10-11-12
🟥	00126	Mercury	1-2-3-4-5-[✓ 6]-7-8-9-10-11-12
🟥	00270	Selenium	1-2-3-4-5-[✓ 6]-7-8-9-10-11-12
🟥	01077	Silver	-[✓ 6]-



Scale:

Horizontal 1"=100'

Vertical 1"=10'

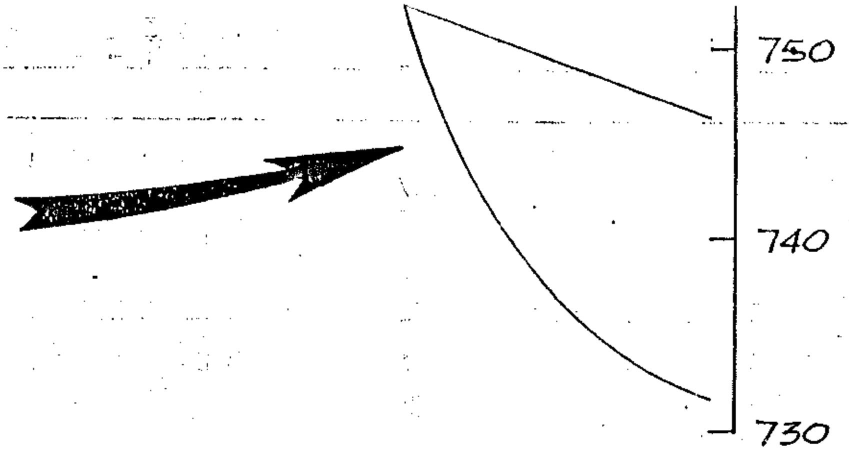
No legend available

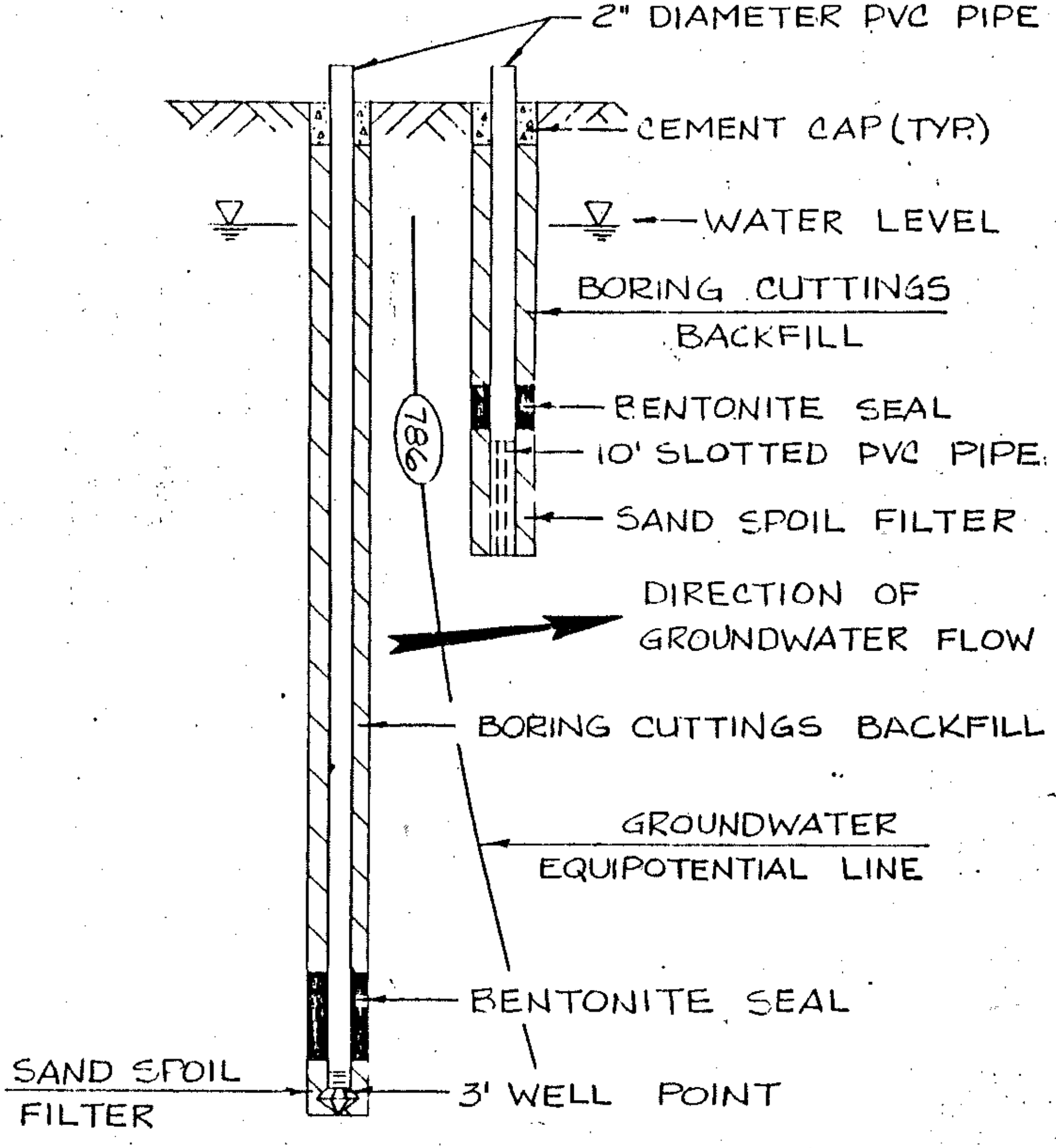
Warzyn Engineering Inc.

Geologic Cross Sections

Drawing No.C7134-11

Date 1-20-78





TYPICAL MONITORING WELL DETAIL

NOT TO SCALE

Date- 1-20-78 Drawing No. 7134-9

Warzyn Engineering Inc.

WELL DETAIL INFORMATION SHEET

JOB NO. C 7134

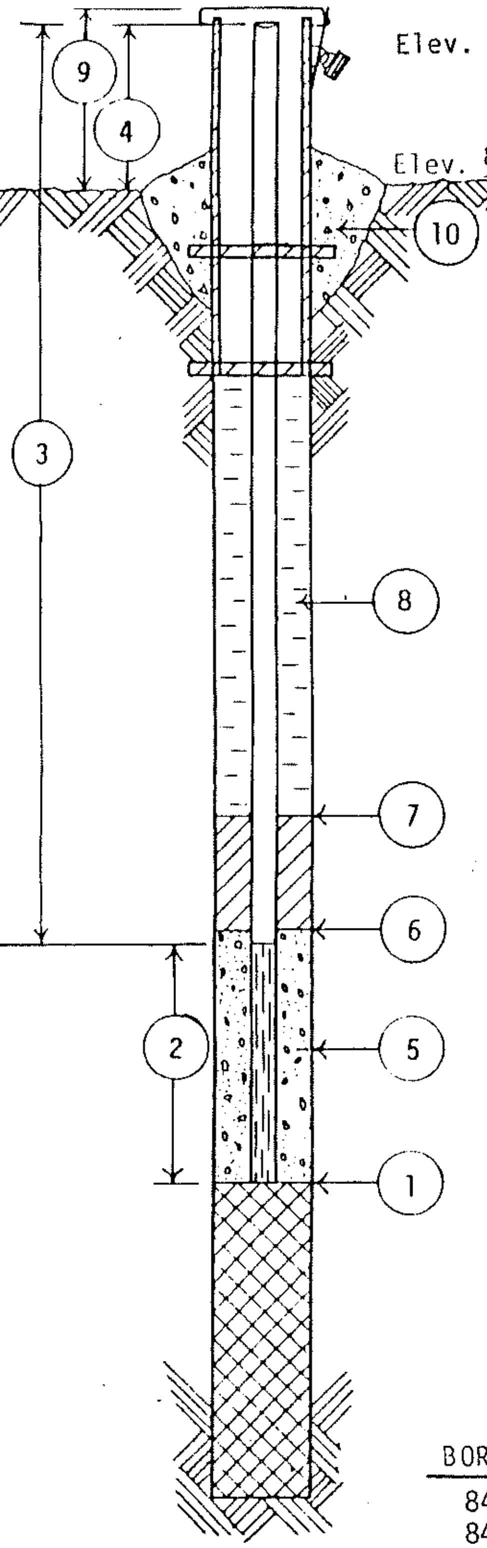
BORING NO. MW-84A

DATE 10/5/83

Elev. 814.57 Steel
814.32 PVC

CHIEF JS

LOCATION WP&L-Columbia Generating Station



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"	

WARZY
ENGINEERING IN

State of Wisconsin
Department of Natural Resources

MONITORING WELL DEVELOPMENT

Form 4400-113B Rev. 7-98

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

Facility/Project Name: Alliant-Columbia
County Name: Columbia
Well Name: MW-301
Facility License, Permit or Monitoring Number:
County Code: 11
Wis. Unique Well Number: VY701
DNR Well ID Number:

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

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

3. Time spent developing well 120 min.

4. Depth of well (from top of well casisng) 29.4 ft.

5. Inside diameter of well 2.00 in.

6. Volume of water in filter pack and well casing 7.6 gal.

7. Volume of water removed from well 84.0 gal.

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

9. Source of water added ____________

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

	Before Development	After Development
11. Depth to Water (from top of well casing)	a. 21.72 ft.	21.77 ft.
Date	b. 12/02/2015 (m m / d d / y y y y)	12/02/2015 (m m / d d / y y y y)
Time	c. 08:30 ☒ a.m. ☐ p.m.	10:30 ☒ a.m. ☐ p.m.
12. Sediment in well bottom	0 inches	0 inches
13. Water clarity	Clear ☐ 10 Turbid ☒ 15 (Describe)	Clear ☒ 20 Turbid ☐ 25 (Describe)

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

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

16. Well developed by: Name (first, last) and Firm
First Name: Gary Last Name: Sterkel
Firm: SCS ENGINEERS

17. Additional comments on development:

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

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

Signature: for Gary Sterkel
Print Name: Gary Sterkel
Firm: SCS ENGINEERS

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

State of Wisconsin
Department of Natural Resources

MONITORING WELL DEVELOPMENT

Form 4400-113B Rev. 7-98

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

Facility/Project Name Alliant - Columbia	**County Name** Columbia	**Well Name** MW-302	
Facility License, Permit or Monitoring Number	**County Code** 11	**Wis. Unique Well Number** VY702	**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 120 min.

4. Depth of well (from top of well casisng) 33 . 6 ft.

5. Inside diameter of well 2 . 00 in.

6. Volume of water in filter pack and well casing 5 . 4 gal.

7. Volume of water removed from well 60 . 0 gal.

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

9. Source of water added ____________

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

		Before Development	After Development
11. Depth to Water (from top of well casing)	a.	28 . 37 ft.	28 . 41 ft.
Date	b.	12 / 02 / 2015 (m m d d y y y y)	12 / 02 / 2015 (m m d d y y y y)
Time	c.	02 : 00 ☐ a.m. ☒ p.m.	04 : 00 ☐ a.m. ☒ p.m.
12. Sediment in well bottom		0 . __ inches	0 . __ inches
13. Water clarity		Clear ☐ 1 0 Turbid ☒ 1 5 (Describe)	Clear ☒ 2 0 Turbid ☐ 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: Gary Last Name: Sterkel
Firm: SCS ENGINEERS

17. Additional comments on development:

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

I hereby certify that the above information is true and correct to the best of my knowledge.
Signature: for G.S.
Print Name: Gary Sterkel
Firm: SCS ENGINEERS

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

SCS # 25215135

State of Wisconsin
Department of Natural Resources

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

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

Facility/Project Name: WPL-Columbia

Local Grid Location of Well: ______ ft. ☐ N. ☐ S. ______ ft. ☐ E. ☐ W.

Well Name: MW-301

Facility License, Permit or Monitoring No.:

Local Grid Origin ☐ (estimated: ☐) or Well Location ☐

Lat. ___ ° ___ ' ___ " Long. ___ ° ___ ' ___ " or

Wis. Unique Well No.: VY701

DNR Well ID No.:

Facility ID:

St. Plane 541562.2 ft. N, 2125001 ft. E. S/C/N

Date Well Installed: 11 / 11 / 2015 (m m / d d / y y y y)

Type of Well: Well Code 11 / MW

Section Location of Waste/Source: SW 1/4 of SE 1/4 of Sec. 27, T. 12 N, R. 9 ☒ E ☐ W

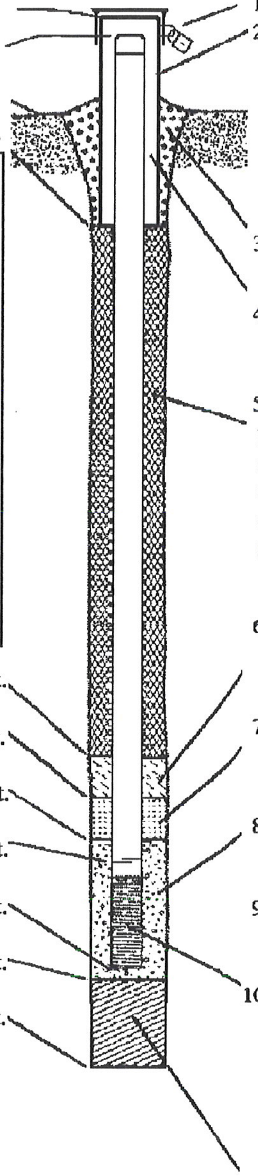
Well Installed By: Name (first, last) and Firm: Kevin Duerst, Badger State Drilling

Distance from Waste/Source ______ ft.

Enf. Stds. Apply ☐

Location of Well Relative to Waste/Source: u ☐ Upgradient, s ☐ Sidegradient, d ☐ Downgradient, n ☐ Not Known

Gov. Lot Number:



A. Protective pipe, top elevation _ _ 807 . _16 ft. MSL

B. Well casing, top elevation _ _ _ _ 806 _89 ft. MSL

C. Land surface elevation _ _ 803 _69 ft. MSL

D. Surface seal, bottom _791._69 ft. MSL or _ _ _12 ft.

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

13. Sieve analysis performed? ☐ Yes ☐ No

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

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

16. Drilling additives used? ☐ Yes ☒ No

Describe ______

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

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

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

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

H. Screen joint, top _ _ _787.69 ft. MSL or _ _ _ _ 16 ft.

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

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

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

L. Borehole, diameter _ _ 8.5 in.

M. O.D. well casing _ _ 2.4 in.

N. I.D. well casing _ _ 2.0 in.

1. Cap and lock? ☐ Yes ☒ No

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

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

4. Material between well casing and protective pipe: Bentonite ☒ 3 0
Bentonite to grade, sand above Other ☐

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

6. Bentonite seal:
   - a. Bentonite granules ☐ 3 3
   - b. ☐ 1/4 in. ☒ 3/8 in. ☐ 1/2 in. Bentonite chips ☑ 3 2
   - c. 4 ft3 Other ☐

7. Fine sand material: Manufacturer, product name & mesh size
   - a. RW Sidley Inc. #7 ☐
   - b. Volume added 0.5 ft^3

8. Filter pack material: Manufacturer, product name & mesh size
   - a. RW Sidley #5 ☐
   - b. Volume added 2 ft^3

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

10. Screen material: PVC
   - a. Screen type: Factory cut ☒ 1 1; Continuous slot ☐ 0 1; Other ☐
   - b. Manufacturer Johnson
   - c. Slot size: 0._01 in.
   - d. Slotted length: _ _10 ft.

11. Backfill material (below filter pack): None ☐ 1 4
Native 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 53718-6751

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

SCS # 25215135

State of Wisconsin
Department of Natural Resources

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

MONITORING WELL CONSTRUCTION

Form 4400-113A Rev. 7-98

Facility/Project Name: WPL-Columbia

Local Grid Location of Well: ______ ft. ☐ N. ☐ S. ______ ft. ☐ E. ☐ W.

Well Name: MW-302

Facility License, Permit or Monitoring No.:

Local Grid Origin ☐ (estimated: ☐) or Well Location ☐
Lat. ___ ° ___ ' ___ " Long. ___ ° ___ ' ___ " or

Wis. Unique Well No.: VY702

DNR Well ID No.:

Facility ID:

St. Plane 541964.7 ft. N, 2123849 ft. E. S/C/N

Date Well Installed: 11 / 12 / 2015 (m m / d d / y y y y)

Section Location of Waste/Source: SE 1/4 of SW 1/4 of Sec. 27, T. 12 N, R. 9 ☒ E ☐ W

Type of Well: Well Code 11 / MW

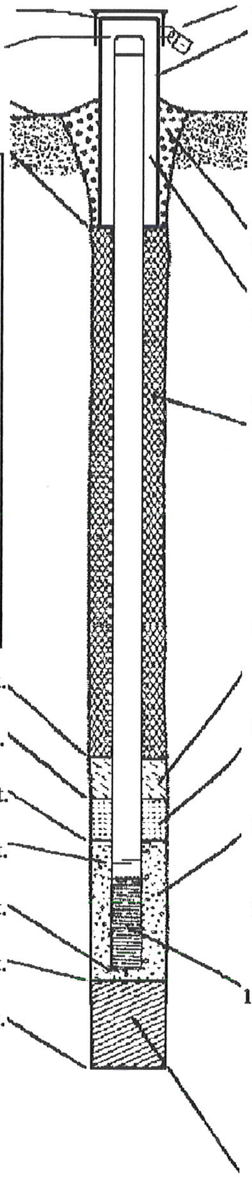
Well Installed By: Name (first, last) and Firm: Kevin Duerst, Badger State Drilling

Distance from Waste/Source ______ ft.

Enf. Stds. Apply ☐

Location of Well Relative to Waste/Source: u ☐ Upgradient s ☐ Sidegradient d ☐ Downgradient n ☐ Not Known

Gov. Lot Number:



A. Protective pipe, top elevation 813.19 ft. MSL

B. Well casing, top elevation 813.00 ft. MSL

C. Land surface elevation 809.93 ft. MSL

D. Surface seal, bottom 793.53 ft. MSL or 16.4 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 809.93 ft. MSL or 0 ft.

F. Fine sand, top 793.53 ft. MSL or 16.4 ft.

G. Filter pack, top 791.53 ft. MSL or 18.4 ft.

H. Screen joint, top 789.53 ft. MSL or 20.4 ft.

I. Well bottom 779.53 ft. MSL or 30.4 ft.

J. Filter pack, bottom 776.93 ft. MSL or 33 ft.

K. Borehole, bottom 776.93 ft. MSL or 33 ft.

L. Borehole, diameter 8.5 in.

M. O.D. well casing 2 3/8 in.

N. I.D. well casing 2 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 ☐ steel
   - d. Additional protection? ☐ Yes ☐ No
   If yes, describe: yes, bumper posts

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

4. Material between well casing and protective pipe: Bentonite ☒ 3 0; Other ☐ Bentonite to grade, sand above

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

6. Bentonite seal: a. Bentonite granules ☐ 3 3
   - b. ☐ 1/4 in. ☒ 3/8 in. ☐ 1/2 in. Bentonite chips ☐ 3 2
   - c. 4.7 ft3 Other ☐

7. Fine sand material: Manufacturer, product name & mesh size
   - a. RW Sidley Inc. #7 ☐
   - b. Volume added 1 ft^3

8. Filter pack material: Manufacturer, product name & mesh size
   - a. RW Sidley #5 ☐
   - b. Volume added 2.5 ft^3

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

10. Screen material: PVC
   - a. Screen type: Factory cut ☒ 1 1; Continuous slot ☐ 0 1; Other ☐
   - b. Manufacturer: Johnson
   - c. Slot size: 0.01 in.
   - d. Slotted length: 10 ft.

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

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

Signature: for Zach Watson

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.

Appendix C

Laboratory Reports

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

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
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

CERTIFICATIONS

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

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

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

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	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

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

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
6020B MET ICPMS	Analytical Method: EPA 6020B Preparation Method: EPA 3010A Pace Analytical Services - Green Bay								
Antimony	**<0.15**	ug/L	1.0	0.15	1	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	
7470 Mercury	Analytical Method: EPA 7470 Preparation Method: EPA 7470 Pace Analytical Services - Green Bay								
Mercury	**<0.066**	ug/L	0.20	0.066	1	04/20/22 09:45	04/21/22 07:52	7439-97-6	
Field Data	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		
2540C Total Dissolved Solids	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		
9040 pH	Analytical Method: EPA 9040 Pace Analytical Services - Green Bay								
pH at 25 Degrees C	**7.6**	Std. Units	0.10	0.010	1		04/18/22 10:50		H6
300.0 IC Anions	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

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
6020B MET ICPMS	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	
7470 Mercury	Analytical Method: EPA 7470 Preparation Method: EPA 7470 Pace Analytical Services - Green Bay								
Mercury	**<0.066**	ug/L	0.20	0.066	1	04/20/22 09:45	04/21/22 07:59	7439-97-6	
Field Data	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		
2540C Total Dissolved Solids	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		
9040 pH	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
300.0 IC Anions	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	

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

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

QUALITY CONTROL DATA

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

QC Batch: 413354
QC Batch Method: EPA 3010A
Analysis Method: EPA 6020B
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

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
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	

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

QUALITY CONTROL DATA

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

QC Batch: 413340
QC Batch Method: SM 2540C
Analysis 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	

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

QUALITY CONTROL DATA

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

QC Batch: 413406
QC Batch Method: EPA 9040
Analysis 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

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

QUALITY CONTROL DATA

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

QC Batch: 414946
QC Batch Method: EPA 300.0
Analysis Method: EPA 300.0
Analysis Description: 300.0 IC Anions
Laboratory: Pace Analytical Services - Green Bay
Associated Lab Samples: 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	40243482001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
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

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

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	**0.254 ± 0.354 (0.590)** **C:NA T:97%**	pCi/L	05/03/22 12:00	13982-63-3	
	Pace Analytical Services - Greensburg					
Radium-228	EPA 904.0	**0.357 ± 0.315 (0.634)** **C:76% T:90%**	pCi/L	05/02/22 12:15	15262-20-1	
	Pace Analytical Services - Greensburg					
Total Radium	Total Radium Calculation	**0.611 ± 0.669 (1.22)**	pCi/L	05/04/22 22:02	7440-14-4	

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	**0.000 ± 0.289 (0.649)** **C:NA T:99%**	pCi/L	05/03/22 12:11	13982-63-3	
	Pace Analytical Services - Greensburg					
Radium-228	EPA 904.0	**0.179 ± 0.282 (0.610)** **C:80% T:92%**	pCi/L	05/02/22 12:15	15262-20-1	
	Pace Analytical Services - Greensburg					
Total Radium	Total Radium Calculation	**0.179 ± 0.571 (1.26)**	pCi/L	05/04/22 22:02	7440-14-4	

QUALITY CONTROL - RADIOCHEMISTRY

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

QC Batch: 498723
QC Batch Method: EPA 903.1
Analysis Method: EPA 903.1
Analysis Description: 903.1 Radium-226
Laboratory: Pace Analytical Services - Greensburg
Associated Lab Samples: 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	

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

QUALITY CONTROL - RADIOCHEMISTRY

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

QC Batch: 498724
QC Batch Method: EPA 904.0
Analysis Method: EPA 904.0
Analysis Description: 904.0 Radium 228
Laboratory: Pace Analytical Services - Greensburg
Associated Lab Samples: 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	

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

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.

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		

#1

Pace Analytical®

CHAIN-OF-CUSTODY Analytical Request Document

Chain-of-Custody is a LEGAL DOCUMENT - Complete all relevent fields

LAB USE ONLY- Affix Workorder/Login Label Here or List Pace Workorder Number or MTJL Log-in Number Here 40243482

ALL SHADED AREAS are for LAB USE ONLY

Company: SCS Engineers
Address: 2830 Dairy Dr. Madison, WI.
Billing Information: Same
Report To: Thomas Karwoski
Email To: mBlodgett@scsengineers.com
Copy To: Meghan Blodgett
Site Collection Info/Address:
Customer Project Name/Number: Columbia 25222067.00
State: WI / County/City: Columbia/Portage / Time Zone Collected: [ ] PT [ ] MT [✓ CT] [ ] ET
Phone: 608-224-2830
Email:
Site/Facility ID #:
Compliance Monitoring? [ ] Yes [ ] No
Collected By (print): Adam Watson
Purchase Order #:
Quote #:
DW PWS ID #:
DW Location Code:
Collected By (signature):
Turnaround Date Required:
Immediately Packed on Ice: [✓ Yes] [ ] No
Sample Disposal: [ ] Dispose as appropriate [ ] Return [ ] Archive: ______ [ ] Hold: ______
Rush: [ ] Same Day [ ] Next Day [ ] 2 Day [ ] 3 Day [ ] 4 Day [ ] 5 Day (Expedite Charges Apply)
Field Filtered (if applicable): [ ] Yes [✓ No]
Analysis: ______

Container Preservative Type **: 1 | 1 | U | U

Lab Project Manager:

** Preservative Types: (1) nitric acid, (2) sulfuric acid, (3) hydrochloric acid, (4) sodium hydroxide, (5) zinc acetate, (6) methanol, (7) sodium bisulfate, (8) sodium thiosulfate, (9) hexane, (A) ascorbic acid, (B) ammonium sulfate, (C) ammonium hydroxide, (D) TSP, (U) Unpreserved, (O) Other ______

* Matrix Codes (Insert in Matrix box below): Drinking Water (DW), Ground Water (GW), Wastewater (WW), Product (P), Soil/Solid (SL), Oil (OL), Wipe (WP), Air (AR), Tissue (TS), Bioassay (B), Vapor (V), Other (OT)

Customer Sample ID	Matrix *	Comp / Grab	Collected (or Composite Start) Date	Collected Time	Composite End Date	Composite End Time	Res Cl	# of Ctns	Radium 226/228	Metals	pH	TDS, Cl, F, SO4							Lab Sample # / Comments
MW-84A			4/13/22	1420				5	X	X	X	X							4/15 ~~008~~ 001
MW-301			4/13/22	1540				5	X	X	X	X							002

Lab Profile/Line:

~~Lab Sample Receipt Checklist:~~
~~Custody Seals Present/Intact Y N NA~~
~~Custody Signatures Present Y N NA~~
~~Collector Signature Present Y N NA~~
~~Bottles Intact Y N NA~~
~~Correct Bottles Y N NA~~
~~Sufficient Volume Y N NA~~
~~Samples Received on Ice Y N NA~~
~~VOA - Headspace Acceptable Y N NA~~
~~USDA Regulated Soils Y N NA~~
~~Samples in Holding Time Y N NA~~
~~Residual Chlorine Present Y N NA~~
~~Cl Strips:~~
~~Sample pH Acceptable Y N NA~~
~~pH Strips:~~
~~Sulfide Present Y N NA~~
~~Lead Acetate Strips:~~ 4/15/22

LAB USE ONLY:
Lab Sample # / Comments:

Customer Remarks / Special Conditions / Possible Hazards:

Type of Ice Used: [✓ Wet] Blue Dry None
Packing Material Used:
Radchem sample(s) screened (<500 cpm): Y N NA
SHORT HOLDS PRESENT (<72 hours): Y N N/A
Lab Tracking #: 2764151
Samples received via: FEDEX UPS Client Courier Pace Courier

Lab Sample Temperature Info:
Temp Blank Received: [✓ Y] N NA
Therm ID#: 113
Cooler 1 Temp Upon Receipt: 1 oC
Cooler 1 Therm Corr. Factor: .1 oC
Cooler 1 Corrected Temp: 1.1 oC
Comments:

Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:
SCS	4/14/22 1030		
CS logistics	4/15/22 0710	Pace	4/15/22 0710

MTJL LAB USE ONLY
Table #:
Acctnum:
Template:
Prelogin:
PM:
PB:

Trip Blank Received: Y N [✓ NA]
HCL MeOH TSP Other

Non Conformance(s): YES / NO

Sample Preservation Receipt Form

Client Name: SCS Engineers   Project # 40243482

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

Lab Lot# of pH paper: 10D3112   Lab Std #ID of preservation (if pH adjusted):

Initial when completed: TP   Date/ Time:

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

TP 4/15/22

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

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

Page 1 of 2

DC#_Title: ENV-FRM-GBAY-0014 v02_SCUR
Revision: 3 | Effective Date: | Issued by: Green Bay

Sample Condition Upon Receipt Form (SCUR)

Project #:

WO# : 40243482

40243482

Client Name: SCS Engineers

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

Tracking #:

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

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

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

Thermometer Used SR - 113 **Type of Ice:** [✓ Wet] Blue Dry None ☑ Samples on ice, cooling process has begun

Cooler Temperature Uncorr: 1 /Corr: 1.1

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

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

Person examining contents:
Date: 4/15/22 /Initials: TP
Labeled By Initials:

Chain of Custody Present:	☑Yes ☐No ☐N/A	1.
Chain of Custody Filled Out:	☐Yes ☑No ☐N/A	2. PJ # TP 4/15/22
Chain of Custody Relinquished:	☑Yes ☐No ☐N/A	3.
Sampler Name & Signature on COC:	☑Yes ☐No ☐N/A	4.
Samples Arrived within Hold Time:	☑Yes ☐No	5.
- VOA Samples frozen upon receipt	☐Yes ☐No	Date/Time:
Short Hold Time Analysis (<72hr):	☐Yes ☑No	6.
Rush Turn Around Time Requested:	☐Yes ☑No	7.
Sufficient Volume:		8.
For Analysis: ☑Yes ☐No	MS/MSD: ☐Yes ☑No ☐N/A	
Correct Containers Used:	☑Yes ☐No	9.
-Pace Containers Used:	☑Yes ☐No ☐N/A	
-Pace IR Containers Used:	☐Yes ☐No ☑N/A	
Containers Intact:	☑Yes ☐No	10.
Filtered volume received for Dissolved tests	☐Yes ☐No ☑N/A	11.
Sample Labels match COC:	☑Yes ☐No ☐N/A	12.
-Includes date/time/ID/Analysis	Matrix: W	
Trip Blank Present:	☐Yes ☐No ☑N/A	13.
Trip Blank Custody Seals Present	☐Yes ☐No ☑N/A	
Pace Trip Blank Lot # (if purchased):		

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

Person Contacted: Date/Time:

Comments/ Resolution:

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

Page 1 of 2

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

May 16, 2022

Meghan Blodgett
SCS ENGINEERS
2830 Dairy Drive
Madison, WI 53718

RE: Project: 25222067 COLUMBIA CCR MOD 1-3
Pace Project No.: 40243485

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
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

CERTIFICATIONS

Project: 25222067 COLUMBIA CCR MOD 1-3
Pace Project No.: 40243485

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

SAMPLE SUMMARY

Project: 25222067 COLUMBIA CCR MOD 1-3
Pace Project No.: 40243485

Lab ID	Sample ID	Matrix	Date Collected	Date Received
40243485001	**MW-33AR**	Water	04/12/22 14:20	04/15/22 07:10
40243485002	**MW-34A**	Water	04/12/22 15:30	04/15/22 07:10
40243485003	**MW-302**	Water	04/12/22 16:05	04/15/22 07:10
40243485004	**MW-93A**	Water	04/13/22 12:50	04/15/22 07:10
40243485005	**FIELD BLANK MOD1-3LF**	Water	04/13/22 12:50	04/15/22 07:10

SAMPLE ANALYTE COUNT

Project: 25222067 COLUMBIA CCR MOD 1-3
Pace Project No.: 40243485

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
40243485001	**MW-33AR**	EPA 6020B	KXS	2	PASI-G
			MEA	7	PASI-G
		SM 2540C	SRK	1	PASI-G
		EPA 9040	YER	1	PASI-G
		EPA 300.0	HMB	3	PASI-G
40243485002	**MW-34A**	EPA 6020B	KXS	2	PASI-G
			MEA	7	PASI-G
		SM 2540C	SRK	1	PASI-G
		EPA 9040	YER	1	PASI-G
		EPA 300.0	HMB	3	PASI-G
40243485003	**MW-302**	EPA 6020B	KXS	2	PASI-G
			MEA	7	PASI-G
		SM 2540C	SRK	1	PASI-G
		EPA 9040	YER	1	PASI-G
		EPA 300.0	HMB	3	PASI-G
40243485004	**MW-93A**	EPA 6020B	KXS	14	PASI-G
		EPA 7470	AJT	1	PASI-G
			MEA	6	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
40243485005	**FIELD BLANK MOD1-3LF**	EPA 6020B	KXS	14	PASI-G
		EPA 7470	AJT	1	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

ANALYTICAL RESULTS

Project: 25222067 COLUMBIA CCR MOD 1-3
Pace Project No.: 40243485

Sample: MW-33AR **Lab ID: 40243485001** Collected: 04/12/22 14:20 Received: 04/15/22 07:10 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020B MET ICPMS	Analytical Method: EPA 6020B Preparation Method: EPA 3010A Pace Analytical Services - Green Bay								
Boron	**558**	ug/L	10.0	3.0	1	04/18/22 06:24	05/01/22 03:14	7440-42-8	
Calcium	**80000**	ug/L	254	76.2	1	04/18/22 06:24	05/01/22 03:14	7440-70-2	
Field Data	Analytical Method: Pace Analytical Services - Green Bay								
Field pH	**7.60**	Std. Units			1		04/12/22 14:20		
Field Specific Conductance	**847.0**	umhos/cm			1		04/12/22 14:20		
Oxygen, Dissolved	**9.62**	mg/L			1		04/12/22 14:20	7782-44-7	
REDOX	**198.2**	mV			1		04/12/22 14:20		
Turbidity	**0.00**	NTU			1		04/12/22 14:20		
Static Water Level	**783.27**	feet			1		04/12/22 14:20		
Temperature, Water (C)	**10.6**	deg C			1		04/12/22 14:20		
2540C Total Dissolved Solids	Analytical Method: SM 2540C Pace Analytical Services - Green Bay								
Total Dissolved Solids	**506**	mg/L	20.0	8.7	1		04/15/22 16:46		
9040 pH	Analytical Method: EPA 9040 Pace Analytical Services - Green Bay								
pH at 25 Degrees C	**7.7**	Std. Units	0.10	0.010	1		04/22/22 12:03		H6
300.0 IC Anions	Analytical Method: EPA 300.0 Pace Analytical Services - Green Bay								
Chloride	**59.0**	mg/L	2.0	0.43	1		05/05/22 01:49	16887-00-6	
Fluoride	**<0.095**	mg/L	0.32	0.095	1		05/06/22 17:43	16984-48-8	
Sulfate	**155**	mg/L	20.0	4.4	10		05/05/22 04:18	14808-79-8	

ANALYTICAL RESULTS

Project: 25222067 COLUMBIA CCR MOD 1-3
Pace Project No.: 40243485

Sample: MW-34A **Lab ID: 40243485002** Collected: 04/12/22 15:30 Received: 04/15/22 07:10 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020B MET ICPMS	Analytical Method: EPA 6020B Preparation Method: EPA 3010A Pace Analytical Services - Green Bay								
Boron	**237**	ug/L	10.0	3.0	1	04/18/22 06:24	05/01/22 03:36	7440-42-8	
Calcium	**77000**	ug/L	254	76.2	1	04/18/22 06:24	05/01/22 03:36	7440-70-2	
Field Data	Analytical Method: Pace Analytical Services - Green Bay								
Field pH	**8.34**	Std. Units			1		04/12/22 15:30		
Field Specific Conductance	**577.0**	umhos/cm			1		04/12/22 15:30		
Oxygen, Dissolved	**7.82**	mg/L			1		04/12/22 15:30	7782-44-7	
REDOX	**112.6**	mV			1		04/12/22 15:30		
Turbidity	**4.39**	NTU			1		04/12/22 15:30		
Static Water Level	**784.30**	feet			1		04/12/22 15:30		
Temperature, Water (C)	**11.4**	deg C			1		04/12/22 15:30		
2540C Total Dissolved Solids	Analytical Method: SM 2540C Pace Analytical Services - Green Bay								
Total Dissolved Solids	**402**	mg/L	20.0	8.7	1		04/15/22 16:46		
9040 pH	Analytical Method: EPA 9040 Pace Analytical Services - Green Bay								
pH at 25 Degrees C	**7.8**	Std. Units	0.10	0.010	1		04/22/22 12:08		H6
300.0 IC Anions	Analytical Method: EPA 300.0 Pace Analytical Services - Green Bay								
Chloride	**2.2**	mg/L	2.0	0.43	1		05/05/22 02:04	16887-00-6	
Fluoride	**<0.095**	mg/L	0.32	0.095	1		05/06/22 17:57	16984-48-8	
Sulfate	**146**	mg/L	20.0	4.4	10		05/05/22 21:19	14808-79-8	

ANALYTICAL RESULTS

Project: 25222067 COLUMBIA CCR MOD 1-3
Pace Project No.: 40243485

Sample: MW-302 **Lab ID: 40243485003** Collected: 04/12/22 16:05 Received: 04/15/22 07:10 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020B MET ICPMS	Analytical Method: EPA 6020B Preparation Method: EPA 3010A Pace Analytical Services - Green Bay								
Boron	**389**	ug/L	10.0	3.0	1	04/18/22 06:24	05/01/22 03:43	7440-42-8	
Calcium	**91600**	ug/L	254	76.2	1	04/18/22 06:24	05/01/22 03:43	7440-70-2	
Field Data	Analytical Method: Pace Analytical Services - Green Bay								
Field pH	**7.21**	Std. Units			1		04/12/22 16:05		
Field Specific Conductance	**677.1**	umhos/cm			1		04/12/22 16:05		
Oxygen, Dissolved	**8.74**	mg/L			1		04/12/22 16:05	7782-44-7	
REDOX	**197.1**	mV			1		04/12/22 16:05		
Turbidity	**3.92**	NTU			1		04/12/22 16:05		
Static Water Level	**784.42**	feet			1		04/12/22 16:05		
Temperature, Water (C)	**9.5**	deg C			1		04/12/22 16:05		
2540C Total Dissolved Solids	Analytical Method: SM 2540C Pace Analytical Services - Green Bay								
Total Dissolved Solids	**398**	mg/L	20.0	8.7	1		04/15/22 16:46		
9040 pH	Analytical Method: EPA 9040 Pace Analytical Services - Green Bay								
pH at 25 Degrees C	**7.4**	Std. Units	0.10	0.010	1		04/22/22 12:11		H6
300.0 IC Anions	Analytical Method: EPA 300.0 Pace Analytical Services - Green Bay								
Chloride	**0.79J**	mg/L	2.0	0.43	1		05/05/22 02:19	16887-00-6	
Fluoride	**<0.095**	mg/L	0.32	0.095	1		05/06/22 18:12	16984-48-8	
Sulfate	**22.1**	mg/L	2.0	0.44	1		05/05/22 02:19	14808-79-8	M0

ANALYTICAL RESULTS

Project: 25222067 COLUMBIA CCR MOD 1-3
Pace Project No.: 40243485

Sample: MW-93A **Lab ID: 40243485004** Collected: 04/13/22 12:50 Received: 04/15/22 07:10 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020B MET ICPMS	Analytical Method: EPA 6020B Preparation Method: EPA 3010A Pace Analytical Services - Green Bay								
Antimony	**<0.15**	ug/L	1.0	0.15	1	04/18/22 06:24	05/01/22 03:51	7440-36-0	
Arsenic	**<0.28**	ug/L	1.0	0.28	1	04/18/22 06:24	05/01/22 03:51	7440-38-2	
Barium	**113**	ug/L	2.3	0.70	1	04/18/22 06:24	05/01/22 03:51	7440-39-3	
Beryllium	**<0.25**	ug/L	1.0	0.25	1	04/18/22 06:24	05/01/22 03:51	7440-41-7	
Boron	**26.1**	ug/L	10.0	3.0	1	04/18/22 06:24	05/01/22 03:51	7440-42-8	
Cadmium	**<0.15**	ug/L	1.0	0.15	1	04/18/22 06:24	05/01/22 03:51	7440-43-9	
Calcium	**85500**	ug/L	254	76.2	1	04/18/22 06:24	05/01/22 03:51	7440-70-2	
Chromium	**1.2J**	ug/L	3.4	1.0	1	04/18/22 06:24	05/01/22 03:51	7440-47-3	
Cobalt	**0.41J**	ug/L	1.0	0.12	1	04/18/22 06:24	05/01/22 03:51	7440-48-4	
Lead	**<0.24**	ug/L	1.0	0.24	1	04/18/22 06:24	05/01/22 03:51	7439-92-1	
Lithium	**1.5**	ug/L	1.0	0.22	1	04/18/22 06:24	05/01/22 03:51	7439-93-2	
Molybdenum	**1.8**	ug/L	1.5	0.44	1	04/18/22 06:24	05/01/22 03:51	7439-98-7	
Selenium	**0.84J**	ug/L	1.1	0.32	1	04/18/22 06:24	05/01/22 03:51	7782-49-2	
Thallium	**<0.14**	ug/L	1.0	0.14	1	04/18/22 06:24	05/01/22 03:51	7440-28-0	
7470 Mercury	Analytical Method: EPA 7470 Preparation Method: EPA 7470 Pace Analytical Services - Green Bay								
Mercury	**<0.066**	ug/L	0.20	0.066	1	04/20/22 09:45	04/21/22 08:20	7439-97-6	
Field Data	Analytical Method: Pace Analytical Services - Green Bay								
Field pH	**7.68**	Std. Units			1		04/13/22 12:50		
Field Specific Conductance	**691.1**	umhos/cm			1		04/13/22 12:50		
Oxygen, Dissolved	**7.73**	mg/L			1		04/13/22 12:50	7782-44-7	
REDOX	**203.0**	mV			1		04/13/22 12:50		
Turbidity	**0.00**	NTU			1		04/13/22 12:50		
Temperature, Water (C)	**9.9**	deg C			1		04/13/22 12:50		
2540C Total Dissolved Solids	Analytical Method: SM 2540C Pace Analytical Services - Green Bay								
Total Dissolved Solids	**384**	mg/L	20.0	8.7	1		04/15/22 16:46		
9040 pH	Analytical Method: EPA 9040 Pace Analytical Services - Green Bay								
pH at 25 Degrees C	**7.4**	Std. Units	0.10	0.010	1		04/22/22 12:13		H6
300.0 IC Anions	Analytical Method: EPA 300.0 Pace Analytical Services - Green Bay								
Chloride	**19.0**	mg/L	2.0	0.43	1		05/10/22 23:58	16887-00-6	
Fluoride	**<0.095**	mg/L	0.32	0.095	1		05/10/22 23:58	16984-48-8	
Sulfate	**7.0**	mg/L	2.0	0.44	1		05/10/22 23:58	14808-79-8	

ANALYTICAL RESULTS

Project: 25222067 COLUMBIA CCR MOD 1-3
Pace Project No.: 40243485

Sample: FIELD BLANK MOD1-3LF **Lab ID: 40243485005** Collected: 04/13/22 12:50 Received: 04/15/22 07:10 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020B MET ICPMS	Analytical Method: EPA 6020B Preparation Method: EPA 3010A Pace Analytical Services - Green Bay								
Antimony	**<0.15**	ug/L	1.0	0.15	1	04/18/22 06:24	05/01/22 00:54	7440-36-0	
Arsenic	**<0.28**	ug/L	1.0	0.28	1	04/18/22 06:24	05/01/22 00:54	7440-38-2	
Barium	**<0.70**	ug/L	2.3	0.70	1	04/18/22 06:24	05/01/22 00:54	7440-39-3	
Beryllium	**<0.25**	ug/L	1.0	0.25	1	04/18/22 06:24	05/01/22 00:54	7440-41-7	
Boron	**<3.0**	ug/L	10.0	3.0	1	04/18/22 06:24	05/01/22 00:54	7440-42-8	
Cadmium	**<0.15**	ug/L	1.0	0.15	1	04/18/22 06:24	05/01/22 00:54	7440-43-9	
Calcium	**77.3J**	ug/L	254	76.2	1	04/18/22 06:24	05/01/22 00:54	7440-70-2	
Chromium	**<1.0**	ug/L	3.4	1.0	1	04/18/22 06:24	05/01/22 00:54	7440-47-3	
Cobalt	**<0.12**	ug/L	1.0	0.12	1	04/18/22 06:24	05/01/22 00:54	7440-48-4	
Lead	**<0.24**	ug/L	1.0	0.24	1	04/18/22 06:24	05/01/22 00:54	7439-92-1	
Lithium	**<0.22**	ug/L	1.0	0.22	1	04/18/22 06:24	05/01/22 00:54	7439-93-2	
Molybdenum	**<0.44**	ug/L	1.5	0.44	1	04/18/22 06:24	05/01/22 00:54	7439-98-7	
Selenium	**<0.32**	ug/L	1.1	0.32	1	04/18/22 06:24	05/01/22 00:54	7782-49-2	
Thallium	**<0.14**	ug/L	1.0	0.14	1	04/18/22 06:24	05/01/22 00:54	7440-28-0	
7470 Mercury	Analytical Method: EPA 7470 Preparation Method: EPA 7470 Pace Analytical Services - Green Bay								
Mercury	**<0.066**	ug/L	0.20	0.066	1	04/20/22 09:45	04/21/22 08:22	7439-97-6	
2540C Total Dissolved Solids	Analytical Method: SM 2540C Pace Analytical Services - Green Bay								
Total Dissolved Solids	**<8.7**	mg/L	20.0	8.7	1		04/15/22 16:47		
9040 pH	Analytical Method: EPA 9040 Pace Analytical Services - Green Bay								
pH at 25 Degrees C	**6.9**	Std. Units	0.10	0.010	1		04/22/22 12:21		H6
300.0 IC Anions	Analytical Method: EPA 300.0 Pace Analytical Services - Green Bay								
Chloride	**<0.43**	mg/L	2.0	0.43	1		05/11/22 00:12	16887-00-6	
Fluoride	**<0.095**	mg/L	0.32	0.095	1		05/11/22 00:12	16984-48-8	
Sulfate	**<0.44**	mg/L	2.0	0.44	1		05/11/22 00:12	14808-79-8	

QUALITY CONTROL DATA

Project: 25222067 COLUMBIA CCR MOD 1-3
Pace Project No.: 40243485

QC Batch: 413634
QC Batch Method: EPA 7470
Analysis Method: EPA 7470
Analysis Description: 7470 Mercury
Laboratory: Pace Analytical Services - Green Bay
Associated Lab Samples: 40243485004, 40243485005

METHOD BLANK: 2381580
Matrix: Water
Associated Lab Samples: 40243485004, 40243485005

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

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

QUALITY CONTROL DATA

Project: 25222067 COLUMBIA CCR MOD 1-3
Pace Project No.: 40243485

QC Batch: 413354
QC Batch Method: EPA 3010A
Analysis Method: EPA 6020B
Analysis Description: 6020B MET
Laboratory: Pace Analytical Services - Green Bay
Associated Lab Samples: 40243485001, 40243485002, 40243485003, 40243485004, 40243485005

METHOD BLANK: 2380530
Matrix: Water
Associated Lab Samples: 40243485001, 40243485002, 40243485003, 40243485004, 40243485005

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	

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

QUALITY CONTROL DATA

Project: 25222067 COLUMBIA CCR MOD 1-3
Pace Project No.: 40243485

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
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	

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

QUALITY CONTROL DATA

Project: 25222067 COLUMBIA CCR MOD 1-3
Pace Project No.: 40243485

QC Batch: 413340
QC Batch Method: SM 2540C
Analysis Method: SM 2540C
Analysis Description: 2540C Total Dissolved Solids
Laboratory: Pace Analytical Services - Green Bay
Associated Lab Samples: 40243485001, 40243485002, 40243485003, 40243485004, 40243485005

METHOD BLANK: 2380206
Matrix: Water
Associated Lab Samples: 40243485001, 40243485002, 40243485003, 40243485004, 40243485005

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	

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

QUALITY CONTROL DATA

Project: 25222067 COLUMBIA CCR MOD 1-3
Pace Project No.: 40243485

QC Batch: 413872
QC Batch Method: EPA 9040
Analysis Method: EPA 9040
Analysis Description: 9040 pH
Laboratory: Pace Analytical Services - Green Bay
Associated Lab Samples: 40243485001, 40243485002, 40243485003, 40243485004, 40243485005

SAMPLE DUPLICATE: 2382998

Parameter	Units	40243594001 Result	Dup Result	RPD	Max RPD	Qualifiers
pH at 25 Degrees C	Std. Units	9.2	9.1	2	20	1q,H6,PI

SAMPLE DUPLICATE: 2383176

Parameter	Units	40243485001 Result	Dup Result	RPD	Max RPD	Qualifiers
pH at 25 Degrees C	Std. Units	7.7	7.7	0	20	H6

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

QUALITY CONTROL DATA

Project: 25222067 COLUMBIA CCR MOD 1-3
Pace Project No.: 40243485

QC Batch: 414730
QC Batch Method: EPA 300.0
Analysis Method: EPA 300.0
Analysis Description: 300.0 IC Anions
Laboratory: Pace Analytical Services - Green Bay
Associated Lab Samples: 40243485001, 40243485002, 40243485003

METHOD BLANK: 2387879 Matrix: Water
Associated Lab Samples: 40243485001, 40243485002, 40243485003

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chloride	mg/L	<0.43	2.0	05/04/22 11:51	
Fluoride	mg/L	<0.095	0.32	05/04/22 11:51	
Sulfate	mg/L	<0.44	2.0	05/04/22 11:51	

LABORATORY CONTROL SAMPLE: 2387880

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	20	20.5	102	90-110	
Fluoride	mg/L	2	2.0	100	90-110	
Sulfate	mg/L	20	20.6	103	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2387881 2387882

Parameter	Units	40243924001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	224	400	400	655	655	108	108	90-110	0	15	
Sulfate	mg/L	182	400	400	614	615	108	108	90-110	0	15	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2387883 2387884

Parameter	Units	40243485003 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	0.79J	20	20	22.4	22.7	108	110	90-110	1	15	
Fluoride	mg/L	<0.095	2	2	2.1	2.1	106	107	90-110	1	15	
Sulfate	mg/L	22.1	20	20	44.3	44.6	111	112	90-110	1	15	M0

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

QUALITY CONTROL DATA

Project: 25222067 COLUMBIA CCR MOD 1-3
Pace Project No.: 40243485

QC Batch: 414946
QC Batch Method: EPA 300.0
Analysis Method: EPA 300.0
Analysis Description: 300.0 IC Anions
Laboratory: Pace Analytical Services - Green Bay
Associated Lab Samples: 40243485004, 40243485005

METHOD BLANK: 2389209 Matrix: Water
Associated Lab Samples: 40243485004, 40243485005

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	40243482001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
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

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

ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: 25222067 COLUMBIA CCR MOD 1-3
Pace Project No.: 40243485

Sample: MW-93A **Lab ID: 40243485004** Collected: 04/13/22 12:50 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	**0.369 ± 0.343 (0.452)** **C:NA T:94%**	pCi/L	05/03/22 12:00	13982-63-3	
	Pace Analytical Services - Greensburg					
Radium-228	EPA 904.0	**0.918 ± 0.472 (0.830)** **C:68% T:82%**	pCi/L	05/05/22 11:34	15262-20-1	
	Pace Analytical Services - Greensburg					
Total Radium	Total Radium Calculation	**1.29 ± 0.815 (1.28)**	pCi/L	05/09/22 17:12	7440-14-4	

ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: 25222067 COLUMBIA CCR MOD 1-3
Pace Project No.: 40243485

Sample: FIELD BLANK MOD1-3LF **Lab ID: 40243485005** Collected: 04/13/22 12:50 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	**0.000 ± 0.330 (0.715)** **C:NA T:97%**	pCi/L	05/03/22 12:00	13982-63-3	
	Pace Analytical Services - Greensburg					
Radium-228	EPA 904.0	**0.205 ± 0.253 (0.534)** **C:87% T:90%**	pCi/L	05/02/22 12:17	15262-20-1	
	Pace Analytical Services - Greensburg					
Total Radium	Total Radium Calculation	**0.205 ± 0.583 (1.25)**	pCi/L	05/04/22 22:02	7440-14-4	

QUALITY CONTROL - RADIOCHEMISTRY

Project: 25222067 COLUMBIA CCR MOD 1-3
Pace Project No.: 40243485

QC Batch: 498723
QC Batch Method: EPA 903.1
Analysis Method: EPA 903.1
Analysis Description: 903.1 Radium-226
Laboratory: Pace Analytical Services - Greensburg
Associated Lab Samples: 40243485004, 40243485005

METHOD BLANK: 2413743
Matrix: Water
Associated Lab Samples: 40243485004, 40243485005

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	

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

QUALITY CONTROL - RADIOCHEMISTRY

Project: 25222067 COLUMBIA CCR MOD 1-3
Pace Project No.: 40243485

QC Batch: 498724
QC Batch Method: EPA 904.0
Analysis Method: EPA 904.0
Analysis Description: 904.0 Radium 228
Laboratory: Pace Analytical Services - Greensburg
Associated Lab Samples: 40243485004, 40243485005

METHOD BLANK: 2413744
Matrix: Water
Associated Lab Samples: 40243485004, 40243485005

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	

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

QUALIFIERS

Project:	25222067 COLUMBIA CCR MOD 1-3
Pace Project No.:	40243485

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.
PI	The precision between the sample and the duplicate sample exceeded laboratory control limits.

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 25222067 COLUMBIA CCR MOD 1-3
Pace Project No.: 40243485

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
40243485001	**MW-33AR**	EPA 3010A	413354	EPA 6020B	413520
40243485002	**MW-34A**	EPA 3010A	413354	EPA 6020B	413520
40243485003	**MW-302**	EPA 3010A	413354	EPA 6020B	413520
40243485004	**MW-93A**	EPA 3010A	413354	EPA 6020B	413520
40243485005	**FIELD BLANK MOD1-3LF**	EPA 3010A	413354	EPA 6020B	413520
40243485004	**MW-93A**	EPA 7470	413634	EPA 7470	413681
40243485005	**FIELD BLANK MOD1-3LF**	EPA 7470	413634	EPA 7470	413681
40243485001	**MW-33AR**				
40243485002	**MW-34A**				
40243485003	**MW-302**				
40243485004	**MW-93A**				
40243485004	**MW-93A**	EPA 903.1	498723		
40243485005	**FIELD BLANK MOD1-3LF**	EPA 903.1	498723		
40243485004	**MW-93A**	EPA 904.0	498724		
40243485005	**FIELD BLANK MOD1-3LF**	EPA 904.0	498724		
40243485004	**MW-93A**	Total Radium Calculation	503146		
40243485005	**FIELD BLANK MOD1-3LF**	Total Radium Calculation	502166		
40243485001	**MW-33AR**	SM 2540C	413340		
40243485002	**MW-34A**	SM 2540C	413340		
40243485003	**MW-302**	SM 2540C	413340		
40243485004	**MW-93A**	SM 2540C	413340		
40243485005	**FIELD BLANK MOD1-3LF**	SM 2540C	413340		
40243485001	**MW-33AR**	EPA 9040	413872		
40243485002	**MW-34A**	EPA 9040	413872		
40243485003	**MW-302**	EPA 9040	413872		
40243485004	**MW-93A**	EPA 9040	413872		
40243485005	**FIELD BLANK MOD1-3LF**	EPA 9040	413872		
40243485001	**MW-33AR**	EPA 300.0	414730		
40243485002	**MW-34A**	EPA 300.0	414730		
40243485003	**MW-302**	EPA 300.0	414730		
40243485004	**MW-93A**	EPA 300.0	414946		
40243485005	**FIELD BLANK MOD1-3LF**	EPA 300.0	414946		

#2

Pace Analytical®

CHAIN-OF-CUSTODY Analytical Request Document

Chain-of-Custody is a LEGAL DOCUMENT - Complete all relevent fields

LAB USE ONLY- Affix Workorder/Login Label Here or List Pace Workorder Number or MTJL Log-in Number Here 40243485

ALL SHADED AREAS are for LAB USE ONLY

Company: SCS Engineers

Billing Information: Same

Address: 2830 Dairy Dr. Madison WI

Report To: Thomas Karwoski

Email To: MBlodgett@scsengineers.com

Copy To: Meghan Blodgett

Site Collection Info/Address:

Customer Project Name/Number: Columbia 25222067.00

State: WI County/City: Columbia/Portage Time Zone Collected: [ ] PT [ ] MT [✓ CT] [ ] ET

Phone: 608-224-2830
Email:

Site/Facility ID #:

Compliance Monitoring? [ ] Yes [ ] No

Collected By (print): Adam Watson

Purchase Order #:
Quote #:

DW PWS ID #:
DW Location Code:

Collected By (signature):

Turnaround Date Required:

Immediately Packed on Ice: [✓ Yes] [ ] No

Sample Disposal:
[ ] Dispose as appropriate [ ] Return
[ ] Archive: ____________
[ ] Hold: ____________

Rush:
[ ] Same Day [ ] Next Day
[ ] 2 Day [ ] 3 Day [ ] 4 Day [ ] 5 Day
(Expedite Charges Apply)

Field Filtered (if applicable): [ ] Yes [✓ No]

Analysis: ____________

Lab Project Manager:

Container Preservative Type **

1	U	U	1	1					

** Preservative Types: (1) nitric acid, (2) sulfuric acid, (3) hydrochloric acid, (4) sodium hydroxide, (5) zinc acetate, (6) methanol, (7) sodium bisulfate, (8) sodium thiosulfate, (9) hexane, (A) ascorbic acid, (B) ammonium sulfate, (C) ammonium hydroxide, (D) TSP, (U) Unpreserved, (O) Other ____________

Lab Profile/Line:

```
Lab Sample Receipt Checklist:

Custody Seals Present/Intact  Y N NA
Custody Signatures Present    Y N NA
Collector Signature Present   Y N NA
Bottles Intact                Y N NA
Correct Bottles               Y N NA
Sufficient Volume             Y N NA
Samples Received on Ice       Y N NA
VOA - Headspace Acceptable    Y N NA
USDA Regulated Soils          Y N NA
Samples in Holding Time       Y N NA
Residual Chlorine Present     Y N NA
Cl Strips: ____________
Sample pH Acceptable          Y N NA
pH Strips: ____________
Sulfide Present               Y N NA
Lead Acetate Strips: ________

LAB USE ONLY:
Lab Sample # / Comments:
```

TP 4/15/22

* Matrix Codes (Insert in Matrix box below): Drinking Water (DW), Ground Water (GW), Wastewater (WW), Product (P), Soil/Solid (SL), Oil (OL), Wipe (WP), Air (AR), Tissue (TS), Bioassay (B), Vapor (V), Other (OT)

Customer Sample ID	Matrix *	Comp / Grab	Collected (or Composite Start)		Composite End		Res Cl	# of Ctns	Boron, Calcium	pH	TDS, Cl, F, SO4	Metals full list	Radium 226/228						Lab Sample # / Comments
			Date	Time	Date	Time													
MW-33AR	GW		4/12/22	1420				3	X	X	X								001
MW-34A	GW		4/12/22	1530				3	X	X	X								002
MW-302	GW		4/12/22	1605				3	X	X	X								003
MW-93A	GW		4/13/22	1250				5		X	X	X	X						004
~~MW-34A~~	~~GW~~		~~4/13/22~~										~~X~~						
Field Blank MODI-3LF	W		4/13/22	1250				5		X	X	X	X						005

Customer Remarks / Special Conditions / Possible Hazards:

Type of Ice Used: [✓ Wet] Blue Dry None

SHORT HOLDS PRESENT (<72 hours): Y N N/A

Packing Material Used:

Lab Tracking #: 2764152

Radchem sample(s) screened (<500 cpm): Y N NA

Samples received via: FEDEX UPS Client Courier Pace Courier

Lab Sample Temperature Info:
Temp Blank Received: [✓ Y] N NA
Therm ID#: 113
Cooler 1 Temp Upon Receipt: 2 oC
Cooler 1 Therm Corr. Factor: .1 oC
Cooler 1 Corrected Temp: 2.1 oC
Comments:

Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:
SCS	4/14/22 1030		
CS logistics	4/15/22 0710	Pace	4/15/22 0710

MTJL LAB USE ONLY
Table #:
Acctnum:
Template:
Prelogin:
PM:
PB:

Trip Blank Received: Y N [✓ NA]
HCL MeOH TSP Other

Non Conformance(s): YES / NO

Page: Page 23 of: 25

Sample Preservation Receipt Form

Client Name: SCS Engineers Project # 40243485

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

Lab Lot# of pH paper: 1003112 Lab Std #ID of preservation (if pH adjusted):

Initial when completed: TP Date/ Time:

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

TP 4/15/22

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

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

Page 1 of 2

DC#_Title: ENV-FRM-GBAY-0014 v02_SCUR
Revision: 3 | Effective Date: | Issued by: Green Bay

Sample Condition Upon Receipt Form (SCUR)

Project #:

WO# : 40243485

40243485

Client Name: SCS Engineers

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

Tracking #:

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

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

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

Thermometer Used SR - 113 **Type of Ice:** [✓ Wet] Blue Dry None ☒ Samples on ice, cooling process has begun

Cooler Temperature Uncorr: 2 /Corr: 2.1

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

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

Person examining contents:
Date: 4/15/22 /Initials: TP
Labeled By Initials:

Chain of Custody Present:	☒Yes ☐No ☐N/A	1.
Chain of Custody Filled Out:	☐Yes ☒No ☐N/A	2. pg # TP 4/15/22
Chain of Custody Relinquished:	☒Yes ☐No ☐N/A	3.
Sampler Name & Signature on COC:	☒Yes ☐No ☐N/A	4.
Samples Arrived within Hold Time: - VOA Samples frozen upon receipt	☒Yes ☐No ☐Yes ☐No	5. Date/Time:
Short Hold Time Analysis (<72hr):	☐Yes ☒No	6.
Rush Turn Around Time Requested:	☐Yes ☒No	7.
Sufficient Volume: For Analysis: ☒Yes ☐No MS/MSD:	☐Yes ☒No ☐N/A	8.
Correct Containers Used: -Pace Containers Used: -Pace IR Containers Used:	☒Yes ☐No ☒Yes ☐No ☐N/A ☐Yes ☐No ☒N/A	9.
Containers Intact:	☒Yes ☐No	10.
Filtered volume received for Dissolved tests	☐Yes ☐No ☒N/A	11.
Sample Labels match COC: -Includes date/time/ID/Analysis Matrix: W	☒Yes ☐No ☐N/A	12.
Trip Blank Present: Trip Blank Custody Seals Present Pace Trip Blank Lot # (if purchased):	☐Yes ☐No ☒N/A ☐Yes ☐No ☒N/A	13.

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

Page 2 of 2

Appendix D

Historical Monitoring Results

Single Location

Name: WPL - Columbia

Location ID: MW-33AR
Number of Sampling Dates: 21

Parameter Name	Units	12/21/2015	4/5/2016	7/7/2016	10/13/2016	12/29/2016	1/25/2017	4/11/2017	6/6/2017	8/7/2017	10/24/2017	4/24/2018	9/21/2018	10/22/2018	4/2/2019	10/8/2019	5/28/2020	10/8/2020	4/13/2021	6/11/2021	10/12/2021	4/12/2022
Boron	ug/L	954	813	794	827	812	763	760	692	697	678	601	683	682	568	548	566	569	473	--	564	558
Calcium	ug/L	50000	48900	50500	79000	63100	57500	66800	80700	84800	98200	99800	--	66900	131000	121000	58400	57100	51600	--	53700	80000
Chloride	mg/L	10.6	12.5	12.5	52.5	39.6	41.4	47.1	68.1	105	119	188	32.6	14.4	229	153	15.9	27.3	26.9	--	22.6	59
Fluoride	mg/L	<0.2	<0.2	<0.2	<0.5	<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	7.87	8.08	7.68	8.23	7.63	8.62	8.19	7.78	7.47	7.81	7.74	8.16	7.69	7.72	7.74	7.59	7.7	8.78	7.71	7.59	7.6
Sulfate	mg/L	96.2	91.5	99.2	124	132	133	139	151	164	175	163	124	112	201	182	104	97.4	94.3	--	96.4	155
Total Dissolved Solids	mg/L	356	354	364	456	440	426	446	492	598	606	692	466	388	784	634	376	270	362	--	374	506
Antimony	ug/L	0.14	0.11	0.18	0.79	0.11	0.12	<0.073	<0.15	0.35	--	--	--	--	--	--	--	--	--	--	--	--
Arsenic	ug/L	0.46	0.38	0.52	1.2	0.32	0.45	0.31	0.36	0.59	--	--	--	--	--	--	--	--	--	--	--	--
Barium	ug/L	25.8	24.8	26.8	47.7	37.8	33.8	35.1	37.7	42.4	--	--	--	--	--	--	--	--	--	--	--	--
Beryllium	ug/L	<0.13	<0.13	<0.13	0.28	<0.13	<0.13	<0.13	<0.18	0.19	--	--	--	--	--	--	--	--	--	--	--	--
Cadmium	ug/L	<0.089	<0.089	0.11	0.66	<0.089	<0.089	<0.089	<0.081	0.22	--	--	--	--	--	--	--	--	--	--	--	--
Chromium	ug/L	2.3	2.1	1.9	2.2	1.9	2	2.4	1.5	1.7	--	--	--	--	--	--	--	--	--	--	--	--
Cobalt	ug/L	<0.036	<0.036	0.13	0.68	0.039	0.065	<0.036	<0.085	0.23	--	--	--	--	--	--	--	--	--	--	--	--
Lead	ug/L	<0.04	<0.04	0.14	0.73	<0.04	0.046	<0.04	<0.2	0.35	--	--	--	--	--	--	--	--	--	--	--	--
Lithium	ug/L	1.3	1.3	1.1	2.8	1.4	1.3	1.2	1.4	1.4	--	--	--	--	--	--	--	--	--	--	--	--
Mercury	ug/L	<0.1	<0.1	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	--	--	--	--	--	--	--	--	--	--	--	--
Molybdenum	ug/L	4.7	4.1	4.4	2.4	3.8	3.6	3	1.3	2.1	--	--	--	--	--	--	--	--	--	--	--	--
Selenium	ug/L	2.2	2	2.1	2.9	2	2.3	2.3	1.9	2.4	--	--	--	--	--	--	--	--	--	--	--	--
Thallium	ug/L	<0.14	<0.14	0.17	0.76	<0.14	<0.14	<0.14	<0.14	0.31	--	--	--	--	--	--	--	--	--	--	--	--
Total Radium	pCi/L	0.76	0.852	1.79	1.01	1.53	0.556	0.313	0.829	1.12	--	--	--	--	--	--	--	--	--	--	--	--
Radium-226	pCi/L	0.202	0.709	0.835	-0.209	0.834	0.314	0.166	0.3	0.426	--	--	--	--	--	--	--	--	--	--	--	--
Radium-228	pCi/L	0.558	0.143	0.951	1.01	0.698	0.242	0.147	0.529	0.698	--	--	--	--	--	--	--	--	--	--	--	--
Field Specific Conductance	umhos/cm	607	417.6	583.4	1255	702	797	1165	689	823	804	1079	632	618.4	1312	1102	633.4	623.5	622	609	623.2	847
Oxygen, Dissolved	mg/L	10.6	9.67	3.82	9.98	9.41	6.46	9.98	10.7	8.1	9.5	3	10.33	9.88	10.22	12.19	10.35	9.31	10.11	11.42	--	9.62
Field Oxidation Potential	mV	269	176	39.9	67.7	73.5	193.9	833	101.5	152.1	191	33.8	2.9	136.9	129	165.1	199.4	160.4	125.3	85.3	90	198.2
Groundwater Elevation	feet	783.77	763.29	785.19	787.36	785.66	785.88	786.39	787.27	786.11	784.13	783.09	787.9	788.77	786.63	788.26	786.01	785.91	784.27	784.19	783.73	783.27
Temperature	deg C	11.6	10.1	11.9	13.2	12.2	11.3	10.3	10.9	12.3	12.5	10.9	13.8	13.6	10.3	12.8	10.7	13.8	9.8	12.7	13.5	10.6
Turbidity	NTU	--	1.37	0.57	0.45	0.44	0.23	0.45	0.68	0.32	3.24	0.61	3.79	4.69	2.71	2.13	0	0	0.63	0	0	0
pH at 25 Degrees C	Std. Units	7.8	7.8	7.7	7.6	7.6	7.6	8	7.8	7.4	7.7	7.7	7.8	7.8	7.6	7.6	7.6	7.8	7.8	--	8	7.7

Single Location

Name: WPL - Columbia

Location ID: MW-34A
Number of Sampling Dates: 23

Parameter Name	Units	12/21/2015	4/5/2016	7/7/2016	7/28/2016	10/13/2016	12/29/2016	1/25/2017	4/11/2017	6/6/2017	8/7/2017	10/24/2017	4/24/2018	9/21/2018	10/22/2018	4/2/2019	10/8/2019	5/28/2020	10/8/2020	2/25/2021	4/13/2021	6/11/2021	10/12/2021	4/12/2022
Boron	ug/L	230/205	220	216	--	212	224	214	214	201	205	208	209	241	233	204	207	210	213	--	203	--	212	237
Calcium	ug/L	65300/65200	63500	60000	--	55600	62800	58900	66300	66900	67300	69600	69600	--	70100	67500	78800	58700	61300	--	61600	--	58100	77000
Chloride	mg/L	4.9/4.8	5.1	5.6	--	6.8	7.1	7.2	6.2	7.8	7.4	7.6	8.2	17.1	19.9	18.7	57.9	3.9	2.1	--	2.3	--	1.9	2.2
Fluoride	mg/L	<0.2/<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	7.91	7.92	7.52	7.4	8.19	7.43	7.71	8.03	7.57	7.39	7.67	7.8	8.12	7.64	7.73	7.79	7.4	7.81	7.57	7.93	7.61	7.68	8.34
Sulfate	mg/L	69.9/71.3	71.6	63.4	--	54.8	63.9	71.2	87.6	106	105	98	144	141	123	70.4	39.8	44.4	58.7	--	59.3	--	56.1	146
Total Dissolved Solids	mg/L	300/324	298	304	--	288	242	310	330	366	358	340	412	460	392	310	314	284	306	--	290	--	278	402
Antimony	ug/L	<0.073/<0.073	<0.073	<0.073	--	0.59	<0.073	<0.073	<0.073	<0.15	<0.15	--	--	--	--	--	--	--	--	--	--	--	--	--
Arsenic	ug/L	0.2/0.2	0.35	0.26	--	0.87	0.23	0.36	0.29	<0.28	0.36	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	ug/L	15.8/11.1	9.1	9.4	--	9.9	9.5	8.9	11.6	9.9	10.2	--	--	--	--	--	--	--	--	--	--	--	--	--
Beryllium	ug/L	<0.13/<0.13	<0.13	<0.13	--	0.28	<0.13	<0.13	<0.13	<0.18	<0.18	--	--	--	--	--	--	--	--	--	--	--	--	--
Cadmium	ug/L	<0.089/<0.089	<0.089	<0.089	--	0.51	<0.089	<0.089	<0.089	<0.081	0.089	--	--	--	--	--	--	--	--	--	--	--	--	--
Chromium	ug/L	2.5/2.2	2	2.2	--	2.2	1.8	1.8	2.4	1.7	1.5	--	--	--	--	--	--	--	--	--	--	--	--	--
Cobalt	ug/L	0.29/0.13	0.048	0.16	--	0.53	<0.036	<0.036	0.18	<0.085	0.13	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead	ug/L	0.38/0.18	0.046	0.18	--	0.61	0.049	<0.04	0.18	<0.2	<0.2	--	--	--	--	--	--	--	--	--	--	--	--	--
Lithium	ug/L	0.7/0.64	0.4	0.56	--	0.8	0.51	0.46	0.57	0.45	0.62	--	--	--	--	--	--	--	--	--	--	--	--	--
Mercury	ug/L	<0.1/<0.1	<0.1	<0.13	--	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	--	--	--	--	--	--	--	--	--	--	--	--	--
Molybdenum	ug/L	1.1/1.1	1.1	1.1	--	1.7	1.1	1	1.1	0.93	1.1	--	--	--	--	--	--	--	--	--	--	--	--	--
Selenium	ug/L	0.77/1	0.78	0.71	--	1.2	0.45	0.82	1.2	0.77	1.2	--	--	--	--	--	--	--	--	--	--	--	--	--
Thallium	ug/L	<0.14/<0.14	<0.14	<0.14	--	0.68	<0.14	<0.14	<0.14	<0.14	0.24	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Radium	pCi/L	0.689 /0.696	0.869	--	0.788	0.602	0.509	0.477	0.215	0.373	0.348	--	--	--	--	--	--	--	--	--	--	--	--	--
Radium-226	pCi/L	0.585 /0.198	0.869	--	-0.132	0.256	-0.235	0.477	0	-0.29	0.0539	--	--	--	--	--	--	--	--	--	--	--	--	--
Radium-228	pCi/L	0.104 /0.498	-0.021	--	0.788	0.346	0.509	-0.459	0.215	0.373	0.294	--	--	--	--	--	--	--	--	--	--	--	--	--
Field Specific Conductance	umhos/cm	517	386.9	494.3	503.6	819	490	470.9	843	499.1	510.6	454	581.4	578	607.7	531.7	572.9	459	464.2	--	472.6	472.7	478.1	577
Oxygen, Dissolved	mg/L	10	9.38	3.96	5.11	10.33	9.9	9.83	9.96	10.27	8.02	9.9	2.45	10.54	10.62	10.22	11.71	10.12	9.88	--	10.47	11.77	10.1	7.82
Field Oxidation Potential	mV	255	163.5	28.8	130.8	77.5	72.9	17.9	82.5	109.3	144.8	207	38.3	-2.6	118.8	104.4	150.9	198.5	143.2	--	118.8	73.4	72.6	112.6
Groundwater Elevation	feet	783.5	795.16	785.05	784.86	786.45	785.72	785.98	786.3	786.66	785.81	784.5	781.77	787.01	787.88	786.82	787.92	785.98	785.7	--	784.77	784.66	784.42	784.3
Temperature	deg C	11.7	10.9	10.8	10.9	12.2	12.3	12.3	11	11	11.5	11.7	11	12.45	12.7	10.6	13.4	11.1	12.9	--	10.3	12.2	13	11.4
Turbidity	NTU	--	4.08	6.3	4.96	2.27	0.95	2.09	15.96	3.7	2.68	14.34	2.72	24.9	9.32	64.77	52.88	84.51	55	--	36.34	9.72	21.13	4.39
pH at 25 Degrees C	Std. Units	7.7/7.7	7.7	7.4	--	7.6	7.4	7.3	7.9	7.7	7.8	7.7	7.7	7.7	7.8	7.7	7.7	7.6	7.7	--	7.8	--	7.8	7.8

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	3.2	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	<0.1	--	<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	<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-302
Number of Sampling Dates: 20

Parameter Name	Units	12/22/2015	4/5/2016	7/7/2016	10/13/2016	12/29/2016	1/25/2017	4/11/2017	6/6/2017	8/8/2017	10/24/2017	4/24/2018	9/21/2018	10/22/2018	4/2/2019	10/9/2019	5/29/2020	10/8/2020	4/13/2021	10/14/2021	4/12/2022
Boron	ug/L	80	78.8	134	132	106	149	322	671	833	691	1950	203	296	254	246	611	648	521	495	389
Calcium	ug/L	68800	65900	66900	71700	76100	75400	79600	88900	87100	94400	110000	--	56900	62400	61400	90500	80600	82400	84100	91600
Chloride	mg/L	4.2	4.1	3.1	1.1	1.2	1.6	1.6	3.5	4.5	6.9	15	1.7	1.8	1.5	1.1	1.2	1.1	1.4	1.3	0.79
Fluoride	mg/L	<0.2	<0.2	<0.2	<0.1	<0.1	0.13	<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	7.63	7.7	7.29	7.72	7.12	8.21	7.63	7.16	7.04	8.23	7.21	7.74	7.22	7.32	7.08	7.2	7.21	7.51	7.07	7.21
Sulfate	mg/L	37.4	55.6	35.4	64.7	56.4	61.6	81.3	84.6	79	78.4	109	30	26.9	25.2	16.7	34.6	36.5	36.9	37.8	22.1
Total Dissolved Solids	mg/L	312	312	344	360	330	384	436	466	470	446	598	280	288	290	274	404	378	370	394	398
Antimony	ug/L	0.17	0.092	0.2	0.14	0.14	0.17	<0.073	<0.15	<0.15	--	--	--	--	--	--	--	--	--	--	--
Arsenic	ug/L	<0.099	0.17	0.23	0.2	<0.099	0.24	<0.099	<0.28	<0.28	--	--	--	--	--	--	--	--	--	--	--
Barium	ug/L	14.3	9.7	14.6	16.4	16.9	17.8	20.3	22	22.2	--	--	--	--	--	--	--	--	--	--	--
Beryllium	ug/L	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	<0.18	<0.18	--	--	--	--	--	--	--	--	--	--	--
Cadmium	ug/L	<0.089	<0.089	0.14	<0.089	<0.089	<0.089	<0.089	<0.081	<0.081	--	--	--	--	--	--	--	--	--	--	--
Chromium	ug/L	2.3	3.3	2.7	1.7	2.4	2.6	2.7	2.3	2	--	--	--	--	--	--	--	--	--	--	--
Cobalt	ug/L	0.11	0.11	0.2	<0.036	0.079	0.083	0.08	<0.085	<0.085	--	--	--	--	--	--	--	--	--	--	--
Lead	ug/L	0.1	0.084	0.24	<0.04	0.073	0.075	0.047	<0.2	<0.2	--	--	--	--	--	--	--	--	--	--	--
Lithium	ug/L	17.1	13.7	4.5	3	3.3	3.2	2.7	2.2	2.4	--	--	--	--	--	--	--	--	--	--	--
Mercury	ug/L	<0.1	<0.1	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	--	--	--	--	--	--	--	--	--	--	--
Molybdenum	ug/L	8.9	8	2.4	1.6	1.6	1.6	1.5	1.3	1.6	--	--	--	--	--	--	--	--	--	--	--
Selenium	ug/L	2.8	2.7	1.8	1.2	2	1.6	2.5	2	2.4	--	--	--	--	--	--	--	--	--	--	--
Thallium	ug/L	<0.14	<0.14	0.24	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	--	--	--	--	--	--	--	--	--	--	--
Total Radium	pCi/L	0.184	0.505	1.21	0.4	0.252	2.6	0.555	1.45	0.731	--	--	--	--	--	--	--	--	--	--	--
Radium-226	pCi/L	0.184	0.1	-0.358	0.208	-0.103	1.37	0.077	0.649	0.193	--	--	--	--	--	--	--	--	--	--	--
Radium-228	pCi/L	-0.028	0.405	1.21	0.192	0.252	1.23	0.478	0.802	0.538	--	--	--	--	--	--	--	--	--	--	--
Field Specific Conductance	umhos/cm	566	383.6	578	1006	588.9	726	1114	641.8	679	596	894	461	507.6	538.6	515.4	694.7	643.1	661.3	663.7	677.1
Oxygen, Dissolved	mg/L	6.8	9.7	3.7	9.37	8.5	6.22	9.53	9.91	7.4	8.7	2.8	9.82	9.34	9.65	11.38	10	9.21	9.92	8.07	8.74
Field Oxidation Potential	mV	132	198.6	80	96.3	88.9	223.4	107.4	130.4	191.1	220	49.1	56	135.1	126.7	134.5	169.2	152.7	127	149.1	197.1
Groundwater Elevation	feet	784.78	778.91	786.28	787.76	787.05	786.89	787.55	788.37	787.55	785.94	784.37	788.37	789.16	787.56	788.31	787.29	786.74	785.77	785.09	784.42
Temperature	deg C	10.6	9.8	11.2	12.2	11.1	10.4	9.5	10.1	11.4	11.4	10.7	12.45	13.1	9.8	12.6	9.8	11.8	9.6	11.5	9.5
Turbidity	NTU	--	9.69	2.08	0.81	1.78	1.26	1.68	1.9	0.83	2.61	3.42	5.26	5.23	9.72	2.01	2.88	0	2.6	2.54	3.92
pH at 25 Degrees C	Std. Units	7.5	7.6	7.3	7.2	7.1	7.8	7.6	7.5	7.4	7.2	7.4	7.4	7.3	7.4	7.4	7.4	7.6	7.4	7.7	7.4

Appendix E

Alternative Source Demonstrations

Appendix E1

October 2021 Detection Monitoring

Alternative Source Demonstration October 2021 Detection Monitoring

Dry Ash Disposal Facility, Modules 1-3
Columbia Energy Center
Pardeeville, Wisconsin

Prepared for:

Alliant Energy

SCS ENGINEERS

25222067.00 | April 15, 2022

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

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PE CERTIFICATION

Sherren C.
Clark
E-29863
Madison,
Wis.

I, Sherren Clark, hereby certify that that the information in this alternative source demonstration is accurate and meets the requirements of 40 CFR 257.94(e)(2). This certification is based on my review of the groundwater data and related site information available for the Columbia Energy Center Dry Ash Disposal Facility. I am a duly licensed Professional Engineer under the laws of the State of Wisconsin.

4-14-2022

(signature) (date)

Sherren Clark

(printed or typed name)

License number E-29863

My license renewal date is July 31, 2022.

Pages or sheets covered by this seal:
Alternative Source Demonstration, October 2021 Detection Monitoring, Dry Ash Disposal Facility, Modules 1-3, Columbia Energy Center, Pardeeville, Wisconsin

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1.0 INTRODUCTION

This Alternative Source Demonstration (ASD) was prepared to support compliance with the groundwater monitoring requirements of the "Coal Combustion Residuals (CCR) Final Rule" published by the U.S. Environmental Protection Agency (U.S. EPA) in the *Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule*, dated April 17, 2015 (U.S. EPA, 2015), and subsequent amendments. Specifically, this report was prepared to fulfill the requirements of 40 CFR 257.94(e)(2). The applicable sections of the Rule are provided below in *italics*.

1.1 §257.94(E)(2) ALTERNATIVE SOURCE DEMONSTRATION REQUIREMENTS

The owner and operator may demonstrate that a source other than the CCR Unit caused the statistically significant increase over background levels for a constituent or that the statistically significant increase resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality. The owner or operator must complete the written demonstration within 90 days of detecting a statistically significant increase over background levels.

An ASD is completed when there are exceedances of one or more benchmarks established within the groundwater monitoring program. The ASD is completed to determine if any other sources are likely causes of the identified exceedance(s) of established benchmark(s) at the site. This ASD was performed in response to results indicating a statistically significant increase (SSI) over background levels during detection monitoring under the CCR Rule.

This ASD report is evaluating the SSIs observed in the statistical evaluation of the October 2021 detection monitoring event at the Columbia Energy Center (COL) Dry Ash Disposal Facility (ADF), Modules 1-3 CCR Units. The first ASD was prepared for this facility evaluating the SSIs observed in the statistical evaluation of the October 2017 detection monitoring event (SCS Engineers [SCS], 2018). The October 2017 ASD and subsequent semiannual updates have concluded that several lines of evidence demonstrated that SSIs reported for boron, chloride, and sulfate concentrations in the downgradient monitoring wells were likely due to man-made sources other than the CCR Units and/or naturally occurring constituents in the alluvial aquifer.

As discussed in more detail in **Section 4.2** of this ASD, the findings for the October 2021 monitoring event were consistent with those for the previous events.

1.2 SITE INFORMATION AND MAP

The COL site is located at W8375 Murray Road, Pardeeville, Columbia County, Wisconsin (**Figure 1**). The COL site is an active coal-burning generating station, which has been burning coal and disposing of CCR on site since the mid-1970s. The layout of the site is shown on **Figure 2**. The COL property includes two areas of CCR storage and disposal. These are the ADF and the Ash Ponds Facility. This ASD will evaluate the conditions at the site for Modules 1-3 of the ADF only. The ADF is operated under the Wisconsin Department of Natural Resources (WDNR) License No. 3025.

The groundwater monitoring system monitors the following CCR Unit:

- COL Dry ADF – Modules 1-3 (existing CCR Landfill)

Modules 1-3 were originally described as separate existing CCR landfills, although they are contiguous and are managed as a single landfill by the facility and by the WDNR. Wisconsin Power and Light Company (WPL) subsequently clarified that Modules 1-3 are one existing CCR landfill under the federal CCR Rule, and this report reflects WPL's clarification.

A map showing the CCR Units and all background (or upgradient) and downgradient monitoring wells with identification numbers for the CCR groundwater monitoring program and the state monitoring program is provided as **Figure 2.** Separate monitoring systems have been established for the other CCR Units at COL, which include Modules 4-6 of the COL ADF, the primary ash pond, and the secondary ash pond.

1.3 STATISTICALLY SIGNIFICANT INCREASES IDENTIFIED

SSIs were identified by comparing the monitoring results to Upper Prediction Limits (UPLs) established in accordance with 40 CFR 257.93(f)(3) and the statistical method previously selected for the CCR Unit. The UPLs are based on an interwell approach using two background monitoring wells: MW-84A and MW-301. The interwell UPLs were calculated based on a 1-of-2 resampling approach. The UPLs and results for the October 2021 monitoring event are summarized in the attached **Table 1.**

The October 2021 SSIs include the following parameters and wells:

- Boron: MW-33AR, MW-34A, MW-302
- Chloride: MW-33AR
- Sulfate: MW-33AR, MW-34A, MW-302

Concentration trends for the parameters with SSIs are shown in **Appendix A.**

1.4 OVERVIEW OF ALTERNATIVE SOURCE DEMONSTRATION

This ASD report includes:

- Background information (**Section 2.0**)

- Evaluation of potential that SSIs are due to methodology or analysis (**Section 3.0**)

- Evaluation of potential that SSIs are due to natural sources or man-made sources other than the CCR Units (**Section 4.0**)

- ASD conclusions (**Section 5.0**)

- Monitoring recommendations (**Section 6.0**)

The CCR Rule constituent results from background and compliance sampling for parameters with SSIs are provided in **Table 2.** The laboratory reports for the October 2021 detection monitoring event were included in the 2021 Annual Groundwater Monitoring and Corrective Action Report completed in January 2022. Complete laboratory reports for the background monitoring events and the previous detection monitoring events were included in previous annual groundwater monitoring and corrective action reports.

2.0 BACKGROUND

To provide context for the ASD evaluation, the following background information is provided in this section of the report, prior to the ASD evaluation sections:

- Geologic and hydrogeologic setting
- CCR Rule monitoring system
- Other monitoring wells

A more detailed discussion of the background information for the site is provided in the ASD for the October 2017 event (SCS, 2018).

2.1 REGIONAL GEOLOGY AND HYDROGEOLOGY

2.1.1 Regional Information

For the purposes of groundwater monitoring, the surficial sand and gravel aquifer is considered the uppermost aquifer, as defined under 40 CFR 257.53. Immediately underlying the surficial sand and gravel aquifer is the Cambrian-Ordovician sandstone aquifer.

Additional details on the regional geology and hydrogeology were provided in the October 2017 ASD (SCS, 2018).

2.1.2 Site Information

Soils at the site are primarily sand to a depth of approximately 50 to 100 feet, and overlie sandstone bedrock. Soils encountered during the site feasibility study for the COL ADF were described as generally sandy with interbedded silty clay lenses up to 20 feet thick (Warzyn, 1978). During drilling of CCR wells MW-301 and MW-302, the unconsolidated materials were identified as consisting primarily of silty sand. Boring logs for previously installed monitoring wells MW-33AR, MW-34A, MW-84A, MW-1AR, and M-4R show silty sand and sand as the primary unconsolidated materials at these locations. All CCR monitoring wells are screened within the unconsolidated sand unit.

Shallow groundwater at the site generally flows to the north and west across the existing landfill Modules 1-3 area, then generally flows west toward the Wisconsin River. Water levels also indicate a northeast component of flow from Modules 1-3. The existing state monitoring well MW-1AR was included as a supplemental well in the April and October 2021 monitoring events to provide additional evaluation to the northeast of the CCR Unit. A groundwater flow map for October 2021 is shown on **Figure 3**. The groundwater elevation data for the CCR monitoring wells and state monitoring program wells are provided in **Table 3**.

2.2 CCR RULE MONITORING SYSTEM

The groundwater monitoring system established in accordance with the CCR Rule consists of two upgradient (background) monitoring wells and three downgradient monitoring wells. The background wells include MW-301 and MW-84A. The downgradient wells include MW-302, MW-33AR, and MW-34A. The CCR Rule wells are installed within the sand and gravel aquifer. Well depths range from approximately 29 to 45 feet, measured from the top of the well casing.

Existing state monitoring well MW-1AR was included as a supplemental well in the October 2021 monitoring event to provide additional evaluation to the northeast of the CCR Unit. The well depth for

MW-1AR is 44.4 feet and it was installed in November 1994. The MW-1A boring log and MW-1AR well construction form are provided in the April 2021 COL MOD 1-3 ASD, completed in October 2021, and the 2021 Annual Groundwater Monitoring and Corrective Action Report, completed in January 2022.

2.3 OTHER MONITORING WELLS

Additional groundwater monitoring wells currently exist at COL as part of the monitoring systems developed for the state monitoring program and for the other CCR Units.

Monitoring wells for the state monitoring program are installed in the unconsolidated sand and gravel unit, which is the uppermost aquifer as defined under 40 CFR 257.53. This shallow monitoring system includes water table wells and mid-depth piezometers. Well depths range from approximately 14 to 76 feet, measured from the top of the well casing.

3.0 METHODOLOGY AND ANALYSIS REVIEW

To evaluate the potential that an SSI is due to a source other than the regulated CCR Unit, SCS used a two-step evaluation process. First, the sample collection, field and laboratory analysis, and statistical evaluation were reviewed to identify any potential error or analysis that led to exceedance of the benchmark. Second, potential alternative sources, including natural variation and man-made sources other than the CCR Unit, were evaluated. This section of the report provides the findings of the methodology and analysis review. Section 4.0 of the report addresses the potential alternative sources.

3.1 SAMPLING AND FIELD ANALYSIS

Field notes and sampling results were reviewed to determine if any sampling error may have caused or contributed to the observed SSIs. Potential field sampling errors or issues could include mislabeling of samples, improper sample handling, missed holding times, cross contamination during sampling, or other field error. Field blank sample results were also reviewed for any indication of potential contamination from sampling equipment or containers. Based on the review of the field notes and results, SCS did not identify any indication that the SSI concentrations were due to a sampling error.

SCS did not identify any issues with the sampling procedures or field analysis based on review of the data and field notes. Because boron, chloride, and sulfate are laboratory parameters, there is little potential for a field analysis error to contribute to an SSI.

3.2 LABORATORY ANALYSIS REVIEW

The laboratory reports for the October 2021 detection monitoring event were reviewed to determine if any laboratory analysis error or issue may have caused or contributed to an observed SSI for boron, chloride, or sulfate. The laboratory report review included reviewing the laboratory quality control flags and narrative, verifying that correct methods were used and desired detection limits were achieved, and checking the field and laboratory blank sample results.

Based on the review of the laboratory reports, SCS did not identify any indication that the SSIs were due to a laboratory analysis error. There were no laboratory quality control flags or issues identified in the laboratory report that affect the usability of the data for detection monitoring. The laboratory flagged some anion results for matrix spike recovery and/or matrix spike duplicate recovery outside laboratory control limits, including the sample results from background well MW-84 for chloride, fluoride, and sulfate and the sample results from compliance well MW-34A for chloride and fluoride. The laboratory also flagged the sample result from background well MW-301 for calcium for Matrix spike recovery outside laboratory control limits, and attributed the result out of range to a parent sample concentration notably higher than the spike level. In all of these cases, the recovery outside the limits was slightly above the upper limit and the control sample results were within control limits. None of these results affected the determination of SSIs.

Time series plots of the SSI constituent analytical data were also reviewed for any anomalous results that might indicate a possible sampling or laboratory error (e.g., dilution error or incorrect sample labeling). The time series plots are provided in **Appendix A**. The concentrations observed are similar to historical concentrations.

3.3 STATISTICAL EVALUATION REVIEW

The review of the statistical results and methods included a quality control check of the following:

- Input analytical data vs. laboratory analytical reports
- Statistical method and process for each SSI

Based on the review of the statistical evaluation, SCS did not identify any errors or issues in the statistical evaluation that caused or contributed to the determination of interwell SSIs for the October 2021 detection monitoring event.

3.4 SUMMARY OF METHODOLOGY AND ANALYSIS REVIEW FINDINGS

In summary, there were no changes to the SSI determinations for the October 2021 monitoring event based on the methodology and analysis review. No errors or issues causing or contributing to the reported SSIs were identified.

4.0 ALTERNATIVE SOURCES

This section of the report discusses the potential alternative sources for the boron, chloride, and sulfate SSIs at the downgradient monitoring wells; identifies the most likely alternative source(s); and presents the lines of evidence indicating that an alternative source is the most likely cause of the observed SSIs.

4.1 POTENTIAL CAUSES OF SSI

4.1.1 Natural Variation

The statistical analysis was completed using an interwell approach, comparing the October 2021 detection monitoring results to the UPLs calculated based on the sampling of the background wells (MW-84A and MW-301). If concentrations of a constituent that is naturally present in the aquifer vary spatially, then the potential exists that the downgradient concentrations may be higher than upgradient concentrations due to natural variation. Previous monitoring results for boron, chloride, and sulfate at COL Modules 1-3 landfill are shown in **Table 2**.

Although natural variation is present in the shallow aquifer, it does not appear likely that natural variation is the primary source causing the boron, chloride, and sulfate SSIs.

4.1.2 Man-Made Alternative Sources

Man-made alternative sources that could potentially contribute to the boron, chloride, and sulfate SSIs could include the closed ash pond landfill, the active and inactive ash ponds, the former ash pond effluent ditch, the coal storage area, road salt use, railroad operations, or other plant operations.

Based on the groundwater flow directions and on previous investigations at the site, the former ash pond effluent ditch appears to be the most likely cause of the boron and/or sulfate SSIs for wells MW-33AR, MW-34A, and MW-302. The ash pond effluent ditch also likely contributed to the chloride SSIs at MW-33AR.

4.2 LINES OF EVIDENCE

The lines of evidence indicating that the SSIs for boron, chloride, and sulfate in compliance wells MW-33AR, MW-34A, and MW-302, relative to the background wells, are due to an alternative source include:

1. Elevated concentrations of boron, chloride, and sulfate were present in the area west of the landfill, where the three compliance wells are located, before the landfill was constructed.

2. Monitoring performed under the state program documents that the concentrations of boron, chloride, and sulfate were elevated before CCR disposal in the landfill began, and have decreased since the landfill has been in operation.

3. Groundwater flow directions have changed through time due to changes in water management at the plant, so that groundwater impacted by the effluent ditch formerly flowed to the east, under the landfill, and is now flowing west and/or north.

4. The variations in chloride results for well MW-33AR since detection monitoring was initiated have not correlated with boron concentrations, as would be expected for a CCR leachate source; therefore, an alternative source is more likely.

4.2.1 Pre-Landfill Water Quality

Elevated concentrations of boron, chloride, and sulfate were present in the area west of the landfill, where the three compliance wells are located, before the landfill was constructed. Groundwater monitoring performed in 1977 and 1978 as part of the Feasibility Study for the landfill permitting showed that wells located along the west side of the future landfill footprint, where the current compliance wells are located, had elevated results for sulfate, chloride, and specific conductance.

The 1978 Feasibility Study (Warzyn, 1978) for the dry ADF discusses the influence of the ash pond effluent ditch on groundwater west of the proposed site. The former ash pond effluent ditch, shown on **Figure 2**, carried effluent from the ash ponds located north of the plant, and flowed south between the west side of the current landfill and the substation. Groundwater monitoring in December 1977 indicated that sulfate was present at 1,200 milligrams per liter (mg/L) in MW-33A, which was located near the point where the ash pond effluent discharged from a culvert into the effluent ditch. The sulfate concentration at this well decreased to 830 mg/L in the December 1978 sampling (Warzyn, 1979). Current concentrations of sulfate in this area, while above background, are much lower. The October 2021 sulfate result for MW-33AR (installed to replace MW-33A) was 96.4 mg/L, for MW-34A was 56.1 mg/L, and for MW-302 was 37.8 mg/L.

Selected text and tables from the 1978 Feasibility Study and the 1979 Supplementary Feasibility Study Report are included in **Appendix B**.

4.2.2 Long-Term Concentration Trends

Monitoring performed under the state program documents that the concentrations of boron and sulfate were elevated before CCR disposal in the landfill began, and have decreased since the landfill has been in operation. Routine groundwater monitoring for the COL ADF began after the Plan of Operation was approved and prior to initial CCR disposal. The earliest data available from the WDNR Groundwater Environmental Monitoring System (GEMS) database is from September 1984. Initial placement of CCR in test plots in Module 1 of the ADF was approved in October 1984, and CCR disposal began sometime after that. Therefore, the initial groundwater monitoring results in the GEMS database represent pre-disposal conditions for the landfill.

The earliest historic monitoring data show that before CCR disposal in the landfill began, concentrations of boron and sulfate were significantly higher than current concentrations in the area west of the landfill where the compliance wells are located. Graphs of historical concentrations are provided in **Appendix C**. Results for compliance well MW-33AR are plotted with results from well MW-33A. MW-33AR was a replacement well for MW-33A at a slightly different location and depth. The well screen was installed approximately 10 feet higher in MW-33AR than in MW-33A, intersecting the water table, which may explain the increase in concentration that occurred with the well replacement. Results for compliance well MW-302 are plotted with results from monitoring well MW-85, which was located near the current MW-302 location (see **Figure 2**) and was monitored from September 1984 through September 1995.

The recent boron concentrations are consistent with generally decreasing or stable historical concentrations at MW-33AR and MW-34A (**Appendix A** and **Appendix C**). Recent boron concentrations at MW-302 have been variable, but remain well below the concentrations observed in samples from MW-85 prior to CCR disposal in the landfill.

4.2.3 Groundwater Flow Direction Changes

Groundwater flow directions have changed through time due to changes in water management at the plant, so that groundwater impacted by the effluent ditch formerly flowed to the east, under the landfill, and is now flowing west. The 1978 Feasibility Study report states that the southern 2/3 of the proposed fill area (including the area of the active CCR landfill phases) exhibits a southeast and southerly groundwater flow direction, toward an agricultural drainage ditch southeast and south of the landfill area. The 1981 Plan of Operation indicates that flow in the landfill area is to the east-southeast. A water table map prepared by RMT, based on October 2002 water level measurements, shows flow under the landfill generally to the east and northeast from a groundwater high near the effluent ditch and Wisconsin Pollutant Discharge Elimination System (WPDES) pond between the landfill and the substation. The 1981 and 2002 water table maps are provided in **Appendix D**.

Under current conditions, groundwater flow below the active landfill area is generally to the north, northwest, and northeast. The flow changes with time reflect the termination of discharge to the ash pond effluent ditch in the mid-2000s. When discharge via this ditch was active, the ditch was a source of recharge to the groundwater and created a high groundwater area with flow moving away from the ditch to the east. After discharge to the ditch was terminated, water levels in this area decreased significantly and the groundwater flow direction changed.

With the changes in groundwater flow, historically impacted groundwater moved in alternating directions. While the effluent ditch was active, impacted groundwater likely moved eastward past the current compliance wells, as indicated by the long-term concentration data. Although the compliance wells on the west side of MOD 1-3 are downgradient from the landfill under current flow conditions, the observed groundwater impacts may be residual from the past when the wells were downgradient from the effluent ditch.

Existing state monitoring well MW-1AR was included as a supplemental well in the April and October 2021 monitoring events to provide additional evaluation to the northeast of the CCR Unit (**Figure 3**). Although MW-1AR appears to be downgradient from MOD 1-3 under current flow conditions, no SSIs have been observed for this well.

4.2.4 Chloride and Boron Leachate Concentrations

The chloride results for well MW-33AR increased beginning in 2016, peaked in April 2018 and April 2019, decreased significantly in May 2020, and have remained relatively consistent since then (**Table 2** and **Appendix A**). Over the same time period, boron concentrations at MW-33AR have followed a steady gradual decreasing trend. The lack of correlation with boron indicates the source of the increase and subsequent decrease in chloride is not likely the CCR landfill. Sampling of the landfill leachate pond and the lysimeters indicates that boron and chloride concentrations are generally both higher than background (**Table 4**); therefore, a leachate source would tend to influence concentrations of both parameters. Furthermore, the peak chloride concentrations in the groundwater samples from MW-33AR in 2018 and 2019 exceeded the chloride concentrations measured in the leachate at that time, indicating the leachate was not the source of chloride at this location (**Table 2**, **Table 4**, and **Appendix A**). Recent samples from the leachate pond have shown increased concentrations of chloride, but this increase does not correlate with results at MW-33AR, which have decreased, or with chloride results from the lysimeters, which remain low. Based on the comparison of groundwater and leachate chloride results, an alternative man-made source, such as road salt, is a more likely source of chloride than the CCR Unit.

5.0 ALTERNATIVE SOURCE DEMONSTRATION CONCLUSIONS

The lines of evidence discussed above regarding the SSIs reported for boron, chloride, and sulfate concentrations in downgradient monitoring wells MW-33AR, MW-34A, and/or MW-302 demonstrate that the SSIs are likely primarily due to sources other than the CCR Units. Boron, sulfate, and chloride concentrations were elevated prior to disposal of CCR in the landfill and are associated with historical discharges from the ash ponds via the effluent ditch located west of the landfill. Elevated chloride concentrations detected at well MW-33AR appear likely to be related to an alternative non-CCR source, such as salt.

6.0 SITE GROUNDWATER MONITORING RECOMMENDATIONS

In accordance with section 257.94(e)(2) of the CCR Rule, the COL Modules 1-3 CCR Units may continue with detection monitoring based on this ASD. The ASD report will be included in the 2021 Annual Report due January 31, 2022.

7.0 REFERENCES

SCS Engineers, 2018, Alternative Source Demonstration, October 2017 Detection Monitoring, Columbia Energy Center Dry Ash Disposal Facility, April 2018.

U.S. EPA, 2015, Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule, April 2015.

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

Warzyn Engineering, Inc., 1979, and Preliminary Engineering Concepts, Columbia Site, Wisconsin Power and Light Company, Town of Pacific, Columbia County, WI, January 1978.

Tables

Table 1. Groundwater Analytical Results Summary - October 2021 Event
Columbia Landfill MOD 1-3 / SCS Engineers Project #25222067.00

		Background Wells		Compliance Wells			Supplemental Well
Parameter Name	**UPL**	**MW-84A**	**MW-301**	**MW-33AR**	**MW-34A**	**MW-302**	**MW-1AR**
		10/14/2021	10/14/2021	10/12/2021	10/12/2021	10/14/2021	10/14/2021
Appendix III							
Boron, ug/L	35.6	11.1	31.4	564	212	495	12.4
Calcium, ug/L	129,000	75,300	67,800 P6	53700	58,100	84,100	87,600
Chloride, mg/L	6.2	3.5 M0	2.7	22.6	1.9 J, M0	1.3 J	1.2 J
Fluoride, mg/L	DQ	<0.095 M0	<0.095	<0.095	<0.095 M0	<0.095	<0.095
Field pH, Std. Units	7.78	7.42	7.01	7.59	7.68	7.07	7.44
Sulfate, mg/L	30.3	1.3 J, M0	17.4	96.4	56.1	37.8	3.1
Total Dissolved Solids, mg/L	514	326	334	374	278	394	350

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

Abbreviations:
UPL = Upper Prediction Limit
DQ = Double Qualification
SSI = Statistically Significant Increase
LOQ = Limit of Quantitation
LOD = Limit of Detection

Lab Notes:
J = Estimated concentration at or above the LOD and below the LOQ.
P6 = Matrix spike recovery was outside laboratory control limits due to a parent sample concentration notably higher than the spike level.
M0 = Matrix spike recovery and/or matrix spike duplicate recovery was outside laboratory control limits

1. An individual result above the UPL does not constitute an SSI above background. See the accompanying report text for identification of statistically significant results.
2. Interwell UPLs calculated based on results from background wells MW-84A and MW-301. Interwell UPLs based on 1-of-2 retesting approach. UPLs updated in January 2020 based on background well results through October 2019.

Created by:	NDK	Date:	5/17/2021
Last revision by:	RM	Date:	11/9/2021
Checked by:	JAO	Date:	12/10/2021
Scientist/Proj Mgr QA/QC:	TK	Date:	12/20/2021

Table 2. Historical Analytical Results for Parameters with SSIs
Columbia Dry ADF, Modules 1-3

Well Group	Well	Collection Date	Boron (µg/L)	Chloride (mg/L)	Sulfate (mg/L)
Background	MW-301	12/22/2015	26.5	3.70 J	9.30
		4/5/2016	25.2	4.00	15.3
		7/8/2016	23.6	3.50 J	15.0
		10/13/2016	30.6	2.20	13.9
		12/29/2016	32.8	2.00 J	12.3 J
		1/25/2017	32.6	1.50 J	6.50
		4/11/2017	28.8	2.00	10.3
		6/6/2017	21.3	3.50	17.1
		8/8/2017	30.6	5.50	31.6
		10/23/2017	34.3	4.00	27.5
		4/25/2018	24.3	2.30	8.60
		8/8/2018	22.8	-	-
		10/22/2018	27.8	3.20	19.2
		4/3/2019	26.9	2.90 J, B	5.30 J
		10/9/2019	35.9	1.70	8.40
		5/29/2020	21.3	2.00 J	11.5 J
		10/8/2020	28.8	3.4	25.1
		4/13/2021	22.2	1.5 J	8.5
		10/14/2021	31.4	2.7	17.4
	MW-84A	12/22/2015	11.9	4.90	4.90
		4/5/2016	14.0	4.70	4.30
		7/8/2016	14.7	5.10	3.70 J
		7/28/2016	-	-	-
		10/13/2016	11.1	4.30	2.60 J
		12/29/2016	14.7	4.70	2.70 J
		1/25/2017	16.1	4.60	3.00
		4/11/2017	12.9	4.90	2.80 J
		6/6/2017	14.8	5.50	2.70 J
		8/8/2017	22.9	5.50	2.00 J
		10/24/2017	13.8	5.10	2.20 J
		4/25/2018	25.0	4.80	2.80 J
		8/8/2018	12.8	--	--
		10/22/2018	10.1 J	4.20	1.60 J
		4/3/2019	13.6	3.60 B	1.40 J
		10/9/2019	12.0	3.90	1.30 J
		5/29/2020	10.0	3.70	1.50 J
		10/8/2020	9.7 J	4.30	1.3 J
		4/13/2021	14.3	4.40	1.4 J
		10/14/2021	11.1	3.50	17.4

Table 2. Historical Analytical Results for Parameters with SSIs
Columbia Dry ADF, Modules 1-3

Well Group	Well	Collection Date	Boron (µg/L)	Chloride (mg/L)	Sulfate (mg/L)
Compliance	MW-302	12/22/2015	80.0	4.20	37.4
		4/5/2016	78.8	4.10	55.6
		7/7/2016	134	3.10 J	35.4
		10/13/2016	132	1.10 J	64.7
		12/29/2016	106	1.20 J	56.4
		1/25/2017	149	1.60 J	61.6
		4/11/2017	322	1.60 J	81.3
		6/6/2017	671	3.50	84.6
		8/8/2017	833	4.50	79.0
		10/24/2017	691	6.90	78.4
		4/24/2018	1,950	15.0	109
		9/21/2018	203	1.70 J	30.0
		10/22/2018	296	1.80 J	26.9
		4/2/2019	254	1.50 J	25.2
		10/9/2019	246	1.10 J	16.7
		5/29/2020	611	1.20 J	34.6
		10/8/2020	648	1.1 J	36.5
		4/13/2021	521	1.4 J	36.9
		10/14/2021	495	1.3 J	37.8
	MW-33AR	12/21/2015	954	10.6	96.2
		4/5/2016	813	12.5	91.5
		7/7/2016	794	12.5	99.2
		10/13/2016	827	52.5	124
		12/29/2016	812	39.6	132
		1/25/2017	763	41.4	133
		4/11/2017	760	47.1	139
		6/6/2017	692	68.1	151
		8/7/2017	697	105	164
		10/24/2017	678	119	175
		4/24/2018	601	188	163
		9/21/2018	683	32.6	124
		10/22/2018	682	14.4	112
		4/2/2019	568	229	201
		10/8/2019	548	153	182
		5/28/2020	566	15.9	104
		10/8/2020	569	27.3	97.4
		4/13/2021	473	26.9	94.3
		10/12/2021	564	22.6	96.4

Table 2. Historical Analytical Results for Parameters with SSIs
Columbia Dry ADF, Modules 1-3

Well Group	Well	Collection Date	Boron (µg/L)	Chloride (mg/L)	Sulfate (mg/L)
Compliance	MW-34A	12/21/2015	230	4.90	69.9
		4/5/2016	220	5.10	71.6
		7/7/2016	216	5.60	63.4
		7/28/2016	-	-	-
		10/13/2016	212	6.80	54.8
		12/29/2016	224	7.10	63.9
		1/25/2017	214	7.20	71.2
		4/11/2017	214	6.20	87.6
		6/6/2017	201	7.80	106
		8/7/2017	205	7.40	105
		10/24/2017	208	7.60	98.0
		4/24/2018	209	8.20	144
		9/21/2018	241	17.1	141
		10/22/2018	233	19.9	123
		4/4/2019	204	18.7	70.4
		10/8/2019	207	57.9	39.8
		5/28/2020	210	3.90	44.4
		10/8/2020	213	2.10	58.7
		4/13/2021	203	2.30	59.3
		10/12/2021	212	1.9 J, M0	56.1
	MW-1AR	4/14/2021	16.1	1.5 J	4.4 M0
		10/14/2021	12.4	1.2 J	3.1

Abbreviations:
µg/L = micrograms per liter or parts per billion (ppb)
mg/l = milligrams per liter or parts per million (ppm)
J = Estimated value below the laboratory's limit of quantitation
B = Analyte was detected in the associated Method Blank.
M0 = matrix spike recovery and/or matrix spike duplicate recovery outside of laboratory control limits

Notes:
(1) Analytical laboratory reports provided in the Annual Groundwater Monitoring and Corrective Action Reports.
(2) MW-1AR was added to the sampling network in 2021 to provide additional evaluation of site conditions in the CCR unit

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Scientist Check: JAO Date: 2/17/2022

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-1AR	MW-4	MW-5R	MW-33AR	MW-33BR	MW-34A	MW-34B	MW-37A	MW-83	MW-84A	MW-84B	MW-86	MW-91AR	MW-91B	MW-92A	MW-92B	LS-1	LS-3R	LH-2	LH-3	LH-4
Dry Ash Facility (Facility ID #03025)	**Top of Casing Elevation (feet amsl)**	822.55	819.74	805.44	808.29	808.39	805.95	806.05	813.04	807.96	814.28	814.26	824.79	809.03	808.45	808.47	808.41					
	Screen Length (ft)																					
	Total Depth (ft from top of casing)	44.40	39.58	25.97	31.08	57.50	35.43	56.95	31.80	25.42	40.21	52.02	45.43	32.90	52.38	28.94	51.75	17.42	17.10	19.90		
	Top of Well Screen Elevation (ft)	778.15	780.16	779.47	777.21	750.89	770.52	749.10	781.24	782.54	774.07	762.24	779.36	776.13	756.07	779.53	756.66	NM	NM	NM		
	Measurement Date																					
	October 2, 2012	783.41	783.70	784.96	782.38	782.23	783.03	782.99	782.66	dry	783.84	783.94	783.81	784.09	783.90	784.49	784.06			dry	--	
	April 15, 2013	785.44	784.02	786.09	784.16	784.14	784.74	784.79	783.87	784.49	785.83	785.76	785.22	785.14	785.01	785.75	785.34	NM	dry	dry	--	
	October 8, 2013													785.66	785.42	785.97	785.52	NM	NM	NM	--	
	October 15, 2013	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	785.66	785.42	785.97	785.52				--	
	April 14, 2014	784.95	784.09	785.63	783.74	783.91	784.63	784.70	783.45	783.73	785.58	785.52	784.96	785.04	784.96	785.99	785.54	NM	dry	eachate depth = 0.2 in	--	
	October 2-3, 2014	785.03	785.39	786.08	784.37	784.28	784.57	784.54	784.56	dry	785.24	785.18	785.19	785.47	785.28	785.75	785.33	NM	dry	eachate depth = 0.3 in	--	
	April 13-14, 2015	783.96	783.63	785.25	783.01	782.74	783.65	783.95	782.87	dry	784.43	784.51	784.17	784.48	784.37	785.07	784.66	dry	--	dry	--	
	October 6-7, 2015	784.28	784.44	785.72	783.68	783.33	784.05	784.02	783.66	dry	784.80	784.76	784.66	784.89	784.70	785.20	784.76	broken	dry	eachate depth = 14.8 i	--	
	April 4-6, 2016	785.82	aband	787.02	785.29	785.07	785.63	785.67	784.76	785.43	786.37	786.26	785.89	786.05	785.95	786.61	786.21	broken	dry	15.9"	--	
	October 11-13, 2016	786.64	aband	788.00	787.36	786.46	786.45	786.32	786.40	786.81	787.22	787.11	786.96	787.17	786.81	787.68	787.25	liquid depth = 3.5'	dry	0.8"	1.4"	
	April 10-13, 2017	786.96	aband	788.13	786.39	785.99	786.30	786.28	786.34	786.23	787.16	787.06	786.96	787.24	787.03	787.90	787.60	liquid depth = 3.0'	dry	-0.3	1.4"	
	October 3-5, 2017	785.48	aband	786.66	784.51	784.22	784.67	784.63	784.86	784.29	NM	786.49	785.58	786.08	785.83	786.47	786.02	liquid depth = 2.7'	dry	NM	NM	
	October 9-10, 2017	NM	aband	NM	NM	NM	NM	NM	NM	NM	785.56 (6)	NM	NM	NM	NM	NM	NM	NM	NM	1.4" (5)	1.6" (5)	
	February 21, 2018	783.97	aband	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	784.68	784.46	NM	NM	NM	NM	NM	NM	
	April 23-25, 2018	783.99	aband	785.36	783.09	786.36	781.77	780.79	783.28	783.32	785.88	784.91	782.54	784.71	784.53	785.23	784.81	liquid depth = 2.7'	NM	NM	NM	
	October 23-25, 2018	788.25	aband	789.71	788.77	787.96	787.88	787.73	787.62	788.26	788.32	788.19	788.21	788.59	788.31	789.32	788.87	dry	id depth =	4.6	4	--
	April 1-4, 2019	787.05	aband	788.64	786.63	786.54	786.82	786.92	786.47	786.78	787.35	787.34	787.16	787.45	787.18	788.04	787.63	liquid depth = 3.9'	dry	--	--	
	October 7-9, 2019	787.26	aband	789.23	788.26	787.64	787.92	787.74	786.77	788.90	787.79	787.73	787.44	787.78	787.62	788.63	788.17	liquid depth = 3.8'	dry	-0.1"	11.7"	13.1"
	May 27-28, 2020	786.92	aband	788.34	786.01	785.75	785.98	785.99	786.22	786.03	787.02	786.99	786.94	787.26	787.05	787.86	787.47	liquid depth = 3.8'	dry	-0.1	2.4	2.4
	October 7-8, 2020	785.95	aband	787.76	785.91	785.45	785.70	785.68	785.52	785.72	786.10	786.06	786.10	786.55	786.33	786.85	786.38	liquid depth = 3.8'	dry	-0.1	2.7	2.4
	February 25, 2021	NM	aband	NM	NM	NM	784.75	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	-0.1	2.7	2.6
	April 14, 2021	785.11	aband	787.29	784.27	784.05	784.77	784.77	784.46	c	785.84	785.81	785.60	785.86	785.69	786.47	786.06	liquid depth = 3.7'		--	0.2333	0.2167
	June 11, 2021	NM	aband	NM	784.19	NM	784.66	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	--	--	--	--	
	October 11-12, 14, 2021	784.47	aband	786.78	783.73	783.60	784.42	784.41	783.88	783.87	784.96	784.88	784.79	785.14	784.94	785.55	785.11	liquid depth = 3.7'	--			
	October 17, 2021	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	-0.01	0.26	0.23
	Bottom of Well Elevation (ft)	778.15	780.16	779.47	777.21	750.89	770.52	749.10	781.24	782.54	774.07	762.24	779.36	776.13	756.07	779.53	756.66	NM	NM	NM	NM	

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

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

CCR Rule Wells	**Well Number**	**MW-301**	**MW-302**	**MW-303**	**MW-304**	**MW-305**	**M-4R**	**MW-33AR**	**MW-34A**	**MW-84A**	**MW-306**	**MW-307**	**MW-308**	**MW-309**	**MW-310**	**MW-311**
	Top of Casing Elevation (feet amsl)	806.89	813.00	811.52	805.42	806.32	806.10	808.29	805.95	814.28	807.63	806.89	806.9	813.27	813.62	809.74
	Screen Length (ft)	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	Total Depth (ft from top of casing)	29.40	33.6	35.80	25.7	25.6	39.58	31.08	35.43	40.21	27	26.5	28	37.67	38.41	36.19
	Top of Well Screen Elevation (ft)	787.49	789.40	785.72	789.72	790.72	776.52	787.21	780.52	784.07	790.63	790.39	788.90	785.60	785.21	783.55
	Measurement Date													--	--	--
	December 21-22, 2015	NM	784.78	784.11	786.13	788.96	787.58	783.77	783.50	785.31	--	--	--	--	--	--
	April 4-5, 2016	786.78	785.81	785.48	788.08	789.61	789.09	785.29	785.63	786.37	--	--	--	--	--	--
	July 7-8, 2016	786.31	786.28	784.60	787.36	789.26	787.43	785.19	785.05	785.89	--	--	--	--	--	--
	July 28, 2016	NM	NM	784.35	NM	NM	NM	NM	784.86	785.61	--	--	--	--	--	--
	October 11-13, 2016	787.64	787.76	786.18	788.18	789.78	787.88	787.36	786.45	787.22	--	--	--	--	--	--
	December 29, 2016	787.37	787.05	NM	NM	NM	NM	785.66	785.72	786.63	--	--	--	--	--	--
	January 25-26, 2017	787.27	786.89	785.28	789.34	789.36	789.64	785.88	785.98	786.70	785.50	785.36	785.73	--	--	--
	April 10 & 11, 2017	787.89	787.55	786.00	788.22	789.57	787.95	786.39	786.30	787.16	786.22	785.64	786.51	--	--	--
	June 6, 2017	788.25	788.37	786.49	788.58	789.79	787.83	787.27	786.66	787.63	786.85	786.07	786.46	--	--	--
	August 7-9, 2017	787.34	787.55	785.42	789.52	789.30	788.54	786.11	785.81	786.68	785.69	785.19	785.37	--	--	--
	October 23-24, 2017	785.89	785.94	783.92	788.97	788.14	788.00	784.13	784.50	785.32	783.97	784.79	784.17	--	--	--
	February 21, 2018	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	783.19	783.05	783.02
	March 23, 2018	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	783.10	783.10	783.00
	April 23-25, 2018	785.29	784.37	783.27	789.69	787.67	790.43	783.09	781.77	785.88	783.24	783.65	782.65	783.07	782.97	781.83
	May 24, 2018	NM	NM	NM	NM	NM	NM	NM	NM	NM	785.79	785.09	NM	785.45	785.97	786.11
	June 23, 2018	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	786.03	786.64	786.47
	July 23, 2018	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	786.27	786.35	786.55
	August 7, 2018	787.06	NM	785.20	788.25	788.56	787.63	NM	NM	786.55	NM	NM	NM	NM	NM	NM
	August 22, 2018	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	785.54	785.40	785.46
	September 21, 2018	NM	788.37	786.50	NM	NM	NM	787.90	787.01	NM	NM	NM	NM	787.08	787.24	787.66
	October 22-24, 2018	788.98	789.16	787.51	789.05	790.04	788.47	788.77	787.88	788.32	787.66	786.57	787.81	787.99	788.18	788.64
	April 1-4, 2019	787.04	787.56	786.52	789.72	790.07	789.44	786.63	786.82	787.35	786.72	786.71	787.53	786.30	786.38	786.38
	June 12, 2019	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	787.25	NM
	June 19, 2019	NM	NM	786.81	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	October 7-9, 2019	788.47	788.31	787.02	790.41	790.36	790.65	NM	NM	NM	787.47	786.99	787.18	787.26	787.94	787.64
	December 13, 2019	--	--	--	--	--	--	--	--	--	787.03	785.68	786.43	--	--	--
	December 23, 2019	--	--	--	--	--	--	--	--	--	--	--	--	--	775.22	--
	January 17, 2020	--	--	785.58	--	--	--	--	--	--	--	--	--	--	--	--
	February 3, 2020	787.24	NM	NM	NM	NM	NM	NM	NM	786.50	785.77	785.57	786.48	NM	NM	NM
	May 27-29, 2020	787.77	787.29	785.56	789.30	787.78	787.73	786.01	785.98	787.02	785.77	785.35	786.28	785.98	785.81	785.85
	June 30, 2020	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	786.18	NM	NM
	August 6, 2020	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	785.93	NM	NM
	October 7-8, 2020	786.53	786.74	785.16	788.52	787.96	787.74	785.91	785.70	786.10	785.39	784.71	785.68	785.47	785.56	785.83
	December 11, 2020	--	--	--	--	788.19	--	--	--	--	--	--	--	785.26	785.26	--
	February 25, 2021	--	--	784.27	--	788.36	--	--	784.75	--	--	--	--	--	--	--
	April 12, 2021	786.50	785.77	784.07	787.99	788.11	786.34	784.27	784.77	785.84	784.32	784.21	785.55	784.29	784.24	784.15
	June 11, 2021	--	--	--	--	--	--	784.19	784.66	--	--	--	--	784.20	784.05	--
	July 20, 2021	--	--	783.64	--	788.39	--	--	--	--	--	--	--	--	--	--
	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	--	--	--	--	--	--	--	--	--	--	--	--	782.93	--	--
	Bottom of Well Elevation (ft)	771.33	780.55	774.82	733.43	776.98	753.04	771.89	776.98	776.36	780.63	780.39	778.90	775.60	775.21	773.55

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

Notes:
NM = not measured

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

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

I:\25222067.00\Deliverables\2021 Oct ASD MOD 1-3 LF\Tables\[Table 3 - Groundwater Elevation Summary.xls]levels

Table 4. Analytical Results - Lysimeters and Leachate Pond
Columbia Dry Ash Disposal Facility
SCS Engineers Project #25222067.00

Monitoring Point	Monitoring Period	Monitoring Point Dry/ Broken	Boron, Total (µg/L)	Chloride, Total (mg/L)	Sulfate, Total (mg/L)
LS-1	2015-Apr	DRY	--	--	--
	2015-Oct	BROKEN	--	--	--
	2016-Apr	DRY	--	--	--
	2016-Oct	--	6530	12.3	789
	2017-Apr	--	6510	20.7 J	814
	2017-Oct	--	6200	14.2 J	764
	2018-Apr	--	5920	16.0 J	856
	2018-Oct	DRY	--	--	--
	2019-Apr	--	5,640	22.0 J	911
	2019-Oct	--	6,180	19.2 J	861
	2020-May	--	6,180	25.4 J	1,040
	2020-Oct	--	5,640	27.2 J	950
	2021-Apr	--	6,010	21.1 J	976
	2021-Oct	--	6,230	14.3 J	987
LS-3R	2015-Apr	--	6480	20.6 B	807
	2015-Oct	DRY	--	--	--
	2016-Apr	DRY	--	--	--
	2016-Oct	DRY	--	--	--
	2017-Apr	DRY	--	--	--
	2017-Oct	DRY	--	--	--
	2018-Apr	DRY	--	--	--
	2018-Oct	--	6180	26.2 J	841
	2019-Apr	DRY	--	--	--
	2019-Oct	DRY	--	--	--
	2020-May	DRY	--	--	--
	2020-Oct	DRY	--	--	--
	2021-Apr	DRY	--	--	--
	2021-Oct	DRY	--	--	--

Table 4. Analytical Results - Lysimeters and Leachate Pond
Columbia Dry Ash Disposal Facility
SCS Engineers Project #25222067.00

Monitoring Point	Monitoring Period	Monitoring Point Dry/ Broken	Boron, Total (µg/L)	Chloride, Total (mg/L)	Sulfate, Total (mg/L)
LP-1	2015-Apr	--	4060	27.8	734
	2015-Oct	--	4,300	37.1	820
	2016-Apr	--	1,830	26.8	416
	2016-Oct	--	4,610	71.5	835
	2017-Apr	--	2,690	66.3	587
	2017-Oct	--	4,970	91.7	739
	2018-Apr	--	2,060	63.2	634
	2018-Oct	--	2,630	151	907
	2019-Apr	--	570	35.1	249
	2019-Oct	--	1,270	63.9	602
	2020-May	--	2,460	179	952
	2020-Oct	--	2,710	243	1,160
	2021-Apr	--	3,340	319	1,180
	2021-Oct	--	3,440	299	1,470

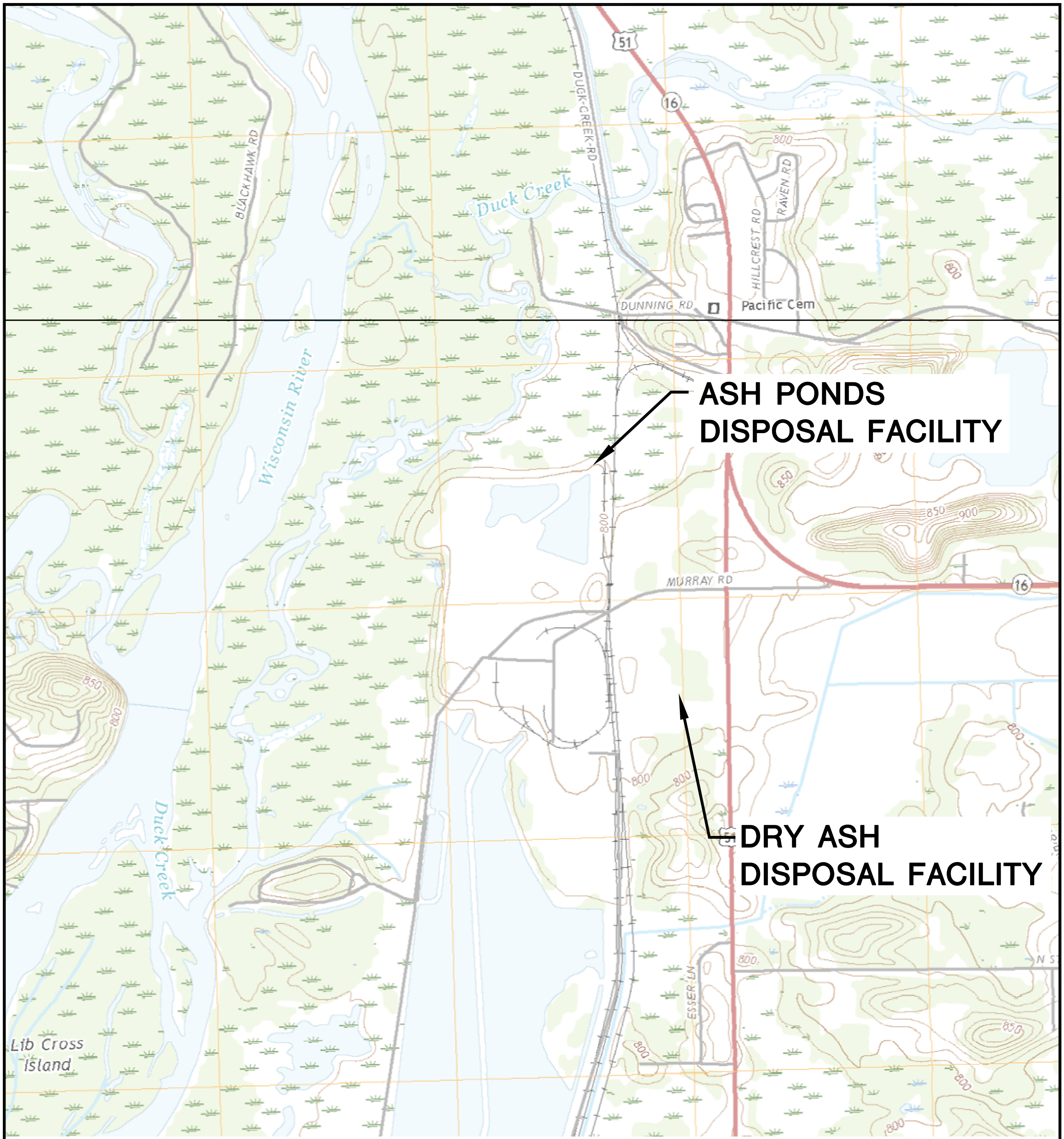
Abbreviations:
µg/L = micrograms per liter
mg/L = milligrams per liter
-- = not analyzed

Notes:
B = Analyte was detected in the associated method blank.
J = Estimated concentration at or above the LOD and below the LOQ.

Created by: TLC Date: 12/1/2014
Last revision by: RM Date: 2/14/2022
Checked by: JAO Date: 2/15/2021

I:\25222067.00\Deliverables\2021 Oct ASD MOD 1-3 LF\Tables\[Table 4 - Leachate_2015-Oct 2021 ASD.xlsx]Lys LP1 App III

Figures



ASH PONDS DISPOSAL FACILITY

DRY ASH DISPOSAL FACILITY

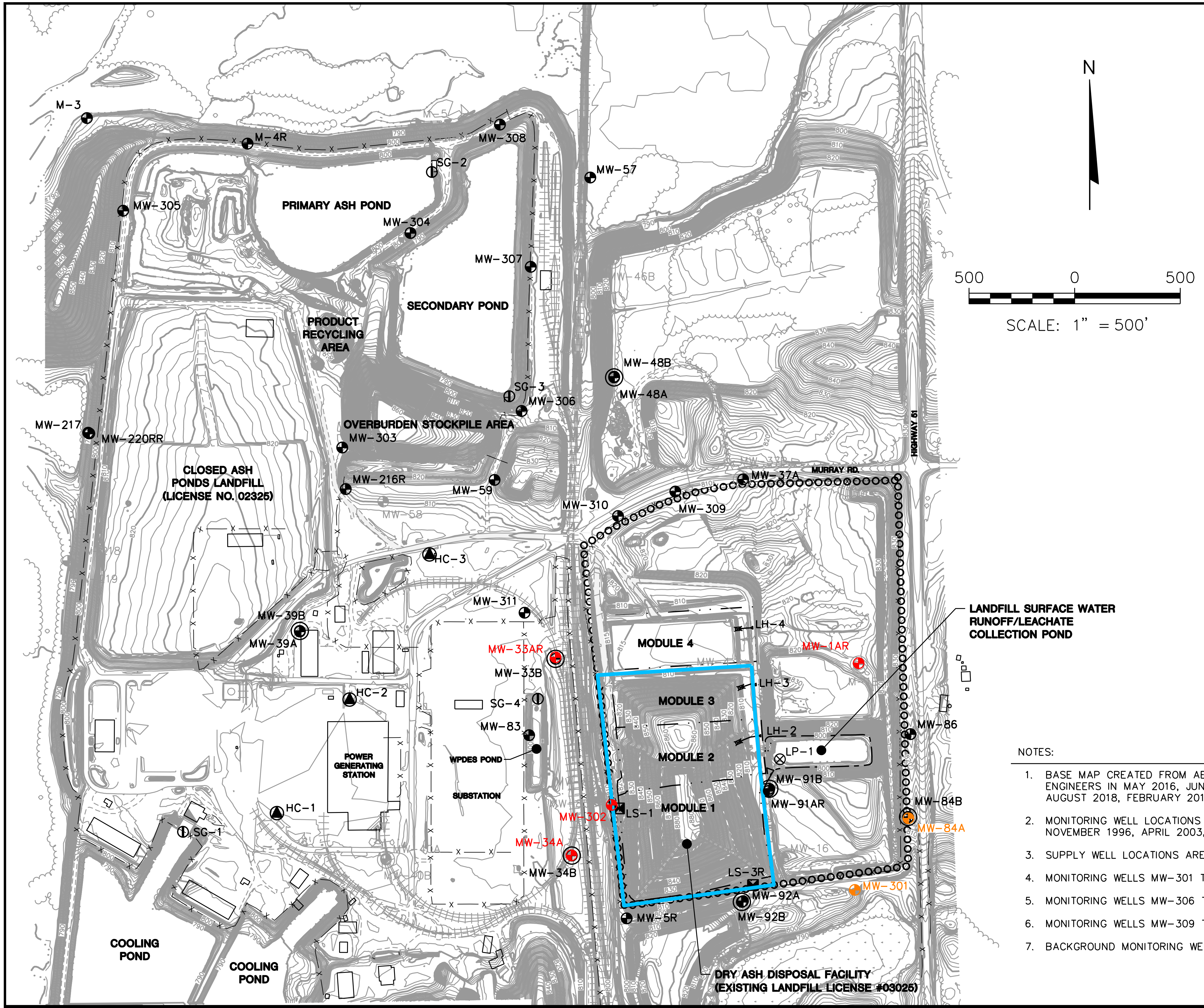
POYNETTE QUADRANGLE
WISCONSIN–COLUMBIA CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)
2018
SCALE: 1" = 2,000'

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

SITE LOCATION MAP

PROJECT NO.	25220067.00	DRAWN BY:	BSS	ENGINEER	SCS ENGINEERS 2830 DAIRY DRIVE MADISON, WI 53718-6751 PHONE: (608) 224-2830	FIGURE
DRAWN:	12/02/2019	CHECKED BY:	MDB			1
REVISED:	01/10/2020	APPROVED BY:	TK 04/10/2020			

I:\25220067.00\Drawings\ASD Mod 1-3 LF\Site Location Map.dwg, 4/12/2020 7:05:09 PM



LEGEND

———	EXISTING MAJOR CONTOUR (10' INTERVAL)
———	EXISTING MINOR CONTOUR (2' CONTOUR)
—x—x—	EXISTING FENCE LINE
┼┼┼┼┼┼	EXISTING TRACKS
═══	EXISTING PAVED ROAD
=====	EXISTING UNPAVED ROAD
—·· —	EDGE OF WATER
○○○○○○○○	APPROVED LIMITS OF WASTE (DRY ASH LANDFILL)
— · · —	CONSTRUCTED LIMITS OF WASTE (DRY ASH LANDFILL)
▲	WATER SUPPLY WELL
⦶	STAFF GAUGE
◕	WATER TABLE WELL
◉	PIEZOMETER
⊗	SURFACE WATER SAMPLE LOCATION
⧗	LYSIMETER
◕	ABANDONED WATER TABLE WELL
◉	ABANDONED PIEZOMETER
⇜	LEACHATE HEADWELL
━━━	CCR UNIT
●	CCR MONITORING WELL
●	CCR BACKGROUND MONITORING WELL

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. BACKGROUND MONITORING WELLS FOR THE MODULE 1-3 DRY ASH FACILITY ARE: MW-301 AND MW-84A.

PROJECT NO.	25221067.00	DRAWN BY:	KP
DRAWN:	06/29/2021	CHECKED BY:	NDK
REVISED:	12/21/2021	APPROVED BY:	TK 12/22/2021

ENGINEER

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

CLIENT

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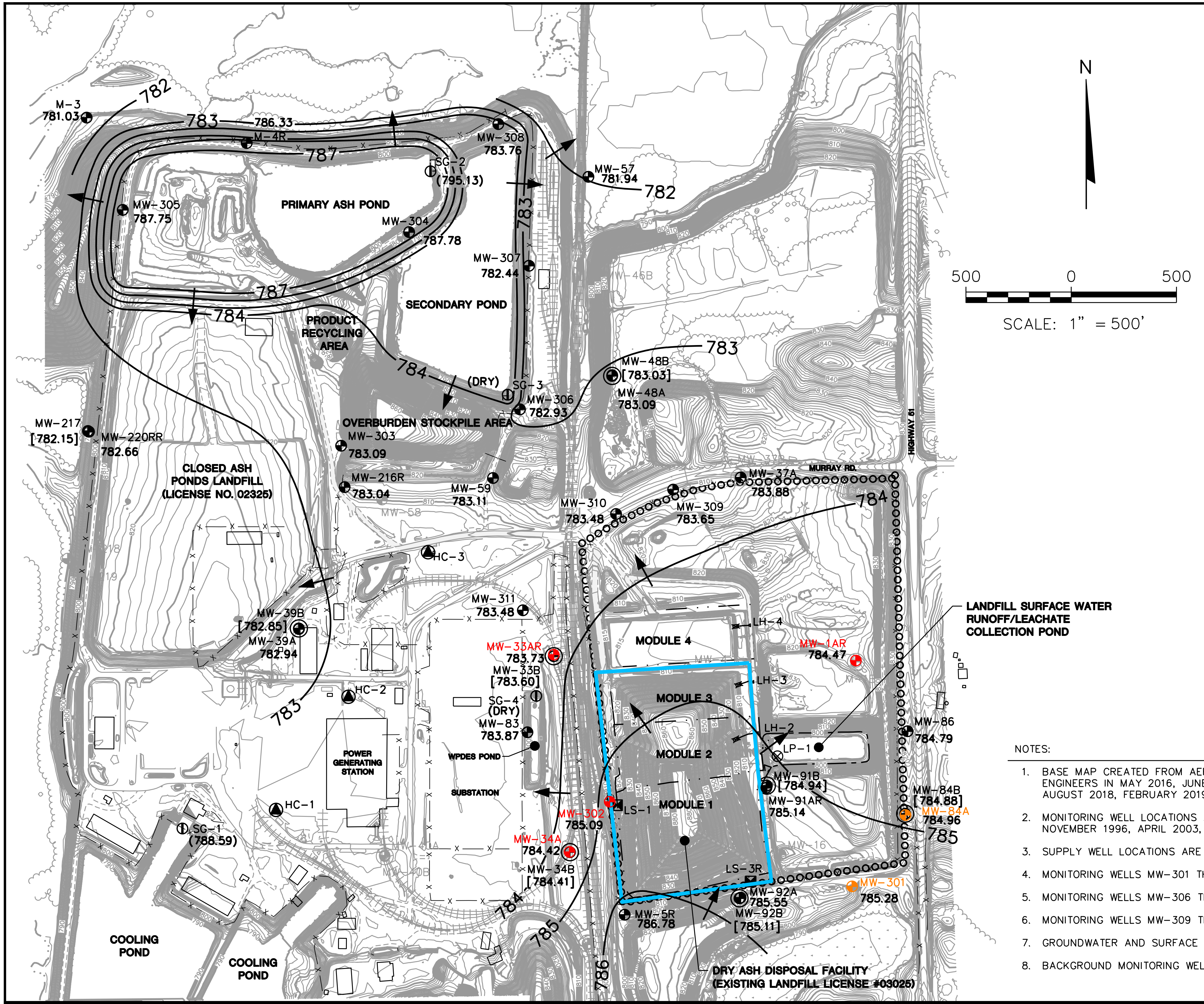
COLUMBIA ENERGY CENTER
W8375 MURRAY ROAD
PARDEEVILLE, WI 53954

SITE

ALLIANT ENERGY
COLUMBIA ENERGY CENTER
MODULE 1-3 DRY ASH DISPOSAL FACILITY
PARDEEVILLE, WI

SITE PLAN AND MONITORING WELL LOCATIONS

FIGURE
2



LEGEND

—	EXISTING MAJOR CONTOUR (10' INTERVAL)
—	EXISTING MINOR CONTOUR (2' CONTOUR)
—x—x—	EXISTING FENCE LINE
┼┼┼┼┼┼	EXISTING TRACKS
═	EXISTING PAVED ROAD
╌	EXISTING UNPAVED ROAD
—··—	EDGE OF WATER
○○○○○○○○	APPROVED LIMITS OF WASTE (DRY ASH LANDFILL)
— · · —	CONSTRUCTED LIMITS OF WASTE (DRY ASH LANDFILL)
▲	WATER SUPPLY WELL
◑	STAFF GAUGE
●	WATER TABLE WELL
◉	PIEZOMETER
⊗	SURFACE WATER SAMPLE LOCATION
⧗	LYSIMETER
●	ABANDONED WATER TABLE WELL
◉	ABANDONED PIEZOMETER
↜	LEACHATE HEADWELL
—	CCR UNIT
🔴	CCR MONITORING WELL
🟠	CCR BACKGROUND MONITORING WELL
787.62	WATER TABLE ELEVATION
[788.87]	POTENTIOMETRIC SURFACE ELEVATION (NOT CONTOURED)
(795.20)	SURFACE WATER ELEVATION (NOT CONTOURED)
—	WATER TABLE CONTOUR
→	APPROXIMATE GROUNDWATER FLOW DIRECTION

NOTES:

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

PROJECT NO.	25221067.00	DRAWN BY:	KP
DRAWN:	10/26/2021	CHECKED BY:	NDK
REVISED:	12/27/2021	APPROVED BY:	TK 12/27/2021

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SITE

ALLIANT ENERGY
COLUMBIA ENERGY CENTER
MODULE 1-3 DRY ASH DISPOSAL FACILITY
PARDEEVILLE, WI

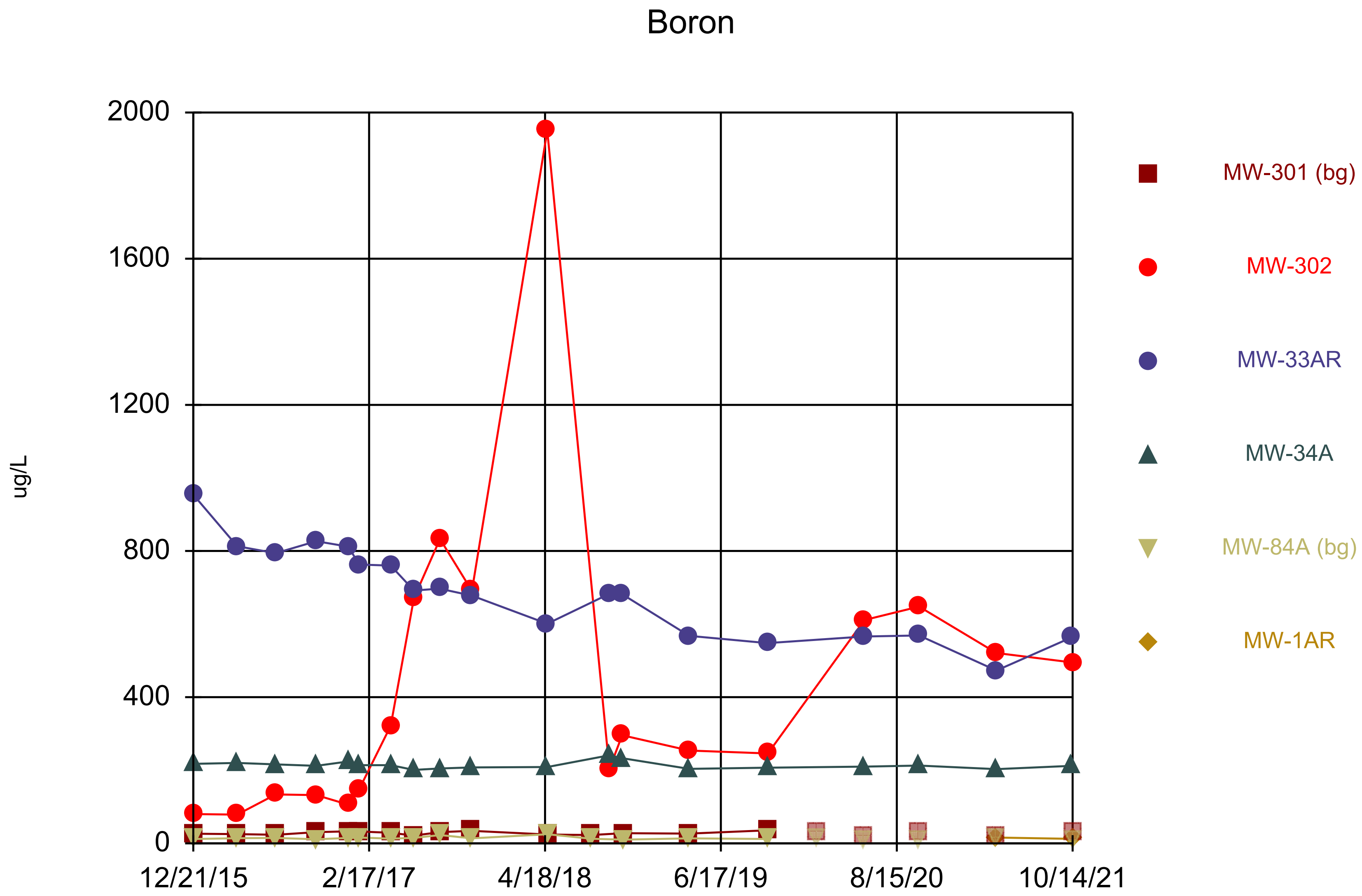
WATER TABLE MAP
OCTOBER 2021

FIGURE
3

I:\25221067.00\Drawings\Water Table Map O□1 2021 MOD1-3.dwg, 1/3/2022 □51:21 AM

Appendix A

Trend Plots for CCR Wells



Time Series Analysis Run 2/14/2022 4:37 PM View: MOD 1-3 LF

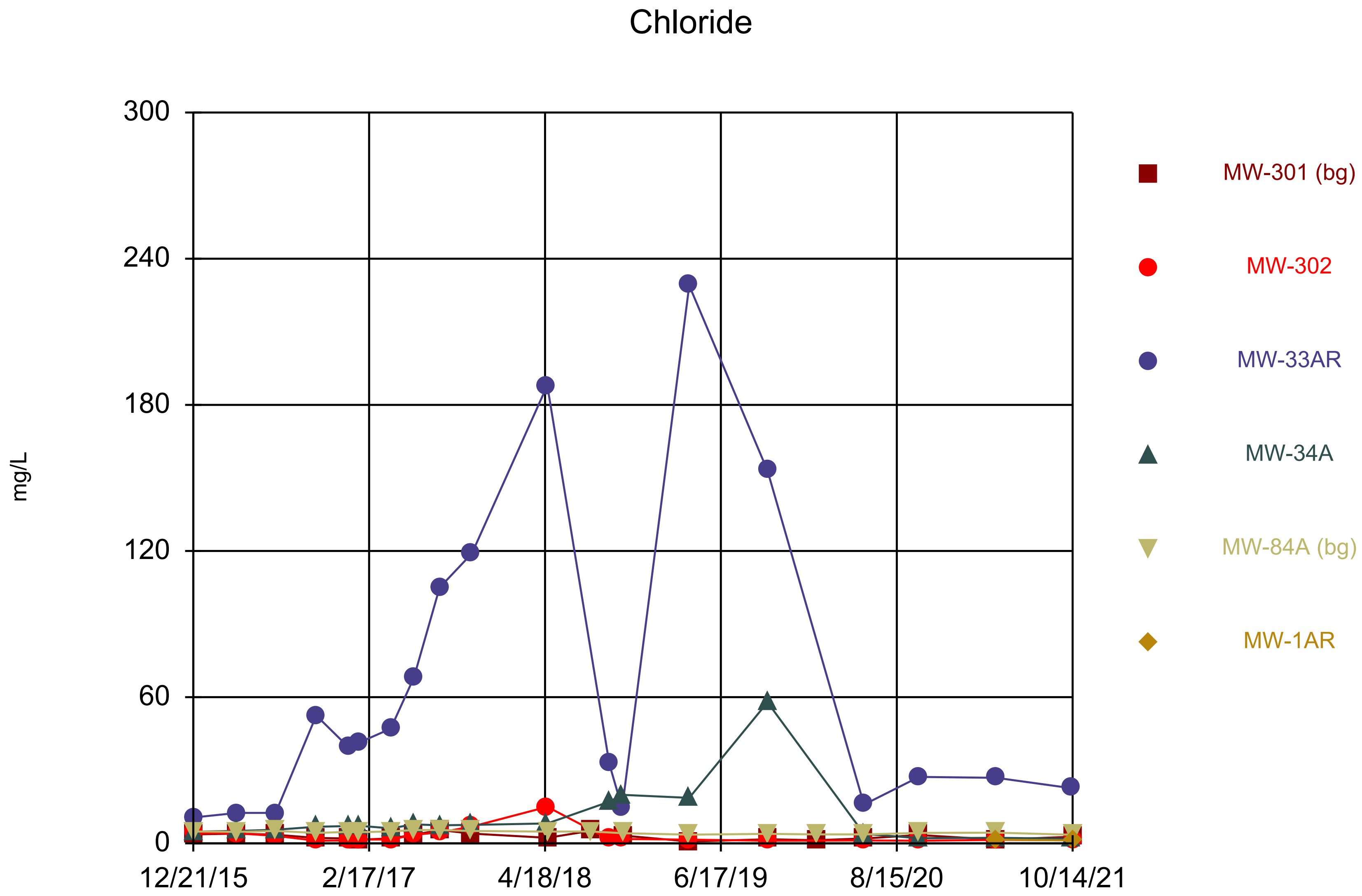
Columbia Energy Center Client: SCS Engineers Data: December - Chem- export-Dec2020

Time Series

Constituent: Boron (ug/L) Analysis Run 2/14/2022 4:38 PM View: MOD 1-3 LF

Columbia Energy Center Client: SCS Engineers Data: December - Chem- export-Dec2020

	MW-301 (bg)	MW-302	MW-33AR	MW-34A	MW-84A (bg)	MW-1AR
12/21/2015			954	217.5 (D)		
12/22/2015	26.5	80			11.9	
4/5/2016	25.2	78.8	813	220	14	
7/7/2016		134	794	216		
7/8/2016	23.6				14.7	
10/13/2016	30.6	132	827	212	11.1	
12/29/2016	32.8	106	812	224	14.7	
1/25/2017	32.6	149	763	214	16.1	
4/11/2017	28.8	322	760	214	12.9	
6/6/2017	21.3	671	692	201	14.8	
8/7/2017			697	205		
8/8/2017	30.6	833			22.9	
10/23/2017	34.3					
10/24/2017		691	678	208	13.8	
4/24/2018		1950	601	209		
4/25/2018	24.3				25	
8/8/2018	22.8				12.8	
9/21/2018		203	683	241		
10/22/2018		296	682	233		
10/24/2018	27.8				10.1 (J)	
4/2/2019	26.9	254	568	204		
4/3/2019					13.6	
10/8/2019			548	207		
10/9/2019	35.9	246			12	
2/3/2020	27.9				15.7	
5/28/2020			566	210		
5/29/2020	21.3	611			10	
10/8/2020	28.8	648	569	213	9.7 (J)	
4/13/2021		521	473	203		
4/14/2021	22.2				14.3	16.1
10/12/2021			564	212		
10/14/2021	31.4	495			11.1	12.4



Time Series Analysis Run 2/14/2022 4:37 PM View: MOD 1-3 LF

Columbia Energy Center Client: SCS Engineers Data: December - Chem- export-Dec2020

Time Series

Constituent: Chloride (mg/L)   Analysis Run 2/14/2022 4:38 PM   View: MOD 1-3 LF

Columbia Energy Center   Client: SCS Engineers   Data: December - Chem- export-Dec2020

	MW-301 (bg)	MW-302	MW-33AR	MW-34A	MW-84A (bg)	MW-1AR
12/21/2015			10.6	4.85 (D)		
12/22/2015	3.7 (J)	4.2			4.9	
4/5/2016	4	4.1	12.5	5.1	4.7	
7/7/2016		3.1 (J)	12.5	5.6		
7/8/2016	3.5 (J)				5.1	
10/13/2016	2.2	1.1 (J)	52.5	6.8	4.3	
12/29/2016	2 (J)	1.2 (J)	39.6	7.1	4.7	
1/25/2017	1.5 (J)	1.6 (J)	41.4	7.2	4.6	
4/11/2017	2	1.6 (J)	47.1	6.2	4.9	
6/6/2017	3.5	3.5	68.1	7.8	5.5	
8/7/2017			105	7.4		
8/8/2017	5.5	4.5			5.5	
10/23/2017	4					
10/24/2017		6.9	119	7.6	5.1	
4/24/2018		15	188	8.2		
4/25/2018	2.3				4.8	
8/8/2018	5.2				4.9	
9/21/2018		1.7 (J)	32.6	17.1		
10/22/2018		1.8 (J)	14.4	19.9		
10/24/2018	3.2				4.2	
4/2/2019	0.79 (J)	1.5 (J)	229	18.7		
4/3/2019					3.6	
10/8/2019			153	57.9		
10/9/2019	1.7 (J)	1.1 (J)			3.9	
2/3/2020	1.3 (J)				3.7	
5/28/2020			15.9	3.9		
5/29/2020	2 (J)	1.2 (J)			3.7	
10/8/2020	3.4	1.1 (J)	27.3	2.1	4.3	
4/13/2021		1.4 (J)	26.9	2.3		
4/14/2021	1.5 (J)				4.4	1.5 (J)
10/12/2021			22.6	1.9 (J)		
10/14/2021	2.7	1.3 (J)			3.5	1.2 (J)

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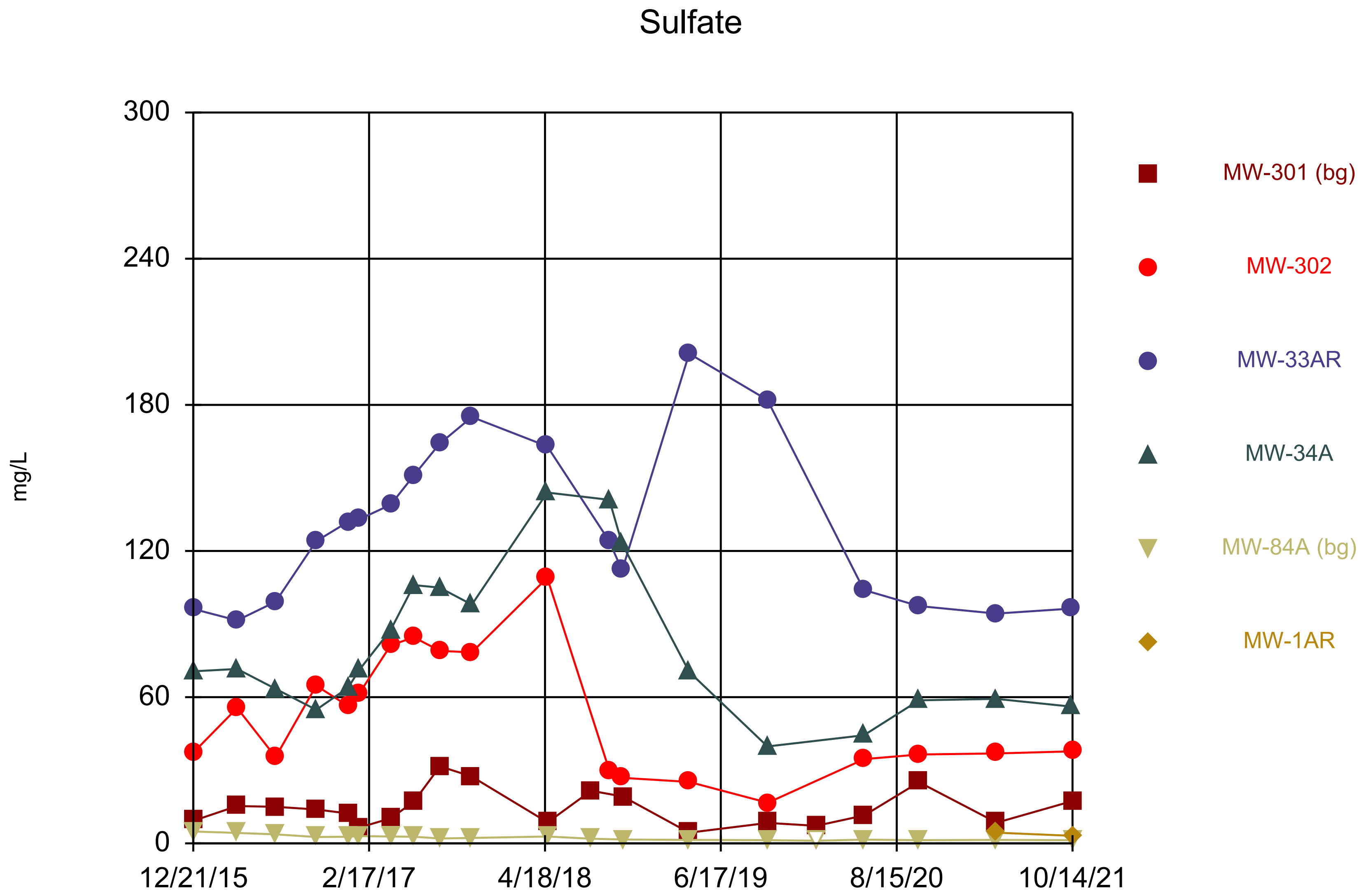
Hollow symbols indicate censored values.



Time Series Analysis Run 2/14/2022 4:37 PM View: MOD 1-3 LF

Columbia Energy Center Client: SCS Engineers Data: December - Chem- export-Dec2020

Time Series

Constituent: Sulfate (mg/L)   Analysis Run 2/14/2022 4:38 PM   View: MOD 1-3 LF

Columbia Energy Center   Client: SCS Engineers   Data: December - Chem- export-Dec2020

	MW-301 (bg)	MW-302	MW-33AR	MW-34A	MW-84A (bg)	MW-1AR
12/21/2015			96.2	70.6 (D)		
12/22/2015	9.3	37.4			4.9	
4/5/2016	15.3	55.6	91.5	71.6	4.3	
7/7/2016		35.4	99.2	63.4		
7/8/2016	15				3.7 (J)	
10/13/2016	13.9	64.7	124	54.8	2.6 (J)	
12/29/2016	12.3 (J)	56.4	132	63.9	2.7 (J)	
1/25/2017	6.5	61.6	133	71.2	3	
4/11/2017	10.3	81.3	139	87.6	2.8 (J)	
6/6/2017	17.1	84.6	151	106	2.7 (J)	
8/7/2017			164	105		
8/8/2017	31.6	79			2 (J)	
10/23/2017	27.5					
10/24/2017		78.4	175	98	2.2 (J)	
4/24/2018		109	163	144		
4/25/2018	8.6				2.8 (J)	
8/8/2018	21.6				1.9 (J)	
9/21/2018		30	124	141		
10/22/2018		26.9	112	123		
10/24/2018	19.2				1.6 (J)	
4/2/2019	4.4	25.2	201	70.4		
4/3/2019					1.4 (J)	
10/8/2019			182	39.8		
10/9/2019	8.4	16.7			1.3 (J)	
2/3/2020	7.2				<2.2 (U)	
5/28/2020			104	44.4		
5/29/2020	11.5	34.6			1.5 (J)	
10/8/2020	25.1	36.5	97.4	58.7	1.3 (J)	
4/13/2021		36.9	94.3	59.3		
4/14/2021	8.5				1.4 (J)	4.4
10/12/2021			96.4	56.1		
10/14/2021	17.4	37.8			1.3 (J)	3.1

Appendix B

Feasibility Study Water Quality Information

1370

FEASIBILITY STUDY
PROPOSED FLY ASH AND/OR SCRUBBER SLUDGE DISPOSAL FACILITY-COLUMBIA SITE

WISCONSIN POWER AND LIGHT COMPANY
TOWN OF PACIFIC, COLUMBIA COUNTY, WISCONSIN

Jan 78

C 7134

conceivable that groundwater flow in the area north of Murray Road may be altered such that contaminants derived from the present ash settling basin might be diverted southerly towards the homes along Murray Road. These questions would have to be addressed in greater detail, consistent with the goals of Wisconsin Power and Light Company.

WATER QUALITY

During the first two weeks of December, 1977, 64 water samples were obtained from surface waters and groundwater monitoring wells at the Columbia Energy Center. The purpose of the sampling was to assess background water quality in the vicinity of the proposed disposal site. The sampling stations included 59 monitoring wells, the cooling lake, ash settling pond, the drainage ditch carrying the ash pond discharge waters and the agricultural drainage ditch along the southern boundary of the site. Due to the large number of sampling stations, the analyses were limited to pH, specific conductance, iron, calcium, magnesium, sulfate and chloride. The analytical data is contained in Appendix F and is discussed below.

pH

Most groundwaters found in the United States have pH values ranging from around 6.0 to 8.5. The pH of a water represents the result of a number of interrelated chemical equilibria. This equilibria can be altered shortly after sampling by gains or losses of carbon dioxide, the oxidation of ferrous iron and numerous other chemical reactions. Thus, pH measurements must be taken shortly after obtaining the sample. For this study, the pH of samples was determined immediately upon return to the laboratory.

Within the proposed site boundaries at the Columbia Energy Center, pH values ranged between 6.3 and 8.1 and averaged 7.5. Typically, the lower pH values were observed in the lowland areas and wetlands, probably as a result of acidic organic soils. The pH of water in the ash disposal settling pond and the cooling lake was 11.4 and 8.3, respectively.

SPECIFIC CONDUCTANCE

Specific conductance, or conductivity, is the ability of a substance to conduct an electric current. The conductance determination is correlative with the dissolved-solids concentration. Conductivity, however, is temperature dependent and thus requires the reference of specific conductance measurements to a standard temperature. The values discussed here are referred to 25°C.

The specific conductance of groundwater in the study area ranged from 220 umhos/cm to a maximum of 2600 umhos/cm. The highest conductivity readings were observed in monitoring wells located along the coal storage area and the drainage ditch carrying the ash pond discharge where values up to 2600 umhos/cm were measured. The conductivity of the ash pond effluent was 1380 umhos/cm. This data appears to confirm earlier speculation of infiltration of effluent from the ash pond discharge channel and from the coal storage area into the groundwater. Conductance within the proposed site boundaries averaged approximately 465 umhos/cm.

Conductivity in the ash disposal settling pond was measured at 1510 umhos/cm. Shallow monitoring wells M-6 and 39A, located adjacent to the pond also exhibited elevated values of 1160 umhos/cm and 1800 umhos/cm, respectively.

High conductivities were also observed along U. S. Highway 51 at monitoring wells 51A and 51B. The chloride data, discussed below, indicates infiltration of road salt has probably occurred at this location.

Specific conductance measurements obtained in the vicinity of the proposed disposal site are shown on Drawing C 7134-15.

IRON

The element iron is an abundant element found in most rocks and soil. It generally occurs as sulfides and oxides in igneous and metamorphic rocks and as iron oxide and hydroxide cementing materials in coarse-grained sedimentary rocks.

Ferrous iron is unstable in the presence of oxygen where it is bound to hydroxide anions as $2Fe(OH)_3$.

$$2Fe^{++} + 4HCO_3^- + H_2O \rightleftharpoons 2Fe(OH)_3 + 4CO_2$$

If subjected to a strong reducing environment, such as a marsh, the reaction is reversed and iron goes back into solution. The amount which dissolves is related to a number of variables including the velocity with which water moves through this environment.

The U. S. Public Health Service recommends an iron concentration of less than 0.3 mg/l in water used for drinking and culinary purposes. Laundry and porcelain tend to be stained when concentrations reach 0.5 to 1.0 mg/l. At this level it can also be tasted.

The presence of iron under the proposed disposal area in the majority of cases was below the detection limit of 0.1 mg/l. In monitoring wells 5 and 18, located in or near the central marsh area, iron increased to 10 mg/l and 5.7 mg/l, respectively. In the southern marsh, monitoring wells exhibited concentrations between 0.5 mg/l and 6.1 mg/l. Although the iron concentration in the cooling lake was below the detection limit, down-gradient wells 44 and 30A located on the cooling lake dike yielded values of 11 mg/l and 26 mg/l iron respectively. Boring logs indicated trace amounts of organic material at the base of the dike which is probably the reason for the high concentrations observed. At the same location, iron in well 30B installed to a depth of 100 feet below the surface was below 0.1 mg/l. Thus, the occurrence of high iron concentrations in this area appears restricted to groundwater in the upper portion of the aquifer where organic material is present and conditions are favorable for the dissolution of iron.

The ash pond discharge in the drainage ditch paralleling the west site boundary showed an iron concentration of 3.7 mg/l. Shallow monitoring wells 33A and 34A adjacent to the ditch indicated less than 0.1 mg/l iron.

North of Murray Road the iron concentration in monitoring wells in the marsh and uplands were typically less than 0.1 mg/l. Although the ash basin had less than 0.1 mg/l iron, several wells along cross-section F-F' showed anomalously high values (#M6-2.3 mg/l; #47-16 mg/l; #51B-21 mg/l).

CALCIUM

Calcium, because of its relative abundance and mobility, is the principle cation in most natural fresh water. Calcium is a constituent of many rock types but is found in greatest quantities in waters leaching deposits of limestone and dolomite. In sandstone and other detrital rock, calcium carbonate is a common cement between grains.

Monitoring wells located within the site boundaries exhibited calcium concentrations between 30 mg/l and 66 mg/l and averaged about 42 mg/l. Similar to iron, the concentrations of calcium in monitoring wells along cross-section F-F' were anomalously high, up to 150 mg/l calcium. Water table wells along the drainage ditch carrying the ash pond discharge averaged 83 mg/l while the ash pond effluent contained 28 mg/l. Generally the amount of calcium in groundwater decreased with depth. Nested monitoring wells typically showed somewhat lower concentrations of calcium in the deeper wells.

MAGNESIUM

As a relatively abundant element on the earth's crust, the principle sources of magnesium in natural waters are considered to be ferromagnesian minerals in igneous rocks and magnesium carbonate in carbonate rocks (limestone and dolomite). Waters in which magnesium is the predominant cation are somewhat unusual. Like calcium, magnesium imparts the property of hardness to water and is, therefore, of concern to industrial users.

Generally, concentrations of magnesium were 1/3 to 1/2 of the calcium levels. Magnesium concentrations within the site boundaries ranged between 10 mg/l and 36 mg/l and averaged 27 mg/l. Similar to calcium and iron, higher magnesium values were observed, in general, north of Murray Road and especially in monitoring wells along cross-section F-F'.

SULFATE

Sulphur is widely distributed in reduced form in both igneous and sedimentary rocks as metallic sulfides and when present in sufficient concentrations, constitutes ore of economic importance. During weathering processes with aerated water, the sulfides are oxidized to sulfate ions and are dissolved into water. Pyrite (FeS_2) crystals often occur in sedimentary rocks and are particularly associated with biogenic deposits such as coal which were deposited under strongly reducing conditions.

The concentrations of sulfate in groundwater in the vicinity of the proposed disposal site ranged from less than 1 mg./l to 1,200 mg./l of sulfate. (Refer to Drawing C 7134-15.) Typically, within the site boundaries concentrations averaged approximately 12 mg./l. Near the coal storage area, however, significant increases were observed. Observation wells 26A, 26B, and 42 exhibited concentrations between 900 and 1100 mg./l. The depth of sulfate enrichment in groundwater, near the coal pile, appears to extend to considerable depths, indicated by relatively high sulfate concentrations in Well 26B sealed 100 feet below ground surface. The oxidation of pyrite minerals in the coal leaching into the groundwater is probably the major source of the high concentrations observed.

Sulfate concentrations in the ash disposal settling pond were 520 mg./l. In the ditch carrying the ash pond discharge, the effluent is treated with sulfuric acid which results in precipitation of barium sulfate and aluminum hydroxide (personal communication, Merlin Horn, 1978). Consequently, the sulfate concentration of the effluent waters is lowered considerably to 13 mg./l. Well 33A, however, located near the point of effluent discharge, exhibited 1200 mg./l sulfates.

CHLORIDE

Chloride is generally present in much lower concentrations in rocks than many of the other major constituents of natural water. Important sources, however, are associated with sedimentary rocks, particularly the evaporites. The chemical behavior of chloride in natural water is relatively inert compared to the other major ions. There are few oxidation-reduction reactions and no significant chemical complexing reactions which chloride enters into. In addition, chloride ions are not significantly adsorbed on mineral surfaces. For these reasons, chloride is commonly used as a tracer in groundwater.

Chloride concentrations in groundwater in the vicinity of the Columbia Energy Center typically range between 0.5 mg./l and 30 mg./l. The highest concentrations in monitoring wells tended to be located adjacent to U. S. Highway 51 where the use of road salt has resulted in the percolation of chloride into the groundwater. Monitoring Wells 51A and 51B located in a low area north of Murray Road along U. S. Highway 51, yielded chloride concentrations in excess of 200 mg./l. Two other wells, 52A and 19, also located along U. S. Highway 51, yielded values of 30 mg./l and 42.5 mg./l chloride, respectively.

Within the proposed site boundaries, the chloride concentration averaged 7.1 mg./l. Excluding the few wells adjacent to U. S. Highway 51 exhibiting elevated concentrations, no other significant trends in the occurrence of chloride were observed.

SUMMARY

In summary, the groundwater in the vicinity of the proposed disposal site exhibited a somewhat alkaline pH. In lowland areas, the pH was typically below 7.0, probably a result of the presence of acidic organic soils.

Specific conductance within the proposed site averaged 465 umhos/cm. Conductivities up to 2600 umhos/cm were observed, however, in the vicinity of the coal storage area, the present ash disposal pond and ash pond effluent channel where infilatration of water from these sources is occurring into the groundwater system.

The groundwater typically exhibted relatively low iron concentrations although, locally, concentrations in excess of drinking water standards were observed in about 20% of the wells. The occurrence of the higher iron concentrations appears to be related to the presence of organic soils.

Groundwater at the proposed site also tended to exhibit high calculated hardness (216 mg./l) based on average observed values for calcium (42 mg./l) and magnesium (27 mg./l). Dissolution of limestone and dolomite rocks in the glacial drift are the probable sources of these elements in the groundwater.

Enrichment of sulfate in groundwater has occurred as a result of leaching of pyrite (FeS_2) minerals from the coal storage area where concentrations up to 1200 mg./l were observed. The depth of this enrichment appears to extend beyond the maximum depth into the aquifer investigated. Sulfate concentrations decreased rapidly away from the coal storage area to an average of 12 mg./l within the proposed site boundaries. Other local sources of sulfate in groundwater appear to be related to the present ash settling pond.

The concentration of chloride within the proposed site averaged 7.1 mg./l. Higher levels were generally observed in wells adjacent to U. S. Highway 51 where the infiltration of road salt has locally raised chloride concentrations.

The above interpretations are based on one round of water quality sampling only and should be considered as preliminary in nature. High sulfate and chloride concentrations observed at greater depths may be a temporary condition resulting from contamination of spoil backfill materials with coal dust or salt, respectively, during installation of the monitoring well. Future sampling of these monitoring wells will help to distinguish short term contamination from actual conditions existing in the aquifer.

APPENDIX F
WATER QUALITY DATA

WELL NO.	pH	SPECIFIC CONDUCTANCE (umhos/cm @ 25°C)	SULFATE (mg/l)	CHLORIDE (mg/l)	CALCIUM (mg/l)	MAGNESIUM (mg/l)	IRON (mg/l)
1A	7.6	550	17.	6.5	52	37	<0.1
1B	8.05	460	16.	10.5	39	31	<0.1
2	7.8	527	14.	2.5	45	32	<0.1
3A	7.5	548	13.	2.5	58	36	<0.1
3B	8.1	506	14.	7.0	50	34	<0.1
4	7.8	580	10.	4.0	59	34	<0.1
5	6.3	560	210.	12.5	13	29	10
16	7.6	408	12.	1.5	42	28	<0.1
17	6.45	350	30.	16.5	16	13	0.6
18	6.45	380	4.	4.5	33	22	5.7
19	7.9	570	10.	42.5	44	24	<0.1
20	8.0	340	10.	5.0	36	24	<0.1
21	6.9	220	20.	4.5	23	10	0.1
24A	7.45	775	18.	6.0	76	52	0.1
24B	7.85	440	15.	6.0	43	31	0.1
25	8.1	300	10.	2.5	29	20	<0.1
26A	7.2	2100	900	17.0	140	48	1.5
26B	7.5	2600	1100	16.5	43	7.0	0.2
27	7.15	400	6.	8.0	23	18	<0.1
28A	7.75	500	3.	0.5	48	31	<0.1
28B	7.6	480	4.	3.5	39	28	<0.1
29A	7.8	330	16.	1.5	33	21	0.5
30A	6.75	920	64.	11.0	38	30	26
30B	7.6	770	210	21.0	37	19	<0.1
33A	8.2	2500	1200	24.0	83	50	<0.1
33B	7.9	390	22.	6.5	31	27	0.2
34A	7.7	680	140.	10.0	58	45	0.1
34B	7.7	1700	660	15.0	48	22	<0.1
35	6.8	740	<1.0	4.0	66	33	2.9
36	6.8	740	<1.0	3.5	53	35	6.1
37A	7.7	460	9.	4.0	48	31	0.8
37B	7.5	630	73.	7.5	71	35	<0.1
39A	7.5	1800	350	22.0	180	100	0.1
39B	7.9	330	560	20.5	31	22	0.1
40A	8.0	630	140	8.5	43	29	<0.1
40B	8.1	330	17.	3.0	31	22	<0.1
41	6.8	590	16.	11.0	58	27	9.3

WELL NO.	pH	SPECIFIC CONDUCTANCE (umhos/cm @ 25°C)	SULFATE (mg/l)	CHLORIDE (mg/l)	CALCIUM (mg/l)	MAGNESIUM (mg/l)	IRON (mg/l)
42	7.4	2400	900	17.5	50	12	0.5
44	6.9	490	<1.	16.5	39	23	11
45	7.6	390	14.	3.0	40	25	<0.1
46A	7.3	1100	21.	15.5	140	82	<0.1
46B	7.8	470	25.	17.5	40	26	<0.1
47	6.6	1200	3.	8.0	140	40	16
48A	7.3	620	15.	8.0	62	37	<0.1
48B	7.1	520	22.	20.0	43	29	0.2
49	7.15	730	6.	3.5	75	41	<0.1
50A	7.6	520	28.	15.5	51	34	<0.1
50B	7.5	410	21.	18.0	31	21	<0.1
51A	6.1	1850	8.	205.	65	40	<0.1
51B	7.2	1250	23.	275.	57	36	21
52A	7.7	450	16.	30.5	36	17	<0.1
52B	7.4	430	40.	17.5	32	20	<0.1
53	7.75	450	27.	10.5	39	28	<0.1
54A	7.8	350	12.	4.0	34	21	0.1
54B	7.55	390	15.	5.5	40	24	0.1
55B	7.9	340	23.	17.5	32	22	0.1
56	7.8	450	22.	9.5	43	28	0.1
57	7.85	380	17.	7.0	38	24	0.1
M-6	7.0	1160	5.	7.0	150	91	2.3
Cooling Lake	8.3	370	31.	18.0	34	21	<0.1
Ash Pond Effluent	7.45	1380	13.	4.0	28	1.2	3.7
Ash Pond	11.4	1510	520.	23.5	29	0.2	<0.1
Drainage Ditch (A)	7.8	500	21.	7.0	43	29	<0.1
Drainage Ditch (B)	9.05	1780	750	14.0	42	5.4	<0.1

DEC 19 1979

APPENDICES TO

SUPPLEMENTARY FEASIBILITY STUDY REPORT AND PRELIMINARY ENGINEERING CONCEPTS
COLUMBIA SITE
WISCONSIN POWER AND LIGHT COMPANY
TOWN OF PACIFIC, COLUMBIA COUNTY, WISCONSIN

D. N. R. APPROVED
DATE 9/3/80
Nile Ostenso, Hydro

WARZYN
ENGINEERING INC

APPENDIX I

WATER QUALITY DATA - DECEMBER 1978

WARZYN
ENGINEERING INC

12/78

C 7134

WATER QUALITY DATA

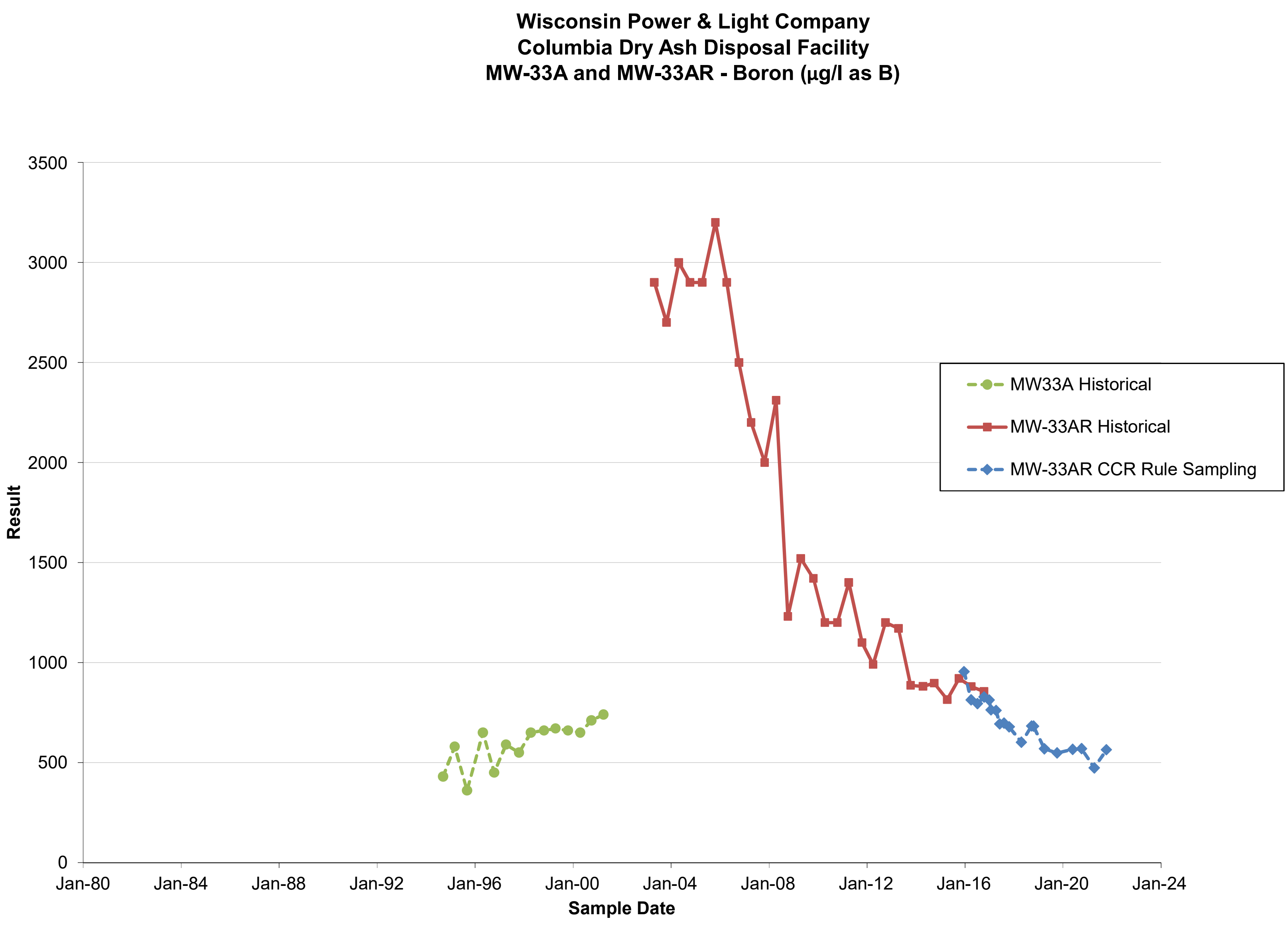
WELL NO.	pH	SPECIFIC CONDUCTANCE (umhos/cm @ 25°C)	SULFATE (mg/l)	CHLORIDE (mg/l)	CALCIUM (mg/l)	MAGNESIUM (mg/l)	IRON (mg/l)	BORON (mg/l)
1A	7.3	530	30	3.1	54	35	<0.1	-
1B	7.0	470	67	6.1	49	30	<0.1	-
2	7.25	458	91	<.5	48	24	<0.1	-
3A	7.0	560	36	<.5	61	31	<0.1	-
3B	7.15	530	52	35.7	37	33	<0.1	-
4	7.2	750	69	5.8	49	30	<0.1	-
5 near [illegible]	6.35	1,650	670	14.1	14	13	<0.1	-
16	6.9	390	69	1.0	49	23	1.7	-
17	5.55	295	57	16.3	14	8.6	<0.1	-
18	5.9	430	10	4.2	47	21	0.2	-
19	7.4	765	75	4.2	51	28	1.1	-
20	7.4	380	26	1.6	39	26	<0.1	-
21	5.7	250	54	10.4	15	8.3	<0.1	-
24A	7.2	730	36	1.6	65	42	0.2	-
24B	7.2	470	10	7.3	42	28	<0.1	-
25	7.0	335	29	7.8	39	21	<0.1	-
26A	7.4	2,250	650	12.6	32	8.6	0.2	-
26B	6.8	2,530	840	20.8	49	18	<0.1	-
27	6.9	410	24	4.2	40	24	<0.1	-
28A	7.2	500	61	0.5	45	28	0.4	-
28B	7.0	465	6	2.1	39	26	<0.1	-
29A	7.1	410	24	3.6	31	22	0.1	-
30A near ditch	5.8	1,140	15	<0.5	97	56	0.1	-
30B in [illegible]	6.65	835	160	14.6	37	20	38	-
33A near ditch	7.8	1,970	830	16.7	21	8.9	<0.1	-
33B [illegible]	7.5	380	31	7.3	24	27	<0.1	-
34A near ditch	7.25	560	46	4.2	53	33	<0.1	-
34B [illegible]	8.5	1,575	730	21.9	28	29	<0.1	-
35	6.7	545	61	3.6	60	26	0.1	-
36	6.4	515	5.0	2.6	43	24	1.0	-
37A	7.05	438	30	3.7	50	28	4.8	-
37B	6.7	325	18	7.3	1.0	0.5	<0.1	-
39A	6.35	1,260	33	13.6	70	7.6	<0.1	-
39B	6.7	385	25	4.2	30	21	0.1	-
40A	7.35	483	40	<0.5	48	24	<0.1	<.05
40B	7.25	343	4	4.2	21	14	<0.1	-
41	6.1	640	54	19.8	43	32	<0.1	-

WELL NO.	pH	SPECIFIC CONDUCTANCE (umhos/cm @ 25°C)	SULFATE (mg/l)	CHLORIDE (mg/l)	CALCIUM (mg/l)	MAGNESIUM (mg/l)	IRON (mg/l)	BORON (mg/l)
42 near ditch on west	7.15	2,050	910	15.6	23	7.5	0.1	-
44 near Cooling Lake	6.15	710	6	0.5	56	27	3.5	-
45	7.2	420	32	1.0	44	26	<0.1	-
46A [illegible]	7.0	560	93	<0.5	130	75	<0.1	<0.05
46B [illegible]	6.5	1,290	170	20.8	46	30	<0.1	<0.05
47 [illegible]	7.3	958	120	<0.5	110	48	<0.1	-
48A [illegible]	6.15	640	59	<0.5	42	51	<0.1	<0.05
48B [illegible]	6.8	450	23	5.2	40	27	<0.1	<0.05
49	7.0	880	26	2.1	93	58	0.1	-
50A	7.4	660	25	17.7	60	36	<0.1	-
50B	7.1	405	16	17.7	38	23	<0.1	-
51A [illegible]	7.0	1,170	57	135	66	31	<0.1	-
51B [illegible]	7.3	1,410	22	330	46	39	<0.1	-
52A	7.0	370	110	18.5	35	10	<0.1	-
52B	7.0	595	43	52.5			0.1	-
53	Frozen							
54A	7.5	345	10	1.0	36	22	<0.1	<0.05
54B	Frozen							
55B	7.3	505	26	15.6	52	29	<0.1	<0.05
56	Frozen							
57	Frozen							
M-6								
58 [illegible] old	6.55	1,265	140	<0.5	110	65	0.1	-
59 [illegible]	6.8	925	40	<0.5	86	60	<0.1	-
60 Hwy [illegible]	7.2	1,510	54	4.7	130	85	<0.1	-
61A [illegible]	6.85	590	39	30.2	58	31	<0.1	-
61B	7.2	505	6	13.5	48	29	<0.1	-
62 Inseal Hwy/[illegible]	6.7	1,517	72	178	120	53	<0.1	-
64	6.9	670	100	26.8	63	36	0.8	-
65 Hwy?	7.2	830	57	17.8	78	50	<0.1	-
66	6.5	680	55	40	66	24	3.6	-

WELL NO.	pH	SPECIFIC CONDUCTANCE (umhos/cm @ 25°C)	SULFATE (mg/l)	CHLORIDE (mg/l)	CALCIUM (mg/l)	MAGNESIUM (mg/l)	IRON (mg/l)	BORON (mg/l)
67	7.0	560	100	1.0	57	32	1.0	-
68A ←	7.6	440	32	2.1	40	27	<0.1	-
68B ←	7.2	400	36	1.0	42	25	<0.1	-
70A Martin Marietta	7.5	440	20	<0.5	27	37	<0.1	-
70B	7.3	520	25	5.2	51	34	<0.1	-
72A Martin Marietta	6.45	860	11	<0.5	100	41	1.8	-
72B	8.4	230	45	<0.5	17	19	<0.1	-
M-4	7.6	864	180	26.1	20	11	<0.1	0.39
MM-4			2	2.6	14	21	0.9	-
Cooling Lake at 1	7.7	355	36	13.6	31	21.2	<0.1	-
Ash Pond at 2	11.4	3,210	1,100	22.9	34	<0.1	<0.1	-
Ash Pond at 3	8.7	725	34	21.9	48	16	<0.1	-
Ash Pond Effluent at 4	6.7	3,090	1,400	25.0	39	0.4	<0.1	-
Drainage Ditch at 5	7.2	730	74	33.9	56	38	<0.1	-
Drainage Ditch at 6	7.35	2,750	640	18.8	34	7.5	<0.1	-
Drainage Ditch at 7	8.05	1,780	740	27.1	31	0.2	<0.1	-

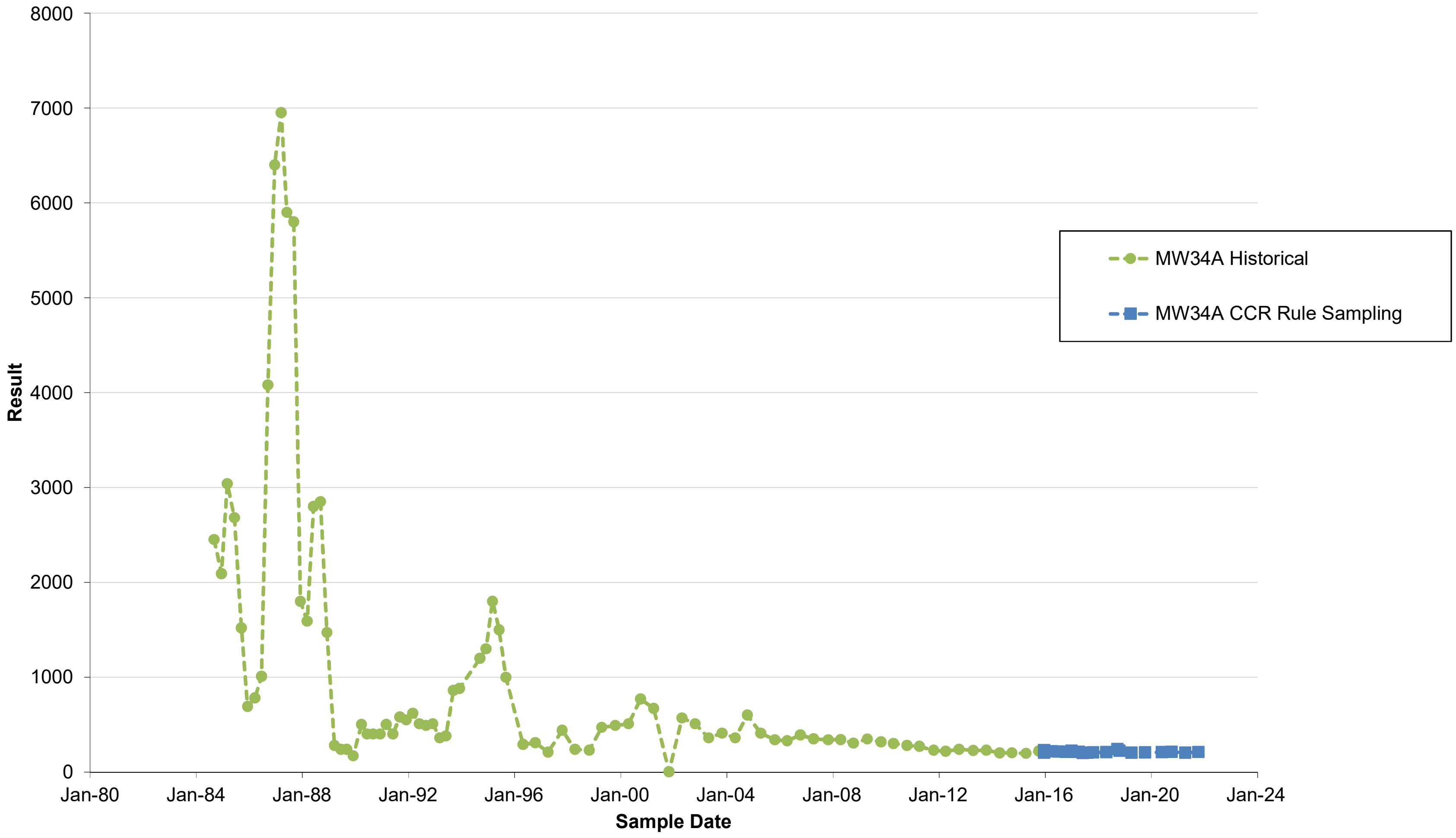
Appendix C

Long-Term Concentration Trend Plots



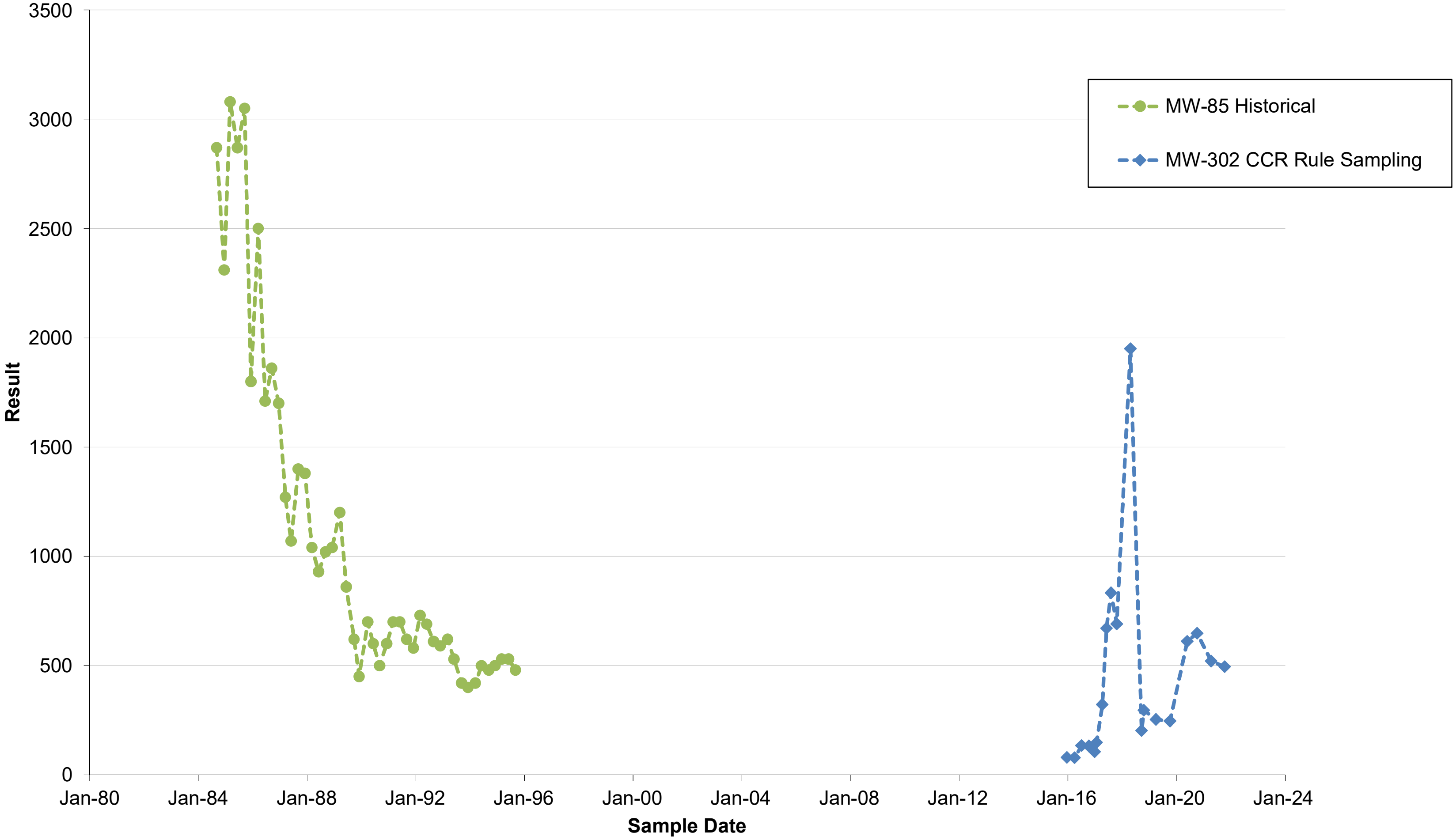
\\10.2.18.8\data\Projects\25221067.00\Deliverables\2021 Oct ASD MOD 1-3 LF\Graphs\[Bo_COL Dry.xlsx]MW-33AR

Wisconsin Power & Light Company
Columbia Dry Ash Disposal Facility
MW34A - Boron (µg/l as B)



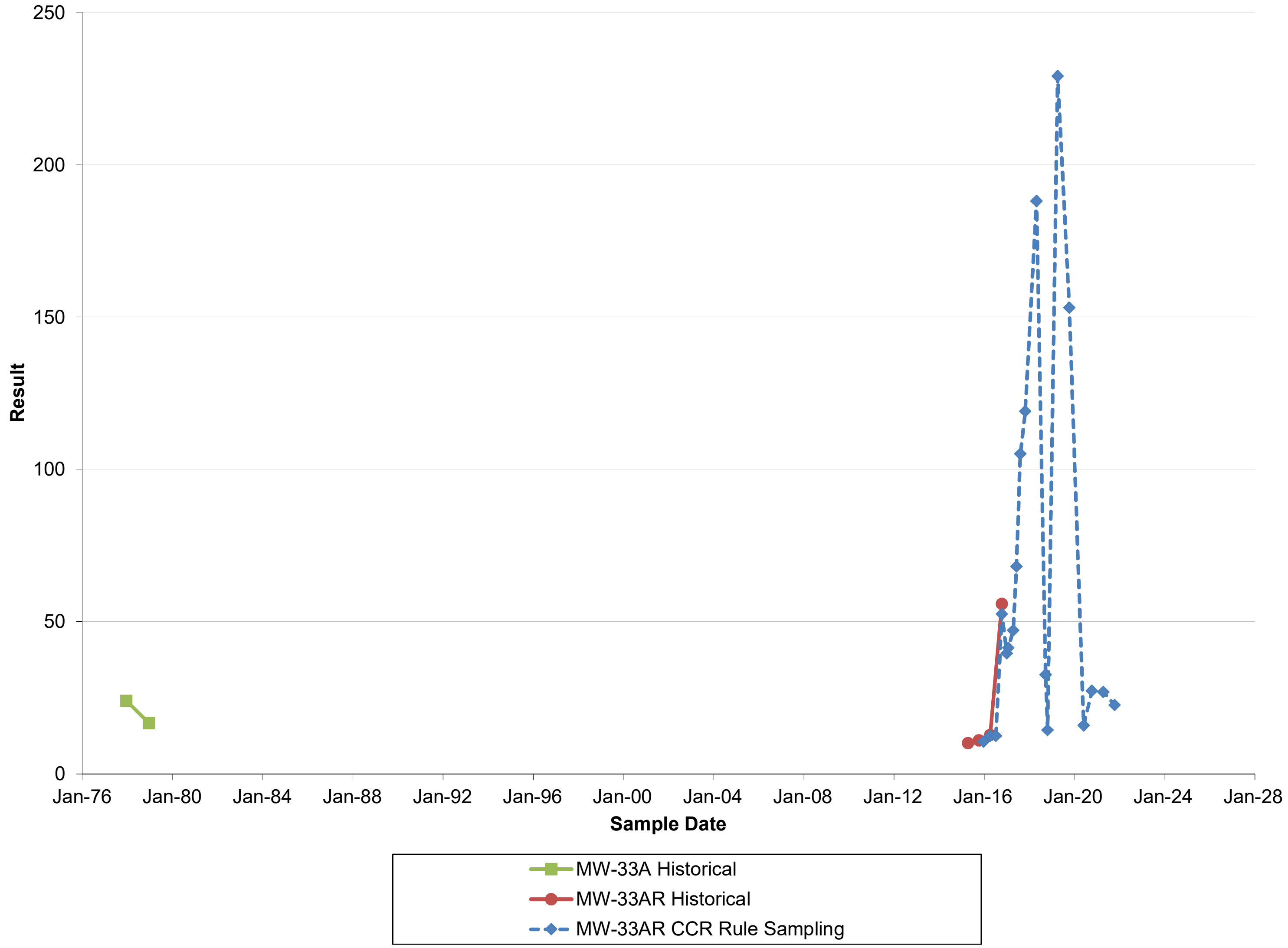
\\10.2.18.8\data\Projects\25221067.00\Deliverables\2021 Oct ASD MOD 1-3 LF\Graphs\[Bo_COL Dry.xlsx]MW-34A

Wisconsin Power & Light Company
Columbia Dry Ash Disposal Facility
MW-302 and MW-85 - Boron (µg/l as B)



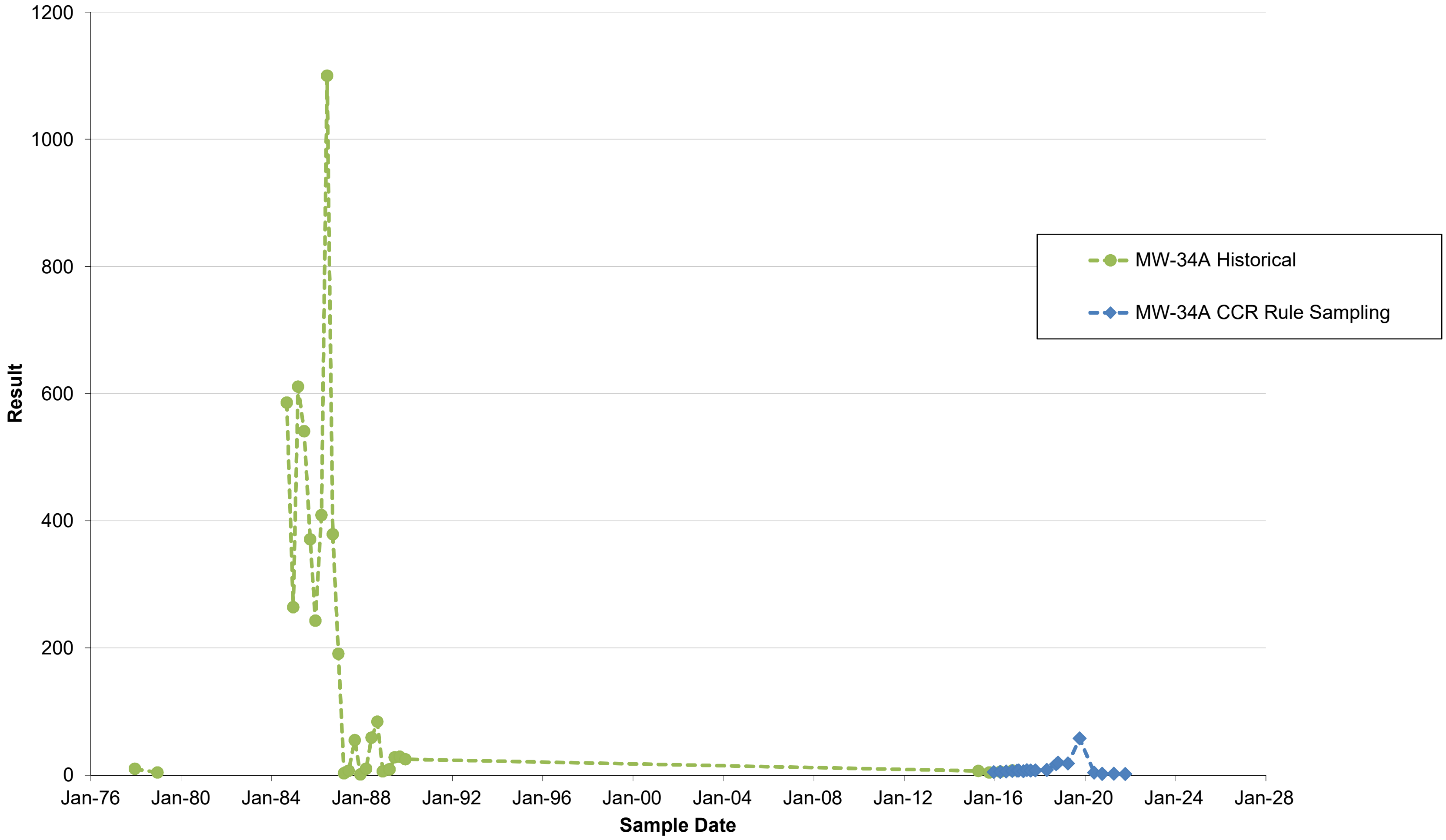
\\10.2.18.8\data\Projects\25221067.00\Deliverables\2021 Oct ASD MOD 1-3 LF\Graphs\[Bo_COL Dry.xlsx]MW-85

Wisconsin Power & Light Company
Columbia Dry Ash Disposal Facility
MW-33 and MW-33AR - Chloride (mg/l as Cl)



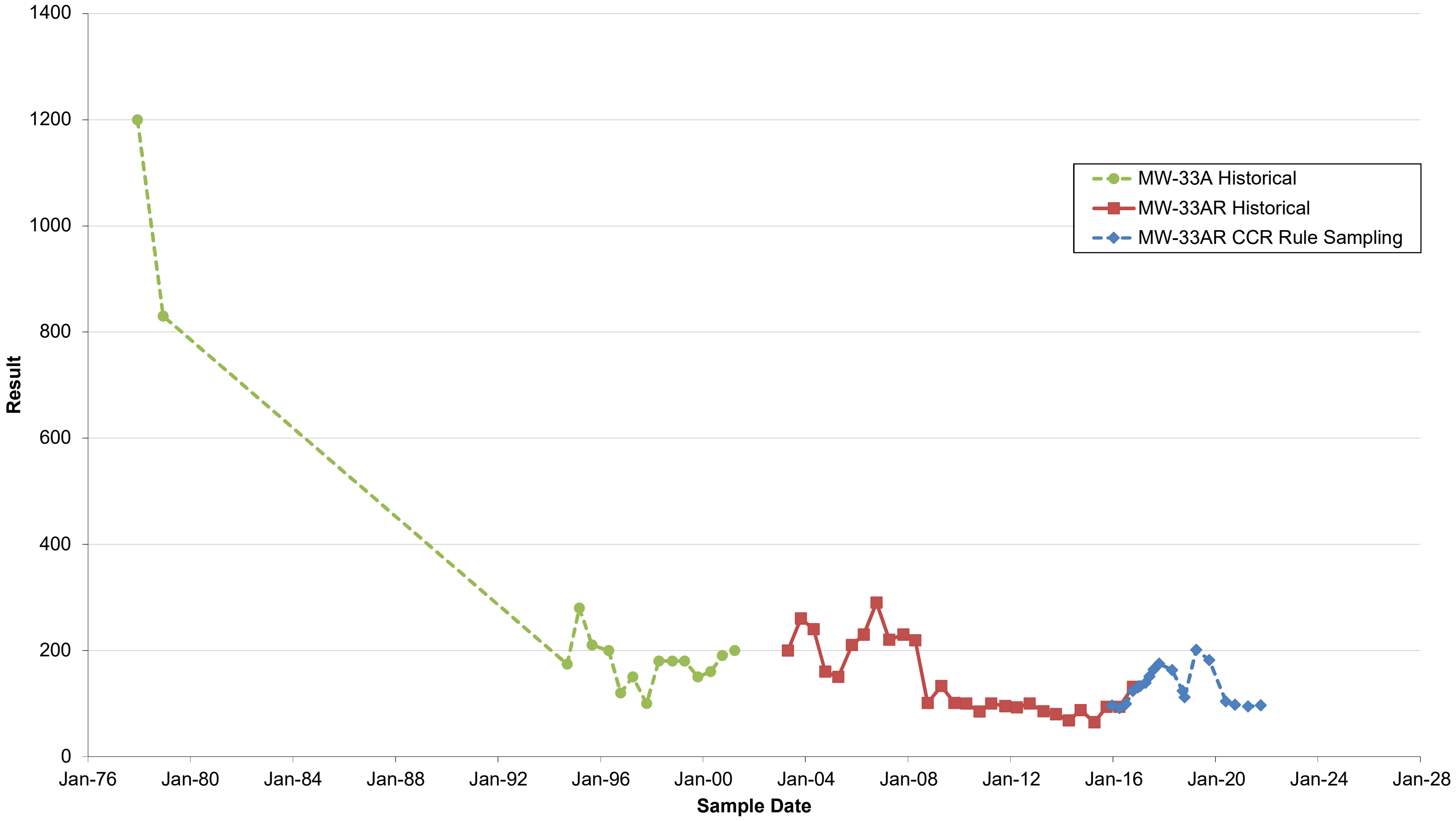
\\10.2.18.8\data\Projects\25221067.00\Deliverables\2021 Oct ASD MOD 1-3 LF\Graphs\[Cl_COL Dry.xlsx]MW-33AR

Wisconsin Power & Light Company
Columbia Dry Ash Disposal Facility
MW34A - Chloride (mg/l as Cl)



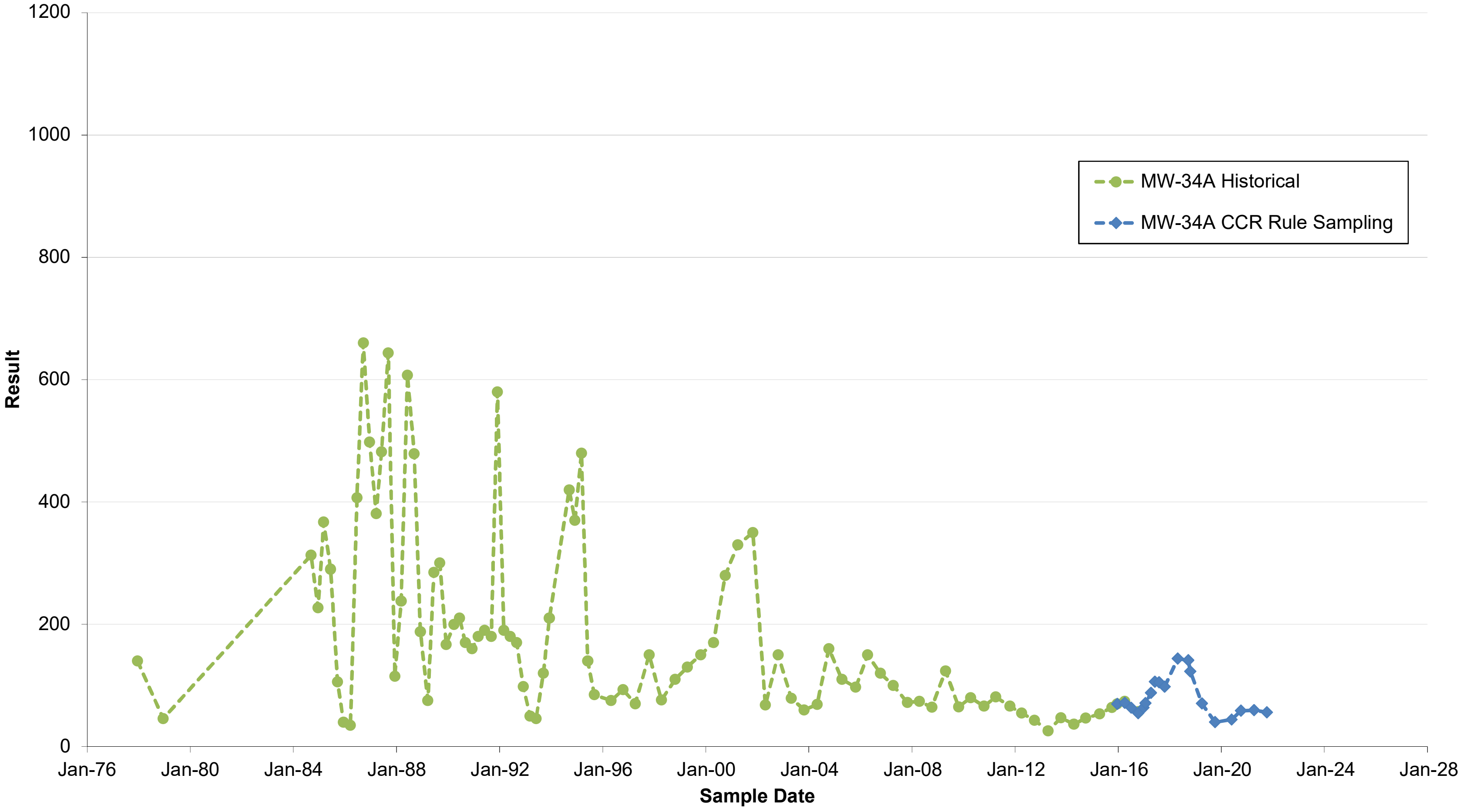
\\10.2.18.8\data\Projects\25221067.00\Deliverables\2021 Oct ASD MOD 1-3 LF\Graphs\[Cl_COL Dry.xlsx]MW-34A

Wisconsin Power & Light Company
Columbia Dry Ash Disposal Facility
MW-33 and MW-33AR - Sulfate (mg/l as SO4)



\\10.2.18.8\data\Projects\25221067.00\Deliverables\2021 Oct ASD MOD 1-3 LF\Graphs\[SO4_COL Dry.xlsx]MW-33AR CCR

Wisconsin Power & Light Company
Columbia Dry Ash Disposal Facility
MW-34A - Sulfate (mg/l as SO4)



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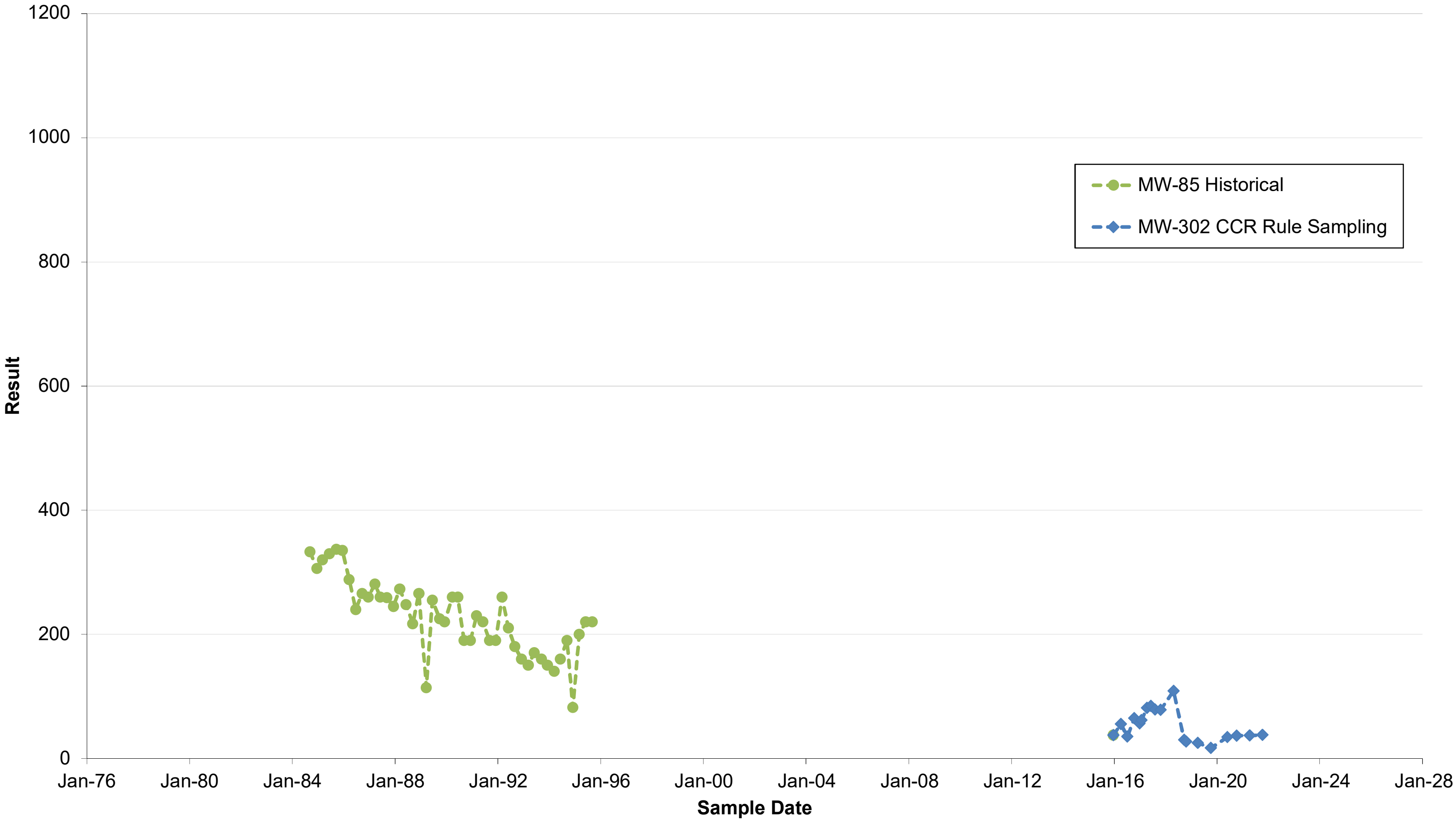
Wisconsin Power & Light Company
Columbia Dry Ash Disposal Facility
MW-85 and MW-302 - Sulfate (mg/l as SO4)



Appendix D

Historical Groundwater Flow Maps

LEGEND

······	PROPOSED PROJECT AREA
63 720.29	OBSERVATION WELL LOCATION, NUMBER, AND WATER TABLE ELEVATION
◆	BORING LOCATION AND NUMBER
ѱ	WETLANDS
⌒	TOPOGRAPHIC CONTOURS (CONTOUR INTERVAL: 20 FT.)
■	PRIVATE RESIDENCES (ASSUMED LOCATIONS OF PRIVATE WATER SUPPLY WELLS)
▨	COMMERCIAL BUILDINGS (ASSUMED LOCATIONS OF POSSIBLE PUBLIC WATER SUPPLY WELLS)
—·→—	SURFACE WATERS (STREAMS OR DRAINAGE DITCHES) ARROWS INDICATE DIRECTION OF FLOW
□	OTHER BUILDINGS (GARAGES, BARNS, ETC.)
◆	HIGH CAPACITY WELLS
—790—	WATER TABLE CONTOURS (CONTOUR INTERVAL: 1 FT.)
➔	DIRECTION OF GROUNDWATER FLOW

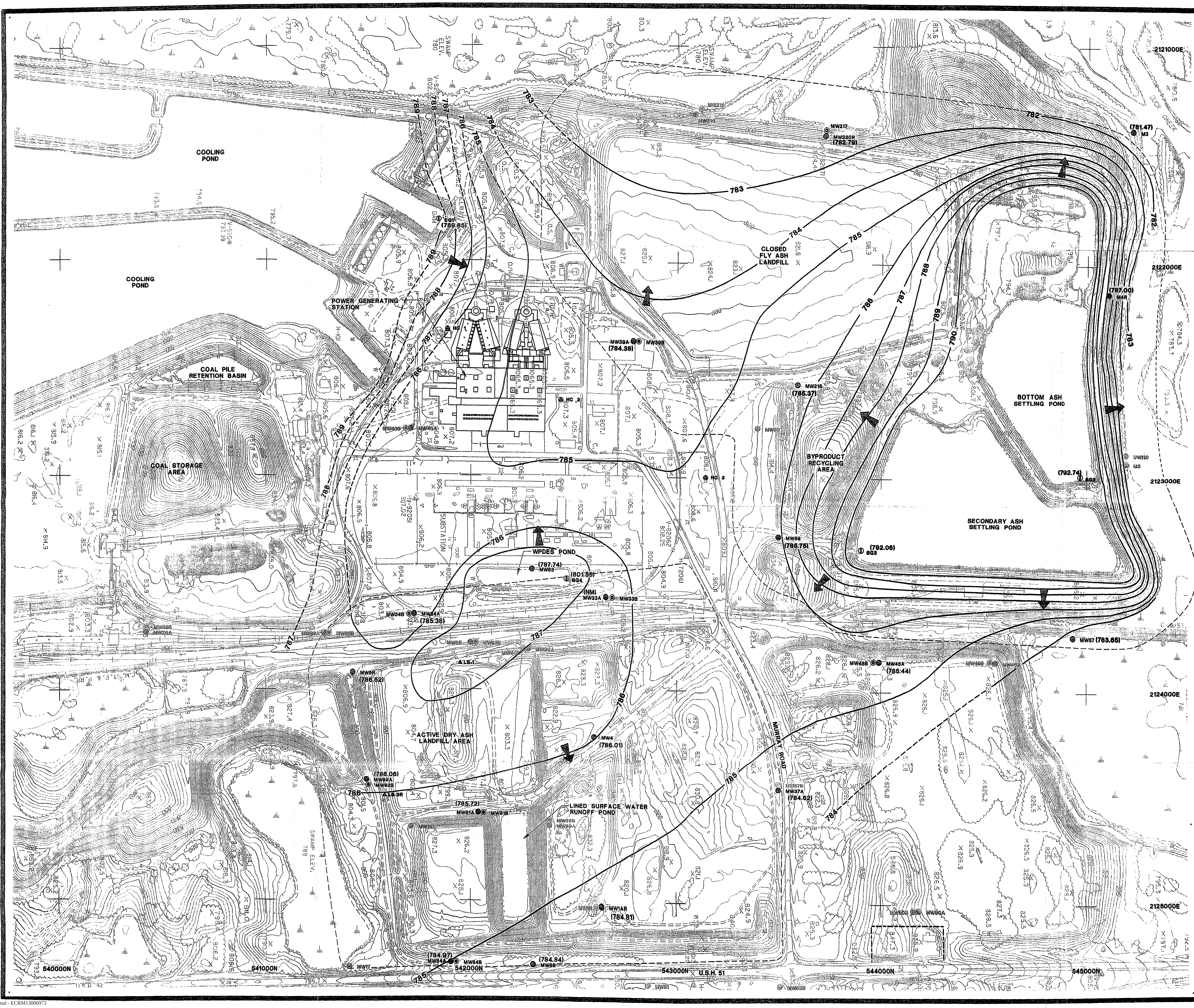
NO	BY	DATE	REVISION	APP'D

WATER TABLE CONTOUR MAP 2/4/81

PLAN OF OPERATION - ASH DISPOSAL FACILITY
COLUMBIA SITE
WISCONSIN POWER & LIGHT COMPANY
PART OF SECTIONS 27 & 34, T12N, R9E
TOWN OF PACIFIC COLUMBIA CO. WISCONSIN

WARZYN ENGINEERING INC

DRAWN TDH	SCALE 1"=300'	SHEET 39 OF 39
CHECKED RJK	DATE 2/10/81	DRAWING NO. C7134-94
APPROVED		
REFERENCE		PRINTED 8/3/88



LEGEND

- - - - - -	PROPERTY LINE
	EXISTING RAILROAD TRACKS
830	EXISTING GROUND CONTOUR
	CONTOUR DEPRESSION
	EXISTING PAVED ROAD
	EXISTING UNPAVED ROAD
	EXISTING FENCE
○ ☐ ☐	EXISTING BUILDING
	EXISTING SPOT ELEVATION
	TREES AND/OR BRUSH
	WETLAND AREA
	EDGE OF WATER
HC 1	WATER SUPPLY WELL
MW91A	WATER TABLE WELL
MW91B	PIEZOMETER
	ABANDONED WATER TABLE WELL
	ABANDONED PIEZOMETER
SG1	STAFF GAUGE
▲LS-1	LYSIMETER
- - - - - -	DESIGN MANAGEMENT ZONE
————	PROPERTY LINE
O.S.	OPEN STORAGE
O.H.	OVERHEAD STRUCTURE
E.P.S.	ELECTRICAL POWER STATION
T	TANK
W	WALL
(785.31)	WATER TABLE ELEVATION (FT-MSL) (N.M. = NOT MEASURED)
—786—	GROUNDWATER CONTOUR LINE (1FT INTERVAL- FT. M.S.L.) (DASHED WHERE INFERRED)
➡	GROUNDWATER FLOW DIRECTION

NOTES

1. BASE MAP IS PROVIDED BY WISCONSIN POWER & LIGHT CO. AND IS BASED ON PHOTOS TAKEN ON APRIL 6, 1995 BY AERO-METRIC ENGINEERING, SHEBOYGAN, WI.
2. HORIZONTAL DATUM IS BASED ON THE WISCONSIN STATE PLANE COORDINATE SYSTEM, SOUTH ZONE - DATUM: NAD 83(91).
3. VERTICAL DATUM IS REFERENCED TO U.S.G.S. MEAN SEA LEVEL (MSL). TOPOGRAPHIC CONTOUR INTERVAL IS TWO FEET.
4. MONITORING WELL LOCATIONS AND ELEVATIONS SURVEYED BY WISCONSIN POWER & LIGHT CO. IN DECEMBER 1994 & NOVEMBER 1996.
5. THE LOCATION OF THE DESIGN MANAGEMENT ZONE DEMARCATION LINE IS APPROXIMATE.
6. WATER ELEVATION USED TO PREPARE THIS MAP WERE MEASURED ON OCTOBER 24, 2002.
7. THE WATER LEVEL AT MW 33A AND MW 33B COULD NOT BE MEASURED DURING OCTOBER 2002 DUE TO AN OBSTRUCTION IN THE WELL CASING.

NO.	BY	DATE	REVISION	APP'D.
3.				
2.				
1.				

PROJECT:
ALLIANT ENERGY - WP&L
COLUMBIA ASH PONDS & DRY ASH
DISPOSAL FACILITY

SHEET TITLE:
WATER TABLE MAP
(OCTOBER 2002)

DRAWN BY: defoej	SCALE: 1"=200'	PROJ. NO. 3024.28
CHECKED BY: JMR		FILE NO. WATERTBL.PLT
APPROVED BY: JCO	DATE PRINTED:	**FIGURE 3**
DATE: JANUARY 2003		

RMT
744 Heartland Trail
Madison, WI 53717-1934
P.O. Box 8923
Madison, WI 53708-8923
Phone: 608-831-4444

Appendix E2

April 2022 Detection Monitoring

Alternative Source Demonstration
April 2022 Detection Monitoring

Dry Ash Disposal Facility, Modules 1-3
Columbia Energy Center
Pardeeville, Wisconsin

Prepared for:

Alliant Energy

SCS ENGINEERS

25222067.00 | October 13, 2022

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

Table of Contents

Tables

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Appendices

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PE CERTIFICATION

Sherren C. Clark
E-29863
Madison,
Wis.

I, Sherren Clark, hereby certify that that the information in this alternative source demonstration is accurate and meets the requirements of 40 CFR 257.94(e)(2). This certification is based on my review of the groundwater data and related site information available for the Columbia Energy Center Dry Ash Disposal Facility. I am a duly licensed Professional Engineer under the laws of the State of Wisconsin.

10-13-2022

(signature) (date)

Sherren Clark, PE

(printed or typed name)

License number E-29863

My license renewal date is July 31, 2024.

Pages or sheets covered by this seal:
Alternative Source Demonstration, April 2022 Detection Monitoring, Dry Ash Disposal Facility, Modules 1-3, Columbia Energy Center, Pardeeville, Wisconsin

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1.0 INTRODUCTION

This Alternative Source Demonstration (ASD) was prepared to support compliance with the groundwater monitoring requirements of the "Coal Combustion Residuals (CCR) Final Rule" published by the U.S. Environmental Protection Agency (U.S. EPA) in the *Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule*, dated April 17, 2015 (U.S. EPA, 2015), and subsequent amendments. Specifically, this report was prepared to fulfill the requirements of 40 CFR 257.94(e)(2). The applicable sections of the Rule are provided below in *italics*.

1.1 §257.94(E)(2) ALTERNATIVE SOURCE DEMONSTRATION REQUIREMENTS

The owner and operator may demonstrate that a source other than the CCR Unit caused the statistically significant increase over background levels for a constituent or that the statistically significant increase resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality. The owner or operator must complete the written demonstration within 90 days of detecting a statistically significant increase over background levels.

An ASD is completed when there are exceedances of one or more benchmarks established within the groundwater monitoring program to determine if any other sources are likely causes of the identified exceedance(s) of established benchmark(s) at the site. This ASD was performed in response to results indicating a statistically significant increase (SSI) over background levels during detection monitoring under the CCR Rule.

This ASD report evaluates the SSIs observed in the statistical evaluation of the April 2022 detection monitoring event at the Columbia Energy Center (COL) Dry Ash Disposal Facility (ADF), Modules 1-3 CCR Units. The first ASD was prepared for this facility evaluating the SSIs observed in the statistical evaluation of the October 2017 detection monitoring event (SCS Engineers [SCS], 2018). The October 2017 ASD and subsequent semiannual updates have provided several lines of evidence demonstrating that SSIs reported for boron, chloride, field pH, and sulfate concentrations in the downgradient monitoring wells were likely due to man-made sources other than the CCR Units and/or naturally occurring constituents in the alluvial aquifer.

As discussed in more detail in **Section 4.2** of this ASD, the findings for the April 2022 monitoring event were consistent with those for the previous events.

1.2 SITE INFORMATION AND MAP

The COL site is located at W8375 Murray Road, Pardeeville, Columbia County, Wisconsin (**Figure 1**). The COL site is an active coal-burning generating station, which has been burning coal and disposing of CCR on site since the mid-1970s. The layout of the site is shown on **Figure 2**. The COL property includes two areas of CCR storage and disposal. These are the ADF and the Ash Ponds Facility. This ASD will evaluate the conditions at the site for Modules 1-3 of the ADF only. The ADF is operated under the Wisconsin Department of Natural Resources (WDNR) License No. 3025.

The groundwater monitoring system monitors the following CCR Unit:

- COL Dry ADF – Modules 1-3 (existing CCR Landfill)

Modules 1-3 were originally described as separate existing CCR landfills, although they are contiguous and are managed as a single landfill by the facility and by the WDNR. Wisconsin Power and Light Company (WPL) subsequently clarified that Modules 1-3 are one existing CCR landfill under the federal CCR Rule, and this report reflects WPL's clarification.

A map showing the CCR Units and all background (or upgradient) and downgradient monitoring wells with identification numbers for the CCR groundwater monitoring program and the state monitoring program is provided as **Figure 2.** Separate monitoring systems have been established for the other CCR Units at COL, which include Modules 4-6 of the COL ADF, the primary ash pond, and the secondary ash pond.

1.3 STATISTICALLY SIGNIFICANT INCREASES IDENTIFIED

SSIs were identified by comparing the monitoring results to Upper Prediction Limits (UPLs) established in accordance with 40 CFR 257.93(f)(3) and the statistical method previously selected for the CCR Unit. The UPLs are based on an interwell approach using two background monitoring wells: MW-84A and MW-301. The interwell UPLs were calculated based on a 1-of-2 resampling approach. The UPLs and results for the April 2022 monitoring event are summarized in the attached **Table 1.**

The April 2022 SSIs include the following parameters and wells:

- Boron: MW-33AR, MW-34A, MW-302
- Chloride: MW-33AR
- Field pH: MW-34A
- Sulfate: MW-33AR, MW-34A

Concentration trends for the parameters with SSIs are shown in **Appendix A.**

Monitoring well MW-93A was included in the April 2022 sampling as a supplemental well, but is not a compliance well for the Module 1-3 CCR Unit and is not located downgradient from the Unit. As shown in **Table 1**, the chloride concentration in the sample from MW-93A was higher than background concentrations, likely because it is adjacent to U.S. Highway 51. All concentrations of Appendix IV parameters at MW-93A were well below the groundwater protection standards. Because well MW-93A is not part of the monitoring system for the Module 1-3 CCR Unit, it is not addressed further in this alternative source demonstration.

1.4 OVERVIEW OF ALTERNATIVE SOURCE DEMONSTRATION

This ASD report includes:

- Background information (**Section 2.0**).
- Evaluation of potential that SSIs are due to methodology or analysis (**Section 3.0**).
- Evaluation of potential that SSIs are due to natural sources or man-made sources other than the CCR Units (**Section 4.0**).
- ASD conclusions (**Section 5.0**).
- Monitoring recommendations (**Section 6.0**).

The CCR Rule constituent results from background and compliance sampling for parameters with SSIs are provided in **Table 2.** The laboratory reports for the April 2022 detection monitoring event will be included in the 2022 Annual Groundwater Monitoring and Corrective Action Report to be completed in January 2023. Complete laboratory reports for the background monitoring events and the previous detection monitoring events were included in previous annual groundwater monitoring and corrective action reports.

2.0 BACKGROUND

To provide context for the ASD evaluation, the following background information is provided in this section of the report, prior to the ASD evaluation sections:

- Geologic and hydrogeologic setting
- CCR Rule monitoring system
- Other monitoring wells

A more detailed discussion of the background information for the site is provided in the ASD for the October 2017 event (SCS, 2018).

2.1 REGIONAL GEOLOGY AND HYDROGEOLOGY

2.1.1 Regional Information

For the purposes of groundwater monitoring, the surficial sand and gravel aquifer is considered the uppermost aquifer, as defined under 40 CFR 257.53. Immediately underlying the surficial sand and gravel aquifer is the Cambrian-Ordovician sandstone aquifer.

Additional details on the regional geology and hydrogeology were provided in the October 2017 ASD (SCS, 2018).

2.1.2 Site Information

Soils at the site are primarily sand to a depth of approximately 50 to 100 feet, and overlie sandstone bedrock. Soils encountered during the site feasibility study for the COL ADF were described as generally sandy with interbedded silty clay lenses up to 20 feet thick (Warzyn, 1978). During drilling of CCR wells MW-301 and MW-302, the unconsolidated materials were identified as consisting primarily of silty sand and sand. Boring logs for previously installed monitoring wells MW-33AR, MW-34A, MW-84A, and MW-1AR (abandoned) show silty sand and sand as the primary unconsolidated materials at these locations. All CCR monitoring wells are screened within the unconsolidated sand unit.

Shallow groundwater at the site generally flows to the north and west across the existing landfill Modules 1-3 area, then generally flows west toward the Wisconsin River. The state monitoring well MW-1AR was included as a supplemental well in past monitoring events and then added to the CCR Unit monitoring system to provide additional evaluation to the northeast of the CCR Unit. MW-1AR was abandoned in March 2022 in preparation of the construction of new Modules 10 and 11. State monitoring well MW-93A, piezometer MW-93B and MW-312 were installed to the east and northeast of Mod 1-3 to provide additional groundwater elevation data in that area. The groundwater flow map for April 2022 is shown on **Figure 3.** The groundwater elevation data for the CCR monitoring wells and state monitoring program wells are provided in **Table 3.**

2.2 CCR RULE MONITORING SYSTEM

The groundwater monitoring system established in accordance with the CCR Rule consists of two upgradient (background) monitoring wells and three downgradient monitoring wells. The background wells include MW-301 and MW-84A. The downgradient wells include MW-302, MW-33AR, and MW-34A. The CCR Rule wells are installed within the sand and gravel aquifer. Well depths range from approximately 29 to 51 feet, measured from the top of the well casing.

2.3 OTHER MONITORING WELLS

Additional groundwater monitoring wells currently exist at COL as part of the monitoring systems developed for the state monitoring program and for the other CCR Units.

Monitoring wells for the state monitoring program are installed in the unconsolidated sand and gravel unit, which is the uppermost aquifer as defined under 40 CFR 257.53. This shallow monitoring system includes water table wells and mid-depth piezometers. Well depths range from approximately 14 to 76 feet, measured from the top of the well casing.

3.0 METHODOLOGY AND ANALYSIS REVIEW

To evaluate the potential that an SSI is due to a source other than the regulated CCR Unit, SCS used a two-step evaluation process. First, the sample collection, field and laboratory analysis, and statistical evaluation were reviewed to identify any potential error or analysis that led to exceedance of the benchmark. Second, potential alternative sources, including natural variation and man-made sources other than the CCR Unit, were evaluated. This section of the report provides the findings of the methodology and analysis review. Section 4.0 of the report addresses the potential alternative sources.

3.1 SAMPLING AND FIELD ANALYSIS

Field notes and sampling results were reviewed to determine if any sampling error may have caused or contributed to the observed SSIs. Potential field sampling errors or issues could include mislabeling of samples, improper sample handling, missed holding times, cross contamination during sampling, or other field error. Field blank sample results were also reviewed for any indication of potential contamination from sampling equipment or containers.

Based on the review of field notes and comparison to previous results, it appears likely that the reported SSI for pH at MW-34A is partially due to a sampling error. Specifically, it appears likely that the field pH and dissolved oxygen readings recorded for this well during low-flow purging and sampling were switched. The two columns are next to each other on the field sheet, and can have similar values. The historical results for field pH and dissolved oxygen are summarized in Table 4 along with results of laboratory analysis of pH. Evidence to support the finding that the values were recorded in the wrong columns includes:

- Dissolved oxygen results for MW-34A have typically been higher than field pH values, but the reverse was true for the reported April 2022 values.

- The lab pH result (7.8) did not agree with the reported field pH result (8.34), but did agree with the reported dissolved oxygen value (7.82).

- The reported field pH result (8.34) was well above any previous result for field pH at MW-34A, but within the range of previous dissolved oxygen results.

- Other field parameters, including specific conductance, oxidation potential, and temperature, and turbidity were within their ranges of previous results.

Based on these results, we conclude that sampling error contributed to the SSI at MW-34A. However, even if the dissolved oxygen and field pH results were switched, the resulting field pH value of 7.82 would still slightly exceed the UPL of 7.78. Therefore, additional alternative sources for the field pH SSI are evaluated in **Section 4.0**.

Because boron, chloride, and sulfate are laboratory parameters, there is little potential for a field analysis error to contribute to an SSI.

3.2 LABORATORY ANALYSIS REVIEW

The laboratory reports for the April 2022 detection monitoring event were reviewed to determine if any laboratory analysis error or issue may have caused or contributed to an observed SSI for boron, chloride, field pH, or sulfate. The laboratory report review included reviewing the laboratory quality control flags and narrative, verifying that correct methods were used and desired detection limits were achieved, and checking the field and laboratory blank sample results.

Based on the review of the laboratory reports, SCS did not identify any indication that the SSIs for boron, chloride, and sulfate were due to a laboratory analysis error. There were no laboratory quality control flags or issues identified in the laboratory report that affect the usability of the data for detection monitoring.

The laboratory flagged some anion results for matrix spike recovery and/or matrix spike duplicate recovery outside laboratory control limits, including the sample results from background well MW-84A for sulfate, and the sample results from compliance well MW-302 for sulfate. In both of these cases, the recovery outside the limits was slightly above the upper limit and the control sample results were within control limits. None of these results affected the determination of SSIs.

Time series plots of the SSI constituent analytical data were also reviewed for any anomalous results that might indicate a possible sampling or laboratory error (e.g., dilution error or incorrect sample labeling). The time series plots are provided in **Appendix A**. Except for the increase in field pH at MW-34A described above, the concentrations observed are similar to historical concentrations.

3.3 STATISTICAL EVALUATION REVIEW

The review of the statistical results and methods included a quality control check of the following:

- Input analytical data vs. laboratory analytical reports
- Statistical method and process for each SSI

Based on the review of the statistical evaluation, SCS did not identify any errors or issues in the statistical evaluation that caused or contributed to the determination of interwell SSIs for the April 2022 detection monitoring event.

3.4 SUMMARY OF METHODOLOGY AND ANALYSIS REVIEW FINDINGS

In summary, there were no changes to the SSI determinations for the April 2022 monitoring event based on the methodology and analysis review. The SSI for field pH at MW-34A appears to be due in part to a data recording error during sampling. No other errors or issues causing or contributing to the reported SSIs were identified.

4.0 ALTERNATIVE SOURCES

This section of the report discusses the potential alternative sources for the boron, chloride, and sulfate SSIs at the downgradient monitoring wells; identifies the most likely alternative source(s); and presents the lines of evidence indicating that an alternative source is the most likely cause of the observed SSIs.

4.1 POTENTIAL CAUSES OF SSI

4.1.1 Natural Variation

The statistical analysis was completed using an interwell approach, comparing the April 2022 detection monitoring results to the UPLs calculated based on the sampling of the background wells (MW-84A and MW-301). If concentrations of a constituent that is naturally present in the aquifer vary spatially, then the potential exists that the downgradient concentrations may be higher than upgradient concentrations due to natural variation. Previous monitoring results for boron, chloride, field pH, and sulfate at COL Modules 1-3 landfill are shown in **Table 2**.

Natural variation may be present in the shallow aquifer for any of the parameters, and may have contributed to the SSI for field pH at MW-34A. Previous field pH measurements in background well MW-84A (**Table 2**) include pH values similar to the field pH in compliance well MW-34A from the April 2022 sampling event, if we assume that the true value for field pH was 7.82 after correcting for the apparent data recording error described in **Section 3.1**.

Although natural variation is present in the shallow aquifer, it does not appear likely that natural variation is the primary source causing the boron, chloride, and sulfate SSIs.

4.1.2 Man-Made Alternative Sources

Man-made alternative sources that could potentially contribute to the boron, chloride, field pH, and sulfate SSIs could include the closed ash pond landfill, the active and inactive ash ponds, the former ash pond effluent ditch, the coal storage area, road salt use, railroad operations, or other plant operations.

Based on the groundwater flow directions and on previous investigations at the site, the former ash pond effluent ditch appears to be the most likely cause of the boron and/or sulfate SSIs for wells MW-33AR, MW-34A, and MW-302. The ash pond effluent ditch also likely contributed to the chloride SSI at MW-33AR and the field pH SSI at MW-34A.

The higher chloride concentrations at MW-33AR is likely related to a non-CCR alternative source.

4.2 LINES OF EVIDENCE

The lines of evidence indicating that the SSIs for boron, chloride, field pH, and sulfate in compliance wells MW-33AR, MW-34A, and MW-302, relative to the background wells, are due to an alternative source include:

1. Elevated levels of boron, chloride, field pH, and sulfate were present in the area west of the landfill, where the three compliance wells are located, before the landfill was constructed.
2. Monitoring performed under the state program documents that the concentrations of boron, chloride, and sulfate were elevated before CCR disposal in the landfill began, and have decreased since the landfill has been in operation.
3. Groundwater flow directions have changed through time due to changes in water management at the plant, so that groundwater impacted by the effluent ditch formerly flowed to the east, under the landfill, and is now flowing west and/or north.
4. The variations in chloride results for well MW-33AR since detection monitoring was initiated have not correlated with boron concentrations, as would be expected for a CCR leachate source; therefore, an alternative source is more likely.

4.2.1 Pre-Landfill Water Quality

Elevated levels of boron, chloride, field pH, and sulfate were present in the area west of the landfill, where the three compliance wells are located, before the landfill was constructed. Groundwater monitoring performed in 1977 and 1978 as part of the Feasibility Study for the landfill permitting showed that wells located along the west side of the future landfill footprint, where the current compliance wells are located, had elevated results for sulfate, chloride, field pH, and specific conductance. The 1978 Feasibility Study (Warzyn, 1978) for the dry ADF discusses the influence of the ash pond effluent ditch on groundwater west of the proposed site. The former ash pond effluent ditch carried effluent from the ash ponds located north of the plant, and flowed south between the west side of the current landfill and the substation. Groundwater monitoring in December 1977 indicated that sulfate was present at 1,200 milligrams per liter (mg/L) in MW-33A, which was located near the point where the ash pond effluent discharged from a culvert into the effluent ditch. The sulfate concentration at this well decreased to 830 mg/L in the December 1978 sampling (Warzyn, 1979). Current concentrations of sulfate in this area, while above background, are much lower. The April 2022 sulfate result for MW-33AR (installed to replace MW-33A) was 155 mg/L, for MW-34A was 146 mg/L, and for MW-302 was 22.1 mg/L.

The feasibility study also notes the regional groundwater pH range (6.0 to 8.5 standard units [std. units]) and as well as the site pH range (6.3 to 8.1 std units) observed in 1977 and 1978. The recent field pH exceedance at MW-34A (8.34 Std. Units, or 7.82 Std. Units if corrected for the apparent data recording error described in Section 3.1) is either within or similar to both the local and regional pH observations. The pH measurements provided in the Feasibility Study water quality tables (**Appendix B**) show pH measurements for the MW-33A/B and MW-34-A/B well nests ranging from 7.7 to 8.2, similar to what was observed at the MW-34A during the April 2022 groundwater monitoring event (**Table 1**).

Selected text and tables from the 1978 Feasibility Study and the 1979 Supplementary Feasibility Study Report are included in **Appendix B.**

4.2.2 Long-Term Concentration Trends

Monitoring performed under the state program documents that the concentrations of boron and sulfate were elevated before CCR disposal in the landfill began, and have decreased since the landfill has been in operation. Routine groundwater monitoring for the COL ADF began after the Plan of Operation was approved and prior to initial CCR disposal. The earliest data available from the WDNR Groundwater Environmental Monitoring System (GEMS) database is from September 1984. Initial placement of CCR in test plots in Module 1 of the ADF was approved in October 1984, and CCR disposal began sometime after that. Therefore, the initial groundwater monitoring results in the GEMS database represent pre-disposal conditions for the landfill.

The earliest historic monitoring data show that before CCR disposal in the landfill began, concentrations of boron and sulfate were significantly higher than current concentrations in the area west of the landfill where the compliance wells are located. Graphs of historical concentrations are provided in **Appendix C**. Results for compliance well MW-33AR are plotted with results from well MW-33A. MW-33AR was a replacement well for MW-33A at a slightly different location and depth. The well screen was installed approximately 10 feet higher in MW-33AR than in MW-33A, intersecting the water table, which may explain the increase in concentration that occurred with the well replacement. Results for compliance well MW-302 are plotted with results from monitoring well MW-85, which was located near the current MW-302 location (see **Figure 2**) and was monitored from September 1984 through September 1995.

The recent boron concentrations are consistent with generally decreasing or stable historical concentrations at MW-33AR and MW-34A (**Appendix A** and **Appendix C**). Recent boron concentrations at MW-302 have been variable, but remain well below the concentrations observed in samples from MW-85 prior to CCR disposal in the landfill.

4.2.3 Groundwater Flow Direction Changes

Groundwater flow directions have changed through time due to changes in water management at the plant, so that groundwater impacted by the effluent ditch formerly flowed to the east, under the landfill, and is now flowing west. The 1978 Feasibility Study report states that the southern 2/3 of the proposed fill area (including the area of the active CCR landfill phases) exhibits a southeast and southerly groundwater flow direction, toward an agricultural drainage ditch southeast and south of the landfill area. The 1981 Plan of Operation indicates that flow in the landfill area is to the east-southeast. A water table map prepared by RMT, based on October 2002 water level measurements, shows flow under the landfill generally to the east and northeast from a groundwater high near the effluent ditch and Wisconsin Pollutant Discharge Elimination System (WPDES) pond between the landfill and the substation. The 1981 and 2002 water table maps are provided in **Appendix D**.

Under current conditions, groundwater flow below the active landfill area is generally to the north and northwest. The flow changes with time reflect the termination of discharge to the ash pond effluent ditch in the mid-2000s. When discharge via this ditch was active, the ditch was a source of recharge to the groundwater and created a high groundwater area with flow moving away from the ditch to the east. After discharge to the ditch was terminated, water levels in this area decreased significantly and the groundwater flow direction changed.

With the changes in groundwater flow, historically impacted groundwater moved in alternating directions. While the effluent ditch was active, impacted groundwater likely moved eastward past the current compliance wells, as indicated by the long-term concentration data. Although the compliance wells on the west side of MOD 1-3 are downgradient from the landfill under current flow conditions, the observed groundwater impacts may be residual from the past when the wells were downgradient from the effluent ditch.

4.2.4 Chloride and Boron Leachate Concentrations

The chloride results for well MW-33AR increased beginning in 2016, peaked in April 2018 and April 2019, decreased significantly in May 2020, and have remained relatively consistent since then. A slight increase was observed in the sample collected during the April 2022 event, but this observed concentration is still significantly lower than the values observed in 2019 (**Table 2** and **Appendix A**). Over the same time period, boron concentrations at MW-33AR have followed a steady gradual decreasing trend.

The lack of correlation with boron indicates the source of the increase and subsequent decrease in chloride is not likely the CCR landfill. Sampling of the landfill leachate pond and lysimeters LS-1 and LS-3R, located on the western and southern edges of MOD 1-3, indicates that boron and chloride concentrations are generally both higher than background (**Table 5**); therefore, a leachate source would tend to influence concentrations of both parameters. Furthermore, the peak chloride concentrations in the groundwater samples from MW-33AR in 2018 and 2019 exceeded the chloride concentrations measured in the leachate at that time, indicating the leachate was not the source of chloride at this location (**Table 2**, **Table 5**, and **Appendix A**). Recent samples from the leachate pond have shown increased concentrations of chloride, but this increase does not correlate with results at MW-33AR, which have decreased, or with chloride results from the lysimeters, which remain low. Based on the comparison of groundwater and leachate chloride results, an alternative man-made source, such as road salt, is a more likely source of chloride than the CCR Unit.

5.0 ALTERNATIVE SOURCE DEMONSTRATION CONCLUSIONS

The lines of evidence discussed above regarding the SSIs reported for boron, chloride, field pH, and sulfate concentrations in downgradient monitoring wells MW-33AR, MW-34A, and/or MW-302 demonstrate that the SSIs are likely primarily due to sources other than the CCR Units. Boron, sulfate, field pH, and chloride concentrations were elevated prior to disposal of CCR in the landfill and are associated with historical discharges from the ash ponds via the effluent ditch located west of the landfill. Elevated chloride concentrations detected at well MW-33AR appear likely to be related to an alternative non-CCR source, such as salt. The SSI for field pH at MW-34A also appears to be due in part to a data recording error during sampling.

6.0 SITE GROUNDWATER MONITORING RECOMMENDATIONS

In accordance with section 257.94(e)(2) of the CCR Rule, the COL Modules 1-3 CCR Units may continue with detection monitoring based on this ASD. The ASD report will be included in the 2022 Annual Report due January 31, 2023.

7.0 REFERENCES

SCS Engineers, 2018, Alternative Source Demonstration, October 2017 Detection Monitoring, Columbia Energy Center Dry Ash Disposal Facility, April 2018.

U.S. EPA, 2015, Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule, April 2015.

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

Warzyn Engineering, Inc., 1979, and Preliminary Engineering Concepts, Columbia Site, Wisconsin Power and Light Company, Town of Pacific, Columbia County, WI, January 1978.

Tables

Table 1. Groundwater Analytical Results Summary - Columbia Landfill MOD 1-3 / SCS Engineers Project #25222067.00

				Background Wells		Compliance Wells			Supplemental Well
Parameter Name	**UPL Method**	**UPL**		**MW-84A**	**MW-301**	**MW-33AR**	**MW-34A**	**MW-302**	**MW-93A**
				4/13/2022	4/13/2022	4/12/2022	4/12/2022	4/12/2022	4/13/2022
Appendix III									
Boron, ug/L	P	35.6		10.5	28.7	558	237	389	26.1
Calcium, ug/L	NP	129,000		75,100	97,300	80,000	77,000	91,600	85,500
Chloride, mg/L	P	6.2		5.2	1.9 J	59.0	2.2	0.79 J	19.0
Fluoride, mg/L	DQ	DQ		<0.095	<0.095	<0.095	<0.095	<0.095	<0.095
Field pH, Std. Units	P	7.78		7.34	6.60	7.60	8.34	7.21	7.68
Sulfate, mg/L	P	30.3		1.4 J, M0	12.7	155	146	22.1 M0	7.0
Total Dissolved Solids, mg/L	NP	514		334	422	506	402	398	384
Appendix IV		**UPL**	**GPS**						
Antimony, ug/L	NP*	0.4	6	<0.15	0.31 J	--	--	--	<0.15
Arsenic, ug/L	P*	0.53	10	0.31 J	0.47 J	--	--	--	<0.28
Barium, ug/L	P	18.3	2000	13.5	7.8	--	--	--	113
Beryllium, ug/L	NP*	0.37	4	<0.25	<0.25	--	--	--	<0.25
Cadmium, ug/L	NP*	0.32	5	<0.15	0.30 J	--	--	--	<0.15
Chromium, ug/L	P*	3.13	100	2.2 J	<1.0	--	--	--	1.2 J
Cobalt, ug/L	NP*	0.38	6	<0.12	0.32 J	--	--	--	0.41 J
Fluoride, mg/L	DQ	DQ	4	<0.095	<0.095	--	--	--	<0.095
Lead, ug/L	NP*	0.48	15	<0.24	3.1	--	--	--	<0.24
Lithium, ug/L	P*	0.86	40	0.36 J	0.56 J	--	--	--	1.5
Mercury, ug/L	DQ	DQ	2	<0.066	<0.066	--	--	--	<0.066
Molybdenum, ug/L	NP*	0.44	100	<0.44	<0.044	--	--	--	1.8
Selenium, ug/L	NP*	0.71	50	<0.32	<0.32	--	--	--	0.84 J
Thallium, ug/L	NP*	0.48	2	<0.14	0.32 J	--	--	--	<0.14
Radium 226/228 Combined, pCI/L	P*	1.93	5	0.611	0.179	--	--	--	1.29

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

Abbreviations:

UPL = Upper Prediction Limit
DQ = Double Qualification
SSI = Statistically Significant Increase
-- = Not Measured
NP = Nonparametric UPL with 1-of-2 retesting
P = Parametric UPL with 1-of-2 retesting
LOQ = Limit of Quantitation
LOD = Limit of Detection
µg/L = micrograms per liter
mg/L = milligrams per liter

* = UPL is below the LOQ for background sampling. For compliance wells, only results confirmed above the LOQ are evaluated as potential SSIs above backgroun
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

Notes:

1. An individual result above the UPL does not constitute an SSI above background. See the accompanying report text for identification of statistically significant results.
2. Interwell UPLs calculated based on results from background wells MW-84A and MW-301. Interwell UPLs based on 1-of-2 retesting approach. UPLs updated in January 2020 based on background well results through October 2019.
3. Interwell UPLs calculated based on results from background wells MW-84 and MW-301.

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Table 2. Historical Analytical Results for Parameters with SSIs
Columbia Dry ADF, Modules 1-3

Well Group	Well	Collection Date	Boron (µg/L)	Chloride (mg/L)	Field pH (Std. Units)	Sulfate (mg/L)
Background	MW-301	12/22/2015	26.5	3.70 J	6.85	9.30
		4/5/2016	25.2	4.00	7.01	15.3
		7/8/2016	23.6	3.50 J	6.87	15.0
		10/13/2016	30.6	2.20	7.28	13.9
		12/29/2016	32.8	2.00 J	6.63	12.3 J
		1/25/2017	32.6	1.50 J	7.10	6.50
		4/11/2017	28.8	2.00	7.11	10.3
		6/6/2017	21.3	3.50	6.70	17.1
		8/8/2017	30.6	5.50	6.75	31.6
		10/23/2017	34.3	4.00	7.37	27.5
		4/25/2018	24.3	2.30	6.76	8.60
		8/8/2018	22.8	-	6.91	-
		10/22/2018	27.8	3.20	6.79	19.2
		4/3/2019	26.9	2.90 J, B	6.62	5.30 J
		10/9/2019	35.9	1.70	6.67	8.40
		5/29/2020	21.3	2.00 J	6.73	11.5 J
		10/8/2020	28.8	3.40	6.95	25.1
		4/13/2021	22.2	1.50 J	6.66	8.5
		10/14/2021	31.4	2.70	7.01	17.4
		4/13/2022	28.7	1.90 J	6.60	12.7
	MW-84A	12/22/2015	11.9	4.90	7.60	4.90
		4/5/2016	14.0	4.70	7.61	4.30
		7/8/2016	14.7	5.10	7.45	3.70 J
		7/28/2016	-	-	7.34	-
		10/13/2016	11.1	4.30	7.91	2.60 J
		12/29/2016	14.7	4.70	7.25	2.70 J
		1/25/2017	16.1	4.60	6.99	3.00
		4/11/2017	12.9	4.90	7.80	2.80 J
		6/6/2017	14.8	5.50	7.28	2.70 J
		8/8/2017	22.9	5.50	7.23	2.00 J
		10/24/2017	13.8	5.10	7.68	2.20 J
		4/25/2018	25.0	4.80	7.45	2.80 J
		8/8/2018	12.8	--	7.38	--
		10/22/2018	10.1 J	4.20	7.24	1.60 J
		4/3/2019	13.6	3.60 B	7.03	1.40 J
		10/9/2019	12.0	3.90	7.23	1.30 J
		5/29/2020	10.0	3.70	7.34	1.50 J
		10/8/2020	9.7 J	4.30	7.49	1.30 J
		4/13/2021	14.3	4.40	7.34	1.40 J
		10/14/2021	11.1	3.50	7.42	17.4
		4/13/2022	10.5	5.20	7.34	1.40 J, M0

Table 2. Historical Analytical Results for Parameters with SSIs
Columbia Dry ADF, Modules 1-3

Well Group	Well	Collection Date	Boron (µg/L)	Chloride (mg/L)	Field pH (Std. Units)	Sulfate (mg/L)
Compliance	MW-302	12/22/2015	80.0	4.20	7.63	37.4
		4/5/2016	78.8	4.10	7.70	55.6
		7/7/2016	134	3.10 J	7.29	35.4
		10/13/2016	132	1.10 J	7.72	64.7
		12/29/2016	106	1.20 J	7.12	56.4
		1/25/2017	149	1.60 J	8.21	61.6
		4/11/2017	322	1.60 J	7.63	81.3
		6/6/2017	671	3.50	7.16	84.6
		8/8/2017	833	4.50	7.04	79.0
		10/24/2017	691	6.90	8.23	78.4
		4/24/2018	1,950	15.0	7.21	109
		9/21/2018	203	1.70 J	7.74	30.0
		10/22/2018	296	1.80 J	7.22	26.9
		4/2/2019	254	1.50 J	7.32	25.2
		10/9/2019	246	1.10 J	7.08	16.7
		5/29/2020	611	1.20 J	7.20	34.6
		10/8/2020	648	1.10 J	7.21	36.5
		4/13/2021	521	1.40 J	7.51	36.9
		10/14/2021	495	1.30 J	7.07	37.8
		4/12/2022	389	0.79 J	7.21	22.1 M0
	MW-33AR	12/21/2015	954	10.6	7.87	96.2
		4/5/2016	813	12.5	8.08	91.5
		7/7/2016	794	12.5	7.68	99.2
		10/13/2016	827	52.5	8.23	124
		12/29/2016	812	39.6	7.63	132
		1/25/2017	763	41.4	8.62	133
		4/11/2017	760	47.1	8.19	139
		6/6/2017	692	68.1	7.78	151
		8/7/2017	697	105	7.47	164
		10/24/2017	678	119	7.81	175
		4/24/2018	601	188	7.74	163
		9/21/2018	683	32.6	8.16	124
		10/22/2018	682	14.4	7.69	112
		4/2/2019	568	229	7.72	201
		10/8/2019	548	153	7.74	182
		5/28/2020	566	15.9	7.59	104
		10/8/2020	569	27.3	7.70	97.4
		4/13/2021	473	26.9	8.78	94.3
		6/11/2021	--	--	7.71	--
		10/12/2021	564	22.6	7.59	96.4
		4/12/2022	558	59.0	7.60	155

Table 2. Historical Analytical Results for Parameters with SSIs
Columbia Dry ADF, Modules 1-3

Well Group	Well	Collection Date	Boron (µg/L)	Chloride (mg/L)	Field pH (Std. Units)	Sulfate (mg/L)
Compliance	MW-34A	12/21/2015	230	4.90	7.91	69.9
		4/5/2016	220	5.10	7.92	71.6
		7/7/2016	216	5.60	7.52	63.4
		7/28/2016	-	-	7.40	-
		10/13/2016	212	6.80	8.19	54.8
		12/29/2016	224	7.10	7.43	63.9
		1/25/2017	214	7.20	7.71	71.2
		4/11/2017	214	6.20	8.03	87.6
		6/6/2017	201	7.80	7.57	106
		8/7/2017	205	7.40	7.39	105
		10/24/2017	208	7.60	7.67	98.0
		4/24/2018	209	8.20	7.80	144
		9/21/2018	241	17.1	8.12	141
		10/22/2018	233	19.9	7.64	123
		4/4/2019	204	18.7	7.73	70.4
		10/8/2019	207	57.9	7.79	39.8
		5/28/2020	210	3.90	7.40	44.4
		10/8/2020	213	2.10	7.81	58.7
		4/13/2021	203	2.30	7.93	59.3
		6/11/2022	--	--	7.71	--
		10/12/2021	212	1.90 J, M0	7.68	56.1
		4/12/2022	237	2.20	8.34	146
	MW-1AR(2)	4/14/2021	16.1	1.50 J	7.26	4.40 M0
		10/14/2021	12.4	1.20 J	7.44	3.10

Abbreviations:
µg/L = micrograms per liter or parts per billion (ppb)
mg/l = milligrams per liter or parts per million (ppm)
J = Estimated value below the laboratory's limit of quantitation
B = Analyte was detected in the associated Method Blank.
M0 = matrix spike recovery and/or matrix spike duplicate recovery outside of laboratory control limits

Notes:
(1) Analytical laboratory reports provided in the Annual Groundwater Monitoring and Corrective Action Reports.
(2) MW-1AR was added to the sampling network in 2021 to provide additional evaluation of site conditions in the CCR unit. MW-1AR was abandoned in March of 2022.

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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-1AR	MW-4	MW-5R	MW-33AR	MW-33BR	MW-34A	MW-34B	MW-37A	MW-83	MW-84A	MW-84B	MW-86	MW-91AR	MW-91B	MW-92A	MW-92B	MW-93A	MW-93B	MW-312	LS-1	LS-3R	LH-2	LH-3	LH-4
Dry Ash Facility (Facility ID #03025)	**Top of Casing Elevation (feet amsl)**	822.55	819.74	805.44	808.29	808.39	805.95	806.05	813.04	807.96	814.28	814.26	824.79	809.03	808.45	808.47	808.41	827.89	827.71	826.79					
	Screen Length (ft)																	10	5	10					
	Total Depth (ft from top of casing)	44.40	39.58	25.97	31.08	57.50	35.43	56.95	31.80	25.42	40.21	52.02	45.43	32.90	52.38	28.94	51.75	50.7	82.5	52.5	17.42	17.10	19.90		
	Top of Well Screen Elevation (ft)	778.15	780.16	779.47	777.21	750.89	770.52	749.10	781.24	782.54	774.07	762.24	779.36	776.13	756.07	779.53	756.66	787.19	750.21	784.29	NM	NM	NM		
	Measurement Date																								
	October 2, 2012	783.41	783.70	784.96	782.38	782.23	783.03	782.99	782.66	dry	783.84	783.94	783.81	784.09	783.90	784.49	784.06	NI	NI	NI			dry	--	
	April 15, 2013	785.44	784.02	786.09	784.16	784.14	784.74	784.79	783.87	784.49	785.83	785.76	785.22	785.14	785.01	785.75	785.34	NI	NI	NI	NM	dry	dry	--	
	October 8, 2013													785.66	785.42	785.97	785.52	NI	NI	NI	NM	NM	NM	--	
	October 15, 2013	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	785.66	785.42	785.97	785.52	NI	NI	NI				--	
	April 14, 2014	784.95	784.09	785.63	783.74	783.91	784.63	784.70	783.45	783.73	785.58	785.52	784.96	785.04	784.96	785.99	785.54	NI	NI	NI	NM	dry	ate depth =	--	
	October 2-3, 2014	785.03	785.39	786.08	784.37	784.28	784.57	784.54	784.56	dry	785.24	785.18	785.19	785.47	785.28	785.75	785.33	NI	NI	NI	NM	dry	ate depth =	--	
	April 13-14, 2015	783.96	783.63	785.25	783.01	782.74	783.65	783.95	782.87	dry	784.43	784.51	784.17	784.48	784.37	785.07	784.66	NI	NI	NI	dry	--	dry	--	
	October 6-7, 2015	784.28	784.44	785.72	783.68	783.33	784.05	784.02	783.66	dry	784.80	784.76	784.66	784.89	784.70	785.20	784.76	NI	NI	NI	broken	dry	ate depth =	--	
	April 4-6, 2016	785.82	aband	787.02	785.29	785.07	785.63	785.67	784.76	785.43	786.37	786.26	785.89	786.05	785.95	786.61	786.21	NI	NI	NI	broken	dry	15.9"	--	
	October 11-13, 2016	786.64	aband	788.00	787.36	786.46	786.45	786.32	786.40	786.81	787.22	787.11	786.96	787.17	786.81	787.68	787.25	NI	NI	NI	liquid depth = 3.5'	dry	0.8"	1.4"	
	April 10-13, 2017	786.96	aband	788.13	786.39	785.99	786.30	786.28	786.34	786.23	787.16	787.06	786.96	787.24	787.03	787.90	787.60	NI	NI	NI	liquid depth = 3.0'	dry	-0.3	1.4"	
	October 3-5, 2017	785.48	aband	786.66	784.51	784.22	784.67	784.63	784.86	784.29	NM	786.49	785.58	786.08	785.83	786.47	786.02	NI	NI	NI	liquid depth = 2.7'	dry	NM	NM	
	October 9-10, 2017	NM	aband	NM	NM	NM	NM	NM	NM	NM	785.56 (6)	NM	NM	NM	NM	NM	NM	NI	NI	NI	NM	NM	1.4" (5)	1.6" (5)	
	February 21, 2018	783.97	aband	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	784.68	784.46	NM	NM	NI	NI	NI	NM	NM	NM	NM	
	April 23-25, 2018	783.99	aband	785.36	783.09	786.36	781.77	780.79	783.28	783.32	785.88	784.91	782.54	784.71	784.53	785.23	784.81	NI	NI	NI	liquid depth = 2.7'	NM	NM	NM	
	October 23-25, 2018	788.25	aband	789.71	788.77	787.96	787.88	787.73	787.62	788.26	788.32	788.19	788.21	788.59	788.31	789.32	788.87	NI	NI	NI	dry	liquid depth = 2.4'	4.6	4	--
	April 1-4, 2019	787.05	aband	788.64	786.63	786.54	786.82	786.92	786.47	786.78	787.35	787.34	787.16	787.45	787.18	788.04	787.63	NI	NI	NI	liquid depth = 3.9'	dry	--	--	
	October 7-9, 2019	787.26	aband	789.23	788.26	787.64	787.92	787.74	786.77	788.90	787.79	787.73	787.44	787.78	787.62	788.63	788.17	NI	NI	NI	liquid depth = 3.8'	dry	-0.1"	11.7"	13.1"
	May 27-28, 2020	786.92	aband	788.34	786.01	785.75	785.98	785.99	786.22	786.03	787.02	786.99	786.94	787.26	787.05	787.86	787.47	NI	NI	NI	liquid depth = 3.8'	dry	-0.1	2.4	2.4
	October 7-8, 2020	785.95	aband	787.76	785.91	785.45	785.70	785.68	785.52	785.72	786.10	786.06	786.10	786.55	786.33	786.85	786.38	NI	NI	NI	liquid depth = 3.8'	dry	-0.1	2.7	2.4
	February 25, 2021	NM	aband	NM	NM	NM	784.75	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NI	NI	NI	NM	NM	-0.1	2.7	2.6
	April 14, 2021	785.11	aband	787.29	784.27	784.05	784.77	784.77	784.46	c	785.84	785.81	785.60	785.86	785.69	786.47	786.06	NI	NI	NI	liquid depth = 3.7'		--	0.233333333	0.2167
	June 11, 2021	NM	aband	NM	784.19	NM	784.66	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NI	NI	NI	--	--	--	--	
	October 11-12, 14, 2021	784.47	adand	786.78	783.73	783.60	784.42	784.41	783.88	783.87	784.96	784.88	784.79	785.14	784.94	785.55	785.11	NI	NI	NI	liquid depth = 3.7'	--			
	October 17, 2021	NM	adand	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NI	NI	NI	NM	NM	-0.01	0.26	0.23
	April 1, 2022	aband	aband	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	-"0.1"	3.1"	2.9"
	April 11-13, 2022	aband	adand	785.52	783.27	783.45	784.30	784.42	783.26	783.78	785.02	785.00	784.70	784.83	784.72	785.45	785.02	783.99	783.97	783.73	liquid depth = 3.8'	dry	NM	NM	NM
	Bottom of Well Elevation (ft)	778.15	780.16	779.47	777.21	750.89	770.52	749.10	781.24	782.54	774.07	762.24	779.36	776.13	756.07	779.53	756.66	777.19	745.21	774.29	NM	NM	NM	NM	

	Well Number	M-3	M-4R	MW-39A	MW-39B	MW-48A	MW-48B	MW-57	MW-59	MW-216R	MW-217	MW-220RR	SG-1	SG-2	SG-3	SG-4
Ash Pond Facility (Facility ID #02325)	**Top of Casing Elevation (feet amsl)**	788.23	806.10	809.62	809.50	828.86	828.84	786.29	815.48	814.21	791.55	792.90	792.06	795.25	808.60	805.36
	Screen Length (ft)															
	Total Depth (ft from top of casing)	16.90	25.55	34.80	76.07	51.88	75.80	14.40	38.50	37.85	37.37	18.96	--	--	--	--
	Top of Well Screen Elevation (ft)	771.33	780.55	774.82	733.43	776.98	753.04	771.89	776.98	776.36	754.18	773.94	--	--	--	--
	Measurement Date															
	October 2, 2012	780.13	786.76	781.49	781.34	782.03	781.93	780.58	779.88	781.91	780.95	780.55	789.14	793.85	dry	dry
	April 15, 2013	785.16	788.39	783.97	784.00	783.77	783.78	784.69	783.66	784.09	784.75	785.02	789.5(1)	NM	dry	dry
	October 8, 2013	781.22	786.67	NM	NM	783.69	783.58	NM	NM	783.39	782.27	782.36	789.5(1)	791.33	dry	dry
	October 15, 2013	NM	NM	782.94	782.81	NM	NM	782.47	783.49	NM	NM	NM	NM	NM	NM	NM
	April 14, 2014	786.04	788.96	783.57	783.68	783.56	783.57	785.51	783.41	783.73	785.25	785.87	788.90	dry	dry	dry
	October 1-3, 2014	781.16	787.55	783.42	783.32	784.05	783.94	782.32	783.55	783.79	782.63	783.03	NM	dry	dry	dry
	April 13-14, 2015	783.08	786.83	782.77	782.68	782.80	782.82	782.81	782.83	782.93	783.34	783.42	789.3	791.70	dry	dry
	October 6-7, 2015	780.66	786.12	782.97	782.81	783.10	783.01	781.82	783.25	783.18	781.95	782.26	788.48	791.58	dry	dry
	April 4-6, 2016	784.21	789.09	785.27	785.27	784.79	784.76	783.21	784.97	785.68	785.02	784.36	NM	793.40	dry	dry
	October 11-13, 2016	781.88	787.88	785.75	785.52	785.73	785.61	783.12	786.51	786.16	783.75	784.09	788.32	792.52	dry	dry
	April 10-13, 2017	782.94	787.95	785.44	785.20	785.82	785.69	782.77	786.09	785.95	784.29	784.09	788.31	793.85	dry	dry
	October 3-5, 2017	780.93	787.04	783.35	783.18	784.30	784.19	782.37	784.23	783.89	782.48	782.61	788.3	793.45	dry	dry
	April 23-25, 2018	782.89	790.43	782.86	782.87	783.14	783.09	783.04	783.02	783.23	783.26	783.45	788.38	>795.25	dry	dry
	October 23-25, 2018	782.95	788.47	787.12	786.88	787.12	786.99	783.48	787.73	787.49	784.90	784.52	787.76	793.25	dry	dry
	April 1-4, 2019	785.68	789.44	786.28	786.31	786.56	786.45	785.27	787.39	786.53	786.33	785.46	788.40	794.60	dry	dry
	October 7-9, 2019	785.33	790.65	787.10	787.02	786.68	786.65	785.29	786.68	787.07	786.01	785.42	748.48	795.20	dry	dry
	May 27-29, 2020	781.80	787.73	785.12	784.92	785.74	785.59	783.11	785.89	785.60	783.41	783.89	748.48	>795.25	dry	dry
	October 7-8 &17, 2020	781.42	787.74	784.74	784.64	785.03	784.96	782.83	785.43	785.10	783.06	783.49	788.34	793.32	dry	NM
	April 12, 2021	782.30	786.34	783.66	783.65	784.13	784.08	782.79	784.08	783.97	783.15	783.49	788.03	793.45	below gauge	dry
	October 11-12, 14, 2021	781.03	786.33	782.94	782.85	783.09	783.03	781.94	783.11	783.04	782.15	782.66	788.59	795.13	dry	dry
	April 11-13, 2022	783.95	788.26	783.37	783.34	783.10	783.10	NM	782.99	783.40	783.93	783.83	788.4	794.65	dry	dry
	June 3, 2022	NM	NM	NM	NM	NM	NM	782.13	NM	NM	NM	NM	NM	NM	NM	NM
	Bottom of Well Elevation (ft)	771.33	780.55	774.82	733.43	776.98	753.04	771.89	776.98	776.36	754.18	773.94	--	--	--	--

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

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

Notes:
NM = not measured

Created by: MDB Date: 5/6/2013
Last revision by: NDK Date: 9/22/2022
Checked by: RM Date: 9/22/2022

(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.

I:\25222067.00\Deliverables\2022 Apr ASD MOD 1-3 LF\Tables\[Table 3 - Groundwater Elevation Summary.xls]levels

Table 4. Field pH, Lab pH, and Dissolved Oxygen at MW-34A
Columbia Dry ADF, Modules 1-3

Date	Field pH (Standard Units)	Dissolved Oxygen (mg/L)	Lab pH (Standard Units)
12/21/2015	7.91	10	7.7
4/5/2016	7.92	9.38	7.7
7/7/2016	7.52	3.96	7.4
7/28/2016	7.40	5.11	--
10/13/2016	8.19	10.33	7.6
12/29/2016	7.43	9.9	7.4
1/25/2017	7.71	9.83	7.3
4/11/2017	8.03	9.96	7.9
6/6/2017	7.57	10.27	7.7
8/7/2017	7.39	8.02	7.8
10/24/2017	7.67	9.9	7.7
4/24/2018	7.80	2.45	7.7
9/21/2018	8.12	10.54	7.7
10/22/2018	7.64	10.62	7.8
4/2/2019	7.73	10.22	7.7
10/8/2019	7.79	11.71	7.7
5/28/2020	7.40	10.12	7.6
10/8/2020	7.81	9.88	7.7
2/25/2021	7.57	--	--
4/13/2021	7.93	10.47	--
6/11/2021	7.61	11.77	--
10/12/2021	7.68	10.1	7.8
4/12/2022	8.34	7.82	7.8

Note: Lab pH analysis initiated outside of the 15 minute EPA required holding time.

Created by:	SCC	Date:	9/27/2022
Last revision by:	SCC	Date:	9/27/2022
Checked by:	NDK	Date:	9/28/2022

Table 5. Analytical Results - Lysimeters and Leachate Pond

Columbia Dry Ash Disposal Facility

SCS Engineers Project #25222067.00

Monitoring Point	Monitoring Period	Monitoring Point Dry/ Broken	Boron, Total (µg/L)	Chloride, Total (mg/L)	Sulfate, Total (mg/L)
LS-1	2015-Apr	DRY	--	--	--
	2015-Oct	BROKEN	--	--	--
	2016-Apr	DRY	--	--	--
	2016-Oct	--	6,530	12.3	789
	2017-Apr	--	6,510	20.7 J	814
	2017-Oct	--	6,200	14.2 J	764
	2018-Apr	--	5,920	16.0 J	856
	2018-Oct	DRY	--	--	--
	2019-Apr	--	5,640	22.0 J	911
	2019-Oct	--	6,180	19.2 J	861
	2020-May	--	6,180	25.4 J	1,040
	2020-Oct	--	5,640	27.2 J	950
	2021-Apr	--	6,010	21.1 J	976
	2021-Oct	--	6,230	14.3 J	987
	2022-Apr	--	6,140	13.3 J	1,040
LS-3R	2015-Apr	--	6,480	20.6 B	807
	2015-Oct	DRY	--	--	--
	2016-Apr	DRY	--	--	--
	2016-Oct	DRY	--	--	--
	2017-Apr	DRY	--	--	--
	2017-Oct	DRY	--	--	--
	2018-Apr	DRY	--	--	--
	2018-Oct	--	6,180	26.2 J	841
	2019-Apr	DRY	--	--	--
	2019-Oct	DRY	--	--	--
	2020-May	DRY	--	--	--
	2020-Oct	DRY	--	--	--
	2021-Apr	DRY	--	--	--
	2021-Oct	DRY	--	--	--
	2022-Apr	DRY	--	--	--

Table 5. Analytical Results - Lysimeters and Leachate Pond
Columbia Dry Ash Disposal Facility
SCS Engineers Project #25222067.00

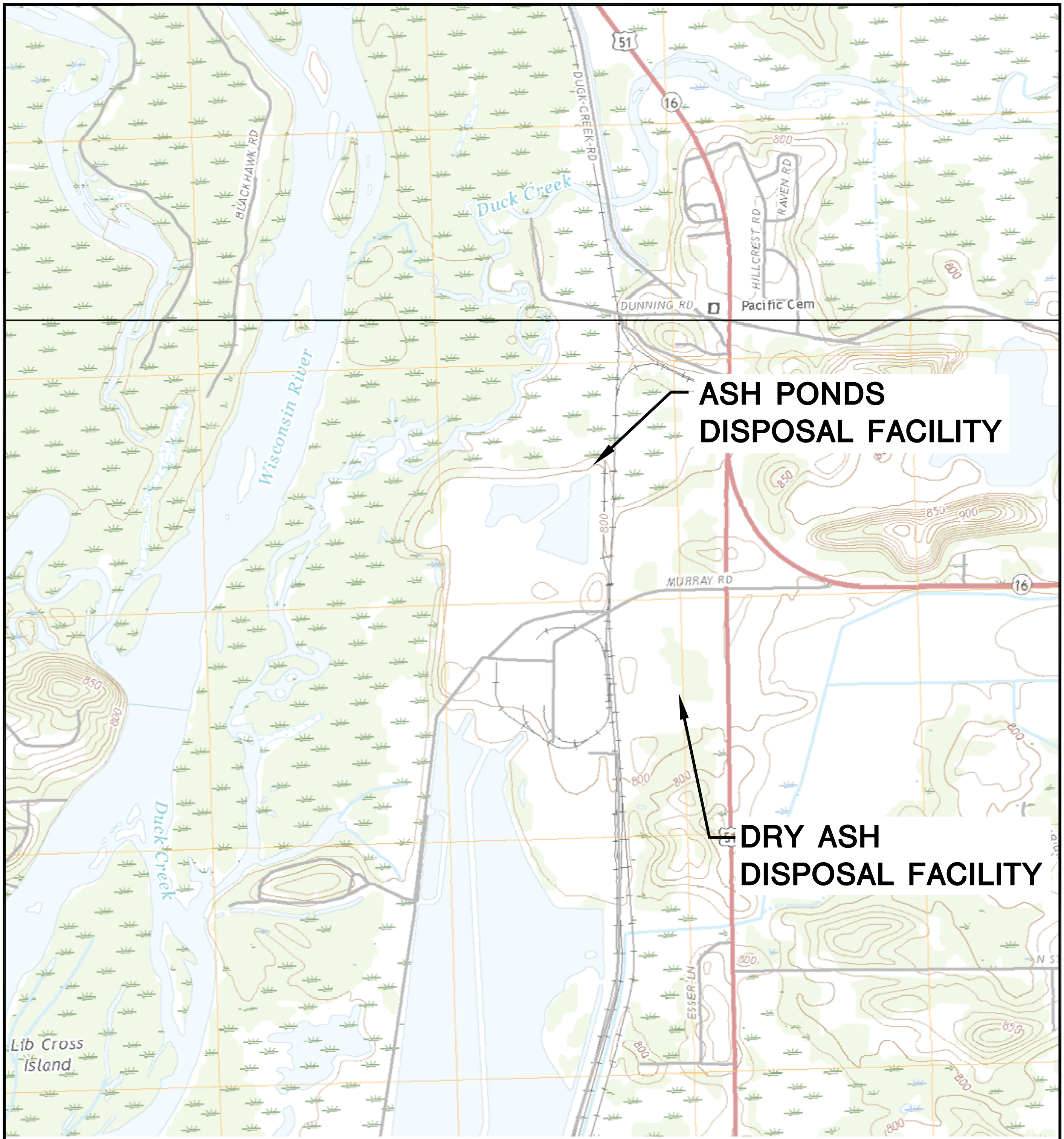
Monitoring Point	Monitoring Period	Monitoring Point Dry/ Broken	Boron, Total (µg/L)	Chloride, Total (mg/L)	Sulfate, Total (mg/L)
LP-1	2015-Apr	--	4,060	27.8	734
	2015-Oct	--	4,300	37.1	820
	2016-Apr	--	1,830	26.8	416
	2016-Oct	--	4,610	71.5	835
	2017-Apr	--	2,690	66.3	587
	2017-Oct	--	4,970	91.7	739
	2018-Apr	--	2,060	63.2	634
	2018-Oct	--	2,630	151	907
	2019-Apr	--	570	35.1	249
	2019-Oct	--	1,270	63.9	602
	2020-May	--	2,460	179	952
	2020-Oct	--	2,710	243	1,160
	2021-Apr	--	3,340	319	1,180
	2021-Oct	--	3,440	299	1,470
	2022-Apr	--	1,030	89.2	506

Abbreviations:
µg/L = micrograms per liter
mg/L = milligrams per liter
-- = not analyzed

Notes:
B = Analyte was detected in the associated method blank.
J = Estimated concentration at or above the LOD and below the LOQ.

Created by: MDB Date: 12/1/2014
Last revision by: RM Date: 8/18/2022
Checked by: DK Date: 8/18/2022

Figures



ASH PONDS DISPOSAL FACILITY

DRY ASH DISPOSAL FACILITY

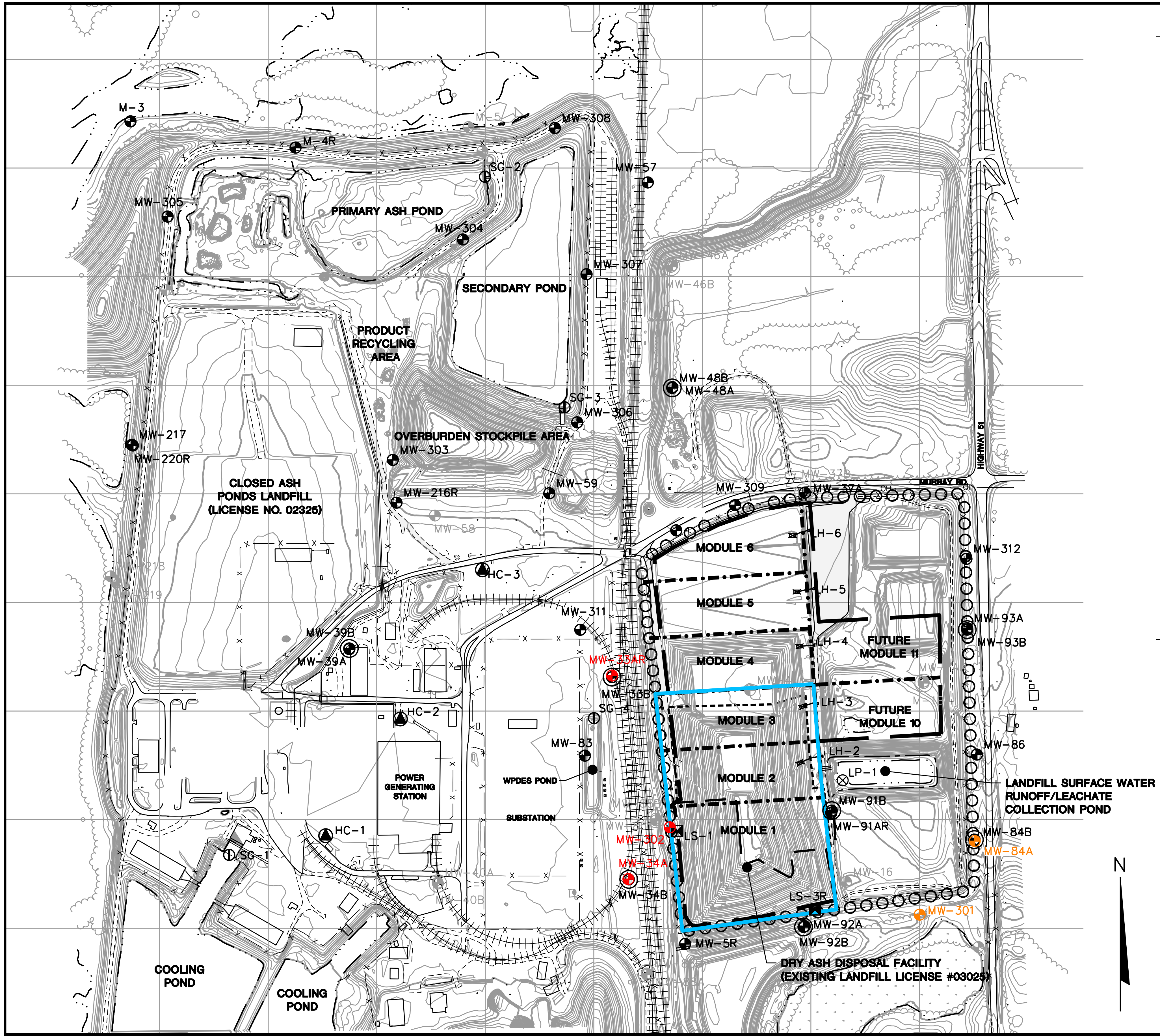
N

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

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

PROJECT NO.	25220067.00	DRAWN BY:	BSS	ENGINEER	SCS ENGINEERS 2830 DAIRY DRIVE MADISON, WI 53718-6751 PHONE: (608) 224-2830	FIGURE
DRAWN:	12/02/2019	CHECKED BY:	MDB			1
REVISED:	01/10/2020	APPROVED BY:	TK 04/10/2020			

I:\25220067.00\Drawings\ASD Mod 1-3 LF\Site Location Map.dwg, 4/12/2020 7:05:09 PM



LEGEND

EXISTING MAJOR CONTOUR (10' INTERVAL)
EXISTING MINOR CONTOUR (2' CONTOUR)
EXISTING FENCELINE
EXISTING TRACKS
EXISTING PAVED ROAD
EXISTING UNPAVED ROAD
EDGE OF WATER
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 MONITORING WELL
CCR BACKGROUND MONITORING WELL
CCR UNIT

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.

500 0 500

SCALE: 1" = 500'

PROJECT NO.	25222067.00	DRAWN BY:	KP
DRAWN:	12/02/2019	CHECKED BY:	NDK/RM
REVISED:	09/19/2022	APPROVED BY:	TK 9/28/2022

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

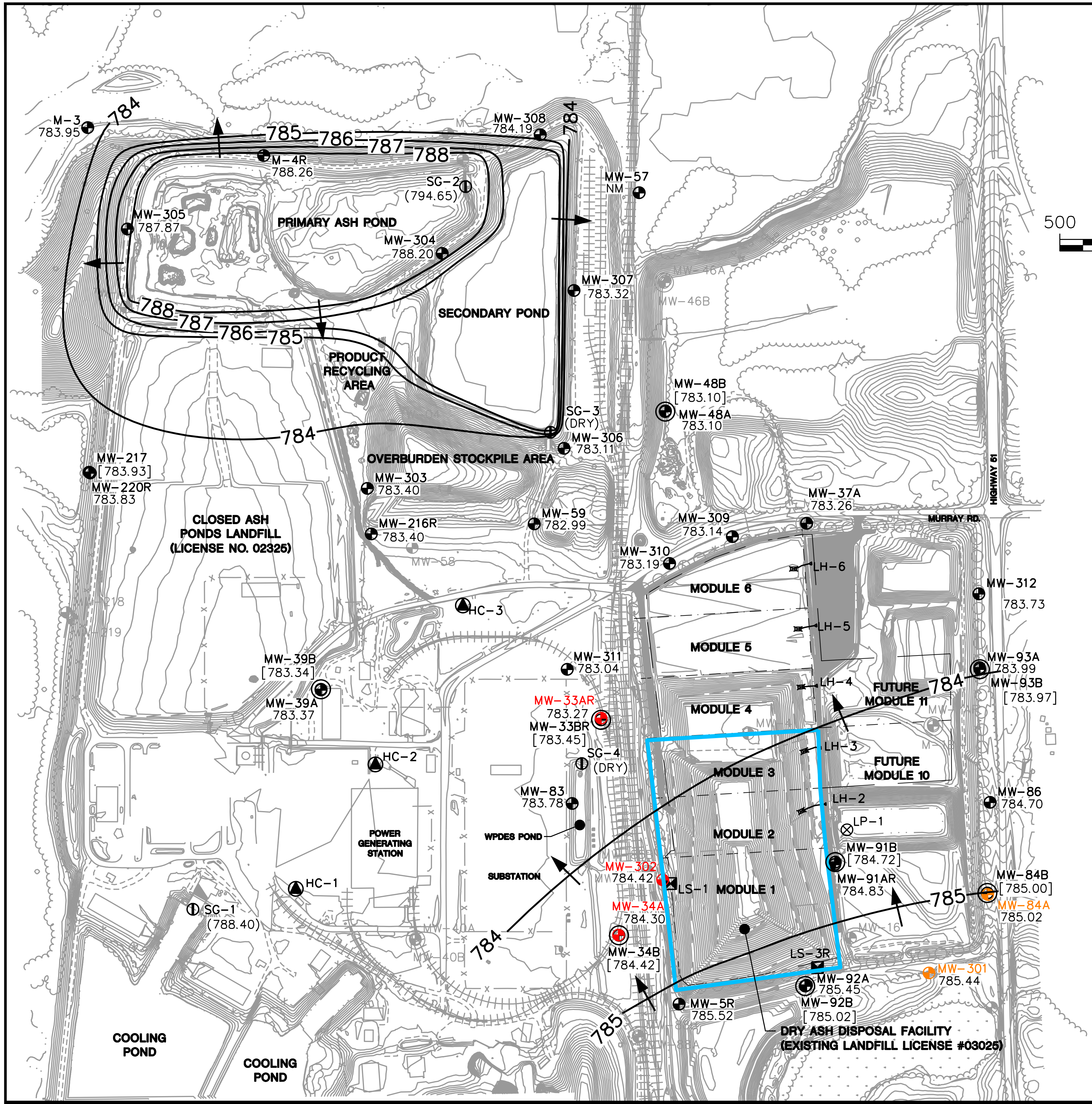
CLIENT
ALLIANT ENERGY
COLUMBIA ENERGY CENTER
W8375 MURRAY ROAD
PARDEEVILLE, WI 53954

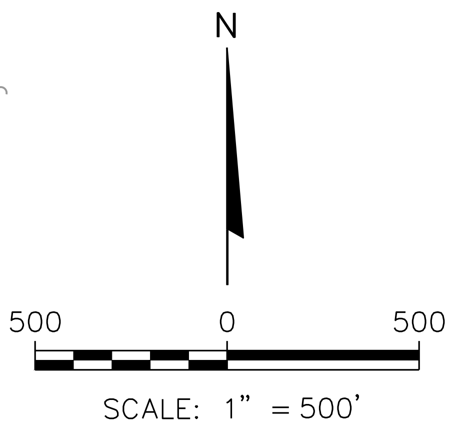
SITE
ALLIANT ENERGY
COLUMBIA ENERGY CENTER
MODULES 1-3 DRY ASH DISPOSAL FACILITY
PARDEEVILLE, WI

SITE PLAN AND MONITORING WELL LOCATIONS

FIGURE
2

I:\25222067.00\Drawings\2□Site Plan and M□nit□ring Well L□□ati□ns M□d 1-3.dwg, □/23/2022 11:51:42 AM





SCALE: 1" = 500'

LEGEND

───	EXISTING MAJOR CONTOUR (10' INTERVAL)
───	EXISTING MINOR CONTOUR (2' CONTOUR)
──x──	EXISTING FENCELINE
┼┼┼┼┼┼┼	EXISTING TRACKS
═══	EXISTING PAVED ROAD
=======	EXISTING UNPAVED ROAD
─··─	EDGE OF WATER
·OOOOOO	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
787.62	WATER TABLE ELEVATION
[788.87]	POTENTIOMETRIC SURFACE ELEVATION (NOT CONTOURED)
(795.20)	SURFACE WATER ELEVATION (NOT CONTOURED)
───	WATER TABLE CONTOUR
⟶	APPROXIMATE GROUNDWATER FLOW DIRECTION

NOTES:

1. BASE MAP CREATED FROM AERIAL SURVEY BY KBM, FLOWN DECEMBER 1, 2014, AND GROUND SURVEY BY SCS ENGINEERS IN MAY 2016, JUNE 2016, OCTOBER 2016, NOVEMBER 2016, APRIL 2017, NOVEMBER 2017, JULY 2018, AUGUST 2018, FEBRUARY 2019, AND MAY 2019.
2. MONITORING WELL LOCATIONS AND ELEVATIONS SURVEYED BY WISCONSIN POWER AND LIGHT, INC. IN DECEMBER 1994, NOVEMBER 1996, APRIL 2003, AND JANUARY 2016 AND BY SCS ENGINEERS IN FEBRUARY 2018.
3. SUPPLY WELL LOCATIONS ARE APPROXIMATE AND ASSUMED BASED ON JANUARY 2013 DRAWINGS BY TRC.
4. MONITORING WELLS MW-301 THROUGH MW-305 INSTALLED BY BADGER STATE DRILLING ON NOVEMBER 11-13, 2015.
5. MONITORING WELLS MW-306 THROUGH MW-308 INSTALLED BY BADGER STATE DRILLING ON NOVEMBER 14-15, 2016.
6. MONITORING WELLS MW-309 THROUGH MW-311 INSTALLED BY BADGER STATE DRILLING ON FEBRUARY 13-14, 2018.
7. GROUNDWATER AND SURFACE WATER ELEVATIONS WERE MEASURED ON APRIL 12-14, 2021.
8. BACKGROUND MONITORING WELLS FOR THE MODULE 1-3 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
DRAWN:	12/02/2019	CHECKED BY:	MDB
REVISED:	06/20/2022	APPROVED BY:	TK 9/28/2022

ENGINEER

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

CLIENT

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

SITE

ALLIANT ENERGY
COLUMBIA ENERGY CENTER
MODULES 1-3 DRY ASH DISPOSAL FACILITY
PARDEEVILLE, WI

WATER TABLE MAP
APRIL 2022

FIGURE
3

I:\25222067.00\Drawings\3 Water Table Map.dwg, 7/23/2022 11:54:04 AM

Appendix A

Trend Plots for CCR Wells

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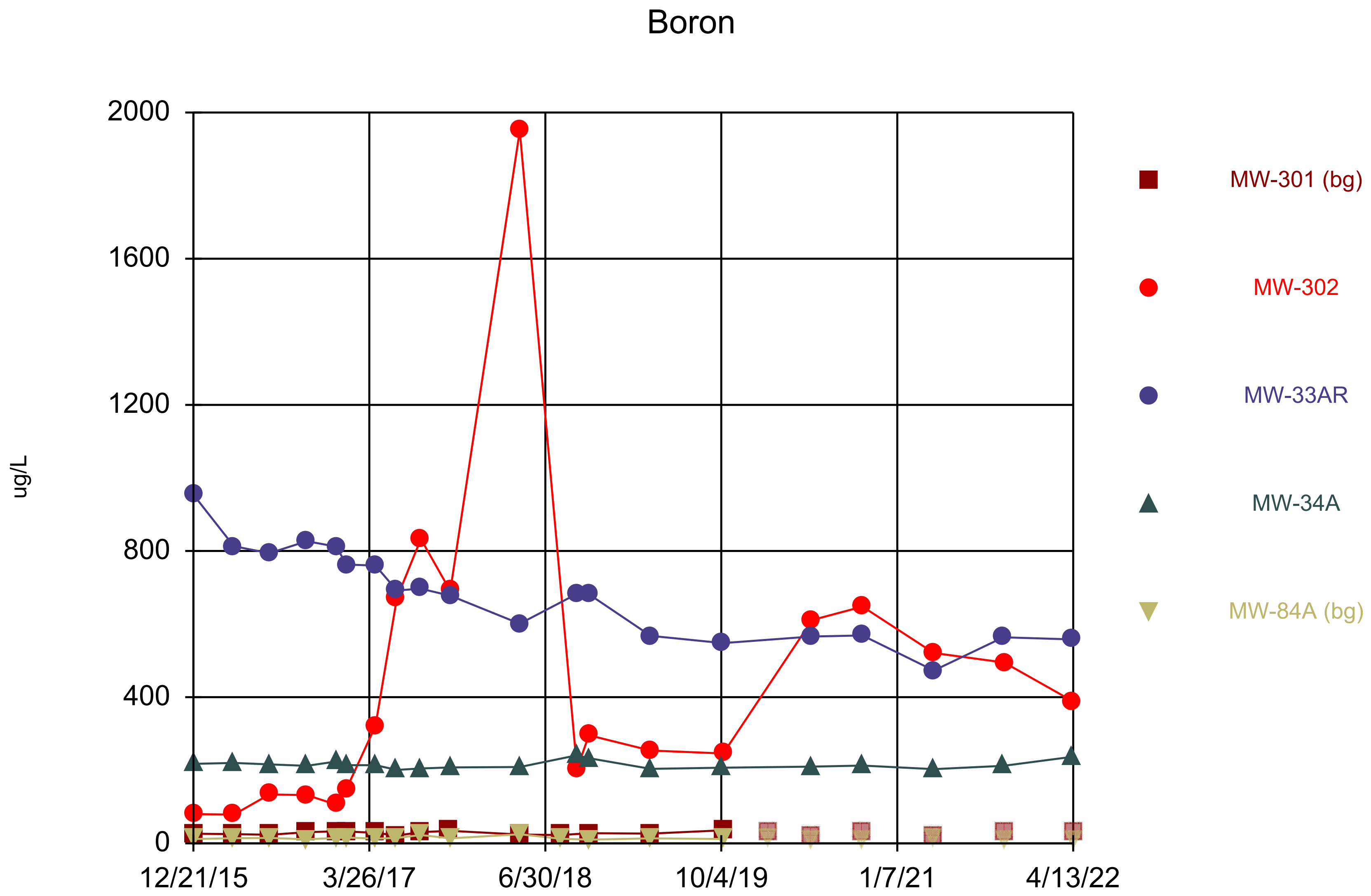

Time Series Analysis Run 9/28/2022 10:32 AM View: MOD 4 LF

Columbia Energy Center Client: SCS Engineers Data: December - Chem- export-Dec2020

Time Series

Constituent: Boron (ug/L)   Analysis Run 9/28/2022 10:34 AM   View: MOD 4 LF

Columbia Energy Center   Client: SCS Engineers   Data: December - Chem- export-Dec2020

	MW-301 (bg)	MW-302	MW-33AR	MW-34A	MW-84A (bg)
12/21/2015			954	217.5 (D)	
12/22/2015	26.5	80			11.9
4/5/2016	25.2	78.8	813	220	14
7/7/2016		134	794	216	
7/8/2016	23.6				14.7
10/13/2016	30.6	132	827	212	11.1
12/29/2016	32.8	106	812	224	14.7
1/25/2017	32.6	149	763	214	16.1
4/11/2017	28.8	322	760	214	12.9
6/6/2017	21.3	671	692	201	14.8
8/7/2017			697	205	
8/8/2017	30.6	833			22.9
10/23/2017	34.3				
10/24/2017		691	678	208	13.8
4/24/2018		1950	601	209	
4/25/2018	24.3				25
8/8/2018	22.8				12.8
9/21/2018		203	683	241	
10/22/2018		296	682	233	
10/24/2018	27.8				10.1 (J)
4/2/2019	26.9	254	568	204	
4/3/2019					13.6
10/8/2019			548	207	
10/9/2019	35.9	246			12
2/3/2020	27.9				15.7
5/28/2020			566	210	
5/29/2020	21.3	611			10
10/8/2020	28.8	648	569	213	9.7 (J)
4/13/2021		521	473	203	
4/14/2021	22.2				14.3
10/12/2021			564	212	
10/14/2021	31.4	495			11.1
4/12/2022		389	558	237	
4/13/2022	28.7				10.5

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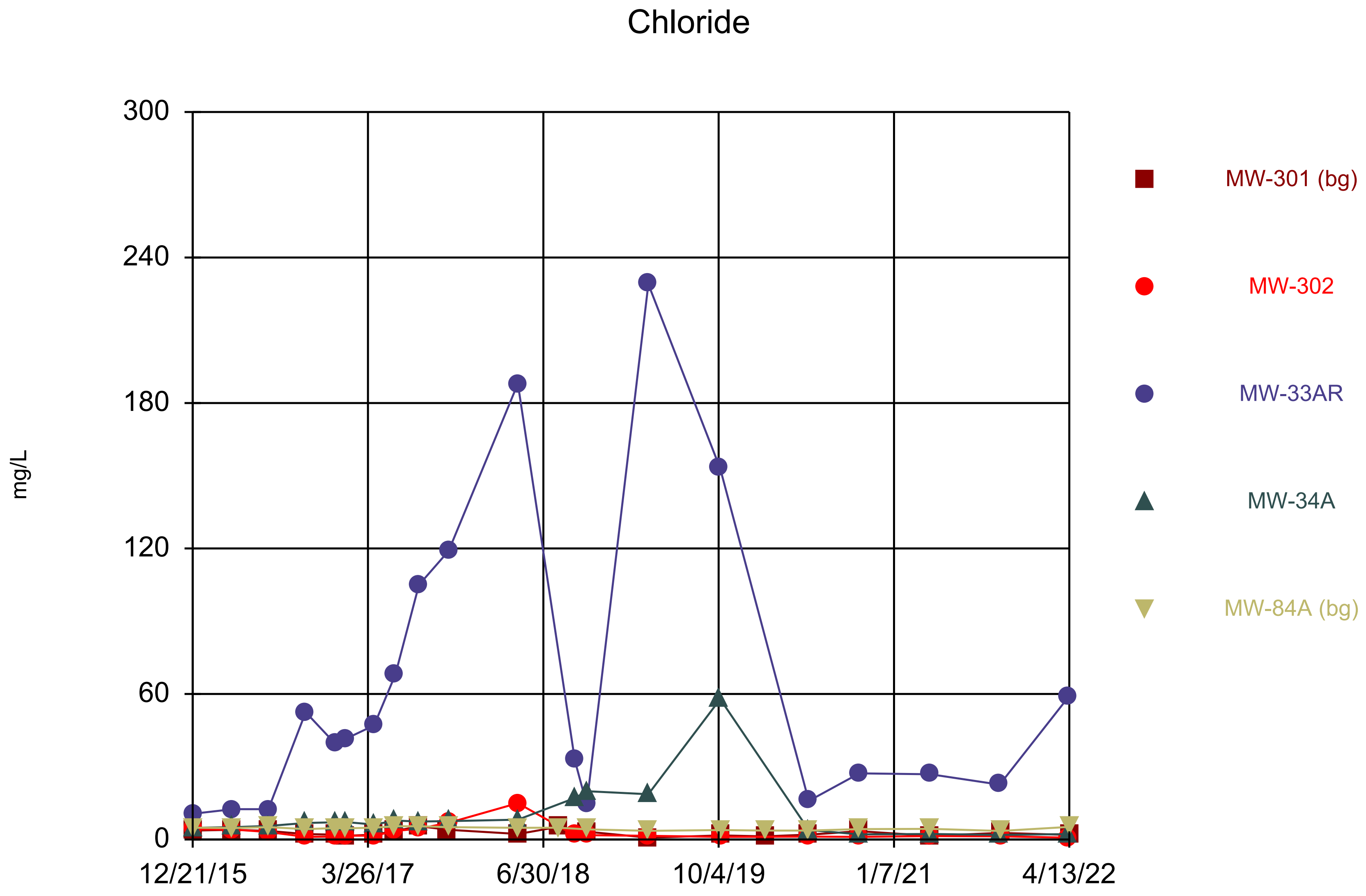


Time Series Analysis Run 9/28/2022 10:32 AM View: MOD 4 LF

Columbia Energy Center Client: SCS Engineers Data: December - Chem- export-Dec2020

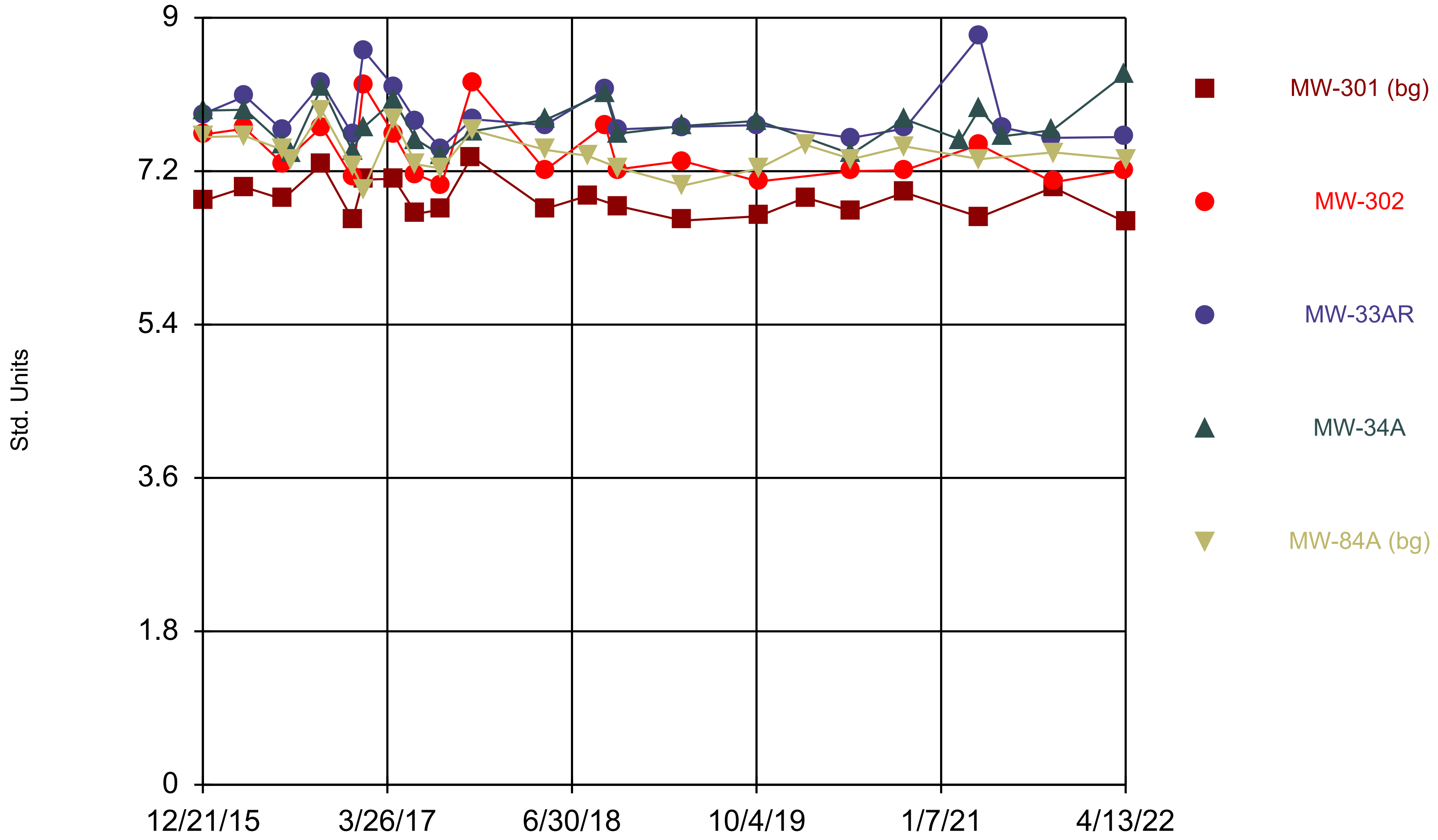
Time Series

Constituent: Chloride (mg/L)   Analysis Run 9/28/2022 10:34 AM   View: MOD 4 LF

Columbia Energy Center   Client: SCS Engineers   Data: December - Chem- export-Dec2020

	MW-301 (bg)	MW-302	MW-33AR	MW-34A	MW-84A (bg)
12/21/2015			10.6	4.85 (D)	
12/22/2015	3.7 (J)	4.2			4.9
4/5/2016	4	4.1	12.5	5.1	4.7
7/7/2016		3.1 (J)	12.5	5.6	
7/8/2016	3.5 (J)				5.1
10/13/2016	2.2	1.1 (J)	52.5	6.8	4.3
12/29/2016	2 (J)	1.2 (J)	39.6	7.1	4.7
1/25/2017	1.5 (J)	1.6 (J)	41.4	7.2	4.6
4/11/2017	2	1.6 (J)	47.1	6.2	4.9
6/6/2017	3.5	3.5	68.1	7.8	5.5
8/7/2017			105	7.4	
8/8/2017	5.5	4.5			5.5
10/23/2017	4				
10/24/2017		6.9	119	7.6	5.1
4/24/2018		15	188	8.2	
4/25/2018	2.3				4.8
8/8/2018	5.2				4.9
9/21/2018		1.7 (J)	32.6	17.1	
10/22/2018		1.8 (J)	14.4	19.9	
10/24/2018	3.2				4.2
4/2/2019	0.79 (J)	1.5 (J)	229	18.7	
4/3/2019					3.6
10/8/2019			153	57.9	
10/9/2019	1.7 (J)	1.1 (J)			3.9
2/3/2020	1.3 (J)				3.7
5/28/2020			15.9	3.9	
5/29/2020	2 (J)	1.2 (J)			3.7
10/8/2020	3.4	1.1 (J)	27.3	2.1	4.3
4/13/2021		1.4 (J)	26.9	2.3	
4/14/2021	1.5 (J)				4.4
10/12/2021			22.6	1.9 (J)	
10/14/2021	2.7	1.3 (J)			3.5
4/12/2022		0.79 (J)	59	2.2	
4/13/2022	1.9 (J)				5.2

Field pH



Time Series   Analysis Run 9/28/2022 10:32 AM   View: MOD 4 LF

Columbia Energy Center   Client: SCS Engineers   Data: December - Chem- export-Dec2020

Time Series

Constituent: Field pH (Std. Units) Analysis Run 9/28/2022 10:34 AM View: MOD 4 LF

Columbia Energy Center Client: SCS Engineers Data: December - Chem- export-Dec2020

	MW-301 (bg)	MW-302	MW-33AR	MW-34A	MW-84A (bg)
12/21/2015			7.87	7.91	
12/22/2015	6.85	7.63			7.6
4/5/2016	7.01	7.7	8.08	7.92	7.61
7/7/2016		7.29	7.68	7.52	
7/8/2016	6.87				7.45
7/28/2016				7.4	7.34
10/13/2016	7.28	7.72	8.23	8.19	7.91
12/29/2016	6.63	7.12	7.63	7.43	7.25
1/25/2017	7.1	8.21	8.62	7.71	6.99
4/11/2017	7.11	7.63	8.19	8.03	7.8
6/6/2017	6.7	7.16	7.78	7.57	7.28
8/7/2017			7.47	7.39	
8/8/2017	6.75	7.04			7.23
10/23/2017	7.37				
10/24/2017		8.23	7.81	7.67	7.68
4/24/2018		7.21	7.74	7.8	
4/25/2018	6.76				7.45
8/8/2018	6.91				7.38
9/21/2018		7.74	8.16	8.12	
10/22/2018		7.22	7.69	7.64	
10/24/2018	6.79				7.24
4/2/2019	6.62	7.32	7.72	7.73	
4/3/2019					7.03
10/8/2019			7.74	7.79	
10/9/2019	6.67	7.08			7.23
2/3/2020	6.89				7.51
5/28/2020			7.59	7.4	
5/29/2020	6.73	7.2			7.34
10/8/2020	6.95	7.21	7.7	7.81	7.49
2/25/2021				7.57	
4/13/2021		7.51	8.78	7.93	
4/14/2021	6.66				7.34
6/11/2021			7.71 (R)	7.61 (R)	
10/12/2021			7.59	7.68	
10/14/2021	7.01	7.07			7.42
4/12/2022		7.21	7.6	8.34	
4/13/2022	6.6				7.34

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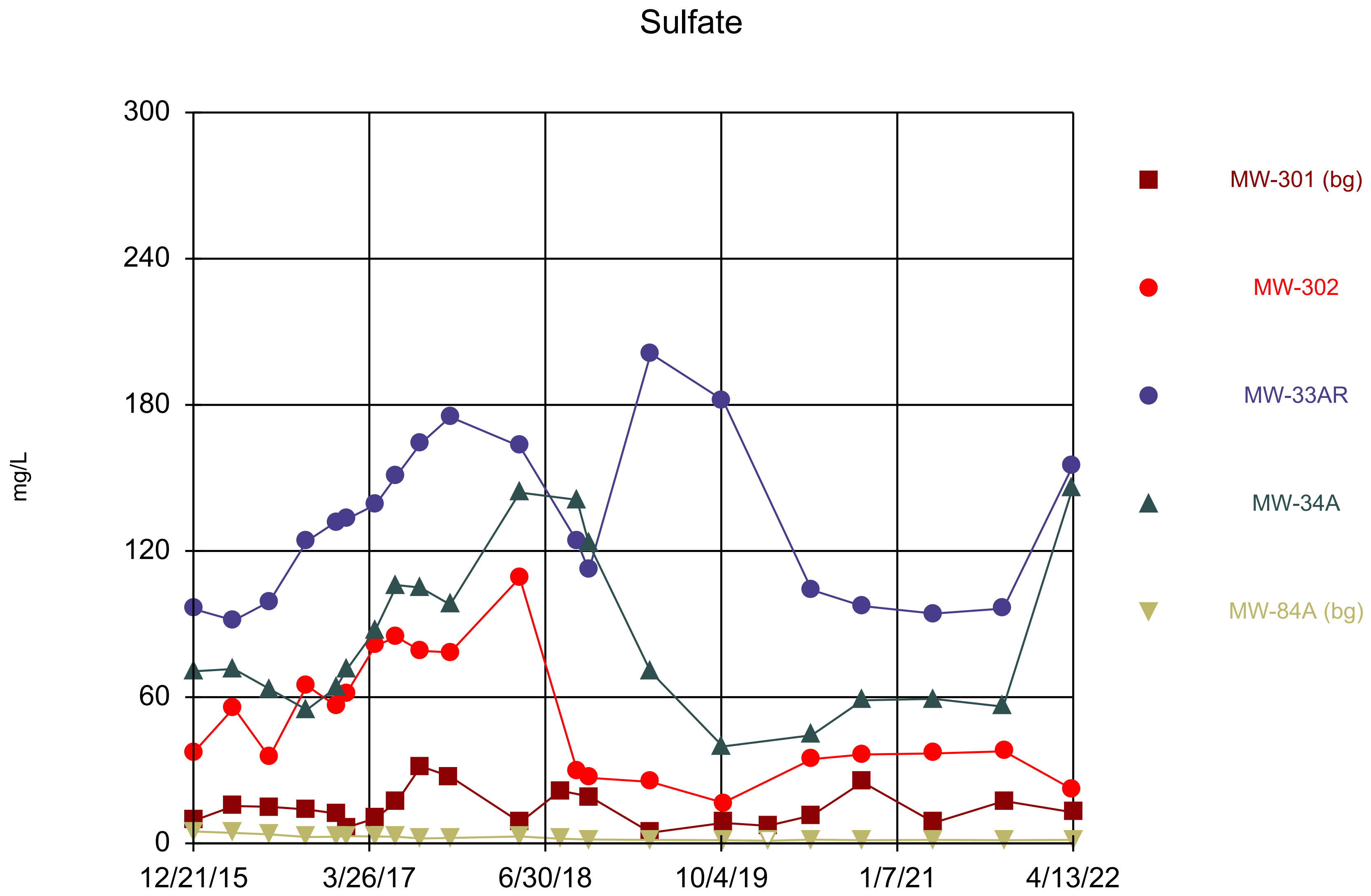
Hollow symbols indicate censored values.



Time Series Analysis Run 9/28/2022 10:32 AM View: MOD 4 LF

Columbia Energy Center Client: SCS Engineers Data: December - Chem- export-Dec2020

Time Series

Constituent: Sulfate (mg/L)   Analysis Run 9/28/2022 10:34 AM   View: MOD 4 LF

Columbia Energy Center   Client: SCS Engineers   Data: December - Chem- export-Dec2020

	MW-301 (bg)	MW-302	MW-33AR	MW-34A	MW-84A (bg)
12/21/2015			96.2	70.6 (D)	
12/22/2015	9.3	37.4			4.9
4/5/2016	15.3	55.6	91.5	71.6	4.3
7/7/2016		35.4	99.2	63.4	
7/8/2016	15				3.7 (J)
10/13/2016	13.9	64.7	124	54.8	2.6 (J)
12/29/2016	12.3 (J)	56.4	132	63.9	2.7 (J)
1/25/2017	6.5	61.6	133	71.2	3
4/11/2017	10.3	81.3	139	87.6	2.8 (J)
6/6/2017	17.1	84.6	151	106	2.7 (J)
8/7/2017			164	105	
8/8/2017	31.6	79			2 (J)
10/23/2017	27.5				
10/24/2017		78.4	175	98	2.2 (J)
4/24/2018		109	163	144	
4/25/2018	8.6				2.8 (J)
8/8/2018	21.6				1.9 (J)
9/21/2018		30	124	141	
10/22/2018		26.9	112	123	
10/24/2018	19.2				1.6 (J)
4/2/2019	4.4	25.2	201	70.4	
4/3/2019					1.4 (J)
10/8/2019			182	39.8	
10/9/2019	8.4	16.7			1.3 (J)
2/3/2020	7.2				<2.2 (U)
5/28/2020			104	44.4	
5/29/2020	11.5	34.6			1.5 (J)
10/8/2020	25.1	36.5	97.4	58.7	1.3 (J)
4/13/2021		36.9	94.3	59.3	
4/14/2021	8.5				1.4 (J)
10/12/2021			96.4	56.1	
10/14/2021	17.4	37.8			1.3 (J)
4/12/2022		22.1	155	146	
4/13/2022	12.7				1.4 (J)

Appendix B

Feasibility Study Water Quality Information

1370

FEASIBILITY STUDY
PROPOSED FLY ASH AND/OR SCRUBBER SLUDGE
DISPOSAL FACILITY-COLUMBIA SITE
WISCONSIN POWER AND LIGHT COMPANY
TOWN OF PACIFIC, COLUMBIA COUNTY, WISCONSIN

Jan 78

C 7134

conceivable that groundwater flow in the area north of Murray Road may be altered such that contaminants derived from the present ash settling basin might be diverted southerly towards the homes along Murray Road. These questions would have to be addressed in greater detail, consistent with the goals of Wisconsin Power and Light Company.

WATER QUALITY

During the first two weeks of December, 1977, 64 water samples were obtained from surface waters and groundwater monitoring wells at the Columbia Energy Center. The purpose of the sampling was to assess background water quality in the vicinity of the proposed disposal site. The sampling stations included 59 monitoring wells, the cooling lake, ash settling pond, the drainage ditch carrying the ash pond discharge waters and the agricultural drainage ditch along the southern boundary of the site. Due to the large number of sampling stations, the analyses were limited to pH, specific conductance, iron, calcium, magnesium, sulfate and chloride. The analytical data is contained in Appendix F and is discussed below.

pH

Most groundwaters found in the United States have pH values ranging from around 6.0 to 8.5. The pH of a water represents the result of a number of interrelated chemical equilibria. This equilibria can be altered shortly after sampling by gains or losses of carbon dioxide, the oxidation of ferrous iron and numerous other chemical reactions. Thus, pH measurements must be taken shortly after obtaining the sample. For this study, the pH of samples was determined immediately upon return to the laboratory.

Within the proposed site boundaries at the Columbia Energy Center, pH values ranged between 6.3 and 8.1 and averaged 7.5. Typically, the lower pH values were observed in the lowland areas and wetlands, probably as a result of acidic organic soils. The pH of water in the ash disposal settling pond and the cooling lake was 11.4 and 8.3, respectively.

SPECIFIC CONDUCTANCE

Specific conductance, or conductivity, is the ability of a substance to conduct an electric current. The conductance determination is correlative with the dissolved-solids concentration. Conductivity, however, is temperature dependent and thus requires the reference of specific conductance measurements to a standard temperature. The values discussed here are referred to 25°C.

The specific conductance of groundwater in the study area ranged from 220 umhos/cm to a maximum of 2600 umhos/cm. The highest conductivity readings were observed in monitoring wells located along the coal storage area and the drainage ditch carrying the ash pond discharge where values up to 2600 umhos/cm were measured. The conductivity of the ash pond effluent was 1380 umhos/cm. This data appears to confirm earlier speculation of infiltration of effluent from the ash pond discharge channel and from the coal storage area into the groundwater. Conductance within the proposed site boundaries averaged approximately 465 umhos/cm.

Conductivity in the ash disposal settling pond was measured at 1510 umhos/cm. Shallow monitoring wells M-6 and 39A, located adjacent to the pond also exhibited elevated values of 1160 umhos/cm and 1800 umhos/cm, respectively.

High conductivities were also observed along U. S. Highway 51 at monitoring wells 51A and 51B. The chloride data, discussed below, indicates infiltration of road salt has probably occurred at this location.

Specific conductance measurements obtained in the vicinity of the proposed disposal site are shown on Drawing C 7134-15.

IRON

The element iron is an abundant element found in most rocks and soil. It generally occurs as sulfides and oxides in igneous and metamorphic rocks and as iron oxide and hydroxide cementing materials in coarse-grained sedimentary rocks.

Ferrous iron is unstable in the presence of oxygen where it is bound to hydroxide anions as $2Fe(OH)_3$.

$$2Fe^{++} + 4HCO_3^- + H_2O \rightleftharpoons 2Fe(OH)_3 + 4CO_2$$

If subjected to a strong reducing environment, such as a marsh, the reaction is reversed and iron goes back into solution. The amount which dissolves is related to a number of variables including the velocity with which water moves through this environment.

The U. S. Public Health Service recommends an iron concentration of less than 0.3 mg/l in water used for drinking and culinary purposes. Laundry and porcelain tend to be stained when concentrations reach 0.5 to 1.0 mg/l. At this level it can also be tasted.

The presence of iron under the proposed disposal area in the majority of cases was below the detection limit of 0.1 mg/l. In monitoring wells 5 and 18, located in or near the central marsh area, iron increased to 10 mg/l and 5.7 mg/l, respectively. In the southern marsh, monitoring wells exhibited concentrations between 0.5 mg/l and 6.1 mg/l. Although the iron concentration in the cooling lake was below the detection limit, downgradient wells 44 and 30A located on the cooling lake dike yielded values of 11 mg/l and 26 mg/l iron respectively. Boring logs indicated trace amounts of organic material at the base of the dike which is probably the reason for the high concentrations observed. At the same location, iron in well 30B installed to a depth of 100 feet below the surface was below 0.1 mg/l. Thus, the occurrence of high iron concentrations in this area appears restricted to groundwater in the upper portion of the aquifer where organic material is present and conditions are favorable for the dissolution of iron.

The ash pond discharge in the drainage ditch paralleling the west site boundary showed an iron concentration of 3.7 mg/l. Shallow monitoring wells 33A and 34A adjacent to the ditch indicated less than 0.1 mg/l iron.

North of Murray Road the iron concentration in monitoring wells in the marsh and uplands were typically less than 0.1 mg/l. Although the ash basin had less than 0.1 mg/l iron, several wells along cross-section F-F' showed anomalously high values (#M6-2.3 mg/l; #47-16 mg/l; #51B-21 mg/l).

CALCIUM

Calcium, because of its relative abundance and mobility, is the principle cation in most natural fresh water. Calcium is a constituent of many rock types but is found in greatest quantities in waters leaching deposits of limestone and dolomite. In sandstone and other detrital rock, calcium carbonate is a common cement between grains.

Monitoring wells located within the site boundaries exhibited calcium concentrations between 30 mg/l and 66 mg/l and averaged about 42 mg/l. Similar to iron, the concentrations of calcium in monitoring wells along cross-section F-F' were anomalously high, up to 150 mg/l calcium. Water table wells along the drainage ditch carrying the ash pond discharge averaged 83 mg/l while the ash pond effluent contained 28 mg/l. Generally the amount of calcium in groundwater decreased with depth. Nested monitoring wells typically showed somewhat lower concentrations of calcium in the deeper wells.

MAGNESIUM

As a relatively abundant element on the earth's crust, the principle sources of magnesium in natural waters are considered to be ferromagnesian minerals in igneous rocks and magnesium carbonate in carbonate rocks (limestone and dolomite). Waters in which magnesium is the predominant cation are somewhat unusual. Like calcium, magnesium imparts the property of hardness to water and is, therefore, of concern to industrial users.

Generally, concentrations of magnesium were 1/3 to 1/2 of the calcium levels. Magnesium concentrations within the site boundaries ranged between 10 mg/l and 36 mg/l and averaged 27 mg/l. Similar to calcium and iron, higher magnesium values were observed, in general, north of Murray Road and especially in monitoring wells along cross-section F-F'.

SULFATE

Sulphur is widely distributed in reduced form in both igneous and sedimentary rocks as metallic sulfides and when present in sufficient concentrations, constitutes ore of economic importance. During weathering processes with aerated water, the sulfides are oxidized to sulfate ions and are dissolved into water. Pyrite (FeS_2) crystals often occur in sedimentary rocks and are particularly associated with biogenic deposits such as coal which were deposited under strongly reducing conditions.

The concentrations of sulfate in groundwater in the vicinity of the proposed disposal site ranged from less than 1 mg./l to 1,200 mg./l of sulfate. (Refer to Drawing C 7134-15.) Typically, within the site boundaries concentrations averaged approximately 12 mg./l. Near the coal storage area, however, significant increases were observed. Observation wells 26A, 26B, and 42 exhibited concentrations between 900 and 1100 mg./l. The depth of sulfate enrichment in groundwater, near the coal pile, appears to extend to considerable depths, indicated by relatively high sulfate concentrations in Well 26B sealed 100 feet below ground surface. The oxidation of pyrite minerals in the coal leaching into the groundwater is probably the major source of the high concentrations observed.

Sulfate concentrations in the ash disposal settling pond were 520 mg./l. In the ditch carrying the ash pond discharge, the effluent is treated with sulfuric acid which results in precipitation of barium sulfate and aluminum hydroxide (personal communication, Merlin Horn, 1978). Consequently, the sulfate concentration of the effluent waters is lowered considerably to 13 mg./l. Well 33A, however, located near the point of effluent discharge, exhibited 1200 mg./l sulfates.

CHLORIDE

Chloride is generally present in much lower concentrations in rocks than many of the other major constituents of natural water. Important sources, however, are associated with sedimentary rocks, particularly the evaporites. The chemical behavior of chloride in natural water is relatively inert compared to the other major ions. There are few oxidation-reduction reactions and no significant chemical complexing reactions which chloride enters into. In addition, chloride ions are not significantly adsorbed on mineral surfaces. For these reasons, chloride is commonly used as a tracer in groundwater.

Chloride concentrations in groundwater in the vicinity of the Columbia Energy Center typically range between 0.5 mg./l and 30 mg./l. The highest concentrations in monitoring wells tended to be located adjacent to U. S. Highway 51 where the use of road salt has resulted in the percolation of chloride into the groundwater. Monitoring Wells 51A and 51B located in a low area north of Murray Road along U. S. Highway 51, yielded chloride concentrations in excess of 200 mg./l. Two other wells, 52A and 19, also located along U. S. Highway 51, yielded values of 30 mg./l and 42.5 mg./l chloride, respectively.

Within the proposed site boundaries, the chloride concentration averaged 7.1 mg./l. Excluding the few wells adjacent to U. S. Highway 51 exhibiting elevated concentrations, no other significant trends in the occurrence of chloride were observed.

SUMMARY

In summary, the groundwater in the vicinity of the proposed disposal site exhibited a somewhat alkaline pH. In lowland areas, the pH was typically below 7.0, probably a result of the presence of acidic organic soils.

Specific conductance within the proposed site averaged 465 umhos/cm. Conductivities up to 2600 umhos/cm were observed, however, in the vicinity of the coal storage area, the present ash disposal pond and ash pond effluent channel where infilatration of water from these sources is occurring into the groundwater system.

The groundwater typically exhibted relatively low iron concentrations although, locally, concentrations in excess of drinking water standards were observed in about 20% of the wells. The occurrence of the higher iron concentrations appears to be related to the presence of organic soils.

Groundwater at the proposed site also tended to exhibit high calculated hardness (216 mg./l) based on average observed values for calcium (42 mg./l) and magnesium (27 mg./l). Dissolution of limestone and dolomite rocks in the glacial drift are the probable sources of these elements in the groundwater.

Enrichment of sulfate in groundwater has occurred as a result of leaching of pyrite (FeS_2) minerals from the coal storage area where concentrations up to 1200 mg./l were observed. The depth of this enrichment appears to extend beyond the maximum depth into the aquifer investigated. Sulfate concentrations decreased rapidly away from the coal storage area to an average of 12 mg./l within the proposed site boundaries. Other local sources of sulfate in groundwater appear to be related to the present ash settling pond.

The concentration of chloride within the proposed site averaged 7.1 mg./l. Higher levels were generally observed in wells adjacent to U. S. Highway 51 where the infiltration of road salt has locally raised chloride concentrations.

The above interpretations are based on one round of water quality sampling only and should be considered as preliminary in nature. High sulfate and chloride concentrations observed at greater depths may be a temporary condition resulting from contamination of spoil backfill materials with coal dust or salt, respectively, during installation of the monitoring well. Future sampling of these monitoring wells will help to distinguish short term contamination from actual conditions existing in the aquifer.

APPENDIX F
WATER QUALITY DATA

WELL NO.	pH	SPECIFIC CONDUCTANCE (umhos/cm @ 25°C)	SULFATE (mg/l)	CHLORIDE (mg/l)	CALCIUM (mg/l)	MAGNESIUM (mg/l)	IRON (mg/l)
1A	7.6	550	17.	6.5	52	37	<0.1
1B	8.05	460	16.	10.5	39	31	<0.1
2	7.8	527	14.	2.5	45	32	<0.1
3A	7.5	548	13.	2.5	58	36	<0.1
3B	8.1	506	14.	7.0	50	34	<0.1
4	7.8	580	10.	4.0	59	34	<0.1
5	6.3	560	210.	12.5	13	29	10
16	7.6	408	12.	1.5	42	28	<0.1
17	6.45	350	30.	16.5	16	13	0.6
18	6.45	380	4.	4.5	33	22	5.7
19	7.9	570	10.	42.5	44	24	<0.1
20	8.0	340	10.	5.0	36	24	<0.1
21	6.9	220	20.	4.5	23	10	0.1
24A	7.45	775	18.	6.0	76	52	0.1
24B	7.85	440	15.	6.0	43	31	0.1
25	8.1	300	10.	2.5	29	20	<0.1
26A	7.2	2100	900	17.0	140	48	1.5
26B	7.5	2600	1100	16.5	43	7.0	0.2
27	7.15	400	6.	8.0	23	18	<0.1
28A	7.75	500	3.	0.5	48	31	<0.1
28B	7.6	480	4.	3.5	39	28	<0.1
29A	7.8	330	16.	1.5	33	21	0.5
30A	6.75	920	64.	11.0	38	30	26
30B	7.6	770	210	21.0	37	19	<0.1
33A	8.2	2500	1200	24.0	83	50	<0.1
33B	7.9	390	22.	6.5	31	27	0.2
34A	7.7	680	140.	10.0	58	45	0.1
34B	7.7	1700	660	15.0	48	22	<0.1
35	6.8	740	<1.0	4.0	66	33	2.9
36	6.8	740	<1.0	3.5	53	35	6.1
37A	7.7	460	9.	4.0	48	31	0.8
37B	7.5	630	73.	7.5	71	35	<0.1
39A	7.5	1800	350	22.0	180	100	0.1
39B	7.9	330	560	20.5	31	22	0.1
40A	8.0	630	140	8.5	43	29	<0.1
40B	8.1	330	17.	3.0	31	22	<0.1
41	6.8	590	16.	11.0	58	27	9.3

WELL NO.	pH	SPECIFIC CONDUCTANCE (umhos/cm @ 25°C)	SULFATE (mg/l)	CHLORIDE (mg/l)	CALCIUM (mg/l)	MAGNESIUM (mg/l)	IRON (mg/l)
42	7.4	2400	900	17.5	50	12	0.5
44	6.9	490	<1.	16.5	39	23	11
45	7.6	390	14.	3.0	40	25	<0.1
46A	7.3	1100	21.	15.5	140	82	<0.1
46B	7.8	470	25.	17.5	40	26	<0.1
47	6.6	1200	3.	8.0	140	40	16
48A	7.3	620	15.	8.0	62	37	<0.1
48B	7.1	520	22.	20.0	43	29	0.2
49	7.15	730	6.	3.5	75	41	<0.1
50A	7.6	520	28.	15.5	51	34	<0.1
50B	7.5	410	21.	18.0	31	21	<0.1
51A	6.1	1850	8.	205.	65	40	<0.1
51B	7.2	1250	23.	275.	57	36	21
52A	7.7	450	16.	30.5	36	17	<0.1
52B	7.4	430	40.	17.5	32	20	<0.1
53	7.75	450	27.	10.5	39	28	<0.1
54A	7.8	350	12.	4.0	34	21	0.1
54B	7.55	390	15.	5.5	40	24	0.1
55B	7.9	340	23.	17.5	32	22	0.1
56	7.8	450	22.	9.5	43	28	0.1
57	7.85	380	17.	7.0	38	24	0.1
M-6	7.0	1160	5.	7.0	150	91	2.3
Cooling Lake	8.3	370	31.	18.0	34	21	<0.1
Ash Pond Effluent	7.45	1380	13.	4.0	28	1.2	3.7
Ash Pond	11.4	1510	520.	23.5	29	0.2	<0.1
Drainage Ditch (A)	7.8	500	21.	7.0	43	29	<0.1
Drainage Ditch (B)	9.05	1780	750	14.0	42	5.4	<0.1

DEC 19 1979

APPENDICES TO

SUPPLEMENTARY FEASIBILITY STUDY REPORT
AND PRELIMINARY ENGINEERING CONCEPTS

COLUMBIA SITE
WISCONSIN POWER AND LIGHT COMPANY
TOWN OF PACIFIC, COLUMBIA COUNTY, WISCONSIN

D. N. R. APPROVED
DATE 9/3/80
Nile Ostenso, Hydro

WARZYN
ENGINEERING INC

APPENDIX I

WATER QUALITY DATA - DECEMBER 1978

WARZYN
ENGINEERING INC

12/76

C 7134

WATER QUALITY DATA

WELL NO.	pH	SPECIFIC CONDUCTANCE (umhos/cm @ 25°C)	SULFATE (mg/l)	CHLORIDE (mg/l)	CALCIUM (mg/l)	MAGNESIUM (mg/l)	IRON (mg/l)	BORON (mg/l)
1A	7.3	530	30	3.1	54	35	<0.1	-
1B	7.0	470	67	6.1	49	30	<0.1	-
2	7.25	458	91	<.5	48	24	<0.1	-
3A	7.0	560	36	<.5	61	31	<0.1	-
3B	7.15	530	52	35.7	37	33	<0.1	-
4	7.2	750	69	5.8	49	30	<0.1	-
5	6.35	1,650	670	14.1	14	13	<0.1	-
16	6.9	390	69	1.0	49	23	1.7	-
17	5.55	295	57	16.3	14	8.6	<0.1	-
18	5.9	430	10	4.2	47	21	0.2	-
19	7.4	765	75	4.2	51	28	1.1	-
20	7.4	380	26	1.6	39	26	<0.1	-
21	5.7	250	54	10.4	15	8.3	<0.1	-
24A	7.2	730	36	1.6	65	42	0.2	-
24B	7.2	470	10	7.3	42	28	<0.1	-
25	7.0	335	29	7.8	39	21	<0.1	-
26A	7.4	2,250	650	12.6	32	8.6	0.2	-
26B	6.8	2,530	840	20.8	49	18	<0.1	-
27	6.9	410	24	4.2	40	24	<0.1	-
28A	7.2	500	61	0.5	45	28	0.4	-
28B	7.0	465	6	2.1	39	26	<0.1	-
29A	7.1	410	24	3.6	31	22	0.1	-
30A near ditch	5.8	1,140	15	<0.5	97	56	0.1	-
30B	6.65	835	160	14.6	37	20	38	-
33A near ditch	7.8	1,970	830	16.7	21	8.9	<0.1	-
33B	7.5	380	31	7.3	24	27	<0.1	-
34A	7.25	560	46	4.2	53	33	<0.1	-
34B	8.5	1,575	730	21.9	28	29	<0.1	-
35	6.7	545	61	3.6	60	26	0.1	-
36	6.4	515	5.0	2.6	43	24	1.0	-
37A	7.05	438	30	3.7	50	28	4.8	-
37B	6.7	325	18	7.3	1.0	0.5	<0.1	-
39A	6.35	1,260	33	13.6	70	7.6	<0.1	-
39B	6.7	385	25	4.2	30	21	0.1	-
40A	7.35	483	40	<0.5	48	24	<0.1	<.05
40B	7.25	343	4	4.2	21	14	<0.1	-
41	6.1	640	54	19.8	43	32	<0.1	-

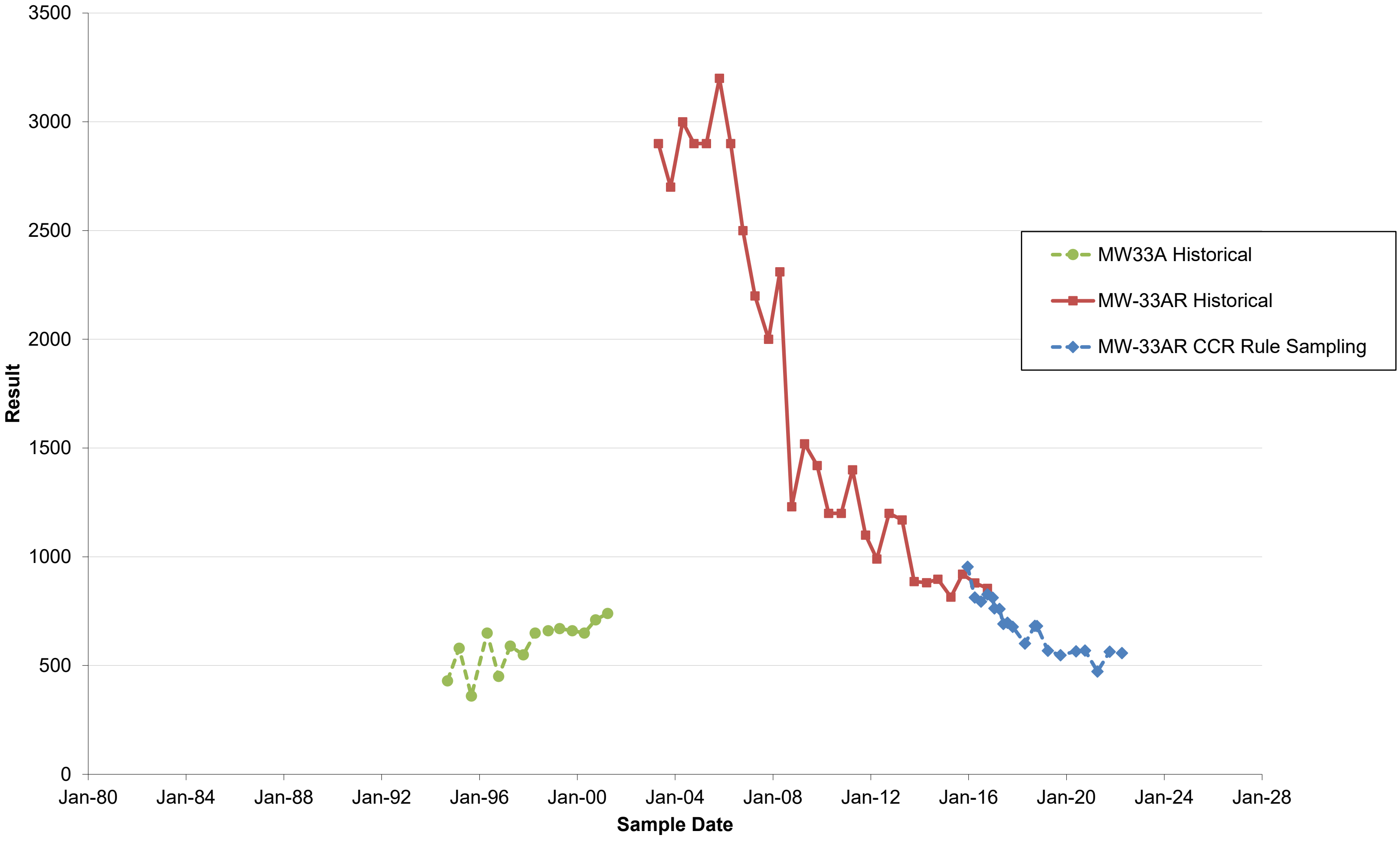
WELL NO.	pH	SPECIFIC CONDUCTANCE (umhos/cm @ 25°C)	SULFATE (mg/l)	CHLORIDE (mg/l)	CALCIUM (mg/l)	MAGNESIUM (mg/l)	IRON (mg/l)	BORON (mg/l)
42 near ditch [illegible]	7.15	2,050	910	15.6	23	7.5	0.1	-
44 near [illegible]	6.15	710	6	0.5	56	27	3.5	-
45	7.2	420	32	1.0	44	26	<0.1	-
46A [illegible]	7.0	560	93	<0.5	130	75	<0.1	<0.05
46B [illegible]	6.5	1,290	170	20.8	46	30	<0.1	<0.05
47 [illegible]	7.3	958	120	<0.5	110	48	<0.1	-
48A [illegible]	6.15	640	59	<0.5	42	51	<0.1	<0.05
48B [illegible]	6.8	450	23	5.2	40	27	<0.1	<0.05
49	7.0	880	26	2.1	93	58	0.1	-
50A	7.4	660	25	17.7	60	36	<0.1	-
50B	7.1	405	16	17.7	38	23	<0.1	-
51A [illegible]	7.0	1,170	57	135	66	31	<0.1	-
51B [illegible]	7.3	1,410	22	330	46	39	<0.1	-
52A	7.0	370	110	18.5	35	10	<0.1	-
52B	7.0	595	43	52.5			0.1	-
53	Frozen							
54A	7.5	345	10	1.0	36	22	<0.1	<0.05
54B	Frozen							
55B	7.3	505	26	15.6	52	29	<0.1	<0.05
56	Frozen							
57	Frozen							
M-6								
58 [illegible] old	6.55	1,265	140	<0.5	110	65	0.1	-
59 [illegible]	6.8	925	40	<0.5	86	60	<0.1	-
60 Hwy 16	7.2	1,510	54	4.7	130	85	<0.1	-
61A [illegible]	6.85	590	39	30.2	58	31	<0.1	-
61B	7.2	505	6	13.5	48	29	<0.1	-
62 Diesel Hwy 16 & 51	6.7	1,517	72	178	120	53	<0.1	-
64	6.9	670	100	26.8	63	36	0.8	-
65 Hwy?	7.2	830	57	17.8	78	50	<0.1	-
66	6.5	680	55	40	66	24	3.6	-

WELL NO.	pH	SPECIFIC CONDUCTANCE (umhos/cm @ 25°C)	SULFATE (mg/1)	CHLORIDE (mg/1)	CALCIUM (mg/1)	MAGNESIUM (mg/1)	IRON (mg/1)	BORON (mg/1)
67	7.0	560	100	1.0	57	32	1.0	-
68A ←	7.6	440	32	2.1	40	27	<0.1	-
68B ←	7.2	400	36	1.0	42	25	<0.1	-
70A Martin Marietta	7.5	440	20	<0.5	27	37	<0.1	-
70B	7.3	520	25	5.2	51	34	<0.1	-
72A Martin Marietta	6.45	860	11	<0.5	100	41	1.8	-
72B	8.4	230	45	<0.5	17	19	<0.1	-
M-4	7.6	864	180	26.1	20	11	<0.1	0.39
MM-4			2	2.6	14	21	0.9	-
Cooling Lake at 1	7.7	355	36	13.6	31	21.2	<0.1	-
Ash Pond at 2	11.4	3,210	1,100	22.9	34	<0.1	<0.1	-
Ash Pond at 3	8.7	725	34	21.9	48	16	<0.1	-
Ash Pond Effluent at 4	6.7	3,090	1,400	25.0	39	0.4	<0.1	-
Drainage Ditch at 5	7.2	730	74	33.9	56	38	<0.1	-
Drainage Ditch at 6	7.35	2,750	640	18.8	34	7.5	<0.1	-
Drainage Ditch at 7	8.05	1,780	740	27.1	31	0.2	<0.1	-

Appendix C

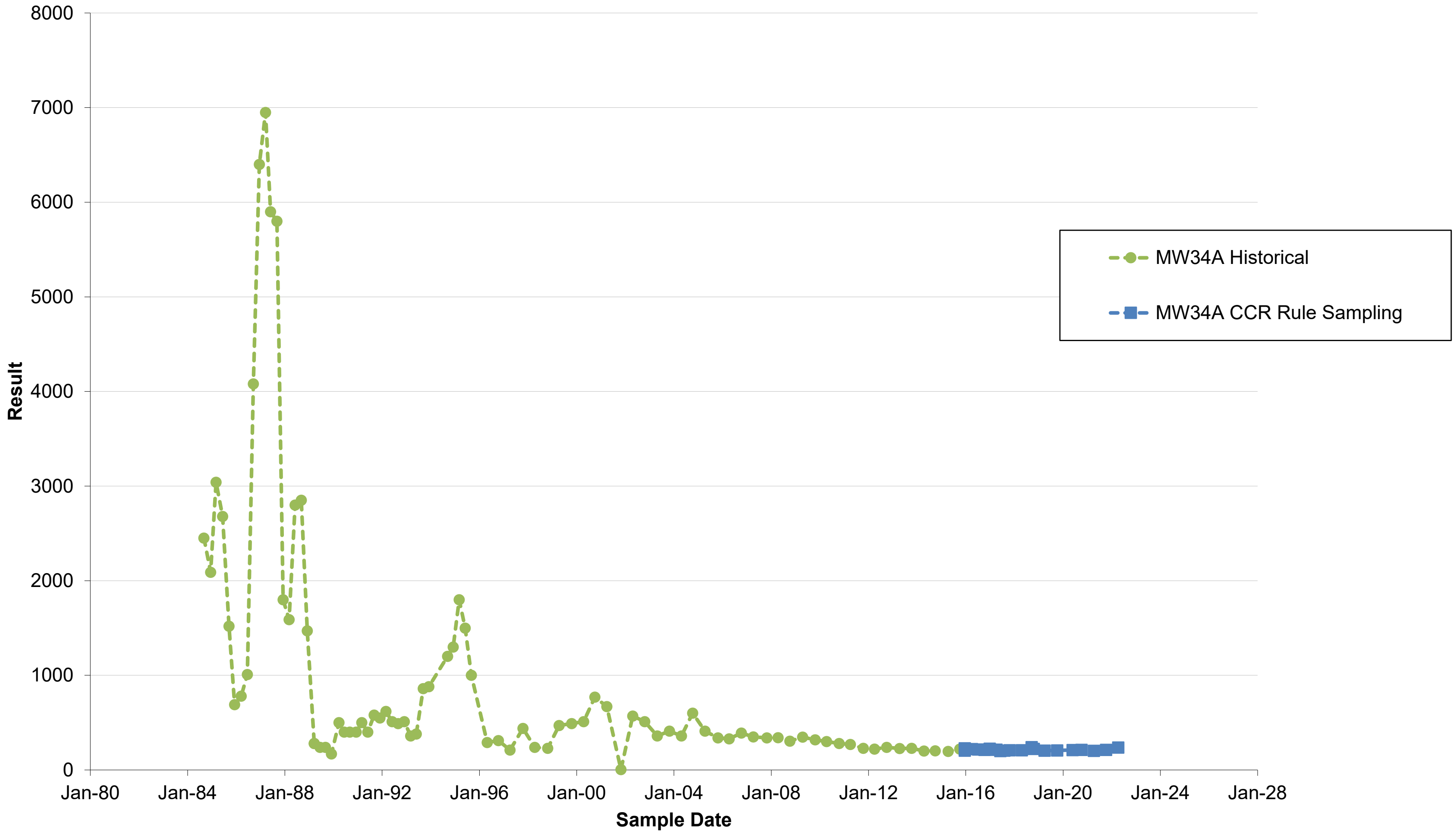
Long-Term Concentration Trend Plots

Wisconsin Power & Light Company
Columbia Dry Ash Disposal Facility
MW-33A and MW-33AR - Boron (µg/l as B)



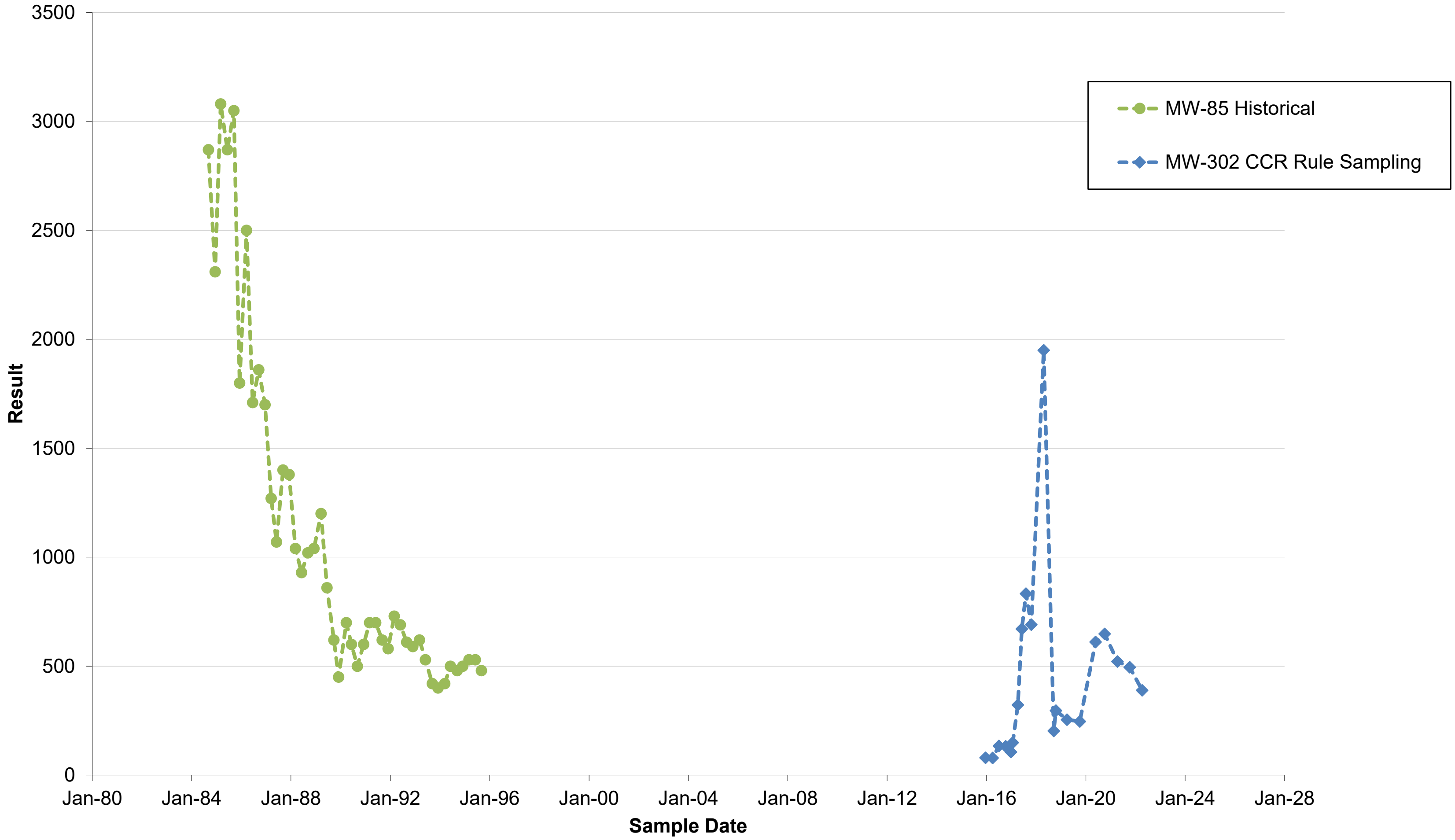
I:\25222067.00\Deliverables\2022 Apr ASD MOD 1-3 LF\Graphs\[Bo_COL Dry.xlsx]MW-33AR

Wisconsin Power & Light Company
Columbia Dry Ash Disposal Facility
MW34A - Boron (µg/l as B)



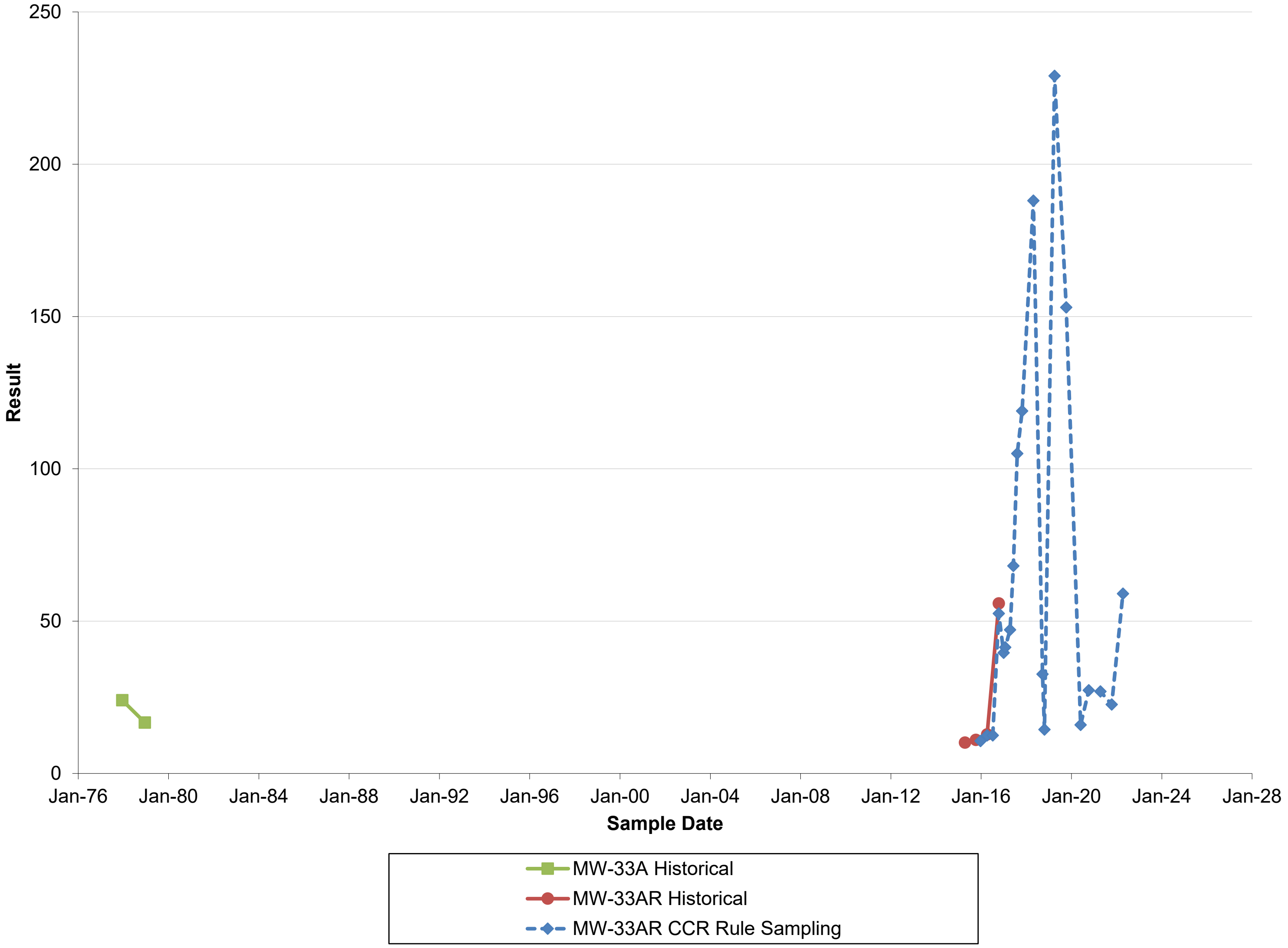
I:\25222067.00\Deliverables\2022 Apr ASD MOD 1-3 LF\Graphs\[Bo_COL Dry.xlsx]MW-34A

Wisconsin Power & Light Company
Columbia Dry Ash Disposal Facility
MW-302 and MW-85 - Boron (µg/l as B)



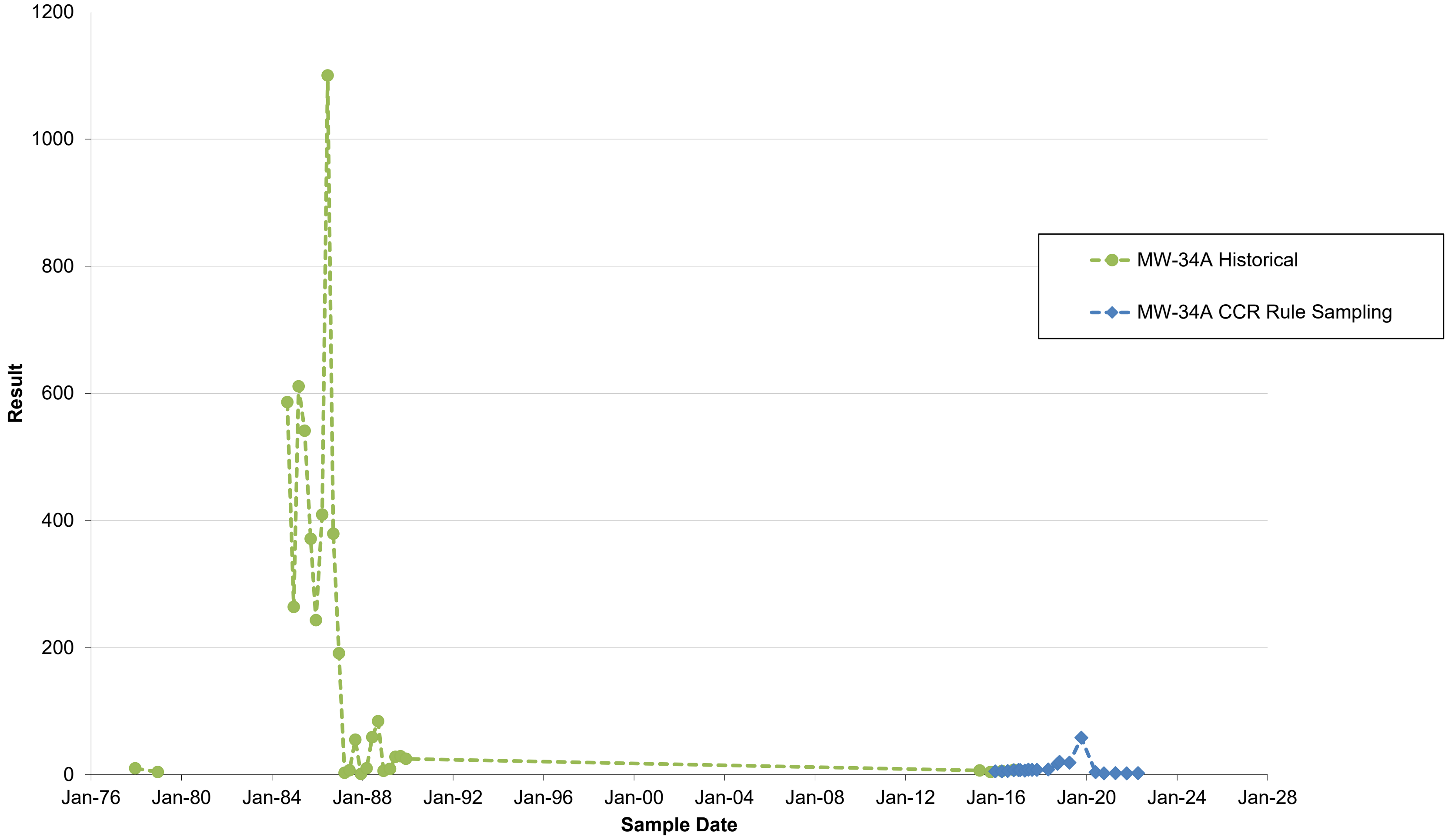
I:\25222067.00\Deliverables\2022 Apr ASD MOD 1-3 LF\Graphs\[Bo_COL Dry.xlsx]MW-85

Wisconsin Power & Light Company
Columbia Dry Ash Disposal Facility
MW-33 and MW-33AR - Chloride (mg/l as Cl)



I:\25222067.00\Deliverables\2022 Apr ASD MOD 1-3 LF\Graphs\[Cl_COL Dry.xlsx]MW-33AR

Wisconsin Power & Light Company
Columbia Dry Ash Disposal Facility
MW34A - Chloride (mg/l as Cl)



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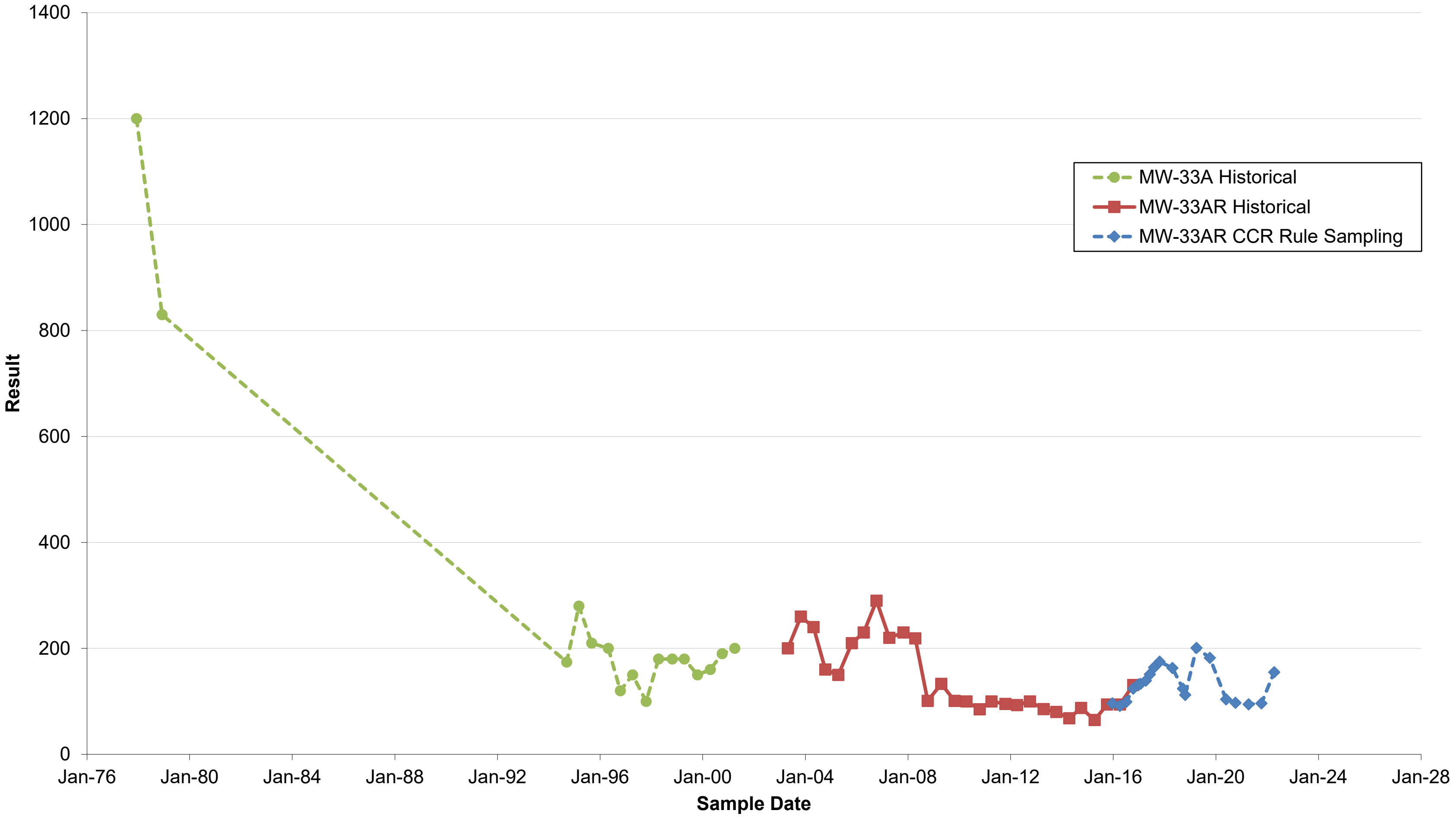
Wisconsin Power & Light Company
Columbia Dry Ash Disposal Facility
MW-33 and MW-33AR - Sulfate (mg/l as SO4)



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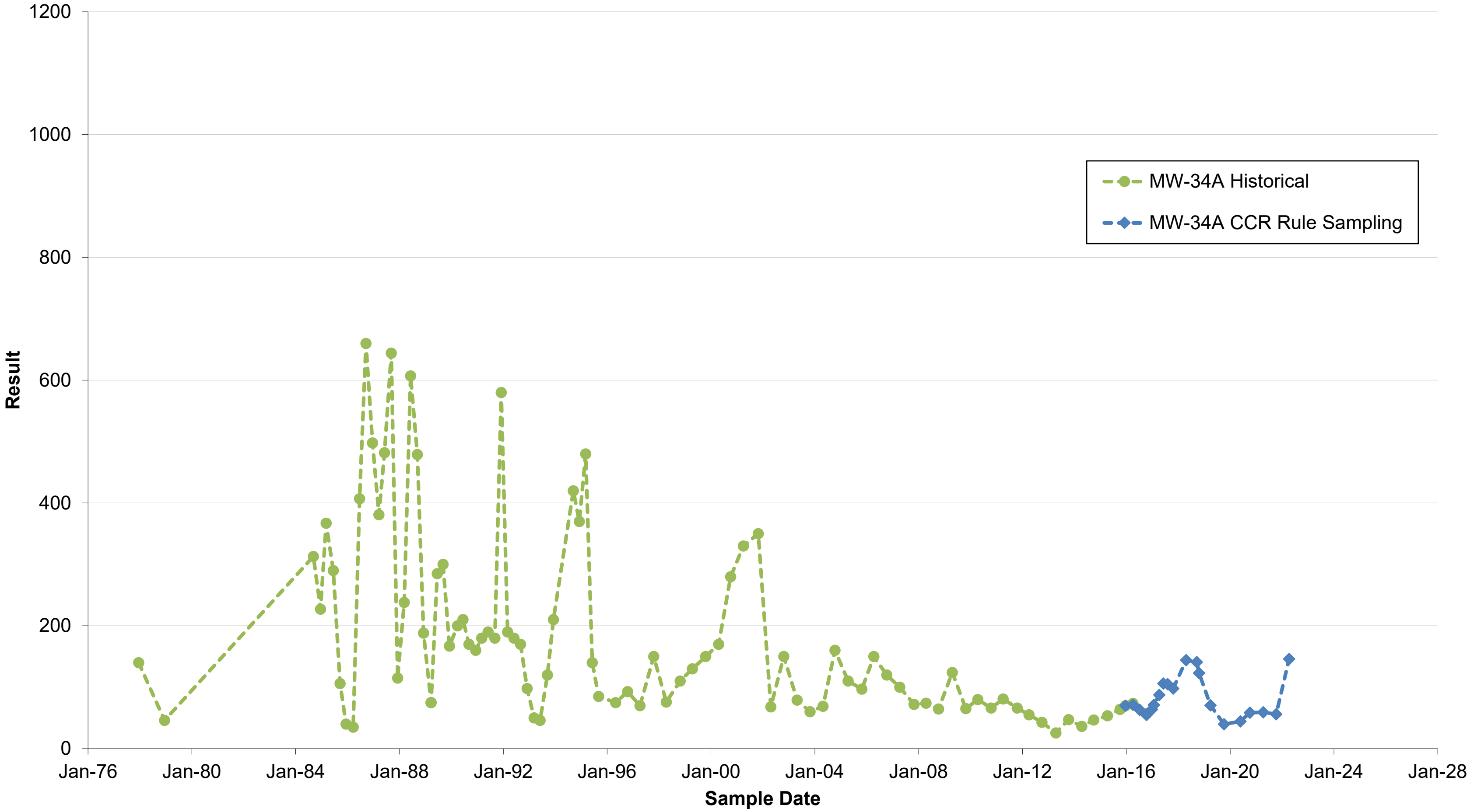
Wisconsin Power & Light Company
Columbia Dry Ash Disposal Facility
MW-34A - Sulfate (mg/l as SO4)



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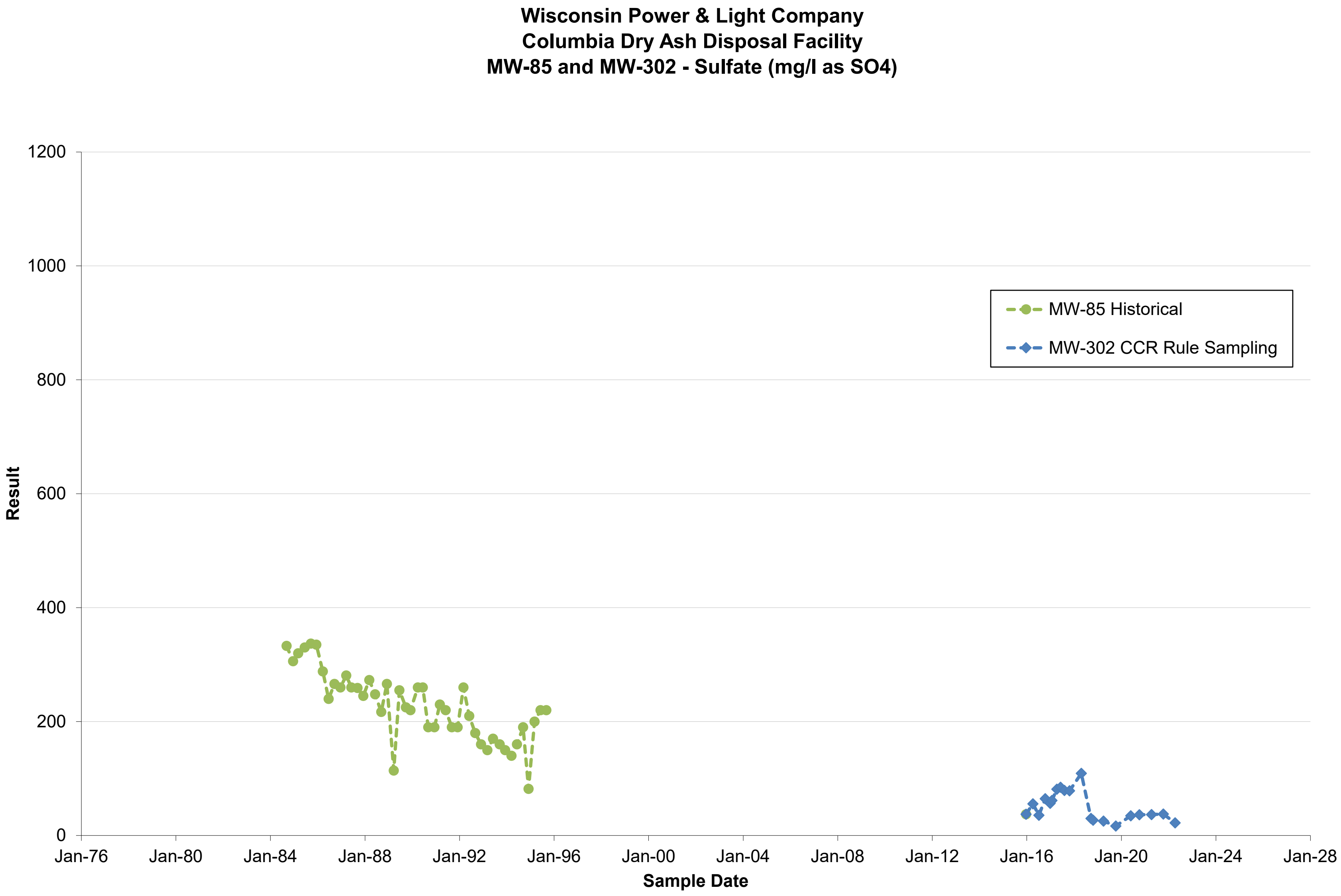

Wisconsin Power & Light Company
Columbia Dry Ash Disposal Facility
MW-85 and MW-302 - Sulfate (mg/l as SO4)
Result
1200
1000
800
600
400
200
0
Jan-76
Jan-80
Jan-84
Jan-88
Jan-92
Jan-96
Jan-00
Jan-04
Jan-08
Jan-12
Jan-16
Jan-20
Jan-24
Jan-28
Sample Date
MW-85 Historical
MW-302 CCR Rule Sampling

Appendix D

Historical Groundwater Flow Maps

LEGEND

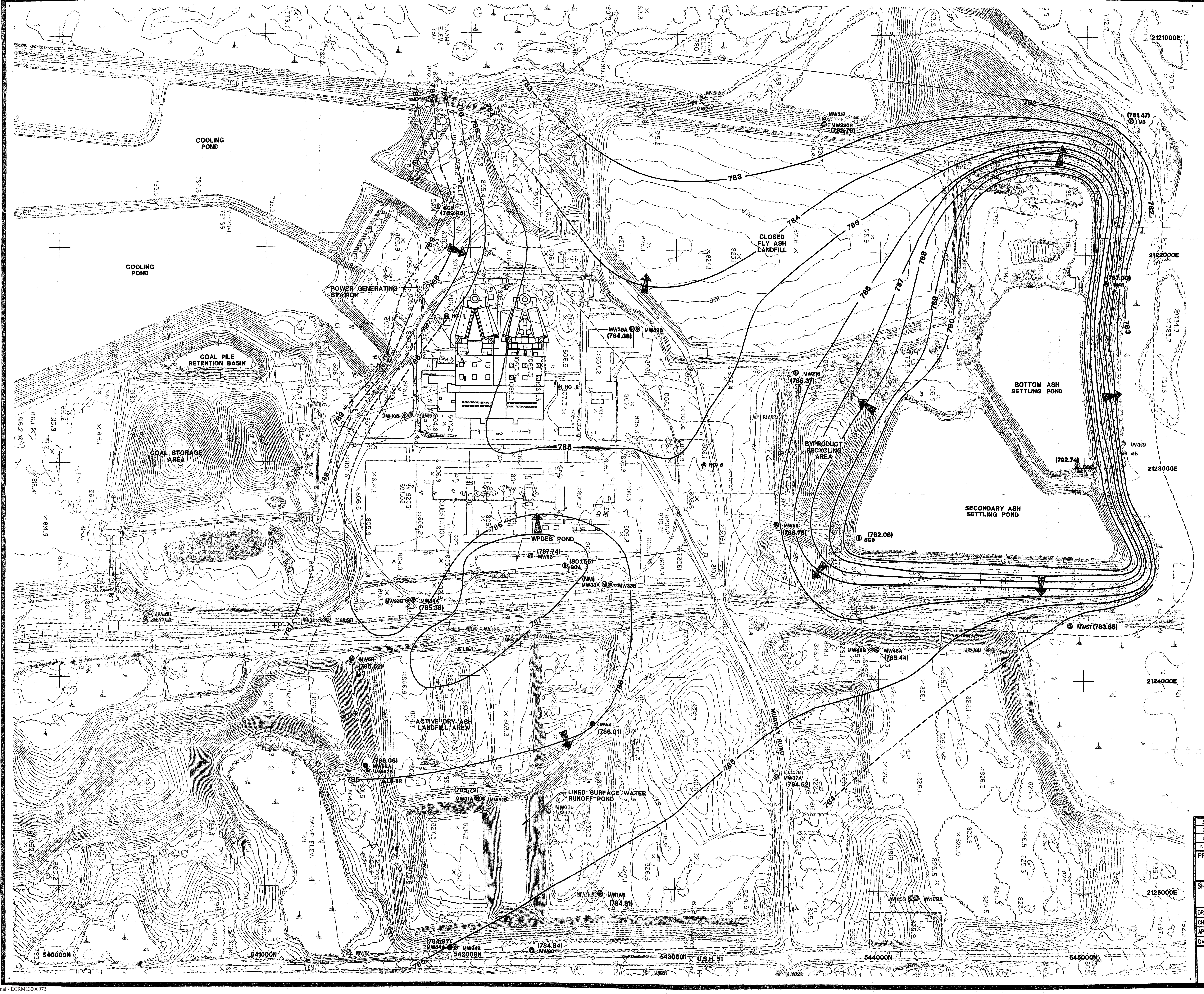
┈┈┈	PROPOSED PROJECT AREA
43 / 720.29	OBSERVATION WELL LOCATION, NUMBER, AND WATER TABLE ELEVATION
⊕	BORING LOCATION AND NUMBER
⩛	WETLANDS
┈	TOPOGRAPHIC CONTOURS (CONTOUR INTERVAL: 20 FT.)
■	PRIVATE RESIDENCES (ASSUMED LOCATIONS OF PRIVATE WATER SUPPLY WELLS)
▨	COMMERCIAL BUILDINGS (ASSUMED LOCATIONS OF POSSIBLE PUBLIC WATER SUPPLY WELLS)
—→—	SURFACE WATERS (STREAMS OR DRAINAGE DITCHES) ARROWS INDICATE DIRECTION OF FLOW
□	OTHER BUILDINGS (GARAGES, BARNS, ETC.)
⊕	HIGH CAPACITY WELLS
—790—	WATER TABLE CONTOURS (CONTOUR INTERVAL: 1 FT.)
➔	DIRECTION OF GROUNDWATER FLOW

NO	BY	DATE	REVISION	APP'D

WATER TABLE CONTOUR MAP 2/4/81

PLAN OF OPERATION – ASH DISPOSAL FACILITY
COLUMBIA SITE
WISCONSIN POWER & LIGHT COMPANY
PART OF SECTIONS 27 & 34, T12N, R9E
TOWN OF PACIFIC COLUMBIA CO. WISCONSIN

WARZYN ENGINEERING INC	DRAWN TDH	SCALE 1"=300'	SHEET 39 OF 39
	CHECKED RJK	DATE 2/10/81	DRAWING NO. C7134-94
	APPROVED		
	REFERENCE		PRINTED 8/3/88



LEGEND

- - - - - - - -	PROPERTY LINE
	EXISTING RAILROAD TRACKS
	EXISTING GROUND CONTOUR
	CONTOUR DEPRESSION
	EXISTING PAVED ROAD
	EXISTING UNPAVED ROAD
	EXISTING FENCE
○ ☐ □	EXISTING BUILDING
	EXISTING SPOT ELEVATION
	TREES AND/OR BRUSH
	WETLAND AREA
	EDGE OF WATER
HC 1	WATER SUPPLY WELL
MW91A	WATER TABLE WELL
MW91B	PIEZOMETER
	ABANDONED WATER TABLE WELL
	ABANDONED PIEZOMETER
SG1	STAFF GAUGE
LS-1	LYSIMETER
- - - - - - - -	DESIGN MANAGEMENT ZONE
— — — — —	PROPERTY LINE
O.S.	OPEN STORAGE
O.H.	OVERHEAD STRUCTURE
E.P.S.	ELECTRICAL POWER STATION
T	TANK
W	WALL
(785.31)	WATER TABLE ELEVATION (FT-MSL) (N.M. = NOT MEASURED)
—786—	GROUNDWATER CONTOUR LINE (1FT INTERVAL- FT. M.S.L.) (DASHED WHERE INFERRED)
➡	GROUNDWATER FLOW DIRECTION

NOTES

1. BASE MAP IS PROVIDED BY WISCONSIN POWER & LIGHT CO. AND IS BASED ON PHOTOS TAKEN ON APRIL 6, 1995 BY AERO-METRIC ENGINEERING, SHEBOYGAN, WI.
2. HORIZONTAL DATUM IS BASED ON THE WISCONSIN STATE PLANE COORDINATE SYSTEM, SOUTH ZONE - DATUM: NAD 83(91).
3. VERTICAL DATUM IS REFERENCED TO U.S.G.S. MEAN SEA LEVEL (MSL). TOPOGRAPHIC CONTOUR INTERVAL IS TWO FEET.
4. MONITORING WELL LOCATIONS AND ELEVATIONS SURVEYED BY WISCONSIN POWER & LIGHT CO. IN DECEMBER 1994 & NOVEMBER 1996.
5. THE LOCATION OF THE DESIGN MANAGEMENT ZONE DEMARCATION LINE IS APPROXIMATE.
6. WATER ELEVATION USED TO PREPARE THIS MAP WERE MEASURED ON OCTOBER 24, 2002.
7. THE WATER LEVEL AT MW 33A AND MW 33B COULD NOT BE MEASURED DURING OCTOBER 2002 DUE TO AN OBSTRUCTION IN THE WELL CASING.

NO.	BY	DATE	REVISION	APP'D.
3.				
2.				
1.				

PROJECT:
ALLIANT ENERGY - WP&L
COLUMBIA ASH PONDS & DRY ASH
DISPOSAL FACILITY

SHEET TITLE:
WATER TABLE MAP
(OCTOBER 2002)

DRAWN BY: defoej	SCALE: 1"=200'	PROJ. NO. 3024.28
CHECKED BY: JMR		FILE NO. WATERTBL.PLT
APPROVED BY: JCO	DATE PRINTED:	**FIGURE 3**
DATE: JANUARY 2003		

RMT®

744 Heartland Trail
Madison, WI 53717-1934

P.O. Box 8923
Madison, WI 53708-8923
Phone: 608-831-4444

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
Monitoring Status – Start of Year	(i) At the start of the current annual reporting period, whether the CCR unit was operating under the detection monitoring program in §257.94 or the assessment monitoring program in §257.95;	Detection
Monitoring Status – End of Year	(ii) At the end of the current annual reporting period, whether the CCR unit was operating under the detection monitoring program in §257.94 or the assessment monitoring program in §257.95;	Detection
Statistically Significant Increases (SSIs)	(iii) If it was determined that there was an SSI over background for one or more constituents listed in appendix III to this part pursuant to §257.94(e):	
	(A) Identify those constituents listed in appendix III to this part and the names of the monitoring wells associated with such an increase; and	October/December 2021 None April 2022 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
Statistically Significant Levels (SSL) Above Groundwater Protection Standard (GPS)	(iv) If it was determined that there was an SSL above the GPS for one or more constituents listed in appendix IV to this part pursuant to §257.95(g) include all of the following:	Not applicable – Appendix IV sampling not required
	(A) Identify those constituents listed in appendix IV to this part and the names of the monitoring wells associated with such an increase;	
	(B) Provide the date when the assessment of corrective measures was initiated for the CCR unit;	
	(C) Provide the date when the public meeting was held for the assessment of corrective measures for the CCR unit; and	
	(D) Provide the date when the assessment of corrective measures was completed for the CCR unit.	
Selection of Remedy	(v) Whether a remedy was selected pursuant to §257.97 during the current annual reporting period, and if so, the date of remedy selection; and	Not applicable – Site is in detection monitoring
Corrective Action	(vi) Whether remedial activities were initiated or are ongoing pursuant to §257.98 during the current annual reporting period.	Not applicable – Site is in detection monitoring

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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

Table 1. Groundwater Monitoring Well Network
Columbia Energy Center - Dry Ash Disposal Facility MOD 4-6
SCS Engineers Project #25222067.00

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

Created by: NDK Date: 9/19/2022
Last revision by: NDK Date: 9/19/2022
Checked by: RM 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

Dry Ash Facility (Facility ID #03025)	**Well Number**	**MW-1AR**	**MW-4**	**MW-5R**	**MW-33AR**	**MW-33BR**	**MW-34A**	**MW-34B**	**MW-37A**	**MW-83**	**MW-84A**	**MW-84B**	**MW-86**	**MW-91AR**	**MW-91B**	**MW-92A**	**MW-92B**	**MW-93A**	**MW-93B**	**MW-312**
	Top of Casing Elevation (feet amsl)	822.55	819.74	805.44	808.29	808.39	805.95	806.05	813.04	807.96	814.28	814.26	824.79	809.03	808.45	808.47	808.41	827.89	827.71	826.79
	Screen Length (ft)																	10	5	10
	Total Depth (ft from top of casing)	44.40	39.58	25.97	31.08	57.50	35.43	56.95	31.80	25.42	40.21	52.02	45.43	32.90	52.38	28.94	51.75	50.7	82.5	52.5
	Top of Well Screen Elevation (ft)	778.15	780.16	779.47	777.21	750.89	770.52	749.10	781.24	782.54	774.07	762.24	779.36	776.13	756.07	779.53	756.66	787.19	750.21	784.29
	Measurement Date																			
	October 2, 2012	783.41	783.70	784.96	782.38	782.23	783.03	782.99	782.66	dry	783.84	783.94	783.81	784.09	783.90	784.49	784.06	NI	NI	NI
	April 15, 2013	785.44	784.02	786.09	784.16	784.14	784.74	784.79	783.87	784.49	785.83	785.76	785.22	785.14	785.01	785.75	785.34	NI	NI	NI
	October 8, 2013													785.66	785.42	785.97	785.52	NI	NI	NI
	October 15, 2013	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	785.66	785.42	785.97	785.52	NI	NI	NI
	April 14, 2014	784.95	784.09	785.63	783.74	783.91	784.63	784.70	783.45	783.73	785.58	785.52	784.96	785.04	784.96	785.99	785.54	NI	NI	NI
	October 2-3, 2014	785.03	785.39	786.08	784.37	784.28	784.57	784.54	784.56	dry	785.24	785.18	785.19	785.47	785.28	785.75	785.33	NI	NI	NI
	April 13-14, 2015	783.96	783.63	785.25	783.01	782.74	783.65	783.95	782.87	dry	784.43	784.51	784.17	784.48	784.37	785.07	784.66	NI	NI	NI
	October 6-7, 2015	784.28	784.44	785.72	783.68	783.33	784.05	784.02	783.66	dry	784.80	784.76	784.66	784.89	784.70	785.20	784.76	NI	NI	NI
	April 4-6, 2016	785.82	aband	787.02	785.29	785.07	785.63	785.67	784.76	785.43	786.37	786.26	785.89	786.05	785.95	786.61	786.21	NI	NI	NI
	October 11-13, 2016	786.64	aband	788.00	787.36	786.46	786.45	786.32	786.40	786.81	787.22	787.11	786.96	787.17	786.81	787.68	787.25	NI	NI	NI
	April 10-13, 2017	786.96	aband	788.13	786.39	785.99	786.30	786.28	786.34	786.23	787.16	787.06	786.96	787.24	787.03	787.90	787.60	NI	NI	NI
	October 3-5, 2017	785.48	aband	786.66	784.51	784.22	784.67	784.63	784.86	784.29	NM	786.49	785.58	786.08	785.83	786.47	786.02	NI	NI	NI
	October 9-10, 2017	NM	aband	NM	NM	NM	NM	NM	NM	NM	785.56 (6)	NM	NM	NM	NM	NM	NM	NI	NI	NI
	February 21, 2018	783.97	aband	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	784.68	784.46	NM	NM	NI	NI	NI
	April 23-25, 2018	783.99	aband	785.36	783.09	786.36	781.77	780.79	783.28	783.32	785.88	784.91	782.54	784.71	784.53	785.23	784.81	NI	NI	NI
	October 23-25, 2018	788.25	aband	789.71	788.77	787.96	787.88	787.73	787.62	788.26	788.32	788.19	788.21	788.59	788.31	789.32	788.87	NI	NI	NI
	April 1-4, 2019	787.05	aband	788.64	786.63	786.54	786.82	786.92	786.47	786.78	787.35	787.34	787.16	787.45	787.18	788.04	787.63	NI	NI	NI
	October 7-9, 2019	787.26	aband	789.23	788.26	787.64	787.92	787.74	786.77	788.90	787.79	787.73	787.44	787.78	787.62	788.63	788.17	NI	NI	NI
	May 27-28, 2020	786.92	aband	788.34	786.01	785.75	785.98	785.99	786.22	786.03	787.02	786.99	786.94	787.26	787.05	787.86	787.47	NI	NI	NI
	October 7-8, 2020	785.95	aband	787.76	785.91	785.45	785.70	785.68	785.52	785.72	786.10	786.06	786.10	786.55	786.33	786.85	786.38	NI	NI	NI
	February 25, 2021	NM	aband	NM	NM	NM	784.75	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NI	NI	NI
	April 14, 2021	785.11	aband	787.29	784.27	784.05	784.77	784.77	784.46	c	785.84	785.81	785.60	785.86	785.69	786.47	786.06	NI	NI	NI
	June 11, 2021	NM	aband	NM	784.19	NM	784.66	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NI	NI	NI
	October 11-12, 14, 2021	784.47	adand	786.78	783.73	783.60	784.42	784.41	783.88	783.87	784.96	784.88	784.79	785.14	784.94	785.55	785.11	NI	NI	NI
	October 17, 2021	NM	adand	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NI	NI	NI
	April 1, 2022	aband	aband	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
	April 11-13, 2022	aband	adand	785.52	783.27	783.45	784.30	784.42	783.26	783.78	785.02	785.00	784.70	784.83	784.72	785.45	785.02	783.99	783.97	783.73
	October 24-28, 2022	aband	aband	785.43	781.94	781.61	783.61	783.61	782.28	dry	784.57	784.54	784.38	784.64	784.47	785.05	784.62	783.74	782.76	783.50
	Bottom of Well Elevation (ft)	778.15	780.16	779.47	777.21	750.89	770.52	749.10	781.24	782.54	774.07	762.24	779.36	776.13	756.07	779.53	756.66	777.19	745.21	774.29

Ash Pond Facility (Facility ID #02325)	**Well Number**	**M-3**	**M-4R**	**MW-39A**	**MW-39B**	**MW-48A**	**MW-48B**	**MW-57**	**MW-59**	**MW-216R**	**MW-217**	**MW-220RR**	**SG-1**	**SG-2**	**SG-3**	**SG-4**
	Top of Casing Elevation (feet amsl)	788.23	806.10	809.62	809.50	828.86	828.84	786.29	815.48	814.21	791.55	792.90	792.06	795.25	808.60	805.36
	Screen Length (ft)															
	Total Depth (ft from top of casing)	16.90	25.55	34.80	76.07	51.88	75.80	14.40	38.50	37.85	37.37	18.96	--	--	--	--
	Top of Well Screen Elevation (ft)	771.33	780.55	774.82	733.43	776.98	753.04	771.89	776.98	776.36	754.18	773.94	--	--	--	--
	Measurement Date															
	October 2, 2012	780.13	786.76	781.49	781.34	782.03	781.93	780.58	779.88	781.91	780.95	780.55	789.14	793.85	dry	dry
	April 15, 2013	785.16	788.39	783.97	784.00	783.77	783.78	784.69	783.66	784.09	784.75	785.02	789.5 (1)	NM	dry	dry
	October 8, 2013	781.22	786.67	NM	NM	783.69	783.58	NM	NM	783.39	782.27	782.36	789.5 (1)	791.33	dry	dry
	October 15, 2013	NM	NM	782.94	782.81	NM	NM	782.47	783.49	NM	NM	NM	NM	NM	NM	NM
	April 14, 2014	786.04	788.96	783.57	783.68	783.56	783.57	785.51	783.41	783.73	785.25	785.87	788.90	dry	dry	dry
	October 1-3, 2014	781.16	787.55	783.42	783.32	784.05	783.94	782.32	783.55	783.79	782.63	783.03	NM	dry	dry	dry
	April 13-14, 2015	783.08	786.83	782.77	782.68	782.80	782.82	782.81	782.83	782.93	783.34	783.42	789.3	791.70	dry	dry
	October 6-7, 2015	780.66	786.12	782.97	782.81	783.10	783.01	781.82	783.25	783.18	781.95	782.26	788.48	791.58	dry	dry
	April 4-6, 2016	784.21	789.09	785.27	785.27	784.79	784.76	783.21	784.97	785.68	785.02	784.36	NM	793.40	dry	dry
	October 11-13, 2016	781.88	787.88	785.75	785.52	785.73	785.61	783.12	786.51	786.16	783.75	784.09	788.32	792.52	dry	dry
	April 10-13, 2017	782.94	787.95	785.44	785.20	785.82	785.69	782.77	786.09	785.95	784.29	784.09	788.31	793.85	dry	dry
	October 3-5, 2017	780.93	787.04	783.35	783.18	784.30	784.19	782.37	784.23	783.89	782.48	782.61	788.3	793.45	dry	dry
	April 23-25, 2018	782.89	790.43	782.86	782.87	783.14	783.09	783.04	783.02	783.23	783.26	783.45	788.38	>795.25	dry	dry
	October 23-25, 2018	782.95	788.47	787.12	786.88	787.12	786.99	783.48	787.73	787.49	784.90	784.52	787.76	793.25	dry	dry
	April 1-4, 2019	785.68	789.44	786.28	786.31	786.56	786.45	785.27	787.39	786.53	786.33	785.46	788.40	794.60	dry	dry
	October 7-9, 2019	785.33	790.65	787.10	787.02	786.68	786.65	785.29	786.68	787.07	786.01	785.42	748.48	795.20	dry	dry
	May 27-29, 2020	781.80	787.73	785.12	784.92	785.74	785.59	783.11	785.89	785.60	783.41	783.89	748.48	>795.25	dry	dry
	October 7-8 &17, 2020	781.42	787.74	784.74	784.64	785.03	784.96	782.83	785.43	785.10	783.06	783.49	788.34	793.32	dry	NM
	April 12, 2021	782.30	786.34	783.66	783.65	784.13	784.08	782.79	784.08	783.97	783.15	783.49	788.03	793.45	below gauge	dry
	October 11-12, 14, 2021	781.03	786.33	782.94	782.85	783.09	783.03	781.94	783.11	783.04	782.15	782.66	788.59	795.13	dry	dry
	April 11-13, 2022	783.95	788.26	783.37	783.34	783.10	783.10	NM	782.99	783.40	783.93	783.83	788.4	794.65	dry	dry
	June 3, 2022	NM	NM	NM	NM	NM	NM	782.13	NM	NM	NM	NM	NM	NM	NM	NM
	October 25, 26, 28, 2022	780.41	783.85	780.76	780.66	779.57	779.55	779.23	778.98	778.61	780.33	781.49	NM	795.21	dry	dry
	Bottom of Well Elevation (ft)	771.33	780.55	774.82	733.43	776.98	753.04	771.89	776.98	776.36	754.18	773.94	--	--	--	--

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

CCR Rule Wells	**Well Number**	**MW-301**	**MW-302**	**MW-303**	**MW-304**	**MW-305**	**M-4R**	**MW-33AR**	**MW-34A**	**MW-84A**	**MW-306**	**MW-307**	**MW-308**	**MW-309**	**MW-310**	**MW-311**
	Top of Casing Elevation (feet amsl)	806.89	813.00	815.72	805.42	806.32	806.10	808.29	805.95	814.28	807.63	806.89	806.9	813.27	813.62	809.74
	Screen Length (ft)	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	Total Depth (ft from top of casing)	29.40	33.6	35.80	25.7	25.6	39.58	31.08	35.43	40.21	27	26.5	28	37.67	38.41	36.19
	Top of Well Screen Elevation (ft)	787.49	789.40	785.72	789.72	790.72	776.52	787.21	780.52	784.07	790.63	790.39	788.90	785.60	785.21	783.55
	Measurement Date															
	December 21-22, 2015	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
	Bottom of Well Elevation (ft)	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

Notes:
NM = not measured

Created by: MDB Date: 5/6/2013
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'.

I:\25222067.00\Deliverables\2022 Fed Annual Report - COL Mod 4-6\Tables\[Table 3 - Groundwater Elevation Summary.xls]levels

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)
MW-309	2.12E-04	0.60
MW-310	1.91E-04	0.54
MW-311	6.12E-04	1.73
Geometric	2.92E-04	0.83

Assumed Porosity, n
0.40

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

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

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

Note:

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

Created by: NDK Date: 8/2/2022
Last revision by: MDB Date: 1/10/2023
Checked by: RM 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

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

Created by: NDK Date: 9/19/2022
Last revision by: RM Date: 1/4/2023
Checked by: BR Date: 1/5/2023
Scientist/PM QA/QC: TK Date: 1/10/2023

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

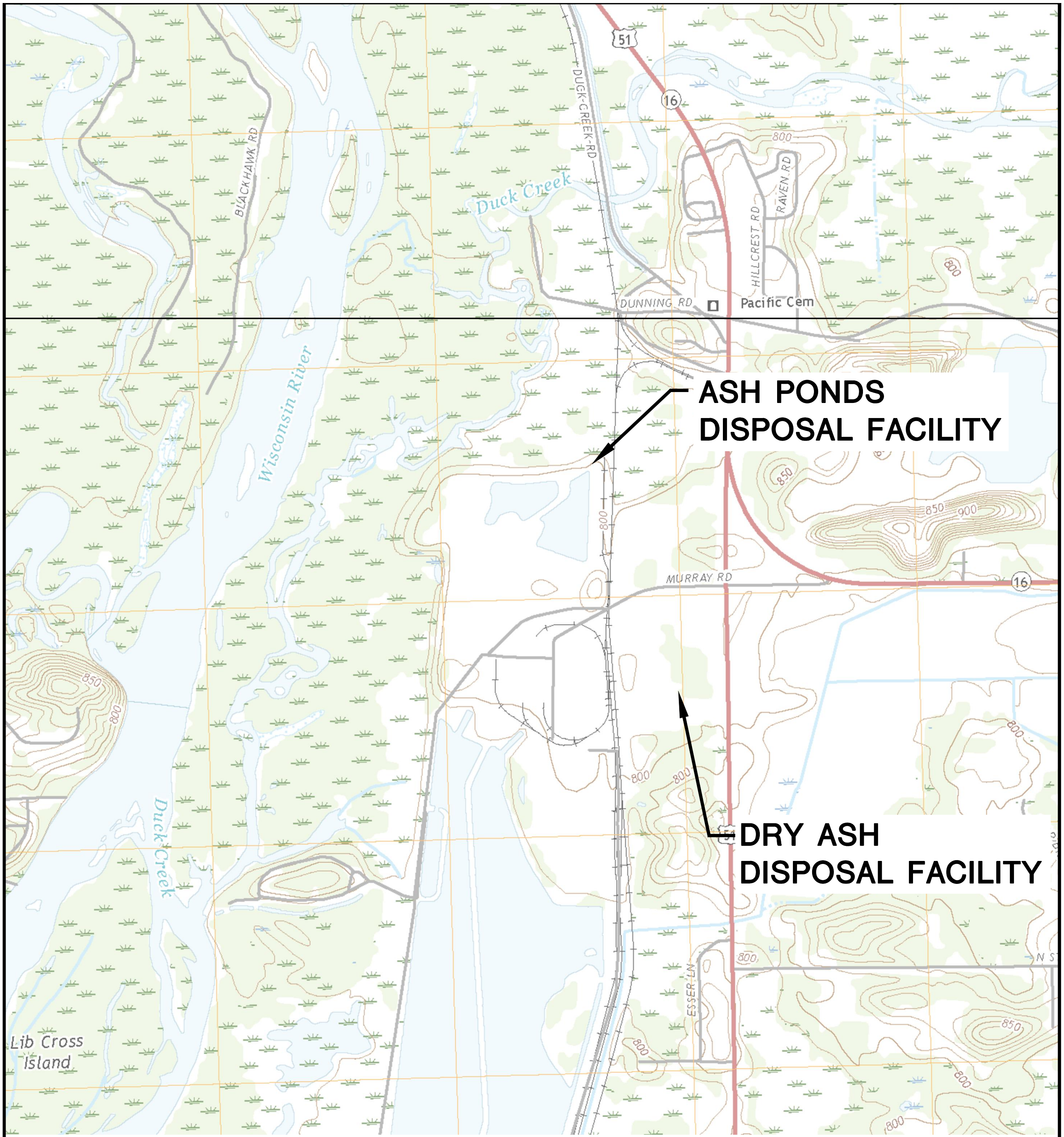
Table 6. Groundwater Field Data Summary

Columbia Energy Center - Dry Ash Disposal Facility - MOD 4 / SCS Engineers Project #25222067.00

Well	Sample Date	Groundwater Elevation (feet)	Field Temperature (deg C)	Field pH (Std. Units)	Oxygen, Dissolved (mg/L)	Field Specific Conductance (umhos/cm)	Field Oxidation Potential (mV)	Turbidity (NTU)
MW-84A	4/13/2022	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 Date: 9/2/2022
Last revision by: AJR Date: 12/5/2022
Checked by: BLR Date: 12/29/2022

Figures



N

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

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

SITE
ALLIANT ENERGY
COLUMBIA ENERGY CENTER
PARDEEVILLE, WI

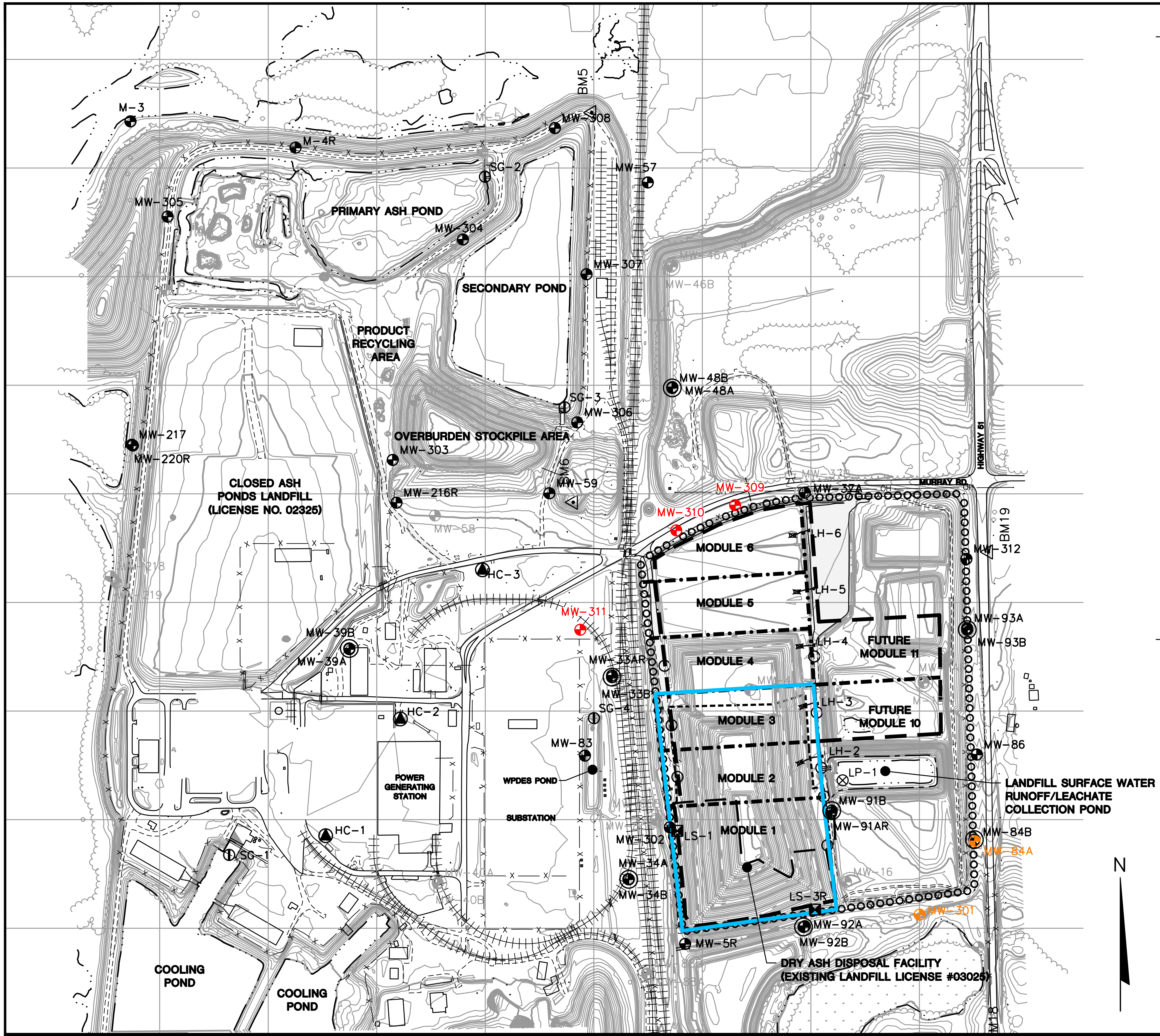
SITE LOCATION MAP

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

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

FIGURE
1

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



LEGEND

——	EXISTING MAJOR CONTOUR (10' INTERVAL)
——	EXISTING MINOR CONTOUR (2' CONTOUR)
—x—x—	EXISTING FENCELINE
┼┼┼┼┼┼┼	EXISTING TRACKS
═══	EXISTING PAVED ROAD
- - - -	EXISTING UNPAVED ROAD
— · · —	EDGE OF WATER
·OOOOOOOO·	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.

500 0 500

SCALE: 1" = 500'

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

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CLIENT

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

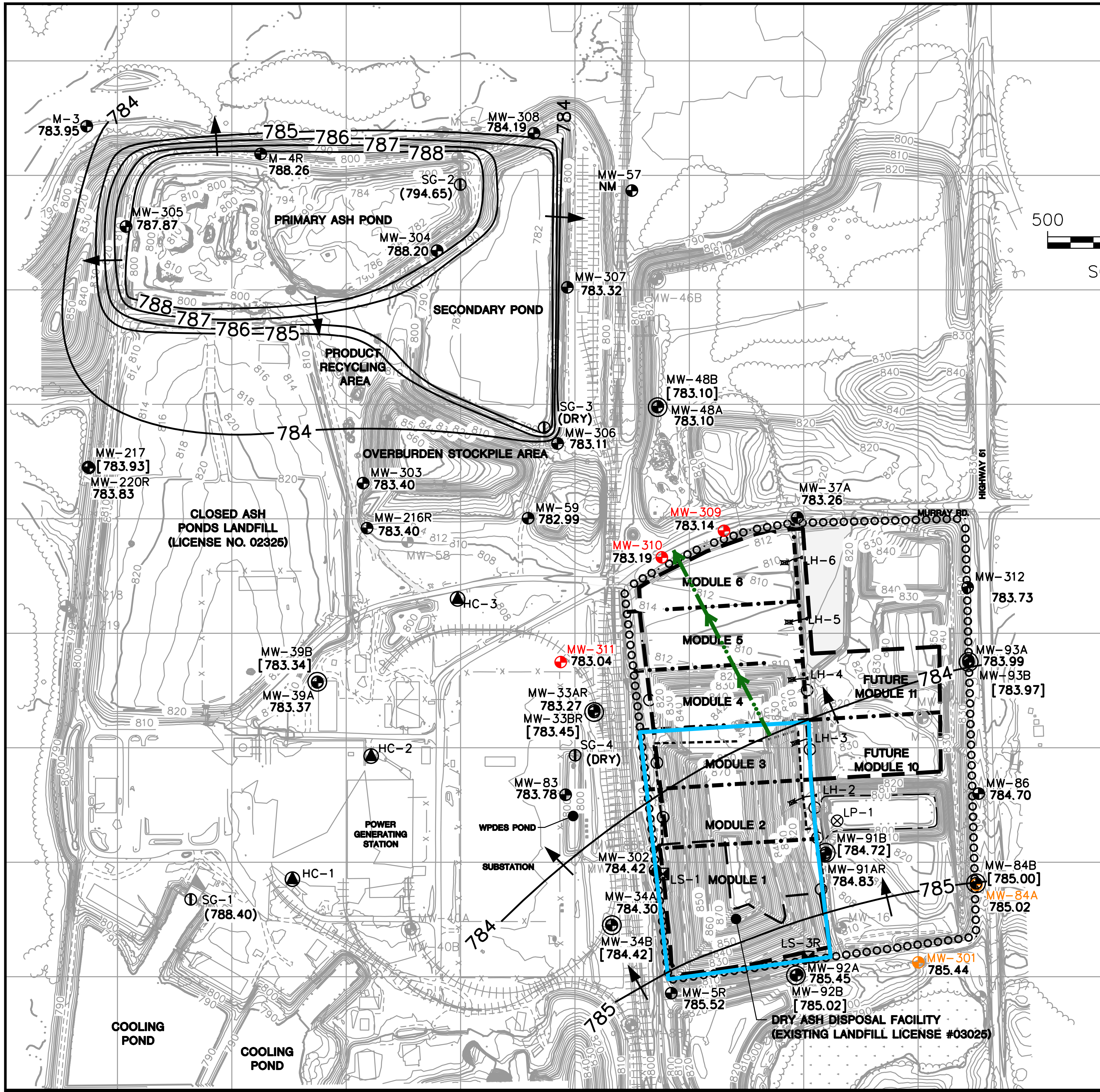
SITE

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

SITE PLAN AND MONITORING WELL LOCATIONS

FIGURE
2

I:\25222067.00\Drawings\Modules 4-6\Site Plan and Monitoring Well Locations Mod 4-6.dwg, 1/16/2023 12:36:25 PM



N

500 0 500

SCALE: 1" = 500'

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
·OOOOOOOO·	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.
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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
DRAWN:	12/02/2019	CHECKED BY:	MDB
REVISED:	01/16/2023	APPROVED BY:	TK, 1/16/2023

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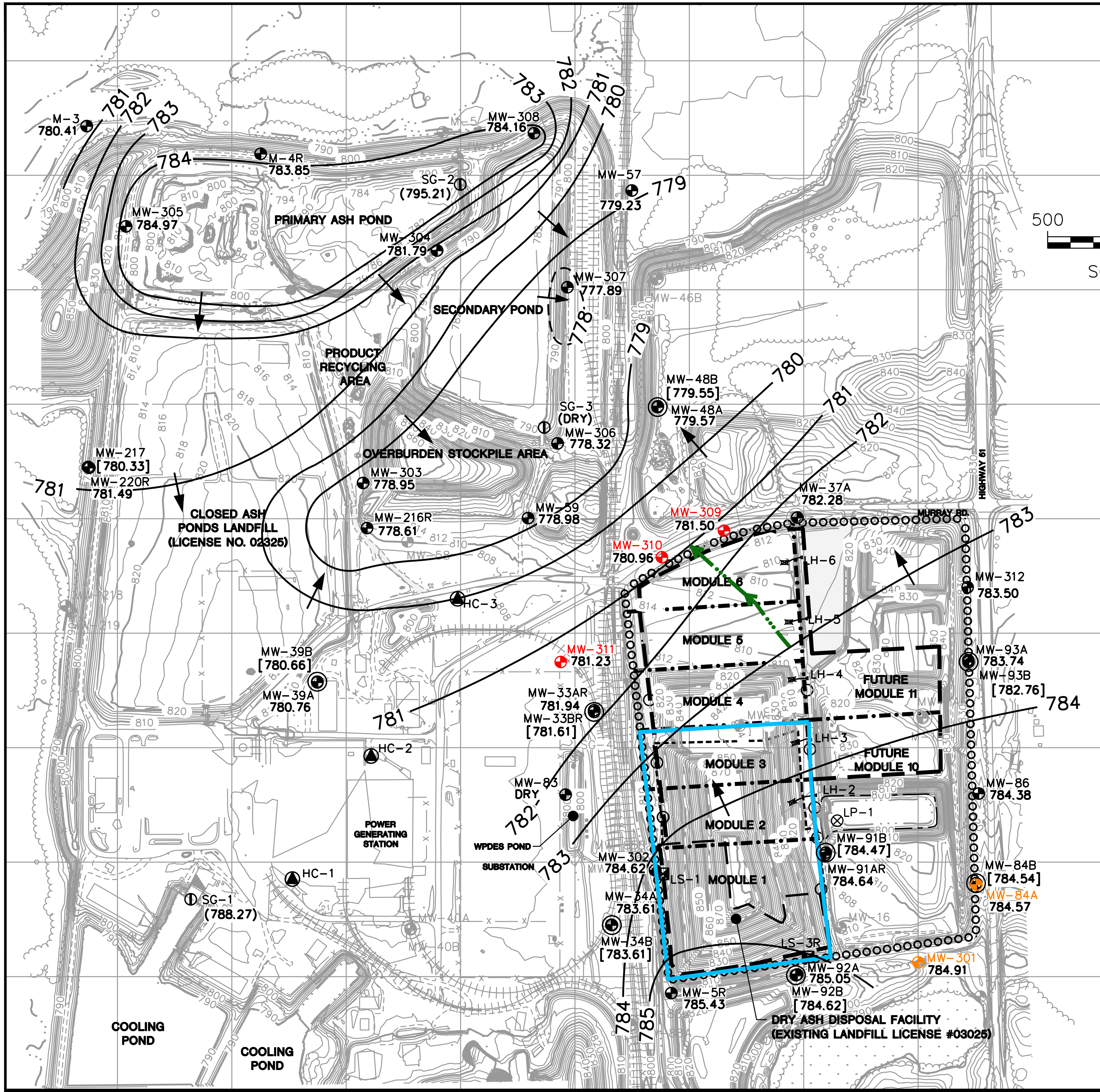
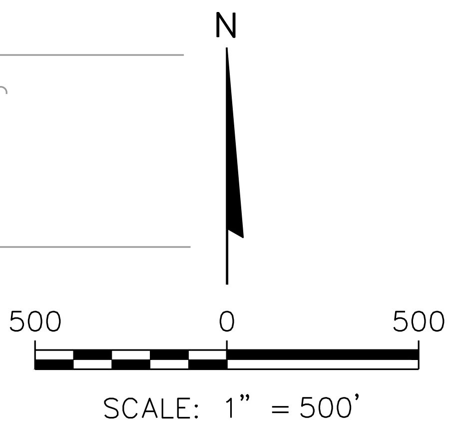
SITE
ALLIANT ENERGY
COLUMBIA ENERGY CENTER
MODULES 4-6 DRY ASH DISPOSAL FACILITY
PARDEEVILLE, WI

WATER TABLE MAP
APRIL 2022

FIGURE
3

I:\25222067.00\Drawings\Modules 4-6\Water Table Map-April 2022.dwg, 1/16/2023 2:43:07 PM





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
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↞	LEACHATE HEADWELL
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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

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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 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
DRAWN:	12/15/2022	CHECKED BY:	MDB
REVISED:	12/30/2022	APPROVED BY:	TK, 1/16/2023

ENGINEER

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

CLIENT

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

SITE

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

WATER TABLE MAP
OCTOBER 2022

FIGURE
4

I:\25222067.00\Drawings\Modules 4-6\Water Table Map-October 2022.dwg, 1/16/2023 2:40:42 PM

Appendix A

Summary of Regional Hydrogeologic Stratigraphy

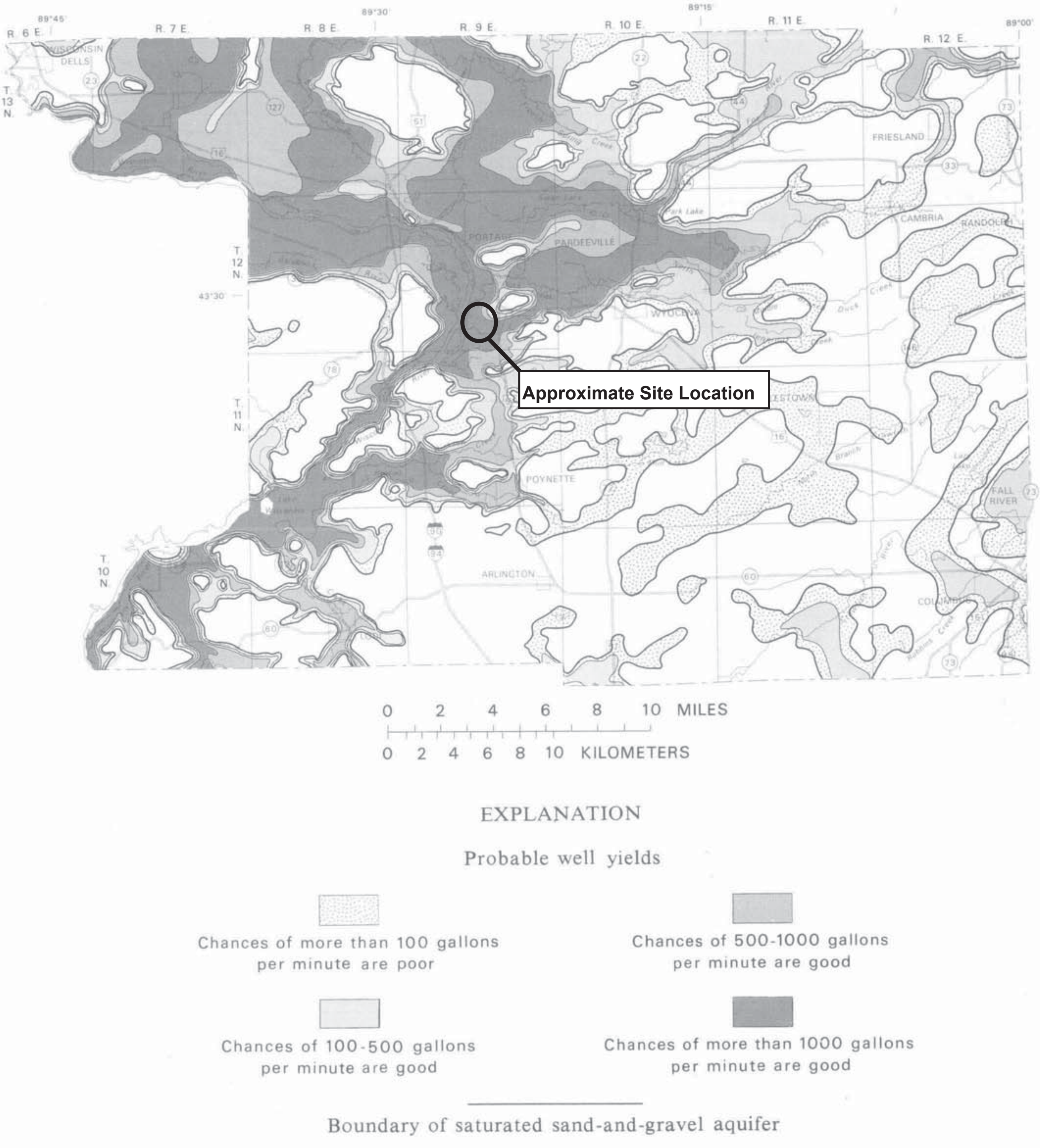
Table COL-3. Regional Hydrogeologic Stratigraphy
Columbia Energy Center / SCS Engineers Project #25215053

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

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

Sources:
Harr, C.A., L.C. Trotta, and R.G. Borman, “Ground-Water Resources and Geology of Columbia County, Wisconsin,” University of Wisconsin-Extension Geological and Natural History Survey Information Circular Number 37, 1978.
Wisconsin Geological and Natural History Survey, Bedrock Stratigraphic Units in Wisconsin, UW Extension Educational Series 51, ISSN: 1052-2115, 2011.

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

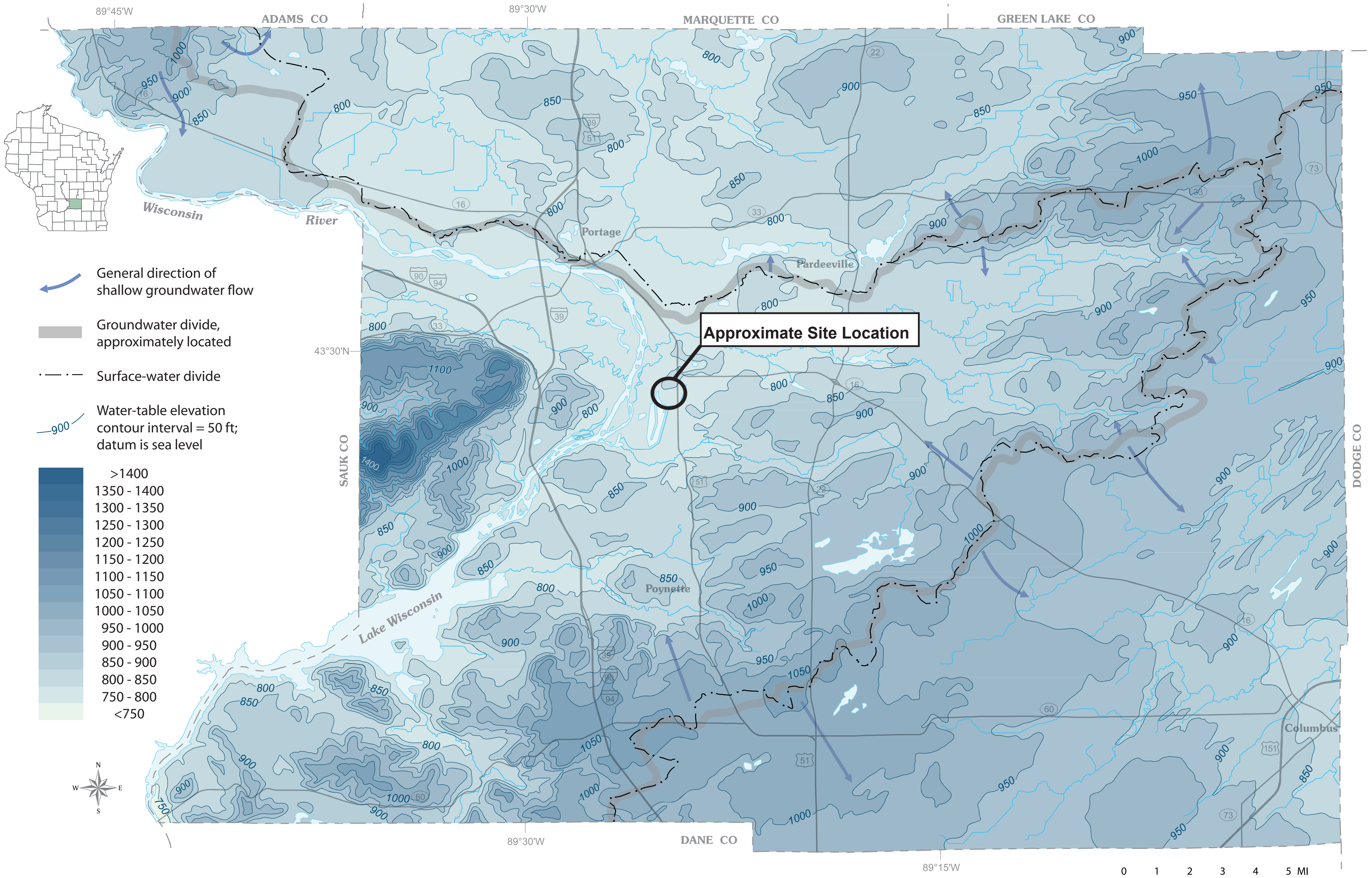


Approximate Site Location

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

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

Generalized water-table elevation in Columbia County, Wisconsin



Extension Wisconsin Geological and Natural History Survey

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

Appendix B

Boring Logs and Well Construction Documentation

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

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

SAMPLE						VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES				
No.	Type	Recovery ↓	Moisture ↓	N	Depth		Qu	W	LL	PL	D
						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						
						End Boring at 37'					
					40	Well Installed at 37'					

WATER LEVEL OBSERVATIONS

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

GENERAL NOTES

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

WELL DETAIL INFORMATION SHEET

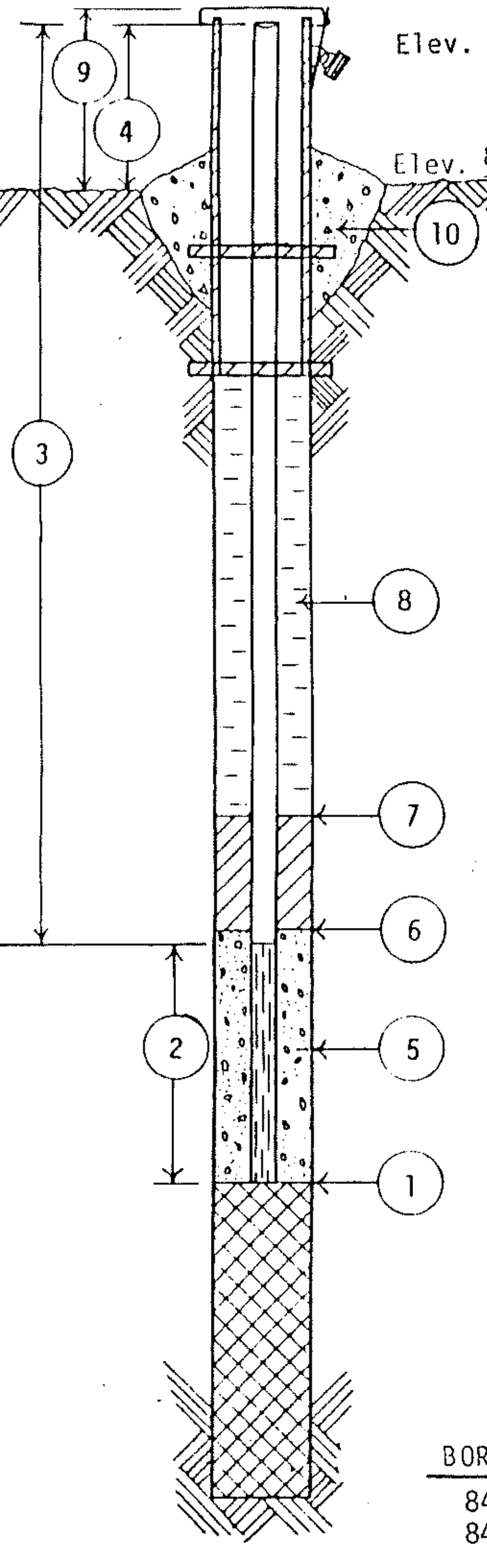
JOB NO. C 7134

BORING NO. MW-84A

DATE 10/5/83

CHIEF JS

LOCATION WP&L-Columbia Generating Station



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"	

WARZY
ENGINEERING IN

State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 7-98

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

Page 1 of 2

Facility/Project Name WPL-Columbia SCS#: 25215135.00		License/Permit/Monitoring Number		Boring Number MW-301	
Boring Drilled By: Name of crew chief (first, last) and Firm Kevin Durst Badger State Drilling		Date Drilling Started 11/11/2015	Date Drilling Completed 11/11/2015	Drilling Method hollow stem auger	
WI Unique Well No. VY701	DNR Well ID No.	Common Well Name	Final Static Water Level Feet	Surface Elevation 803.69 Feet	Borehole Diameter 8.5 in.

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

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

Sample: Number and Type	Sample: Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID/FID	Soil Properties: Pocket Penetration (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
				SILTY SAND, yellowish brown (10YR 5/6), fine to medium grained.										
			1											
S1	21	7 6 9 10	2							M				
			3											
S2	20	6 7 9 10	4	Same as above except, 10YR 5/4 (top section), 10YR 3/6 (bottom section), trace gravel.						M				
			5											
			6	Same as above except, 10YR 3/4 (bottom), 10YR 5/4 (top), trace little roots and sticks, trace gravel.										
S3	22	7 6 9 6	7		SM					M				
			8											
S4	21	4 5 6 5	9	Same as above except, 10YR (top), 10YR 4/6 (bottom), trace clay at bottom.						M				
			10											
S5	18	2 2 4 5	11 12	Same as above except, fine to coarse grained sand, little gravel, trace clay in top half, 10YR 3/6.						M				
			13											
S6	20	2 3 3 3	14 15	Same as above except, 10YR 6/8.						M				

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

Signature

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

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

State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION SUPPLEMENT
Form 4400-122A

Boring Number MW-301 Use only as an attachment to Form 4400-122. Page 2 of 2

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

State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 7-98

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

Page 1 of 2

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

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

Sample									Soil Properties					
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID/FID	Standard Penetration	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			1 2 3 4 5 6 7 8	Hydrovaced boring to 8.5 below ground surface; open hole.										
S1	20	11 14 18	9 10	POORLY GRADED SAND, fine to coarse, yellow, (10YR 7/6), rounded grains.					N/A	M				
S2	20	12 15 20 28	11 12 13	Same but with trace gravel.	SP				N/A	M				
S3	24	16 20 26	14 15	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 be used for any other purpose. NOTE: See instructions for more information, including where the completed form should be sent.

State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION SUPPLEMENT

Form 4400-122A

Boring Number **MW-309** Use only as an attachment to Form 4400-122. Page 2 of 2

Sample									Soil Properties					
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID/FID	Standard Penetration	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			16	POORLY GRADED SAND, fine to coarse, yellow, (10YR 7/6), rounded grains, trace silt.										
S4	22	11 17 32 41	17						N/A	M				
			18											
			19											
S5		22 29 36							N/A	M				
			20											
			21											
S6	24	18 20 28 36	22						N/A	M				
			23											
			24											
S7		18 24 32							N/A	M				
			25											
			26		SP									
S8	22	14 18 30 40	27						N/A	W				Depth to water at ~ 26 feet.
			28											
			29											
S9	22	22 32 34							N/A	W				
			30											
			31											
			32											
			33											
			34											
			35											
			36											
				End of Boring at 36.5 feet bgs.										

State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 7-98

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

Page 1 of 2

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

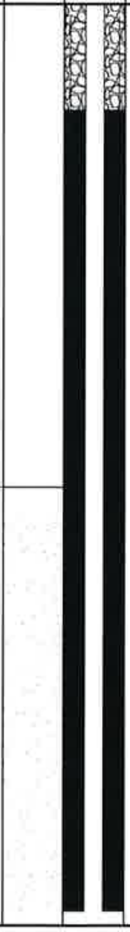
WI Unique Well No. VR110	DNR Well ID No.	Common Well Name MW-310	Final Static Water Level 27.9 Feet MSL	Surface Elevation 810.96 Feet MSL	Borehole Diameter 8.5 in.

Local Grid Origin ☐ (estimated: ☐) or Boring Location ☒
State Plane 543,332 N, 2,123,880 E S/C/N
NW 1/4 of SE 1/4 of Section 27, T 12 N, R 9 E

Lat ____ ° ____ ' ____ "
Long ____ ° ____ ' ____ "

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

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



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

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

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

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

State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION SUPPLEMENT

Form 4400-122A

Boring Number **MW-310** Use only as an attachment to Form 4400-122. Page 2 of 2

Sample									Soil Properties					
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID/FID	Standard Penetration	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			16	POORLY GRADED SAND AND GRAVEL, fine to medium sand, coarse gravel, brownish yellow, (10YR 6/6), angular gravel, round sand.										
S4	10	25 50/5	17						N/A	M				Tough drilling.
			18											
			19											
S5	24	38 60 50/4	20						N/A	M				
			21											
S6	12	38 50/5	22						N/A	M				
			23											
			24											
S7	24	32 46 50/4	25						N/A	M				
			26		SP									
S8	16	25 40 50/5	27						N/A	W				Depth to water at ~26 feet.
			28											
			29											
S9		32 25 50/5	30						N/A	W				
			31											
			32											
			33											
			34											
			35											
			36											
				End of Boring at 36.5 feet bgs.										

State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 7-98

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

Page 1 of 2

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 ☐ (estimated: ☐) or Boring Location ☒
State Plane 542,874 N, 2,123,437 E S/C/N
NE 1/4 of SW 1/4 of Section 27, T 12 N, R 9 E
Lat ___° ___' ___"
Long ___° ___' ___"
Local Grid Location: Feet ☐ N ☐ S Feet ☐ E ☐ W
Facility ID:
County: Columbia
County Code: 11
Civil Town/City/ or Village: Town of Pacific

Sample									Soil Properties					
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID/FID	Standard Penetration	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			1 2 3 4 5 6 7 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	11 12 13	Same as above but with trace silt.	SP				N/A	M				
S3	24	18 26 31	14 15						N/A	M				

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

Signature

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

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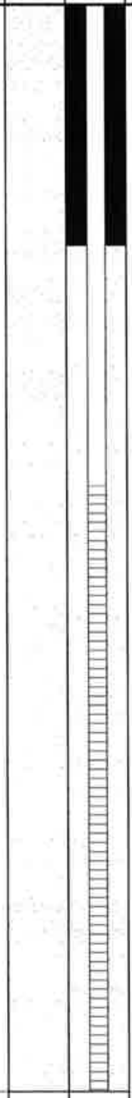
State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION SUPPLEMENT

Form 4400-122A

Boring Number **MW-311** 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	U S C S	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	
			16	POORLY GRADED SAND AND GRAVEL, fine to coarse sand, coarse gravel, yellow, (10YR 7/6), rounded sand, angular gravel, trace silt.										
S4	24	18 30 40 50/5	17						N/A	M				
			18											
			19											
S5	24	30 40 45	20						N/A	M				
			21											
S6	8	45 34 50/3	22						N/A	M+/W				
			23											
			24		SP									
S7	18	46 50/5	25						N/A	W				Depth to water at ~25 feet.
			26											
S8	20	46 54 54 50/4	27						N/A	W				
			28											
			29											
S9	24	25 38 50/5	30	Same as above but with thin silt seams.					N/A	W				
			31											
			32											
			33	End of Boring at 33 feet bgs.										

SCS # 25215135

State of Wisconsin
Department of Natural Resources

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

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

Facility/Project Name: WPL-Columbia

Local Grid Location of Well: ______ ft. ☐ N. ☐ S. ______ ft. ☐ E. ☐ W.

Well Name: MW-301

Facility License, Permit or Monitoring No.

Local Grid Origin ☐ (estimated: ☐) or Well Location ☐

Lat. ___° ___' ___" Long. ___° ___' ___" or

Wis. Unique Well No.: VY701

DNR Well ID No.

Facility ID

St. Plane 541562.2 ft. N, 2125001 ft. E. S/C/N

Date Well Installed: 11 / 11 / 2015 (m m / d d / y y y y)

Type of Well
Well Code 11 / MW

Section Location of Waste/Source: SW 1/4 of SE 1/4 of Sec. 27, T. 12 N, R. 9 ☒ E ☐ W

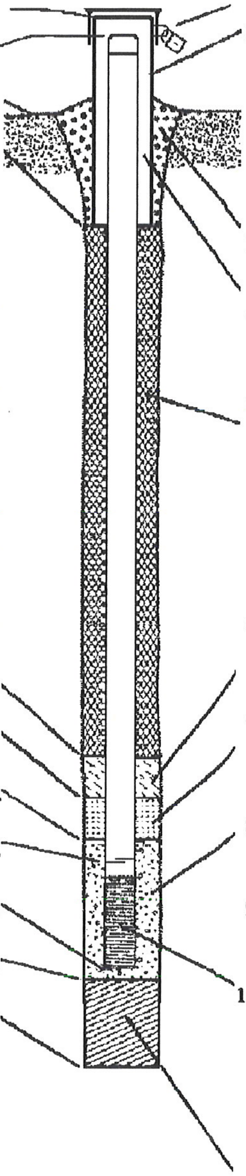
Well Installed By: Name (first, last) and Firm
Kevin Duerst
Badger State Drilling

Distance from Waste/Source ______ ft.

Enf. Stds. Apply ☐

Location of Well Relative to Waste/Source: u ☐ Upgradient s ☐ Sidegradient d ☐ Downgradient n ☐ Not Known

Gov. Lot Number



A. Protective pipe, top elevation 807 . 16 ft. MSL

B. Well casing, top elevation 806 89 ft. MSL

C. Land surface elevation 803 69 ft. MSL

D. Surface seal, bottom 791. 69 ft. MSL or 12 ft.

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

13. Sieve analysis performed? ☐ Yes ☐ No

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

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

16. Drilling additives used? ☐ Yes ☒ No

Describe ______

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

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

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

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

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

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

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

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

L. Borehole, diameter 8.5 in.

M. O.D. well casing 2.4 in.

N. I.D. well casing 2.0 in.

1. Cap and lock? ☐ Yes ☒ No

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

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

4. Material between well casing and protective pipe: Bentonite ☒ 3 0
Bentonite to grade, sand above Other ☐

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

6. Bentonite seal: a. Bentonite granules ☐ 3 3
b. ☐ 1/4 in. ☒ 3/8 in. ☐ 1/2 in. Bentonite chips ☑ 3 2
c. 4 ft3 Other ☐

7. Fine sand material: Manufacturer, product name & mesh size
a. RW Sidley Inc. #7 ☐
b. Volume added 0.5 ft^3

8. Filter pack material: Manufacturer, product name & mesh size
a. RW Sidley #5 ☐
b. Volume added 2 ft^3

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

10. Screen material: PVC
a. Screen type: Factory cut ☒ 1 1; Continuous slot ☐ 0 1; Other ☐
b. Manufacturer Johnson
c. Slot size: 0. 01 in.
d. Slotted length: 10 ft.

11. Backfill material (below filter pack): None ☐ 1 4
Native 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 53718-6751

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

SCS # 25217156.01

State of Wisconsin
Department of Natural Resources

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

MONITORING WELL CONSTRUCTION

Form 4400-113A Rev. 7-98

Facility/Project Name: WPL-Columbia Generating Station

Local Grid Location of Well: 543447.673 ft. ☒ N. ☐ S. 2124151.113 ft. ☒ E. ☐ W.

Well Name: MW-309

Facility License, Permit or Monitoring No.:

Local Grid Origin ☐ (estimated: ☐) or Well Location ☐
Lat. ____ ° ____ ' ____ " Long. ____ ° ____ ' ____ " or

Wis. Unique Well No.: VR111

DNR Well ID No.:

Facility ID:

St. Plane ________ ft. N, ________ ft. E. S/C/N

Date Well Installed: 02 / 14 / 2018 (m m / d d / y y y y)

Type of Well
Well Code 11 / MW

Section Location of Waste/Source: NW 1/4 of SE 1/4 of Sec. 27, T. 12 N, R. 09 ☒ E ☐ W

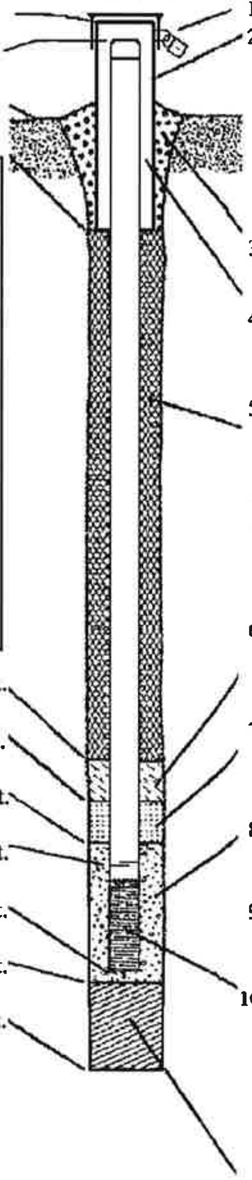
Well Installed By: Name (first, last) and Firm
Mark Crampton
Badger State Drilling Co., Inc.

Distance from Waste/Source ______ ft.

Enf. Stds. Apply ☒

Location of Well Relative to Waste/Source:
u ☐ Upgradient
s ☐ Sidegradient
d ☒ Downgradient
n ☐ Not Known

Gov. Lot Number:



A. Protective pipe, top elevation 813.59 ft. MSL

B. Well casing, top elevation 813.28 ft. MSL

C. Land surface elevation 809.88 ft. MSL

D. Surface seal, bottom 807.61 ft. MSL or 2.27 ft.

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

13. Sieve analysis performed? ☒ Yes ☐ No

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

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

16. Drilling additives used? ☐ Yes ☒ No

Describe --

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

E. Bentonite seal, top 807.61 ft. MSL or 2.27 ft.

F. Fine sand, top 788.61 ft. MSL or 21.27 ft.

G. Filter pack, top 786.61 ft. MSL or 23.27 ft.

H. Screen joint, top 785.61 ft. MSL or 24.27 ft.

I. Well bottom 775.61 ft. MSL or 34.27 ft.

J. Filter pack, bottom 773.38 ft. MSL or 36.5 ft.

K. Borehole, bottom 773.38 ft. MSL or 36.5 ft.

L. Borehole, diameter 8.5 in.

M. O.D. well casing 2.38 in.

N. I.D. well casing 2.01 in.

1. Cap and lock? ☒ Yes ☐ No

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

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

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

5. Annular space seal:
a. Granular/Chipped Bentonite ☒ 3 3
b. ______ Lbs/gal mud weight . . . Bentonite-sand slurry ☐ 3 5
c. ______ Lbs/gal mud weight . . . . . Bentonite slurry ☐ 3 1
d. ______ % Bentonite . . . . . . Bentonite-cement grout ☐ 5 0
e. 0.342 Ft^3 volume added for any of the above
f. How installed:
Tremie ☐ 0 1
Tremie pumped ☐ 0 2
Gravity ☒ 0 8

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

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

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

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

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

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

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

Signature

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

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

SCS # 25217156.01

State of Wisconsin
Department of Natural Resources

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

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

Facility/Project Name: WPL-Columbia Generating Station

Local Grid Location of Well: 543331.971 ft. ☒ N. ☐ S. 2123879.85 ft. ☒ E. ☐ W.

Well Name: MW-310

Facility License, Permit or Monitoring No.:

Local Grid Origin ☐ (estimated: ☐) or Well Location ☐

Lat. ____ ° ____ ' ____ " Long. ____ ° ____ ' ____ " or

Wis. Unique Well No.: VR110

DNR Well ID No.: ___

Facility ID: ___

St. Plane ____ ft. N, ____ ft. E. S/C/N

Date Well Installed: 02 / 13 / 2018 (m m / d d / y y y y)

Type of Well: Well Code 11 / MW

Section Location of Waste/Source: NW 1/4 of SE 1/4 of Sec. 27, T. 12 N, R. 09 ☒ E ☐ W

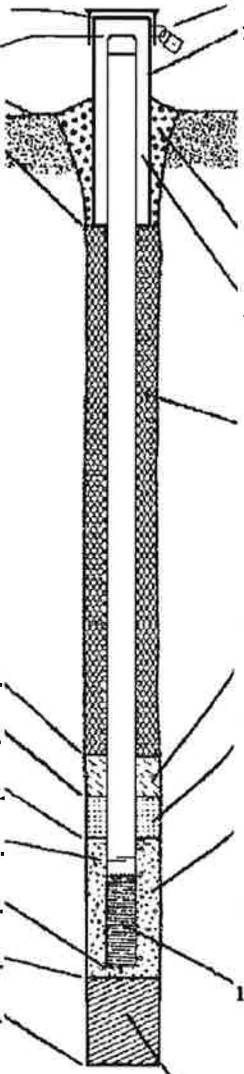
Well Installed By: Name (first, last) and Firm: Dave Cruise, Badger State Drilling Co., Inc.

Distance from Waste/Source ____ ft.

Enf. Stds. Apply ☒

Location of Well Relative to Waste/Source: u ☐ Upgradient s ☐ Sidegradient d ☒ Downgradient n ☐ Not Known

Gov. Lot Number: ____



A. Protective pipe, top elevation 813.93 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) Other ☒

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

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

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

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

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

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

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

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

Signature

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

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SCS # 25217156.01

State of Wisconsin
Department of Natural Resources

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

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

Facility/Project Name: WPL-Columbia Generating Station

Local Grid Location of Well: 542874.39 ft. ☒ N. ☐ S. 2123437.50 ft. ☒ E. ☐ W.

Well Name: MW-311

Facility License, Permit or Monitoring No.

Local Grid Origin ☐ (estimated: ☐) or Well Location ☐

Lat. ° ' " Long. ° ' " or

St. Plane ______ ft. N, ______ ft. E. S/C/N

Wis. Unique Well No.: VR112

DNR Well ID No.: ___

Facility ID: ___

Date Well Installed: 02 / 14 / 2018 (m m / d d / y y y y)

Section Location of Waste/Source: NE 1/4 of SW 1/4 of Sec. 27, T. 12 N, R. 09 ☒ E ☐ W

Type of Well: Well Code 11 / MW

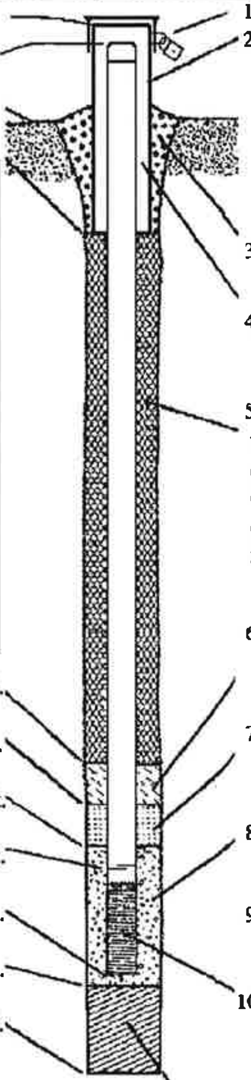
Well Installed By: Name (first, last) and Firm: Mark Crampton, Badger State Drilling Co., Inc.

Location of Well Relative to Waste/Source: u ☐ Upgradient s ☐ Sidegradient d ☒ Downgradient n ☐ Not Known

Gov. Lot Number

Distance from Waste/Source ______ ft.

Enf. Stds. Apply ☒



A. Protective pipe, top elevation 810.05 ft. MSL

B. Well casing, top elevation 809.74 ft. MSL

C. Land surface elevation 806.53 ft. MSL

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

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

13. Sieve analysis performed? ☒ Yes ☐ No

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

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

16. Drilling additives used? ☐ Yes ☒ No

Describe --

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

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

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

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

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

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

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

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

L. Borehole, diameter 8.5 in.

M. O.D. well casing 2.38 in.

N. I.D. well casing 2.01 in.

1. Cap and lock? ☒ Yes ☐ No

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

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

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

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

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

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

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

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

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

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

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

Signature

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

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SCS # 25217156.01

State of Wisconsin
Department of Natural Resources

MONITORING WELL DEVELOPMENT

Form 4400-113B Rev. 7-98

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

Facility/Project Name	County Name	Well Name
WPL - Alliant Columbia Generating Station	Columbia	MW-309

Facility License, Permit or Monitoring Number	County Code	Wis. Unique Well Number	DNR Well ID Number
	11	VR111	

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

2. Well development method
   - surged with bailer and bailed ☐ 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 casisng) 37.67 ft.

5. Inside diameter of well 2.0 in.

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

7. Volume of water removed from well 50.0 gal.

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

9. Source of water added ____________

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

		Before Development	After Development
11. Depth to Water (from top of well casing)	a.	30.07 ft.	32.29 ft.
Date	b.	02/16/2018 (mm dd yyyy)	02/16/2018 (mm dd yyyy)
Time	c.	12:47 ☐ a.m. ☒ p.m.	13:50 ☐ a.m. ☒ p.m.
12. Sediment in well bottom		__.__ inches	__.__ inches
13. Water clarity		Clear ☐ 1 0 Turbid ☒ 1 5 (Describe) Brown Silty	Clear ☒ 2 0 Turbid ☐ 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

17. Additional comments on development:

Two cycles of well purging dry and recharging.

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

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

Signature: Kyle Kramer
Print Name: Kyle Kramer
Firm: SCS ENGINEERS, 2830 Dairy Drive, Madison, WI 53718

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

SCS # 25217156.01

State of Wisconsin
Department of Natural Resources

MONITORING WELL DEVELOPMENT

Form 4400-113B Rev. 7-98

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

Facility/Project Name: 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 casisng) 38 . 41 ft.

5. Inside diameter of well 2 . 0 in.

6. Volume of water in filter pack and well casing 7 . 28 gal.

7. Volume of water removed from well 60 . 0 gal.

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

9. Source of water added ____________

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

	Before Development	After Development
11. Depth to Water (from top of well casing)	a. 30 . 55 ft.	32 . 30 ft.
Date	b. 2 / 16 / 2018 (m m d d y y y y)	2 / 16 / 2018 (m m d d y y y y)
Time	c. 9 : 45 ☒ a.m. ☐ p.m.	12 : 36 ☐ a.m. ☒ p.m.
12. Sediment in well bottom	. inches	. inches
13. Water clarity	Clear ☐ 1 0 Turbid ☒ 1 5 (Describe) brown silty	Clear ☒ 2 0 Turbid ☐ 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

17. Additional comments on development:

Four cycles of well purging dry and recharging.

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

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

Signature:
Print Name: Kyle Kramer
Firm: SCS ENGINEERS, 2830 Dairy Drive, Madison, WI 53718

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

SCS # 25217156.01

State of Wisconsin
Department of Natural Resources

MONITORING WELL DEVELOPMENT

Form 4400-113B Rev. 7-98

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

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

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

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

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

3. Time spent developing well: 168 min.

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

5. Inside diameter of well: 2.0 in.

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

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

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

9. Source of water added ____________

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

		Before Development	After Development
11. Depth to Water (from top of well casing)	a.	26.75 ft.	28.51 ft.
Date	b.	2/16/2018 (mm/dd/yyyy)	2/16/2018 (mm/dd/yyyy)
Time	c.	2:00 ☐ a.m. ☒ p.m.	4:48 ☐ a.m. ☒ p.m.
12. Sediment in well bottom		___ inches	___ inches
13. Water clarity		Clear ☐ 10 Turbid ☒ 15 (Describe) brown silly	Clear ☒ 20 Turbid ☐ 25 (Describe)

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

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

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

17. Additional comments on development:

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

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

Signature:
Print Name: Kyle Kramer
Firm: SCS ENGINEERS, 2830 Dairy Drive, Madison, WI 53718

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

Appendix C

Laboratory Reports

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

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

CERTIFICATIONS

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

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

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

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	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

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

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
6020B MET ICPMS	Analytical Method: EPA 6020B Preparation Method: EPA 3010A Pace Analytical Services - Green Bay								
Antimony	**<0.15**	ug/L	1.0	0.15	1	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	
7470 Mercury	Analytical Method: EPA 7470 Preparation Method: EPA 7470 Pace Analytical Services - Green Bay								
Mercury	**<0.066**	ug/L	0.20	0.066	1	04/20/22 09:45	04/21/22 07:52	7439-97-6	
Field Data	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		
2540C Total Dissolved Solids	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		
9040 pH	Analytical Method: EPA 9040 Pace Analytical Services - Green Bay								
pH at 25 Degrees C	**7.6**	Std. Units	0.10	0.010	1		04/18/22 10:50		H6
300.0 IC Anions	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

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
6020B MET ICPMS	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	
7470 Mercury	Analytical Method: EPA 7470 Preparation Method: EPA 7470 Pace Analytical Services - Green Bay								
Mercury	**<0.066**	ug/L	0.20	0.066	1	04/20/22 09:45	04/21/22 07:59	7439-97-6	
Field Data	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		
2540C Total Dissolved Solids	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		
9040 pH	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
300.0 IC Anions	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	

QUALITY CONTROL DATA

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

QC Batch: 413634
QC Batch Method: EPA 7470
Analysis 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 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mercury	ug/L	<0.066	5	5	5.0	5.0	100	101	85-115	1	20	

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

QUALITY CONTROL DATA

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

QC Batch: 413354
QC Batch Method: EPA 3010A
Analysis Method: EPA 6020B
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	

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

QUALITY CONTROL DATA

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

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
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	

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

QUALITY CONTROL DATA

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

QC Batch: 413340
QC Batch Method: SM 2540C
Analysis 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	

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

QUALITY CONTROL DATA

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

QC Batch: 413406
QC Batch Method: EPA 9040
Analysis 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

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

QUALITY CONTROL DATA

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

QC Batch: 414946
QC Batch Method: EPA 300.0
Analysis Method: EPA 300.0
Analysis Description: 300.0 IC Anions
Laboratory: Pace Analytical Services - Green Bay
Associated Lab Samples: 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	40243482001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
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

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

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	**0.254 ± 0.354 (0.590)** **C:NA T:97%**	pCi/L	05/03/22 12:00	13982-63-3	
	Pace Analytical Services - Greensburg					
Radium-228	EPA 904.0	**0.357 ± 0.315 (0.634)** **C:76% T:90%**	pCi/L	05/02/22 12:15	15262-20-1	
	Pace Analytical Services - Greensburg					
Total Radium	Total Radium Calculation	**0.611 ± 0.669 (1.22)**	pCi/L	05/04/22 22:02	7440-14-4	

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	**0.000 ± 0.289 (0.649)** **C:NA T:99%**	pCi/L	05/03/22 12:11	13982-63-3	
	Pace Analytical Services - Greensburg					
Radium-228	EPA 904.0	**0.179 ± 0.282 (0.610)** **C:80% T:92%**	pCi/L	05/02/22 12:15	15262-20-1	
	Pace Analytical Services - Greensburg					
Total Radium	Total Radium Calculation	**0.179 ± 0.571 (1.26)**	pCi/L	05/04/22 22:02	7440-14-4	

QUALITY CONTROL - RADIOCHEMISTRY

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

QC Batch: 498723
QC Batch Method: EPA 903.1
Analysis Method: EPA 903.1
Analysis Description: 903.1 Radium-226
Laboratory: Pace Analytical Services - Greensburg
Associated Lab Samples: 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	

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

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	

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

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.

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		

#1

Pace Analytical®

CHAIN-OF-CUSTODY Analytical Request Document

Chain-of-Custody is a LEGAL DOCUMENT - Complete all relevent fields

LAB USE ONLY- Affix Workorder/Login Label Here or List Pace Workorder Number or MTJL Log-in Number Here 40243482

ALL SHADED AREAS are for LAB USE ONLY

Company: SCS Engineers
Billing Information: Same
Address: 2830 Dairy Dr. Madison, WI.
Report To: Thomas Karwoski
Email To: mBlodgett@scsengineers.com
Copy To: Meghan Blodgett
Site Collection Info/Address:
Customer Project Name/Number: Columbia 25222067.00
State: WI / County/City: Columbia/Portage / Time Zone Collected: [ ] PT [ ] MT [✓ CT] [ ] ET
Phone: 608-224-2830
Email:
Site/Facility ID #:
Compliance Monitoring? [ ] Yes [ ] No
Collected By (print): Adam Watson
Purchase Order #:
Quote #:
DW PWS ID #:
DW Location Code:
Collected By (signature):
Turnaround Date Required:
Immediately Packed on Ice: [✓ Yes] [ ] No
Sample Disposal: [ ] Dispose as appropriate [ ] Return [ ] Archive: ______ [ ] Hold: ______
Rush: [ ] Same Day [ ] Next Day [ ] 2 Day [ ] 3 Day [ ] 4 Day [ ] 5 Day (Expedite Charges Apply)
Field Filtered (if applicable): [ ] Yes [✓ No]
Analysis: ______

Container Preservative Type **: 1 | 1 | U | U

Lab Project Manager:

** Preservative Types: (1) nitric acid, (2) sulfuric acid, (3) hydrochloric acid, (4) sodium hydroxide, (5) zinc acetate, (6) methanol, (7) sodium bisulfate, (8) sodium thiosulfate, (9) hexane, (A) ascorbic acid, (B) ammonium sulfate, (C) ammonium hydroxide, (D) TSP, (U) Unpreserved, (O) Other ______

* Matrix Codes (Insert in Matrix box below): Drinking Water (DW), Ground Water (GW), Wastewater (WW), Product (P), Soil/Solid (SL), Oil (OL), Wipe (WP), Air (AR), Tissue (TS), Bioassay (B), Vapor (V), Other (OT)

Customer Sample ID	Matrix *	Comp / Grab	Collected (or Composite Start) Date	Collected (or Composite Start) Time	Composite End Date	Composite End Time	Res Cl	# of Ctns	Radium 226/228	Metals	PH	TDS, Cl, F, SO4	Lab Sample # / Comments
MW-84A			4/13/22	1420				5	X	X	X	X	4/15 ~~008~~ 001
MW-301			4/13/22	1540				5	X	X	X	X	002

Lab Profile/Line:

```
Lab Sample Receipt Checklist:

Custody Seals Present/Intact Y N NA
Custody Signatures Present   Y N NA
Collector Signature Present  Y N NA
Bottles Intact               Y N NA
Correct Bottles              Y N NA
Sufficient Volume            Y N NA
Samples Received on Ice      Y N NA
VOA - Headspace Acceptable   Y N NA
USDA Regulated Soils         Y N NA
Samples in Holding Time      Y N NA
Residual Chlorine Present    Y N NA
Cl Strips: ____________
Sample pH Acceptable         Y N NA
pH Strips: ____________
Sulfide Present              Y N NA
Lead Acetate Strips: 4/15/22

LAB USE ONLY:
Lab Sample # / Comments:
```

Customer Remarks / Special Conditions / Possible Hazards:

Type of Ice Used: [✓ Wet] Blue Dry None
Packing Material Used:
Radchem sample(s) screened (<500 cpm): Y N NA
SHORT HOLDS PRESENT (<72 hours): Y N N/A
Lab Tracking #: 2764151
Samples received via: FEDEX UPS Client Courier Pace Courier

Lab Sample Temperature Info:
Temp Blank Received: [✓ Y] N NA
Therm ID#: 113
Cooler 1 Temp Upon Receipt: 1 oC
Cooler 1 Therm Corr. Factor: .1 oC
Cooler 1 Corrected Temp: 1.1 oC
Comments:

Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:
SCS	4/14/22 1030		
CS logistics	4/15/22 0710	Pace	4/15/22 0710

MTJL LAB USE ONLY
Table #:
Acctnum:
Template:
Prelogin:
PM:
PB:

Trip Blank Received: Y N [✓ NA]
HCL MeOH TSP Other

Non Conformance(s): YES / NO

Sample Preservation Receipt Form

Client Name: SCS Engineers

Project # 40243482

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

Initial when completed: TP

Date/ Time:

Lab Lot# of pH paper: 10D3112

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

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

TP 4/15/22

Exceptions to preservation check: VOA, Coliform, TOC, TOX, TOH, O&G, WI DRO, Phenolics, Other: ___________

Headspace in VOA Vials (>6mm) : ☐Yes ☐No ☑N/A *If yes look in headspace column

AG1U	1 liter amber glass
BG1U	1 liter clear glass
AG1H	1 liter amber glass HCL
AG4S	125 mL amber glass H2SO4
AG4U	120 mL amber glass unpres
AG5U	100 mL amber glass unpres
AG2S	500 mL amber glass H2SO4
BG3U	250 mL clear glass unpres

BP1U	1 liter plastic unpres
BP3U	250 mL plastic unpres
BP3B	250 mL plastic NaOH
BP3N	250 mL plastic HNO3
BP3S	250 mL plastic H2SO4

VG9A	40 mL clear ascorbic
DG9T	40 mL amber Na Thio
VG9U	40 mL clear vial unpres
VG9H	40 mL clear vial HCL
VG9M	40 mL clear vial MeOH
VG9D	40 mL clear vial DI

JGFU	4 oz amber jar unpres
JG9U	9 oz amber jar unpres
WGFU	4 oz clear jar unpres
WPFU	4 oz plastic jar unpres
SP5T	120 mL plastic Na Thiosulfate
ZPLC	ziploc bag
GN	1 L plastic HNO3

Page 1 of 2

DC#_Title: ENV-FRM-GBAY-0014 v02_SCUR
Revision: 3 | Effective Date: | Issued by: Green Bay

Sample Condition Upon Receipt Form (SCUR)

Project #:

WO#: 40243482
40243482

Client Name: SCS Engineers

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

Tracking #:

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

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

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

Thermometer Used SR - 113 **Type of Ice:** [✓ Wet] Blue Dry None ☑ Samples on ice, cooling process has begun

Cooler Temperature Uncorr: 1 /Corr: 1.1

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

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

Person examining contents:
Date: 4/15/22 /Initials: TP

Labeled By Initials: AD

Chain of Custody Present:	☑Yes ☐No ☐N/A	1.
Chain of Custody Filled Out:	☐Yes ☑No ☐N/A	2. Pj # TP 4/15/22
Chain of Custody Relinquished:	☑Yes ☐No ☐N/A	3.
Sampler Name & Signature on COC:	☑Yes ☐No ☐N/A	4.
Samples Arrived within Hold Time:	☑Yes ☐No	5.
- VOA Samples frozen upon receipt	☐Yes ☐No	Date/Time:
Short Hold Time Analysis (<72hr):	☐Yes ☑No	6.
Rush Turn Around Time Requested:	☐Yes ☑No	7.
Sufficient Volume:		8.
For Analysis: ☑Yes ☐No	MS/MSD: ☐Yes ☑No ☐N/A	
Correct Containers Used:	☑Yes ☐No	9.
-Pace Containers Used:	☑Yes ☐No ☐N/A	
-Pace IR Containers Used:	☐Yes ☐No ☑N/A	
Containers Intact:	☑Yes ☐No	10.
Filtered volume received for Dissolved tests	☐Yes ☐No ☑N/A	11.
Sample Labels match COC:	☑Yes ☐No ☐N/A	12.
-Includes date/time/ID/Analysis	Matrix: W	
Trip Blank Present:	☐Yes ☐No ☑N/A	13.
Trip Blank Custody Seals Present	☐Yes ☐No ☑N/A	
Pace Trip Blank Lot # (if purchased):		

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

Person Contacted: Date/Time:

Comments/ Resolution:

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

Page 2 of 2

www.pacelabs.com

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

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

CERTIFICATIONS

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

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

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

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

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
6020B MET ICPMS	Analytical Method: EPA 6020B Preparation Method: EPA 3010A Pace Analytical Services - Green Bay								
Boron	**32.5**	ug/L	10.0	3.0	1	04/18/22 06:24	05/01/22 02:52	7440-42-8	
Calcium	**80200**	ug/L	254	76.2	1	04/18/22 06:24	05/01/22 02:52	7440-70-2	
Field Data	Analytical Method: Pace Analytical Services - Green Bay								
Field pH	**7.64**	Std. Units			1		04/12/22 12:45		
Field Specific Conductance	**1420**	umhos/cm			1		04/12/22 12:45		
Oxygen, Dissolved	**7.66**	mg/L			1		04/12/22 12:45	7782-44-7	
REDOX	**111.7**	mV			1		04/12/22 12:45		
Turbidity	**7.83**	NTU			1		04/12/22 12:45		
Static Water Level	**783.14**	feet			1		04/12/22 12:45		
Temperature, Water (C)	**11.5**	deg C			1		04/12/22 12:45		
2540C Total Dissolved Solids	Analytical Method: SM 2540C Pace Analytical Services - Green Bay								
Total Dissolved Solids	**764**	mg/L	20.0	8.7	1		04/15/22 16:45		
9040 pH	Analytical Method: EPA 9040 Pace Analytical Services - Green Bay								
pH at 25 Degrees C	**7.6**	Std. Units	0.10	0.010	1		04/18/22 10:56		H6
300.0 IC Anions	Analytical Method: EPA 300.0 Pace Analytical Services - Green Bay								
Chloride	**319**	mg/L	20.0	4.3	10		04/26/22 23:57	16887-00-6	
Fluoride	**<0.095**	mg/L	0.32	0.095	1		04/26/22 15:12	16984-48-8	
Sulfate	**17.9**	mg/L	2.0	0.44	1		04/26/22 15:12	14808-79-8	

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
6020B MET ICPMS	Analytical Method: EPA 6020B Preparation Method: EPA 3010A Pace Analytical Services - Green Bay								
Boron	**72.0**	ug/L	10.0	3.0	1	04/18/22 06:24	05/01/22 02:59	7440-42-8	
Calcium	**31900**	ug/L	254	76.2	1	04/18/22 06:24	05/01/22 02:59	7440-70-2	
Field Data	Analytical Method: Pace Analytical Services - Green Bay								
Field pH	**7.74**	Std. Units			1		04/12/22 12:25		
Field Specific Conductance	**711**	umhos/cm			1		04/12/22 12:25		
Oxygen, Dissolved	**10.03**	mg/L			1		04/12/22 12:25	7782-44-7	
REDOX	**200.5**	mV			1		04/12/22 12:25		
Turbidity	**1.17**	NTU			1		04/12/22 12:25		
Static Water Level	**783.19**	feet			1		04/12/22 12:25		
Temperature, Water (C)	**10.6**	deg C			1		04/12/22 12:25		
2540C Total Dissolved Solids	Analytical Method: SM 2540C Pace Analytical Services - Green Bay								
Total Dissolved Solids	**416**	mg/L	20.0	8.7	1		04/15/22 16:45		
9040 pH	Analytical Method: EPA 9040 Pace Analytical Services - Green Bay								
pH at 25 Degrees C	**7.9**	Std. Units	0.10	0.010	1		04/18/22 10:59		H6
300.0 IC Anions	Analytical Method: EPA 300.0 Pace Analytical Services - Green Bay								
Chloride	**35.2**	mg/L	2.0	0.43	1		04/26/22 15:26	16887-00-6	
Fluoride	**<0.095**	mg/L	0.32	0.095	1		04/26/22 15:26	16984-48-8	
Sulfate	**39.8**	mg/L	2.0	0.44	1		04/26/22 15:26	14808-79-8	

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
6020B MET ICPMS	Analytical Method: EPA 6020B Preparation Method: EPA 3010A Pace Analytical Services - Green Bay								
Boron	**<3.0**	ug/L	10.0	3.0	1	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	
2540C Total Dissolved Solids	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		
9040 pH	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
300.0 IC Anions	Analytical Method: EPA 300.0 Pace Analytical Services - Green Bay								
Chloride	**<0.43**	mg/L	2.0	0.43	1		04/26/22 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	

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
6020B MET ICPMS	Analytical Method: EPA 6020B Preparation Method: EPA 3010A Pace Analytical Services - Green Bay								
Boron	**32.7**	ug/L	10.0	3.0	1	04/18/22 06:24	05/01/22 03:06	7440-42-8	
Calcium	**61800**	ug/L	254	76.2	1	04/18/22 06:24	05/01/22 03:06	7440-70-2	
Field Data	Analytical Method: Pace Analytical Services - Green Bay								
Field pH	**8.00**	Std. Units			1		04/12/22 14:00		
Field Specific Conductance	**482.0**	umhos/cm			1		04/12/22 14:00		
Oxygen, Dissolved	**7.74**	mg/L			1		04/12/22 14:00	7782-44-7	
REDOX	**110.2**	mV			1		04/12/22 14:00		
Turbidity	**2.50**	NTU			1		04/12/22 14:00		
Static Water Level	**783.04**	feet			1		04/12/22 14:00		
Temperature, Water (C)	**11.1**	deg C			1		04/12/22 14:00		
2540C Total Dissolved Solids	Analytical Method: SM 2540C Pace Analytical Services - Green Bay								
Total Dissolved Solids	**278**	mg/L	20.0	8.7	1		04/15/22 16:45		
9040 pH	Analytical Method: EPA 9040 Pace Analytical Services - Green Bay								
pH at 25 Degrees C	**7.7**	Std. Units	0.10	0.010	1		04/18/22 11:20		H6
300.0 IC Anions	Analytical Method: EPA 300.0 Pace Analytical Services - Green Bay								
Chloride	**1.0J**	mg/L	2.0	0.43	1		04/26/22 15:55	16887-00-6	
Fluoride	**<0.095**	mg/L	0.32	0.095	1		04/26/22 15:55	16984-48-8	
Sulfate	**8.9**	mg/L	2.0	0.44	1		04/26/22 15:55	14808-79-8	

QUALITY CONTROL DATA

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

QC Batch: 413354
QC Batch Method: EPA 3010A
Analysis Method: EPA 6020B
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	

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

QUALITY CONTROL DATA

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

QC Batch: 413340
QC Batch Method: SM 2540C
Analysis 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	

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

QUALITY CONTROL DATA

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

QC Batch: 413406
QC Batch Method: EPA 9040
Analysis 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

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

QUALITY CONTROL DATA

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

QC Batch: 414020
QC Batch Method: EPA 300.0
Analysis Method: EPA 300.0
Analysis Description: 300.0 IC Anions
Laboratory: Pace Analytical Services - Green Bay
Associated Lab Samples: 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 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
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 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
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

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

QUALIFIERS

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

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.

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		

#3

Pace Analytical®

CHAIN-OF-CUSTODY Analytical Request Document

Chain-of-Custody is a LEGAL DOCUMENT - Complete all relevent fields

LAB USE ONLY- Affix Workorder/Login Label Here or List Pace Workorder Number or MTJL Log-in Number Here

40243483

ALL SHADED AREAS are for LAB USE ONLY

Company: SCS Engineers
Billing Information: Same
Address: 2830 Dairy Dr. Madison WI.
Report To: Thomas Karwoski
Email To: MBlodgett@scsengineers.com
Copy To: Meghan Blodgett
Site Collection Info/Address: Columbia Generating Station
Customer Project Name/Number: Columbia 25222067.00
State: WI
County/City: Columbia / ~~Portage~~
Time Zone Collected: [ ] PT [ ] MT [✓ CT] [ ] ET
Phone: 608-224-2830
Email:
Site/Facility ID #:
Compliance Monitoring? [ ] Yes [ ] No
Collected By (print): Adam Watson
Purchase Order #:
Quote #:
DW PWS ID #:
DW Location Code:
Collected By (signature):
Turnaround Date Required:
Immediately Packed on Ice: [ ] [✓ Yes] [ ] No
Sample Disposal: [ ] Dispose as appropriate [ ] Return [ ] Archive: ______ [ ] Hold: ______
Rush: [ ] Same Day [ ] Next Day [ ] 2 Day [ ] 3 Day [ ] 4 Day [ ] 5 Day (Expedite Charges Apply)
Field Filtered (if applicable): [ ] Yes [✓ No]
Analysis: ______

Container Preservative Type **: 1 U U

Lab Project Manager:

** Preservative Types: (1) nitric acid, (2) sulfuric acid, (3) hydrochloric acid, (4) sodium hydroxide, (5) zinc acetate, (6) methanol, (7) sodium bisulfate, (8) sodium thiosulfate, (9) hexane, (A) ascorbic acid, (B) ammonium sulfate, (C) ammonium hydroxide, (D) TSP, (U) Unpreserved, (O) Other ______

* Matrix Codes (Insert in Matrix box below): Drinking Water (DW), Ground Water (GW), Wastewater (WW), Product (P), Soil/Solid (SL), Oil (OL), Wipe (WP), Air (AR), Tissue (TS), Bioassay (B), Vapor (V), Other (OT)

Lab Profile/Line:

Lab Sample Receipt Checklist:
~~Custody Seals Present/Intact Y N NA~~
~~Custody Signatures Present Y N NA~~
~~Collector Signature Present Y N NA~~
~~Bottles Intact Y N NA~~
~~Correct Bottles Y N NA~~
~~Sufficient Volume Y N NA~~
~~Samples Received on Ice Y N NA~~
~~VOA - Headspace Acceptable Y N NA~~
~~USDA Regulated Soils Y N NA~~
~~Samples in Holding Time Y N NA~~
~~Residual Chlorine Present Y N NA~~
~~Cl Strips: ______~~
~~Sample pH Acceptable Y N NA~~
~~pH Strips: ______~~
~~Sulfide Present Y N NA~~
~~Lead Acetate Strips:~~
TP 4/15/22

LAB USE ONLY:
Lab Sample # / Comments:

Customer Sample ID	Matrix *	Comp / Grab	Collected (or Composite Start) Date	Collected (or Composite Start) Time	Composite End Date	Composite End Time	Res Cl	# of Ctns	Boron + Calcium	pH	TDS, Cl, F, SO4	Lab Sample # / Comments
MW-309	GW		4/12/22	1245				3	X	X	X	001
MW-310	GW		4/12/22	1225				3	X	X	X	002
Field Blank MOD-4	W		4/12/22	1225				3	X	X	X	003
MW-311	GW		4/12/22	1400				3	X	X	X	004
												~~005~~ TP 4/15/22

Customer Remarks / Special Conditions / Possible Hazards:

Type of Ice Used: [✓ Wet] Blue Dry None
Packing Material Used:
Radchem sample(s) screened (<500 cpm): Y N NA
SHORT HOLDS PRESENT (<72 hours): Y N N/A
Lab Tracking #: 2764170
Samples received via: FEDEX UPS Client Courier Pace Courier

Lab Sample Temperature Info:
Temp Blank Received: [✓ Y] N NA
Therm ID#: 113
Cooler 1 Temp Upon Receipt: 2 oC
Cooler 1 Therm Corr. Factor: .1 oC
Cooler 1 Corrected Temp: 2.1 oC
Comments:

Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:
SCS	4/14/22 1020		
CS logistics	4/15/22 0710	pace	4/15/22 0710

MTJL LAB USE ONLY
Table #:
Acctnum:
Template:
Prelogin:
PM:
PB:

Trip Blank Received: Y N [✓ NA]
HCL MeOH TSP Other

Non Conformance(s): YES / NO

Sample Preservation Receipt Form

Client Name: SCS Engineers Project # 40243483

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

Lab Lot# of pH paper: 10DB112 Lab Std #ID of preservation (if pH adjusted):

Initial when completed: VP

Date/ Time:

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

VP 4/15/22

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

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

DC#_Title: ENV-FRM-GBAY-0014 v02_SCUR
Revision: 3 | Effective Date: | Issued by: Green Bay

Sample Condition Upon Receipt Form (SCUR)

Project #:

WO# : 40243483

40243483

Client Name: SCS Engineers

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

Tracking #:

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

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

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

Thermometer Used SR - 113 **Type of Ice:** [✓ Wet] Blue Dry None ☒ Samples on ice, cooling process has begun

Cooler Temperature Uncorr: 2 /Corr: 2.1

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

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

Person examining contents:
Date: 4/15/22 **Initials:** TP
Labeled By Initials: ALJ

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

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

Page 2 of 2

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	3.2	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	<0.1	--	<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	<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	--	--	--	--	--	--	--	--	--	--	--	--	--
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	--	--	--	--	--	--	--	--	--	--	--	--
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	--	--	--	--	--	--	--	--
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

NR 140 Groundwater Quality Standard Exceedances
Wisconsin Power and Light - Columbia Dry Ash Disposal Facility
CCR Wells
2022

Parameter	Units	NR 140 PAL	NR 140 ES	Sample ID	Collected Date*	Result	Data Flags	Exceedance
Boron, Total	µg/L	200	1000	MW-33AR	4/12/2022	558		PAL
				MW-34A	4/12/2022	237		PAL
				MW-302	4/12/2022	389		PAL
Chloride, Total	mg/L	125	250	MW-309	4/12/2022	319		ES
Sulfate, Total	mg/L	125	250	MW-33AR	4/12/2022	155		PAL
				MW-34A	4/12/2022	146		PAL

Notes/Abbreviations:

PAL: NR 140 Preventive Action Limit	µg/L: microgram per liter
ES: NR 140 Enforcement Standard	mg/L: milligram per liter

*: 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.

Created By:	MDB	1/19/2023
Last Modified:	MDB	1/19/2023
Checked By:	AJR	1/27/2023

I:\25222067.00\Data and Calculations\Tables\2022 Site Annual Report Additional Tables\[2022_NR 140 Exceedances_Dry Ash CCR.xlsx]Exceedances

Leachate Pipe Cleaning and Inspection Report

Work Order Details // 7785317 Pipe leachate jetting 2022 - Hooper

Asset: CO350 Landfill Module #6, WI Lic. #3026 **Location:** CO/0/WM/CELL Cell, Flyash, Lined Landfill

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WO: 7785317 Pipe leachate jetting 2022 - Hooper

PM:

Status:	APPR	**Scheduled Start:**		**Scheduled Finish:**	
Parent:		**Report Date:**	10/19/2022	**Actual Finish:**	
Calc Priority:	7	**Reported By:**	CLEPPERB17067	**Reported By Phone:**	
WO Priority:	4	**Failure Class:**	VSLTNK	**Found By:**	
Repair Tag:		**Supervisor:**	CLEPPERB17067	**Problem Code:**	
Work Type:	EI	**Lead Craft:**		**P&ID Asset #:**	
		Crew:	CO	**Special Requirement:**	
Column/Row:		**Floor/Elevation:**		**Physical Location:**	
Vendor:		**Service Contract:**			

GL Account: 10003-5004-1015-073999-??????-?????-????? **Wind Turbine Error:** null (null)

Job Plan:

Date Completed **Completed By** **Supervisor**

Planner

Safe Start Section

Safe Start:

Ask yourself - Am I in one of these four states: Rushing? Frustrated? Fatigued? Or Complacent?

Remember: Keep your "Eyes on Task", "Mind on Task". Stay out of the "Line-of-Fire" and ensure you have the proper "Balance/Transaction/Grip". If it's not safe, don't do it. Make it safe - then do it!

Specific Comments: ______________________________

Briefing Conducted by: ______________________________

HOOPER SERVICE
Plumbing
Heating & Cooling
Fire Protection

QUOTED PRICE FOR PLUMBING SERVICES | Wednesday, October 19, 2022

Attention	Brian Clepper
Email	brianclepper@alliantenergy.com
Address	W8375Murray Rd Pardeeville WI 53954
Phone	608.234.2770

From:	Kevin Thompson
Phone #	(608) 268.2151
Email	kthompson@hoopercorp.com
Fax #	(608) 249.7360

Number of pages (including this cover page):2

Hard Copy to Follow: No

RE: Columbia Landfill Jetting

Hooper Service Division is pleased to provide labor, material, and equipment to complete the following:

Base Bid – Plumbing

- **Jett existing underground waste lines approximately 300' in from each end of 600' runs**
- **Total of (6) 6" lines to be jetted**

Total Plumbing Base Bid…………………………………………………………………………..REDACTED

We have not included the following items that may be required to be furnished by others:

- ➢ UNFORSEEN CONDITIONS NOT REFLECTED IN THE ABOVE SCOPE
- ➢ QUOTE ASSUMES UNRESTRICTED ACCESS TO THE ABOVE SCOPE OF WORK – DELAYS DUE TO CONDITIONS NOT SPELLED OUT IN THE ABOVE SCOPE IS EXCLUDED FROM PRICING.

- Bond
- Parking fees
- Temporary utilities
- Temporary dust partitions
- Infection control barriers, fans, mats, etc.
- Off-hour labor costs.
- Ceiling removal or replacement for the installation of new plumbing.
- Electrical work for plumbing equipment
- Warranty on any owner supplied fixtures/equipment/materials.
- Roof openings and or patching.
- Design fees and State or City plan approval.
- Quote assumes existing valves are operational.

Please feel free to contact me with any questions or concerns at (608) 268-2151 or Kthompson@hoopercorp.com

Sincerely,

Kevin L. Thompson

Kevin Thompson
Plumbing Manager
Service Division – Credential # 230897

HOOPER
Service Division

Any alteration or deviation from the above specifications involving extra costs will be executed only upon written orders, and will become an extra charge over and above the quote.

ACCEPTANCE OF QUOTED PRICE

Please sign and return
The above prices, specifications and conditions are satisfactory and hereby accepted. You are authorized to proceed with the work as specified. I agree that payment will be made in full net 30 days from invoice date. Any alteration or deviation from the above specifications involving extra costs will be executed only upon written orders, and will become an extra charge over and above the quote.

Date:____________________ **Signature:**____ **P.O. number:**_________________

***QUOTED PRICE VALID FOR 30 DAYS**

POST–CONSTRUCTION
OVERALL SITE LAYOUT

MODULES 5 AND 6 LINER CONSTRUCTION
CONSTRUCTION DOCUMENTATION
COLUMBIA DRY ASH DISPOSAL FACILITY
TOWN OF PACIFIC, WISCONSIN

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

Wisconsin Power and Light Company
WISCONSIN POWER AND LIGHT
COLUMBIA ENERGY CENTER
W8375 MURRAY ROAD
PARDEEVILLE, WISCONSIN 53954

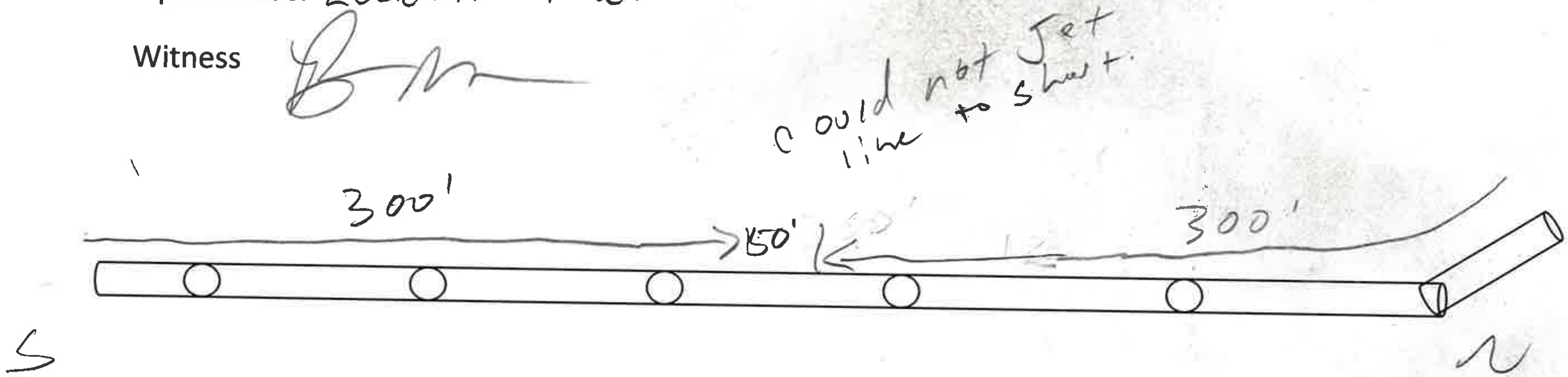
PROJECT NO.	25221134.00	DRAWN BY:	KF
DRAWN:	07/28/2021	CHECKED BY:	NRM
REVISED:	11/30/2021	APPROVED BY:	PSS 12/02/2021

SHEET 3 of 15

Date 10/31/22

Pipe Number Leachate line.

Witness

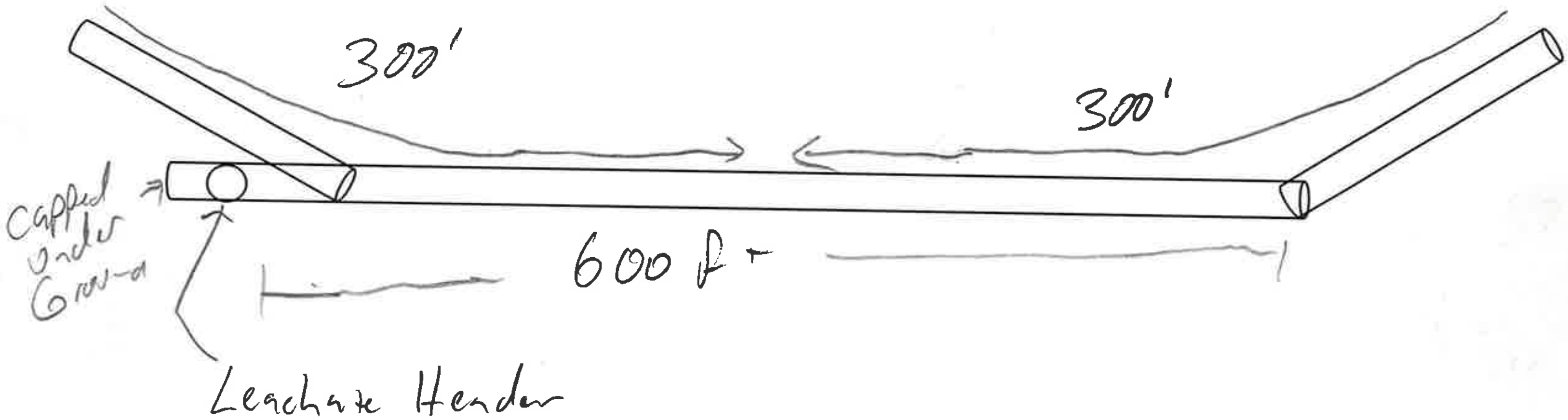


Comments: Approx 50 fee in line could not be Jetted. Started on South side & observed clear water on South when Jettin North Section.

Date 10/31/22

Pipe Number mod 2

Witness

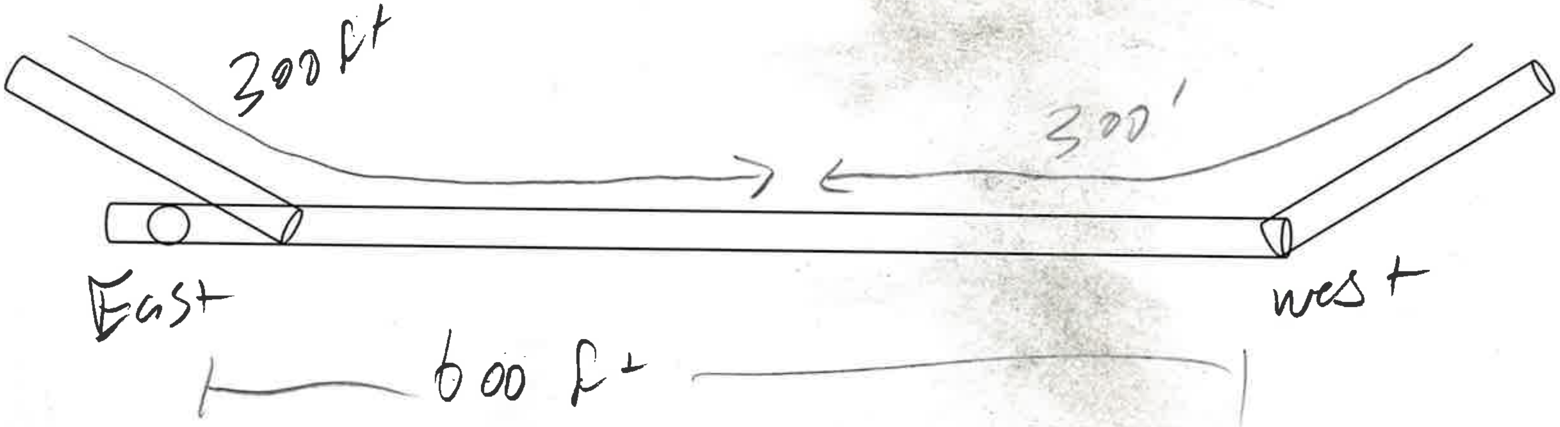


Comments - Black water observed at outlet.

Date 10/31/22

Pipe Number Mod 3

Witness

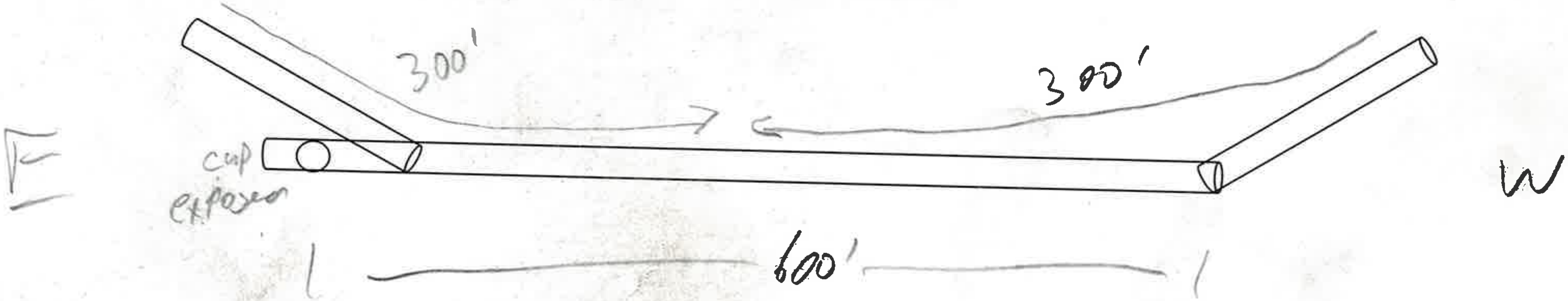


Comments : water obsued at Dock Pond outlet

Date 10/27/22

Pipe Number Mod 4

Witness

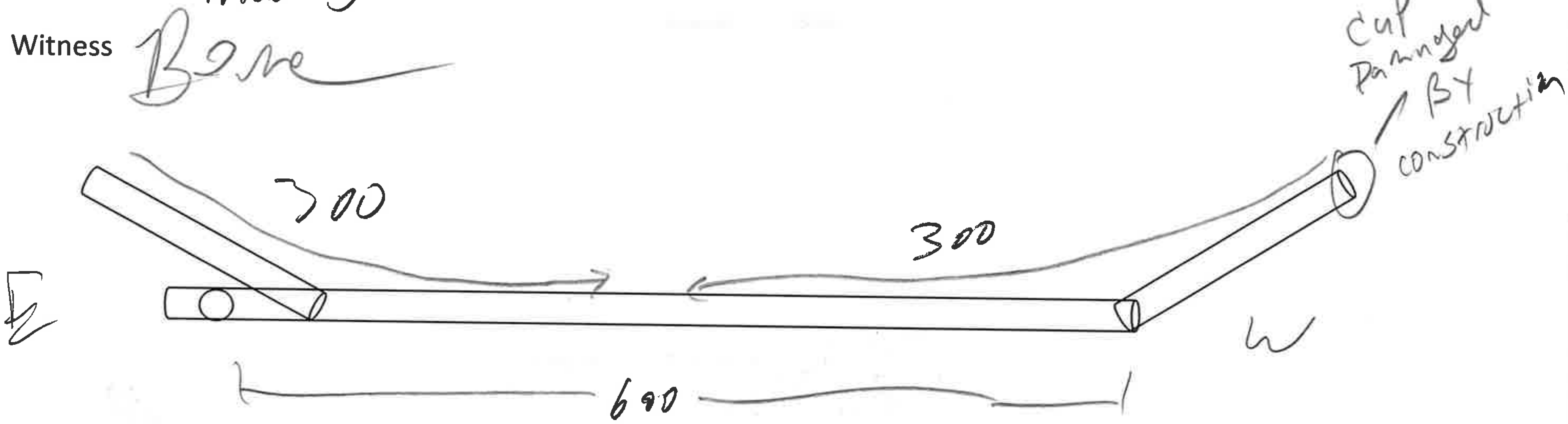


Comments : New Construction for Mod 10/11 on East side. Did not remove cup due to sand & linear work.

Date 10/31/22

Pipe Number Mod 5

Witness Bone

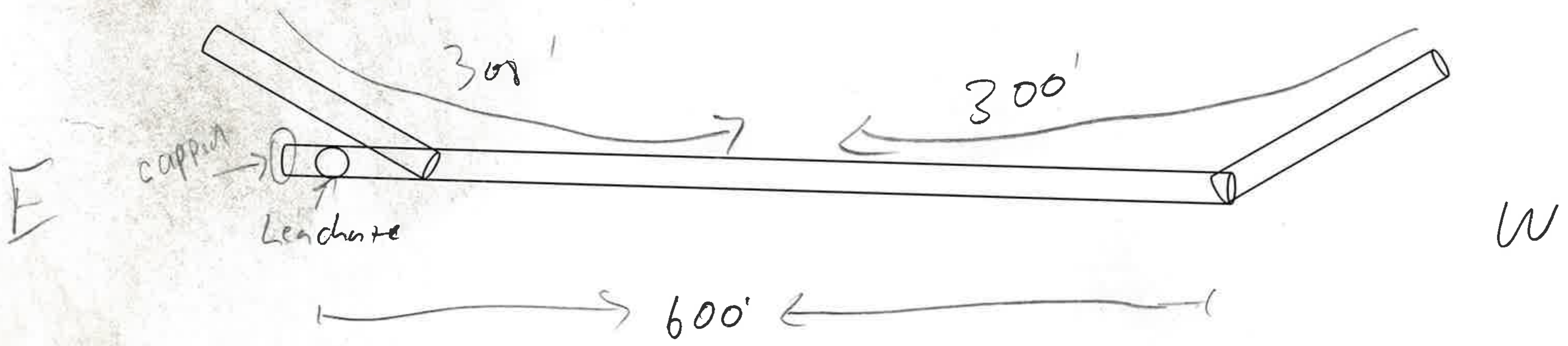


Comments Active Construction in Modual. HDPE Cap replaced

Date 10/31/22

Pipe Number mod 6

Witness



Comments: Dry