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November 24, 2020

Andrew Wheeler
Administrator
U.S. Environmental Protection Agency
1200 Pennsylvania Avenue, N.W.
Washington, DC 20460

Submitted electronically

Subject: **Request for site-specific alternative deadline to initiate closure of CCR surface impoundment pursuant to 40 CFR 257.103(f)(1) – *Revision 1***
Columbia Energy Center
Wisconsin Power and Light Company
Portage, Wisconsin

Mr. Wheeler:

On behalf of Wisconsin Power and Light Company (WPL), Alliant Energy is submitting the enclosed request for a site-specific alternative deadline to initiate closure of a CCR surface impoundment pursuant to 40 CFR 257.103(f)(1). This is a revised request in response to feedback from EPA. The enclosed demonstration includes documentation that the criteria in paragraphs §257.103(f)(1)(i) through (iii) have been met.

We appreciate EPA's consideration of this request and the assistance from EPA staff during the development of the enclosed information. Please contact me at (608) 458-3853 or jeffreymaxted@alliantenergy.com if you have any questions or need additional information.

Sincerely,

Jeff Maxted
Manager – Environmental Services
Alliant Energy

Enclosures

Cc: Kirsten Hillyer, Frank Behan, Richard Huggins – U.S. EPA
Matt Cole – Columbia Energy Center
Jeff Hanson, Marney Hoefer – Alliant Energy

Columbia Energy Center
CCR Surface Impoundment

Demonstration for a Site-Specific Alternative to Initiation of Closure Deadline

Wisconsin Power and Light Company

Columbia Energy Center

Project No. 127539

Revision 1
November 24, 2020

Burns & McDonnell

Columbia Energy Center
CCR Surface Impoundment

Demonstration for a Site-Specific Alternative to Initiation of Closure Deadline

Prepared for

Wisconsin Power and Light Company
Columbia Energy Center

Project No. 127539
Pardeeville, Wisconsin

Revision 1
November 24, 2020

Prepared by

Burns & McDonnell Engineering Company, Inc.
Kansas City, Missouri

INDEX AND CERTIFICATION

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Certification

I hereby certify, as a Professional Engineer in the State of Wisconsin, that the information in this document was assembled under my direct personal charge. This report is not intended or represented to be suitable for reuse by the Wisconsin Power and Light Company or others without specific verification or adaptation by the Engineer. I hereby certify that this Demonstration for a Site-Specific Alternate to Initiation of Closure Deadline was prepared for the Columbia CCR Surface Impoundment in accordance with standard engineering practices, and, based on my knowledge, information, and belief, the content of this Demonstration when developed in October 2020 is true and meets the requirements of 40 C.F.R. § 257.103(f)(1).

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Date: November 24th, 2020

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LIST OF ABBREVIATIONS

Abbreviation	**Term/Phrase/Name**
Alliant	Alliant Energy
BMcD	Burns & McDonnell
CCR	Coal Combustion Residual
CFR	Code of Federal Regulations
Columbia	Columbia Energy Center
ELG Rule	Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category
EPA	Environmental Protection Agency
FGD	Flue gas desulfurization
Gpm	Gallons per minute
POTW	Publicly-Owned Treatment Works
PSD	Prevention of Significant Deterioration
RDCC	Remote Drag Chain Conveyor
RCRA	Resource Conservation and Recovery Act
SDA	Spray Dryer Absorber
WPL	Wisconsin Power and Light Company

1.0 EXECUTIVE SUMMARY

On April 17, 2015, the Environmental Protection Agency (EPA) issued the federal Coal Combustion Residual (CCR) Rule, 40 C.F.R. Part 257, Subpart D, to regulate the disposal of CCR materials generated at coal-fueled electric generating units. The rule is being administered under Subtitle D of the Resource Conservation and Recovery Act (RCRA, 42 U.S.C. § 6901 *et seq*.).

On August 28, 2020, the EPA Administrator issued revisions to the CCR Rule that require all unlined surface impoundments to cease receipt of CCR and non-CCR waste and initiate closure by April 11, 2021, unless an alternative deadline is requested and approved. 40 C.F.R. § 257.101(a)(1) (85 Fed. Reg. 53,516, 53,561 (Aug. 28, 2020)). Specifically, owners and operators of a CCR surface impoundment may seek and obtain an alternative closure deadline by demonstrating that there is currently no alternate capacity available on or off-site and that it is not technically feasible to complete the development of alternative capacity prior to April 11, 2021. 40 C.F.R. § 257.103(f)(1). To make this demonstration, the facility is required to provide detailed information regarding the process the facility is undertaking to develop the alternative capacity. 40 C.F.R. § 257.103(f)(1). Any extensions granted cannot extend past October 15, 2023, except an extension can be granted until October 15, 2024, if the impoundment qualifies as an "eligible unlined CCR surface impoundment" as defined by the rule. 40 C.F.R. § 257.103(f)(1)(vi). Regardless of the maximum time allowed under the rule, EPA explains in the preamble to the Part A rule that each impoundment "must still cease receipt of waste as soon as feasible, and may only have the amount of time [the owner/operator] can demonstrate is genuinely necessary." 85 Fed. Reg. at 53,546.

On behalf of its subsidiary utility, Wisconsin Power and Light Company (WPL), Alliant Energy (Alliant) is submitting this Demonstration for a Site-Specific Alternative to Initiation of Closure Deadline pursuant to 40 C.F.R. § 257.103(f)(1) for the Primary Ash Pond at the Columbia Energy Center (Columbia), located near Pardeeville, Wisconsin. Columbia is jointly owned by WPL, Wisconsin Public Service Corporation, and Madison Gas and Electric Company. Columbia is operated by WPL. Columbia is a two-unit, 1,150-megawatt (585 each unit) coal-fired facility that burns Powder River Basin coal. Columbia has two CCR surface impoundments, known as the Primary Ash Pond and Secondary Ash Pond and an existing CCR landfill. The Primary Ash Pond receives both CCR and non-CCR wastestreams. The Secondary Ash Pond is an inactive impoundment that has not received CCR since 2004 and no longer receives wastestreams from the plant. The original ash pond was constructed between 1972 and 1974 during the initial development of the power plant and reconfigured in 1977 as the primary fly ash settling basin (which has been closed and is regulated as a closed landfill that is not subject to the CCR Rule) and the secondary settling basin (which includes the Primary and Secondary Ash Pond footprints). The secondary settling basin was reconfigured again in 1981 to match the current arrangements discussed in more detail below. **WPL has elected to convert to dry ash handling at Columbia, redirect the non-CCR wastestreams to other plant systems, and cease all wastestreams to the Primary Ash Pond by October 31st, 2022.**

To obtain an alternative closure deadline under 40 C.F.R. § 257.103(f)(1), a facility must meet the following three criteria:

1. § 257.103(f)(1)(i) - There is no alternative disposal capacity available on-site or off-site. An increase in costs or the inconvenience of existing capacity is not sufficient to support qualification;
2. § 257.103(f)(1)(ii) - Each CCR and/or non-CCR wastestream must continue to be managed in that CCR surface impoundment because it was technically infeasible to complete the measures necessary to obtain alternative disposal capacity either on or off-site of the facility by April 11, 2021; and
3. § 257.103(f)(1)(iii) - The facility is in compliance with all the requirements of the CCR Rule.

To demonstrate that the first two criteria above have been met, 40 C.F.R. § 257.103(f)(1)(iv)(A) requires the owner or operator to submit a work plan that contains the following elements:

- A written narrative discussing the options considered both on and off-site to obtain alternative capacity for each CCR and/or non-CCR wastestreams, the technical infeasibility of obtaining alternative capacity prior to April 11, 2021, and the option selected and justification for the alternative capacity selected. The narrative must also include all of the following:
    - An in-depth analysis of the site and any site-specific conditions that led to the decision to select the alternative capacity being developed;
    - An analysis of the adverse impact to plant operations if the CCR surface impoundment in question were to no longer be available for use; and
    - A detailed explanation and justification for the amount of time being requested and how it is the fastest technically feasible time to complete the development of the alternative capacity.
- A detailed schedule of the fastest technically feasible time to complete the measures necessary for alternate capacity to be available including a visual timeline representation. The visual timeline must clearly show all of the following:
    - How each phase and the steps within that phase interact with or are dependent on each other and the other phases;
    - All of the steps and phases that can be completed concurrently;

  - The total time needed to obtain the alternative capacity and how long each phase and step within each phase will take; and
  - At a minimum, the following phases: engineering and design, contractor selection, equipment fabrication and delivery, construction, and start up and implementation.
- A narrative discussion of the schedule and visual timeline representation, which must discuss the following:
  - Why the length of time for each phase and step is needed and a discussion of the tasks that occur during the specific step;
  - Why each phase and step shown on the chart must happen in the order it is occurring;
  - The tasks that occur during each of the steps within the phase; and
  - Anticipated worker schedules.
- A narrative discussion of the progress the owner or operator has made to obtain alternative capacity for the CCR and/or non-CCR wastestreams. The narrative must discuss all the steps taken, starting from when the owner or operator initiated the design phase up to the steps occurring when the demonstration is being compiled. It must discuss where the facility currently is on the timeline and the efforts that are currently being undertaken to develop alternative capacity.

To demonstrate that the third criterion above has been met, 40 C.F.R. § 257.103(f)(1)(iv)(B) requires the owner or operator to submit the following information:

- A certification signed by the owner or operator that the facility is in compliance with all of the requirements of 40 C.F.R. Part 257, Subpart D;
- Visual representation of hydrogeologic information at and around the CCR unit(s) that supports the design, construction and installation of the groundwater monitoring system. This includes all of the following:
  - Map(s) of groundwater monitoring well locations in relation to the CCR unit(s);
  - Well construction diagrams and drilling logs for all groundwater monitoring wells; and
  - Maps that characterize the direction of groundwater flow accounting for seasonal variations.
- Constituent concentrations, summarized in table form, at each groundwater monitoring well monitored during each sampling event;
- A description of site hydrogeology including stratigraphic cross-sections;
- Any corrective measures assessment conducted as required at § 257.96;
- Any progress reports on corrective action remedy selection and design and the report of final remedy selection required at § 257.97(a);

- The most recent structural stability assessment required at § 257.73(d); and
- The most recent safety factor assessment required at § 257.73(e).

2.0 WORKPLAN

To demonstrate that the criteria in 40 C.F.R. § 257.103(f)(1)(i) and (ii) have been met, the following is a workplan, consisting of the elements required by § 257.103(f)(1)(iv)(A). Specifically, this workplan documents that there is no alternative capacity available on or off-site for each of the CCR and/or non-CCR wastestreams that WPL plans to continue to manage in the Primary Ash Pond and discusses the options considered for obtaining alternative disposal capacity. The workplan provides a detailed schedule for the conversion project, including a narrative description of the schedule and an update on the progress already made toward obtaining the alternative capacity. In addition, the narrative includes an analysis of the site-specific conditions that led to the decision to convert to dry handling and an analysis of the adverse impact to plant operations if Columbia were no longer able to use the Primary Ash Pond.

2.1 No Alternative Disposal Capacity and Approach to Obtain Alternative Capacity - § 257.103(f)(1)(iv)(A)(1)

A summary of pertinent pond data is provided in Table 2-1. A site plan can be found on Figure 1 in Appendix A and a site water balance diagram can be found on Figure 2 in Appendix A.

Table 2-1: Columbia CCR Surface Impoundment Summary

CCR Surface Impoundment Name	Year Placed in Service	Impoundment Size (acres) / Storage Volume (cubic yards)	Lined?	Meets Location Restrictions?	Groundwater Status
Primary Ash Pond	1974	14.7 / 330,000	No	Does not meet aquifer separation.	Assessment Monitoring was initiated in July 2018 and is ongoing. No exceedances of Appendix IV parameters have been identified.
Secondary Ash Pond	1974	9.6 / 185,000	No	Does not meet aquifer separation	Assessment Monitoring was initiated in January 2020 and is ongoing. No exceedances of Appendix IV parameters have been identified.

2.1.1 CCR Wastestreams

WPL evaluated each CCR wastestream placed in the Primary Ash Pond at Columbia. Columbia does not currently have additional ponds, tanks, or other treatment systems that can accept these CCR and Non-CCR wastestreams on site. The onsite landfill is not permitted to accept wet-managed wastes. In addition, there are no existing pipelines to convey these wastestreams to a suitable water treatment facility. Further, it would require approximately 47 mobile frac tanks and 130 trucks per day to haul this amount of wastewater to an offsite facility. The large number of interconnections results in an increased risk for leaks that would be considered an unauthorized bypass in the facility's wastewater discharge permit. Further, this amount of truck traffic poses significant safety risk and increases the potential for fugitive dust, greenhouse gas emissions, and carbon footprint which may require a Prevention of Significant Deterioration (PSD) permit and modification under the Clean Air Act Permit Program if the calculated increase in emissions are over the PSD limits. The following CCR wastestreams shown in Table 2-2 must continue to be placed in the Primary Ash Pond due to lack of alternative capacity both on and off-site.

Table 2-2: Columbia CCR Wastestreams

CCR Wastestream	Average Flow (gpm)	Description	WPL Notes
Bottom Ash	660	Bottom ash is currently sluiced to the Primary Ash Pond where it is either removed for beneficial use or remains for disposal. The sluice water is then recirculated back to the bottom ash system.	A new dry bottom ash system (Remote Drag Chain Conveyor (RDCC) System) will be installed. Ash will be collected and sent offsite for beneficial use and/or transported to a nearby onsite landfill. This wastestream will cease flow to the Primary Ash Pond by the requested October 31, 2022 site specific deadline to initiate closure.
Economizer Ash	18	Economizer ash is currently handled with the bottom ash.	Economizer ash system will be handled with the new dry bottom ash system. This wastestream will cease flow to the Primary Ash Pond by the requested October 31, 2022 site specific deadline to initiate closure.
Pyrites (non-CCR but handled with CCR wastestreams)	3	Pyrites are currently handled with the bottom ash.	Pyrites system will be handled with the new dry bottom ash system. This wastestream will cease flow to the Primary Ash Pond by the requested October 31, 2022 site specific deadline to initiate closure.

2.1.2 Non-CCR Wastestreams

WPL evaluated each non-CCR wastestream placed in the Primary Ash Pond at Columbia. For the reasons discussed below, the following non-CCR wastestreams shown in Table 2-3 must continue to be placed in the Primary Ash Pond due to lack of alternative capacity both on and off-site. The existing site water balance is included in Appendix A of this Demonstration (see Figure 2).

Table 2-3: Columbia Non-CCR Wastestreams

Non-CCR Wastestream	Average Flow (gpm)	Description	WPL Notes
Chemical Waste Sumps	34	Collects flows from multiple sources including Demin Waste, RO Reject, and miscellaneous equipment drains. Flows are pumped to Primary Ash Pond.	These flows will require relocation to the condensate sump which currently flows to the cooling pond via Outfall 301. An option to recycle this flow to the existing scrubber will also be included. These modifications will be completed prior to the requested October 31, 2022, site specific deadline to initiate closure.
Air Heater (AH) Wash Sump Discharges	215	Collects flow from multiple sources including boiler blowdown and fly ash exhauster seal water. Flows are pumped to the Primary Ash Pond.	The air heater wash sump flows will require relocation to the condensate sump which currently flows to the cooling pond and to Outfall 301. An option to recycle this flow to the existing scrubber will also be included. These modifications will be completed prior to the requested October 31, 2022, site specific deadline to initiate closure.
Boiler Room Sump Discharges	362	Collects flow from multiple sources including fire protection, condenser priming, tripper floor washdown, refractory cooling, ash hopper seal water, and miscellaneous drains. Flows are pumped to the Primary Ash Pond	The boiler sump flows will be relocated to the RDCC high recycle system to comply with the ELG Rule. These modifications will be completed prior to the requested October 31, 2022, site specific deadline to initiate closure.
Duck Pond	10	Collects flows from the landfill runoff and leachate. Flows are hauled via truck to the Primary Ash Pond.	These flows will be routed to the FGD system for use as make-up water and be evaporated in the SDA. This is not currently possible by hauling to the facility sumps, so a new conveyance must be identified and placed into service. These modifications will be completed prior to the requested October 31, 2022, site specific deadline to initiate closure.

These wastestreams cannot currently be rerouted to other non-CCR impoundments onsite (Duck Pond, Frog Pond, Coal Pile Runoff Pond, and Cooling Pond) without developing this onsite alternative capacity further. The site discharge permit would need to be modified, and significant plant modifications will be required, including the addition of sumps, pumps, piping, and associated power supply systems. The boiler room sump flows must be incorporated into a high recycle rate system to comply with the Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category (ELG Rule).

WPL has evaluated off-site disposal options for the large volume of non-CCR wastestreams and determined that such disposal is not feasible. WPL has not yet identified a publicly-owned treatment works (POTW) that will accept these wastestreams. Off-site disposal also would require on-site temporary storage (such as frac tanks), the installation of sumps/pumps/piping/and power supply to reroute these flows to that temporary storage, permit modifications with external sources (if a POTW can be identified to receive these flows), and significant daily tanker truck traffic driving an unknown distance across Wisconsin roadways if a POTW could even be identified and contracted to receive it. The numbers of tanks and trucks are summarized as follows for each non-CCR wastestream:

- Chemical Waste Sumps (34 gpm): This flow would require approximately 3 frac tanks onsite and 7 daily trucks, at 21,000 gallons and 7,500 gallons each.
- Air Heater Wash Sump (215 gpm): This flow would require approximately 15 frac tanks onsite and 41 daily trucks.
- Boiler Room Sumps (362 gpm): This flow would require approximately 25 frac tanks onsite and 70 daily trucks.
- Duck Pond (10 gpm): This flow would require approximately 2 daily trucks, with significant increases during and after rain events. WPL is not currently permitted to discharge this water at a POTW. WPL will continue to engage POTWs to identify options for hauling excess landfill storm water when required, and if a POTW option is identified this flow may be temporarily re-routed until an on-site conveyance to the SDA is placed into service.

This frac tank traffic as well as the significant daily tanker truck volume for offsite disposal (total of 120 trucks per day during normal operations with increases during rain events) would result in increased potential for safety and noise impacts and further increases in fugitive dust, greenhouse gas emissions and carbon footprint which may require a PSD permit and modification under the Clean Air Act Permit Program if the calculated increase in emissions are over the PSD limits.

2.1.3 Site-Specific Conditions Supporting Alternative Capacity Approach - § 257.103(f)(1)(iv)(A)(1)(i)

The plant has adequate space available for the installation of a Remote Drag Chain Conveyor (RDCC) System and has selected this solution as the preferred alternative for compliance with the federal CCR Rule. The selected solution also maintains Columbia's current compliance with the Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category (ELG Rule) because the facility does not discharge wastewater to Waters of the United States and this solution does not create any new outfalls to surface water. As shown on Figure 1 in Appendix A, Columbia is bounded by the Wisconsin River and Duck Creek to the north and west, Columbia Lake (i.e. the Cooling Pond) to the South, and the Canadian Pacific Railway and US Highway 51 to the east. There are no locations outside of the areas currently supporting the plant that are able to satisfy the location restriction requirements of the CCR Rule. Specifically, peripheral undeveloped areas are primarily wetland and do not have adequate separation from the uppermost aquifer and are therefore not suitable for development as an alternative CCR unit or for the use of other alternative infrastructure. Further, the remaining impoundments onsite (Duck Pond, Frog Pond, Coal Pile Runoff Pond, and Cooling Pond) are not authorized to receive CCR material by the facility NPDES permit, are not adequately sized for managing wastewaters, and also would not meet all Location Restrictions for CCR units. The site discharge permit would need to be modified, and significant plant modifications would be required (sumps, pumps, piping, and associated power supply systems) to redirect non-CCR wastestreams to these locations, or to redirect these flows to frac tanks and load into trucks for offsite disposal. Consequently, in order to continue to operate and generate electricity, Columbia must continue to use the Primary Ash Pond for treatment of both CCR and non-CCR wastestreams until the plant can be retrofitted with a dry bottom ash handling system, and non-CCR process flows can be redirected away from the impoundment. As EPA explained in the preamble of the 2015 rule and described within this demonstration, it is not possible for sites that sluice CCR material to an impoundment to eliminate the impoundment and dispose of the material offsite. *See* 80 Fed. Reg. 21,301, 21,423 (Apr. 17, 2015) ("[W]hile it is possible to transport dry ash off-site to [an] alternate disposal facility that is simply not feasible for wet-generated CCR. Nor can facilities immediately convert to dry handling systems."). WPL recognizes this fact and agrees with the EPA that offsite disposal is not an option for Columbia. There are no treatment facilities nearby that have confirmed the ability to accept CCR flows, nor is it feasible to transport the large volume of CCR and non-CCR wastestreams. A pipeline of that length is not feasible and further, would require over 250 trucks per day. WPL has determined it is not feasible to haul this amount of wastewater per day to an offsite facility.

2.1.4 Impact to Plant Operations if Alternative Capacity Not Obtained – § 257.103(f)(1)(iv)(A)(1)(ii)

As described in Sections 2.1.1, 2.1.2, and 2.1.3 of this demonstration, in order to continue to operate, generate electricity, and comply with both the CCR Rule and the discharge permit conditions, Columbia must continue to use the Primary Ash Pond for treatment of both CCR and non-CCR wastestreams until alternate disposal capacity can be developed. If the Primary Ash Pond was removed from service on April 11, 2021, Columbia would be required to cease operation during the conversion of the units or fail to be in compliance with EPA regulations administered under RCRA and the Clean Water Act. Forcing Columbia offline for an extended period would introduce substantial electric grid reliability concerns, and the impact of these concerns must be considered when assessing the need for additional time to install the dry ash handling system. To continue operation of Columbia, WPL must be allowed additional time to complete the following primary activities in order to cease routing flow to the Primary Ash Pond:

- Installation of a RDCC, storage bunker, and ancillary equipment.
- Reroute of all remaining non-CCR wastestreams to the condensate sump and FGD system.

2.1.5 Options Considered Both On and Off-Site to Obtain Alternative Capacity

The options considered for alternative disposal capacity of the wastestreams currently routed to the Primary Ash Pond are summarized in Table 2-4. For additional details on the CCR and non-CCR wastestreams, please refer to Table 2-2 and Table 2-3, respectively.

Table 2-4: Alternatives for Disposal Capacity

Alternative Capacity Technology	Average Time to Construct (Months)[1]	Feasible at Columbia?	Selected?	WPL Notes
Conversion to dry handling	33.8	Yes	Yes	In October 2020, WPL identified the Remote Drag Chain Conveyor system as the fastest feasible technology that can be implemented and therefore enable the discontinuation of CCR and non-CCR discharges to the Primary Pond. The bottom ash conversion is being performed and design is underway. WPL expects to complete this project in a total of 24 months, which is faster than EPA's average estimate and is primarily driven by the lead time of the RDCC.

Alternative Capacity Technology	Average Time to Construct (Months)[1]	Feasible at Columbia?	Selected?	WPL Notes
Non-CCR wastestream basin	23.5	No	No	Construction of a new non-CCR impoundment in undeveloped peripheral areas would result in substantial impacts to jurisdictional waters that would extend the compliance schedule for Columbia. This option is not required for WPL since the existing FGD system, the condensate sump, and the new RDCC will have the capacity to receive the non-CCR wastestreams (following redirection of these streams).
Wastewater Treatment Facility	22.3	NA	No	This system is not required for WPL. Since the site does not discharge any process wastestreams, this treatment would not provide a benefit. Columbia needs to provide adequate storage for reuse of its wastestreams.
New CCR surface impoundment	31	No	No	Discharges from a new impoundment would not comply with the facility's NPDES permit or the ELG Rule. Construction of a surface impoundment in undeveloped peripheral areas would result in substantial impacts to jurisdictional waters.
Retrofit of a CCR surface impoundment	29.8	Yes	No	Since the current CCR impoundment does not meet location restrictions, this is only feasible if the area is modified to meet the aquifer separation requirement. However, if additional fill were incorporated to meet aquifer separation criteria, this timeframe would be longer than the selected solution. Thus, this is not the fastest technically feasible solution and therefore does not comply with the rule requirements.
Multiple technology system	39.1	Yes	Yes	This is being implemented for WPL on a faster schedule than the EPA average timeframe. Since the existing FGD system, the condensate sump, and the new RDCC will have the capacity to receive the non-CCR wastestreams, WPL will make modifications to the plant systems to redirect these streams. Dry handling of the CCR wastestreams should provide the necessary compliance needs on the fastest feasible schedule for the site.
Temporary treatment system	Not defined	No	No	These systems are not proven for CCR management in the industry and would not realistically provide the required non-CCR wastewater storage capacity to replace the Primary Ash Pond.

[1]From Table 3. See 85 Fed. Reg. at 53,534.

2.1.6 Approach to Obtain Alternative Capacity

WPL plans to convert to dry handling of all CCR at Columbia and redirect the non-CCR wastestreams to the FGD system, the condensate sump, and the new ash handling system. In August 2019, WPL hired Burns & McDonnell (BMcD) to evaluate potential options for bottom ash handling that maintain the facility's compliance with the ELG Rule. The options considered are described in Table 2-5, below.

Table 2-5: Alternatives Considered for CCR wastestreams

System	Technology	Practicability or Feasibility for Columbia
Bottom Ash	Under Boiler Drag Chain Conveyor System	Feasible
Bottom Ash	Under Boiler Compact Submerged Conveyor	Feasible
Bottom Ash	Remote Drag Chain Conveyor System	Feasible
Bottom Ash	Dry Belt/Tray Conveying System	Feasible
Bottom Ash	Pneumatic Conveying System	Feasible
Bottom Ash	Remote Settling Basins	Feasible; intensive labor efforts required and both water balance and safety concerns.

As part of the review, BMcD recommended conversion to a "dry" bottom ash handling system based on new RDCC systems that were introduced in the ash handling system market in 2020. Of the feasible technology options presented in Table 2-5, this alternative is the fastest to implement for both units at Columbia and is expected to have the shortest plant outage requirement (and not sequential outages) as it will not require removal and replacement of the current bottom ash hoppers. During the installation of the RDCC, the Primary Ash Pond will need to receive CCR and/or non-CCR wastestreams similar to the existing configuration; however, once the modifications are complete, the Primary Ash Pond can be removed from service and closed.

For the dry bottom ash handling conversion at Columbia, a new RDCC system would modify the boiler hopper ash sluicing system. During operation, bottom ash falls from the boiler into the hopper and is routed through the crusher. The crushed ash is sluiced to the RDCC, which consists of a submerged chain with metal flight bars that drag ash along the bottom of the conveyor to the inclined "dewatering" section. The dewatering section contains a chain conveyor that pulls bottom ash up an inclined ramp while water gravity drains back into the RDCC. The inclined ramp drops dewatered ash into a bottom ash bunker. Typically, ash collects in the bunker and is loaded into haul trucks with a front-end loader.

Economizer ash handling will remain unchanged and continue to sluice to the bottom ash sluice line and comingled with bottom ash in the RDCC and deposited in the bunker with the bottom ash. Pyrites handling will also remain unchanged and continue to sluice to the bottom ash sluice line and comingled with bottom ash in the RDCC and deposited in the bunker with the bottom ash.

Overflow water from the RDCC, will flow to two (2) mobile clarifiers and then be recirculated back to the bottom ash system users. The bottom ash system will operate in a closed loop with no discharge to site outfalls. A stream to regulate water chemistry may be installed if required and routed to the FGD system as make-up water and make-up water is then evaporated in the existing scrubbers.

Per the BMcD ELG compliance review, conversion to a dry bottom ash handling system such as the RDCC system at Columbia would include the following general scope:

- Install RDCC, clarifiers, chemical injection system, and the following pumps: recirculating high pressure water return pumps, clarifier underflow pumps, new dewatering sump pump, and scrubber feed pumps. This system will receive all of the flows outlined in Table 2-2 as well as the boiler room sump flows in Table 2-3, which must be recirculated to comply with the ELG Rule.
- Install smaller 8” sluice lines and jet nozzles to the RDCC and bottom ash hopper.
- Install a new concrete bunker equipped with drainage trenches.
- Install new equipment building.
- All bottom ash produced will be sent to beneficial reuse or to the onsite landfill.

Additionally, WPL will need to redirect the remaining non-CCR process flows to the new ash handling system, the existing condensate sump, or the existing FGD system prior to or concurrent with the elimination of the bottom ash transport water to allow for initiation of the Primary Ash Pond closure. The redirects will require modifications to the site discharge permit, piping modifications to the plant, and implementation of the new systems being developed during this project. Chemical sumps, Air preheater and duck pond water redirects require plant outages and will be rerouted in the scheduled fall 2022 outage. Boiler room sump water redirects required the installation of the RDCC and will be rerouted in the scheduled fall 2022 outage.

2.1.7 Technical Infeasibility of Obtaining Alternative Capacity prior to April 11, 2021

Based on the foregoing facts, WPL cannot cease all CCR and non-CCR wastestreams and initiate closure of the Primary Ash Pond until the wet-to-dry ash handling conversion is complete. WPL began its selected compliance project execution for Columbia with scoping studies in 2019 and is developing specifications to procure the necessary long-lead equipment items. This work is in progress but is not yet complete. It is not technically feasible to procure the equipment, perform the necessary detailed design, and complete the pre-outage construction activities before the scheduled Spring 2021 outage. The conversion is forecasted to be completed during fall outages that are currently scheduled for each unit. Consequently, it is not possible to implement the measures discussed above in a way that would be successful by April 11, 2021.

The conditions at Columbia demonstrate that no alternative disposal capacity is available on-site or off-site, satisfying the requirement of 40 CFR 257.103(f)(1)(i), and WPL respectfully requests a site-specific extension of the deadline to initiate closure of the Primary Ash Pond until October 31, 2022, the date on which discharges of all CCR and non-CCR wastestreams are expected to end.

2.1.8 Justification for Time Needed to Complete Development of Alternative Capacity Approach – § 257.103(f)(1)(iv)(A)(1)(iii)

The schedule for developing alternative disposal capacity is described in more detail in Sections 2.2 and 2.3. The schedule milestones and current progress are summarized in Table 2-6 below. WPL is requesting an alternative site-specific deadline of October 31, 2022, to cease receipt of wastestreams in the Primary Ash Pond and initiate closure of that CCR unit. The primary factors affecting the compliance schedule at Columbia is the lead time of equipment and outages that must be scheduled to coincide with seasonal fluctuations in electrical demand. Scheduled outages at Columbia typically occur in the spring or fall based on generation capacity in Wisconsin and the grid operator (MISO) does not typically allow WPL to adjust these outages or perform them in the summer months. If WPL were to consider alternative temporary solutions to allow for the Primary Ash Pond to be removed from service, such a measure would require the use of approximately 90 frac tanks. These tanks would require significant site development for containment measures and significant interconnecting piping which would propose an unacceptable potential for leaks. Furthermore, assuming a solids content of 1% in the comingled wastestreams, approximately 5 of these frac tanks would need to be removed and replaced each day. Relocating flows to these frac tanks would require similar plant modifications as outlined for the selected solution, as well as coordination and permitting with external sources (such as regional POTW facilities) that would likely extend the overall compliance schedule. WPL believes the schedule provided represents the fastest technically feasible timeframe for compliance at Columbia, driven primarily by the lead time of the RDCC. Moreover, the project duration of approximately 24 months from the current stage of scope development (development of technical specifications for the procurement of the major equipment) until startup of the dry ash handling system is faster than the average dry ash conversion timeline identified by EPA in the final Part A rule (see Table 3, 85 Fed. Reg. at 53,534).

Table 2-6: Compliance Project Progress Milestones

Year or Progress Reporting Period	Status	Milestone Description	WPL Notes
2020	Completed	Selection of dry ash handling solution and preparation of request for alternate site-specific deadline for initiation of closure of the Primary Ash Pond.	The bottom ash, economizer ash, and pyrites wastestreams will be handled dry in the scheduled major outage in the Fall of 2022.
2020	On Schedule	Detailed scope development and specifications for EPC dry bottom ash equipment and installation	
April 30, 2021		Initiate NPDES permitting December 2020. Finalize required project approvals for project based on budget estimate, issue and award EPC Contract.	Project requires approvals from the Wisconsin Public Service Commission and all current co-owners of Columbia before the project can commence. EPC contractor commences detailed design for conveyors and BOP systems, and initiation of permitting activities
October 31, 2021		Approve vendor submittals and commence fabrication of RDCC	
April 30, 2022		Commence below grade construction	Allows contractors to procure necessary commodities to support pre-outage construction before the Fall 2022 major outage.
October 31, 2022		Completion of dry bottom ash conversion and re-route of non-CCR wastestreams	Normal flows of CCR wastewater to the Primary Ash Pond will cease by this date. Non-CCR wastestreams will be routed to the condensate sump or FGD System as described in Table 2-3. Punchlist items will be underway, but the unit will be started up and operating the new dry ash handling system as of October 31, 2022. WPL will no longer be routing wastestreams to the Primary Ash Pond.

2.2 Detailed Schedule to Obtain Alternative Disposal Capacity - § 257.103(f)(1)(iv)(A)(2)

The required visual timeline representation of the schedule is included in Appendix B of this demonstration and described further in Section 2.3 below.

2.3 Narrative of Schedule and Visual Timeline - § 257.103(f)(1)(iv)(A)(3)

The third section for the workplan is a "detailed narrative of the schedule and the timeline discussing all the necessary phases and steps in the workplan, in addition to the overall timeframe that will be required to obtain capacity and cease receipt of waste." 85 Fed. Reg. at 53,544. As EPA explained in the preamble to the Part A rule, this section of the workplan must discuss "why the length of time for each phase and step is needed, including a discussion of the tasks that occur during the specific stage of obtaining alternative capacity. It must also discuss the tasks that occur during each of the steps within the phase." 85 Fed. Reg. at 53,544. In addition, the schedule should "explain why each phase and step shown on the chart must happen in the order it is occurring and include a justification for the overall length of the phase" and the "anticipated worker schedule." 85 Fed. Reg. at 53,544. EPA notes the overall "discussion of the schedule assists EPA in understanding why the time requested is accurate." 85 Fed. Reg. at 53,544

Outage: The primary activity impacting the project schedule is the outage time required for installation of the dry ash handling system. There is a significant amount of work that is scheduled to take place during the unit outage, including removing the existing ash sluicing equipment, installing the new ash piping and jet nozzles, completing piping ties, completing electrical ties, and performing startup of the new equipment and tuning of the ash handling systems. Scheduled outages at Columbia typically occur in the spring or fall to accommodate seasonal variations in electrical demand; based on generation capacity in Wisconsin, the grid operator (MISO) does not typically allow WPL to adjust these outages or perform them in the summer months. Thus, the opportunities to perform significant outage work are limited to specific periods in the spring and fall of each year. It is not feasible to place the system in service to meet the Fall 2021 or Spring of 2022 outage given the steps required for internal project approvals, the permitting efforts required for the project, and the lead time required for the equipment (which has not yet been bid but typically takes 9-12 months at minimum). Thus, the earliest feasible opportunity to perform the required outage work is during the Fall of 2022. The current schedule in Appendix B allows for a longer lead time but is focused on completion of the design, delivery of the equipment, and completion of pre-outage construction in advance of the Fall 2022 outage.

Design, Procurement, and Permitting Activities: WPL hired BMcD to develop preliminary engineering, a Level 2 schedule, and EPC specification to support the proposed dry bottom ash conversion project. This effort typically requires one month to get budgetary quotes from equipment suppliers and local subcontractors and firm up project scope as well as preparing specifications to procure the necessary ash handling equipment (which is part of the critical path for the project). Following the completion of the project budget, approvals of all co-owners, and issuance of a Certificate of Authority (CA) from the Public

Service Commission of Wisconsin (PSCW), WPL will award a contract for the Engineering, Procurement, and Construction (EPC) for the total project including all required equipment. WPL has included four weeks to bid the equipment contract and two months to select the preferred supplier and negotiate the contract terms for the EPC. The CA will be submitted to the PSCW by December 31, 2020 and the approval process typically takes 6 full months with anticipated approval by early July 2021.

The balance of plant (BOP) design will be completed by EPC Company which will procure Geotech, site survey and pilot trenching services to support detailed engineering while the equipment vendor prepares the initial submittals for their scope of supply. These submittals are usually received two to three months after equipment award and after these submittals are approved, the vendor typically starts with fabrication and the engineer begins the detailed design effort based on this information. Design will proceed, and the fabrication will be scheduled to support delivery of the equipment in the pre-outage construction period. The typical lead time on this equipment is 12-15 months; however, WPL expects this lead time to increase in the coming months as much of the industry will be procuring similar equipment. If the lead time grows beyond what is allotted due to increased demand from industry, it could affect WPL’s ability to get the conveyors onsite in time to support pre-construction activities for the Fall 2022 outage. This risk is reduced by awarding an EPC Company the BOP design with guarantees on schedule as shown in the current project schedule.

The EPC Company will prepare bid documents for site preparation and below-grade construction, controls equipment, above-grade mechanical/structural construction, and above-grade electrical construction. WPL has included three weeks for the EPC Company to review, address comments, and issue each contract. The construction packages can be issued and awarded sequentially as allowed by the design process. The bid and award of the construction contracts by the EPC Company will be performed concurrently with acquiring the necessary permits for this project and must be completed as necessary to support the pre-outage construction. These construction contracts will purchase BOP items and commodities such as structural steel, piping, valves, raceway, cable, and other commodities as necessary to support the construction, and these pre-planning and mobilization activities are included in advance of the pre-outage construction period.

<u>Construction Activities:</u> The durations shown for the project are estimates by BMcD and are based on an average work schedule of five days per week, are subject to delays in procuring and delivering new equipment and construction labor, and are based on the following scope of work which may be performed in the sequence listed below:

- EPC Company Contractor’s shall mobilize to the site as required per the schedule.

- Site Prep and Below-Ground (B/G) Construction shall complete site preparation and below-grade construction (e.g. utility reroutes, laydown, and parking areas as well as any road improvements required). This activity is expected to take two months.
- Above-Ground (A/G) Mechanical/Structural Contractor shall perform structural excavation, bunker construction, and conveyor support foundations. This must be completed before mechanical erection can begin. This activity is expected to take two months.
- Mechanical/Structural Contractor shall install RDCC system (estimated at four months of pre-outage work, followed by one month of work during the available outage duration) to include:
    - Receipt of equipment from equipment vendors
    - Installation of support steel and platforms to provide access for the new conveyors and ancillary equipment.
    - Installation of a new RDCC system including the submerged flight conveyor and clarifier. Portions outside the unit can be installed before the outage, but new sluice piping and jet nozzles under the hopper will be required to be installed during the major outage.
    - Installation of new building to protect the RDCC system from weather.
    - Installation of chemical injection skid and pumps to maintain water chemistry and promote setting.
    - New bunker sump pumps and piping to route any contact stormwater and excess quench water to the RDCC.
    - New recirculating pumps to allow for the bottom ash system. This will allow the system to be closed loop.
    - Redirect process flows from the Primary Pond (five months of pre-outage work and three months of work finishing during outage).
        - Chemical Waste Sumps reroute requires a plant outage and will be complete during the scheduled fall 2022 outage.
        - Air Heater Wash Sump reroute requires a plant outage and will be complete during the scheduled fall 2022 outage.
        - Boiler Room Sumps reroute requires the installation of the RDCC and will be complete during the scheduled fall 2022 outage.
        - Duck Pond reroute requires a plant outage and will be complete during the scheduled fall 2022 outage.
- The EPC Company's Electrical Contractor will install new electrical equipment (if new motor control centers are required), cable tray, conduit, and cable in accessible areas prior to the outage, as well as install new lighting at the bunker area. During the outage, the Electrical Contractor will

terminate the power feeds and finish routing to new equipment following behind the Mechanical Contractor. The current schedule shows three months of pre-outage electrical work and the Electrical Contractor should finish prior to the end of the unit outage.

WPL will provide ongoing schedule updates in the required semi-annual progress reports.

2.4 Progress Towards Obtaining Alternative Capacity - § 257.103(f)(1)(iv)(A)(4)

In the preamble to the final Part A rule, EPA explains that this "section [of the workplan] must discuss all of the steps taken, starting from when the owner or operator initiated the design phase all the way up to the current steps occurring while the workplan is being drafted." 85 Fed. Reg. at 53,544. The discussion also "must indicate where the facility currently is on the timeline and the processes that are currently being undertaken at the facility to develop alternative capacity." 85 Fed. Reg. at 53,545.

As shown in Appendix B and described in Section 2.1.6 and Table 2-5, WPL has made progress toward creating alternative disposal capacity for the CCR and non-CCR wastestreams at Columbia. The conceptual design has been evaluated and the technical solution for compliance has been identified. The equipment suppliers are providing budgetary quotes and modeling activities to identify potential interferences. BMcD will review the information received from the vendors to complete the preliminary design and develop the overall project scope and budget. The remaining activities are provided in Appendix B and summarized in Table 2-6.

3.0 DOCUMENTATION AND CERTIFICATION OF COMPLIANCE

To demonstrate that the criteria in 40 C.F.R. § 257.103(f)(1)(iii) has been met, the following information and submissions are submitted pursuant to 40 C.F.R. § 257.103(f)(1)(iv)(B) to demonstrate that the Columbia facility is in compliance with the CCR Rule. The following CCR units are located at Columbia:

- The Primary Ash Pond (which is the subject of this demonstration)
- The Secondary Ash Pond (which has initiated closure and will complete closure in 2022)
- The CCR Landfill, comprised of four existing landfill cells (Phase 1, Modules 1-4).

3.1 Owner's Certification of Compliance - § 257.103(f)(1)(iv)(B)(1)

In accordance with 40 C.F.R. § 257.103(f)(1)(iv)(B)(1), I hereby certify, based on information provided to me by, and my inquiry of, persons immediately responsible for compliance with the CCR rule at the Columbia Energy Center, that the Columbia Energy Center, including the Primary Ash Pond, is in compliance with 40 C.F.R. Part 257, Subpart D -- Standards for the Disposal of Coal Combustion Residuals in Landfills and Surface Impoundments. All the required CCR compliance information for Columbia Energy Center is up-to-date and posted on the Alliant Energy CCR Rule Data and Compliance website.

On behalf of Wisconsin Power and Light Company:

Matthew P. Cole
(Printed Name)

Director of Operations
(Title)

11/24/2020
(Date)

3.2 Visual Representation of Hydrogeologic Information - § 257.103(f)(1)(iv)(B)(2)

Consistent with the requirements of § 257.103(f)(1)(iv)(B)(2)(i) – (iii), WPL has attached the following items to this demonstration:

- Map(s) of groundwater monitoring well locations in relation to the CCR unit (Attachment C1)
- Well construction diagrams and drilling logs for all groundwater monitoring wells (Attachment C2)
- Maps that characterize the direction of groundwater flow accounting for seasonal variations (Attachment C3)

3.3 Groundwater Monitoring Results - § 257.103(f)(1)(iv)(B)(3)

According to information provided by IPL, groundwater monitoring samples were collected and analyzed in accordance with the Sampling and Analysis Plan. The most recent version of the Sampling and Analysis Plan is included in Attachment C4. Tables summarizing constituent concentrations at each groundwater monitoring well through the first round of the 2020 monitoring period is also included in Attachment C4. The results from the semiannual groundwater monitoring completed in October 2020 are not yet available. The most recent annual groundwater monitoring reports are also included in Attachment C4.

3.4 Description of Site Hydrogeology - § 257.103(f)(1)(iv)(B)(4)

A description of site hydrogeology and stratigraphic cross-sections of the site are included as Attachment C5. The cross-section for the COL CCR Landfill shows existing grades for Modules 1-4, as well as future (planned) conditions. Modules 5 and 6 are approved for future construction by the Wisconsin Department of Natural Resources and will meet the requirements for new CCR landfills prior to receiving CCR.

3.5 Corrective Measures Assessment - § 257.103(f)(1)(iv)(B)(5)

Background sampling began at the Primary Ash Pond in December 2015 and continued through August 2017 for eight rounds of background sampling. The first semiannual detection monitoring samples were collected in October 2017. The first assessment monitoring samples were collected in April 2018. The results, through the April 2020 monitoring period, indicate the Primary Ash Pond is currently in assessment monitoring, with no statistically significant levels exceeding the groundwater protection standards recorded. Accordingly, an assessment of corrective measures is not currently required.

Background sampling for the background (upgradient) wells at the Secondary Ash Pond began in December 2015 and continued through August 2017 for eight rounds of background sampling. The same background wells are used to establish background conditions as for the Primary Ash Pond. Background sampling for the Secondary Ash Pond compliance wells began in January 2017 and continued through October 2018. The first semiannual detection monitoring samples were collected in April 2019. The first assessment monitoring samples were collected in December 2019. The results, through the April 2020 monitoring period, indicate the Secondary Ash Pond is currently in assessment monitoring, with no statistically significant exceedances recorded. Accordingly, an assessment of corrective measures is not currently required.

Background sampling for Modules 1-3 of the Columbia Landfill began in December 2015 and continued through August 2017 for eight rounds of background sampling. The same background wells are used to establish background conditions as for the Primary Ash Pond. The first semiannual detection monitoring samples were collected in October 2017. These units remain in detection monitoring and an assessment of corrective measures is not currently required.

Background sampling for Module 4 of the Columbia Landfill began in February 2018 and continued through September 2018 during construction of this new landfill cell and prior to receiving CCR. Eight rounds of background sampling were completed and the first semiannual detection monitoring samples were collected in April 2019. This unit remains in detection monitoring and an assessment of corrective measures is not currently required.

3.6 Remedy Selection Progress Report - § 257.103(f)(1)(iv)(B)(6)

As noted above, an assessment of corrective measures is not currently required for the CCR units at Columbia.

3.7 Structural Stability Assessment - § 257.103(f)(1)(iv)(B)(7)

Pursuant to § 257.73(d), the initial structural stability assessment report for the Primary and Secondary Ash Ponds was prepared in September 2016 and was updated in October 2020. The most recent report is included as Attachment C6. A structural stability assessment is not required for the CCR landfill modules.

3.8 Safety Factor Assessment - § 257.103(f)(1)(iv)(B)(8)

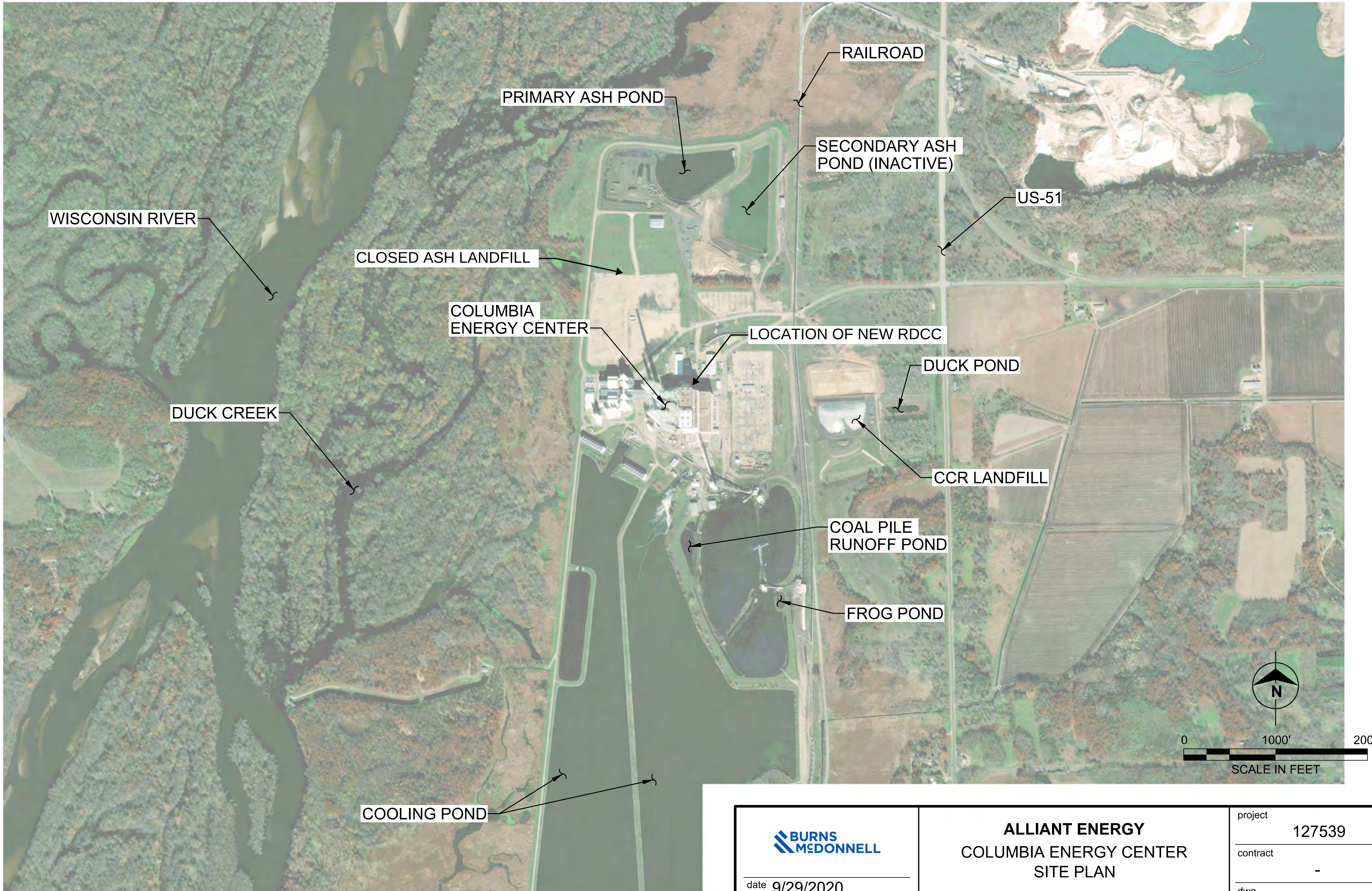
Pursuant to § 257.73(e), the initial safety factor assessment report for the Primary and Secondary Ash Ponds was prepared in September 2016 and updated in October 2020. The most recent report is included as Attachment C7. A safety factor assessment is not required for the CCR landfill modules.

4.0 CONCLUSION

Based upon the information submitted in this demonstration, the Primary Ash Pond at Columbia qualifies for the site-specific alternative deadline for the initiation of closure as allowed by 40 C.F.R. § 257.103 – Alternate Closure Requirements and specifically 40 C.F.R. § 257.103(f)(1) – Site Specific Alternative to Initiation of Closure Deadline.

Therefore, it is requested that EPA approve the demonstration and grant an alternative deadline of October 20, 2022 to complete the dry bottom ash conversion at Columbia, cease routing all CCR and non-CCR wastestreams to the Primary Ash Pond which is subject to closure under 40 C.F.R. § 257.101(a), and initiate closure as required. As discussed previously, this date is subject to delays in procuring and delivering new bottom ash handling equipment and several other factors. WPL will update EPA on the project and any potential schedule impacts as part of the semi-annual progress reports required at 40 C.F.R. § 257.103(f)(1)(x), and if a need for a later compliance deadline is determined, WPL will seek additional time as described in 40 CFR § 257.103(f)(1)(vii).

APPENDIX A – SITE PLAN AND WATER BALANCE DIAGRAM



BURNS McDONNELL

date 9/29/2020

designed A. MYERS

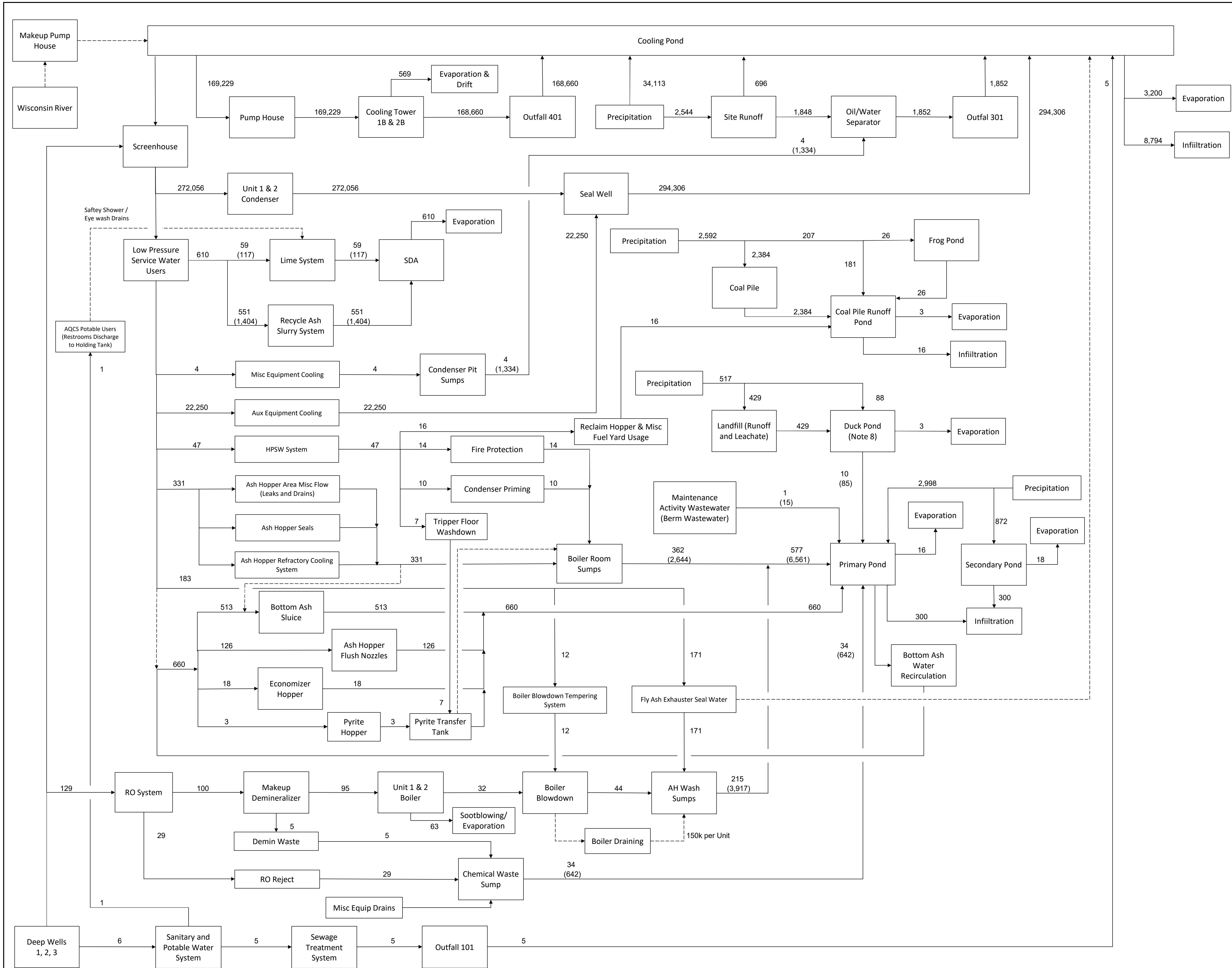
ALLIANT ENERGY

COLUMBIA ENERGY CENTER
SITE PLAN

project 127539

contract -

dwg **FIGURE 1** -



Site Name and Location: Columbia Generating Station

1. SELECT 24-HR RAINFALL EVENT 4.91 inches of rainfall

or Exclude Rainfall

2. UNIT OPERATION

Low Load Operation | Low Load

3. MISCELLANEOUS FLOWS

Bottom Ash Flows | Include

NOTES:

1. Flows are shown in gallons per minute (gpm) and rounded to the nearest gpm.
2. Flows are based on average daily conditions. Max process flows shown in parentheses. Max flows do not balance.
3. Precipitation calculated by using SCS curve number method for the different runoff areas. Flow shown is the rain event chosen, averaged over a 24 hour period.
4. Dashed lines represent intermittent process flows or atypical paths.
5. Flow paths not dictated by a flow value were not measured or enough data was not present to make a reasonable estimation for the value.
6. Infiltration values provided by Alliant Energy and were not calculated by BMcD.
7. In general, flows do not balance around pond systems. Precipitation or intermittent flows are expected to be captured in storage capacity of existing ponds.
8. Duck Pond water is hauled via truck to the Primary Pond. Flow rate based on hauling records. Typically 10k gallons of water hauled per trip.

PRELIMINARY

Date	10/16/2020	Detailed	D. Elliott
Designed	D. Elliott	Checked	B. Hansen

Alliant Energy

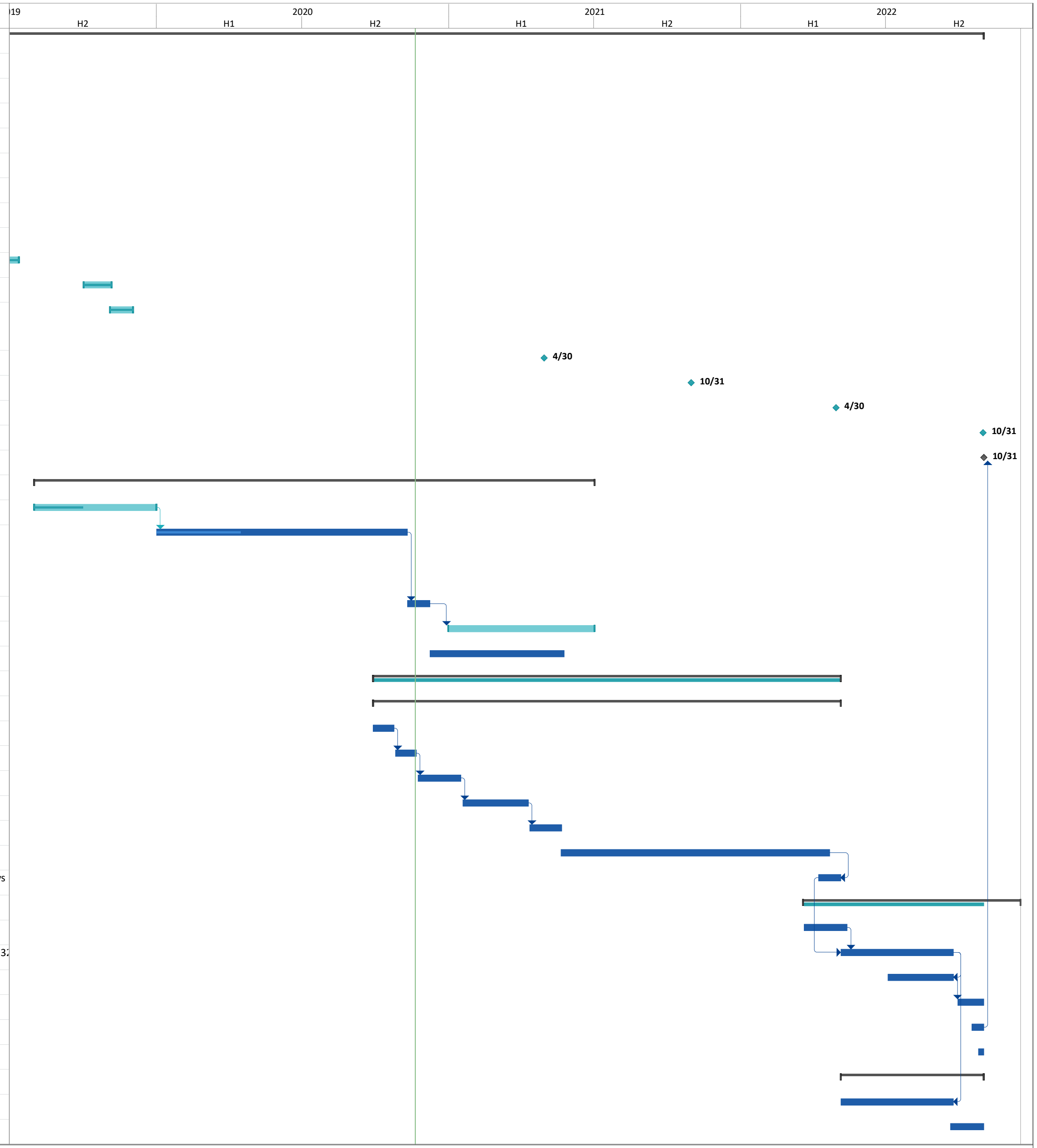
BURNS McDONNELL

Alliant - Columbia Generating Station Water Balance

Project	114958	Contract	
Drawing	WMB - 01	Rev	C

APPENDIX B – SCHEDULE

ID	Task Name	Duration	Start	Finish	Predecessors
1	**CCR Compliance Efforts**	**1967 days**	**Fri 4/17/15**	**Mon 10/31/2**	
2	Final CCR Rule Published in Federal Register	0 days	Fri 4/17/15	Fri 4/17/15	
3	Installed Groundwater Monitoring Wells	10 days	Tue 2/28/17	Mon 3/13/17	
4	Background Groundwater Sampling	83 days	Tue 3/28/17	Thu 7/20/17	
5	Completed Liner Documentation	0 days	Thu 10/13/16	Thu 10/13/16	
6	Prepared Surface Impoundment History of Construction	0 days	Thu 10/13/16	Thu 10/13/16	
7	First Detection Monitoring Samples	2 days	Tue 11/7/17	Wed 11/8/17	
8	Assessment Monitoring Program - First Round	36 days	Tue 6/19/18	Tue 8/7/18	
9	Assessment Monitoring Program - Second Round	19 days	Tue 9/18/18	Fri 10/12/18	
10	Assessment Monitoring Program - Third Round	30 days	Mon 6/3/19	Fri 7/12/19	
11	Assessment Monitoring Program - Fourth Round	25 days	Wed 10/2/19	Tue 11/5/19	
12	EPA Published Proposed Draft ELG Rule and CCR Holistic Approach to Closure Part A Rule	21 days	Mon 11/4/19	Mon 12/2/19	
13	Semi-Annual Progress Report #1	0 days	Fri 4/30/21	Fri 4/30/21	
14	Semi-Annual Progress Report #2	0 days	Sun 10/31/21	Sun 10/31/21	
15	Semi-Annual Progress Report #3	0 days	Sat 4/30/22	Sat 4/30/22	
16	Semi-Annual Progress Report #4	0 days	Mon 10/31/22	Mon 10/31/22	
17	Cease CCR and non-CCR wastestreams to Primary Ash Pond	0 days	Mon 10/31/22	Mon 10/31/22	38
18	**Bottom Ash Conversion - Planning**	**501 days**	**Thu 8/1/19**	**Thu 7/1/21**	
19	BMcD Screening Level ELG Assessment	109 days	Thu 8/1/19	Tue 12/31/19	
20	Alliant Review Alternatives, Select Preferred Option, and Prepare Demonstration for Site-Specific Alternate to Intiation of Closure Deadline	224 days	Wed 1/1/20	Mon 11/9/20	19
21	Owner Review & Management Approval	20 days	Tue 11/10/20	Mon 12/7/20	20
22	Public Service of Wisconsin CA Approval	131 days	Thu 12/31/20	Thu 7/1/21	21
23	Prepare Application for NPDES Permit Modification	120 days	Tue 12/8/20	Mon 5/24/21	
24	**Bottom Ash Conversion - Procurement**	**419 days**	**Mon 9/28/20**	**Thu 5/5/22**	
25	**Bottom Ash Conversion EPC Contract**	**419 days**	**Mon 9/28/20**	**Thu 5/5/22**	
26	Develop Commercial Documents/Issue Bid Package	20 days	Mon 9/28/20	Fri 10/23/20	
27	Bid Period	20 days	Mon 10/26/2C	Fri 11/20/20	26
28	Bid Evaluation/Award EPC Contract	40 days	Mon 11/23/2C	Fri 1/15/21	27
29	Receive Initial Vendor Submittals	60 days	Mon 1/18/21	Fri 4/9/21	28
30	Review and Approve Submittals	30 days	Mon 4/12/21	Fri 5/21/21	29
31	Conveyor Fabrication	240 days	Fri 5/21/21	Thu 4/21/22	
32	Delivery Window	20 days	Fri 4/8/22	Thu 5/5/22	31FF+10 days
33	**Bottom Ash Conversion - Construction & Startup**	**196 days**	**Sun 3/20/22**	**Fri 12/16/22**	
34	Site Prep & B/G Constuction	40 days	Mon 3/21/22	Fri 5/13/22	
35	A/G Pre-Outage Mech/Struct Construction	101 days	Fri 5/6/22	Fri 9/23/22	34FS-6 days,3
36	A/G Pre-Outage Elect Construction	60 days	Mon 7/4/22	Fri 9/23/22	35FF
37	Outage	23 days	Thu 9/29/22	Mon 10/31/22	36
38	Startup	11 days	Mon 10/17/22	Mon 10/31/22	
39	Final Walkdown & Punchlist	5 days	Tue 10/25/22	Mon 10/31/22	
40	**Other Construction**	**127 days**	**Fri 5/6/22**	**Mon 10/31/2**	
41	Install new water redirects piping and pumps	101 days	Fri 5/6/22	Fri 9/23/22	35FF
42	Finalize Tie-ins for Water Redirects	30 days	Tue 9/20/22	Mon 10/31/22	

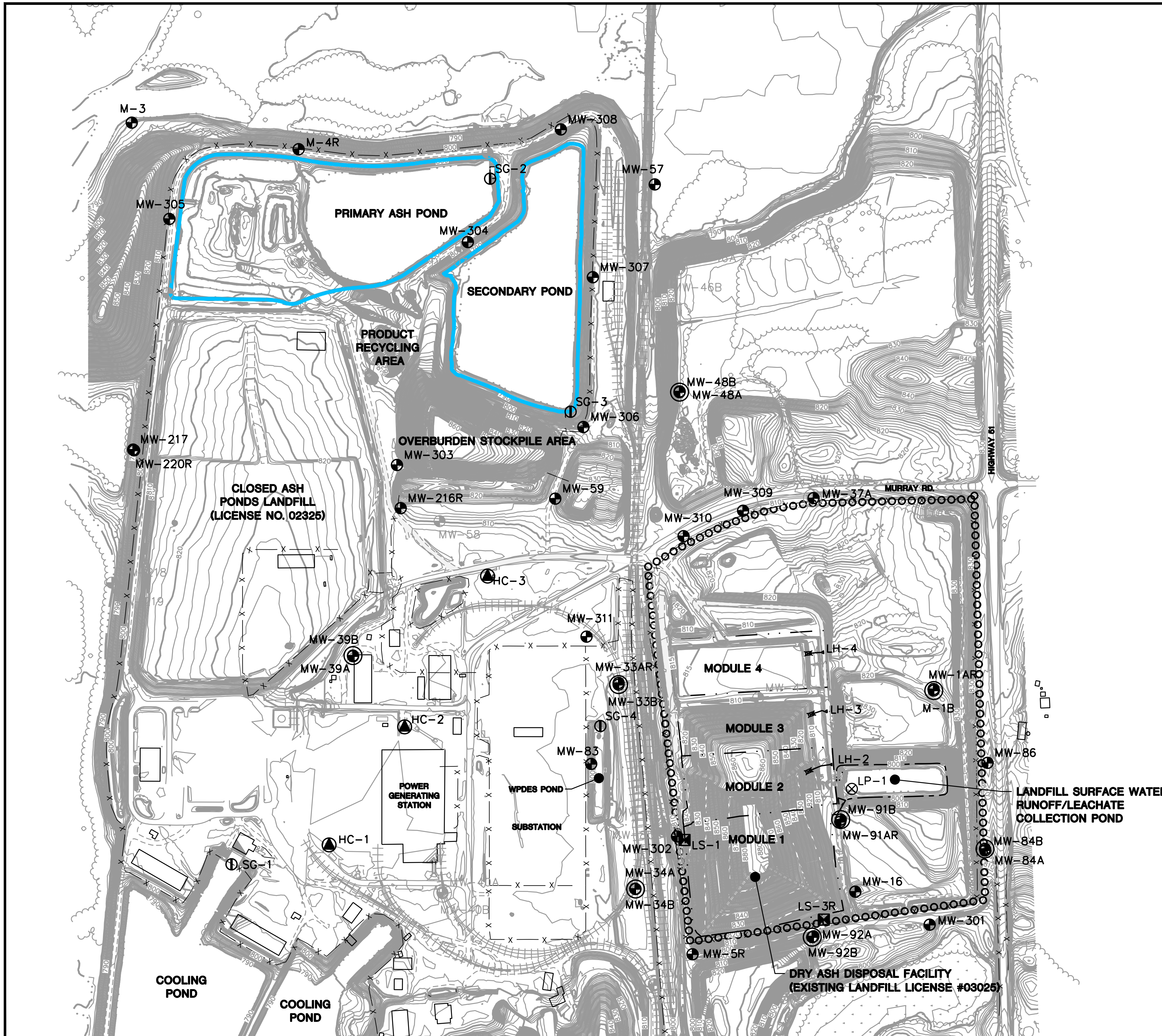


Project: Columbia CCR Surface Impoundment Extension Demonstration
Date: Fri 11/20/20

Task	Summary	External Milestone	Inactive Summary	Manual Summary Rollup	Finish-only	Manual Progress
Split	Project Summary	Inactive Task	Manual Task	Manual Summary	Deadline	
Milestone	External Tasks	Inactive Milestone	Duration-only	Start-only	Progress	

APPENDIX C – COMPLIANCE DOCUMENTS

Attachment C1



LEGEND

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

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.

N

500 0 500

SCALE: 1" = 500'

PROJECT NO.	25219067.00	DRAWN BY:	BSS
DRAWN:	12/02/2019	CHECKED BY:	MDB
REVISED:	10/23/2020	APPROVED BY:	TK 10/23/2020

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, PARDEEVILLE, WI

SITE PLAN AND MONITORING WELL LOCATIONS

FIGURE 1

I:\Client\General (for Newforma)\201023 Alliant Energy\COL\Drawings\1_Site Plan and Monitoring Well Locations.dwg, 10/23/2020 3:57:51 PM

Attachment C2

Environmental Consultants
and Contractors

2830 Dairy Drive
Madison, WI 53718-6751

608 224-2830
FAX 608 224-2839
www.scsengineers.com

SCS ENGINEERS

October 10, 2017
File No. 25216067.17

Mr. Nathaniel Sievers
Columbia Energy Center
W8375 Murray Road
Pardeeville, WI 53954

Subject: Columbia Energy Center – Monitoring Well Construction Documentation

Dear Mr. Sievers:

SCS Engineers (SCS) has completed the installation of five groundwater monitoring wells (MW-301 through MW-305) at the Columbia Energy Center in Pardeeville, Wisconsin (**Figure 1**). The installations consisted of one downgradient well at the Dry Ash Disposal Facility (MW-302) and three downgradient wells (MW-303, MW-304, and MW-305) at the Ash Ponds Facility. One monitoring well (MW-301) was installed to provide background information for both facilities. In addition, the monitoring network includes four pre-existing monitoring wells (MW-4R, MW-33AR, MW-34A, and MW-84A). Monitoring well MW-84A is used to provide background information from both facilities, MW-33AR and MW-34A are downgradient of the Dry Ash Disposal Facility, and M-4R is downgradient of the Ash Ponds Facility.

The new wells were installed to support compliance with the final Coal Combustion Residuals (CCR) Rule (40 CFR 257.50-107). The monitoring well locations are shown on **Figure 2**. **Attachments A** through **C** include documentation of well design, installation, and development as required by 40 CFR 257.91(e)(1).

This monitoring well construction documentation report is ready to be entered into the operating record as required by 40 CFR 257.105(h)(2).

Please contact us at (608) 224-2830 if you have any questions about the well documentation.

Sincerely,

Meghan Blodgett
Hydrogeologist
SCS ENGINEERS

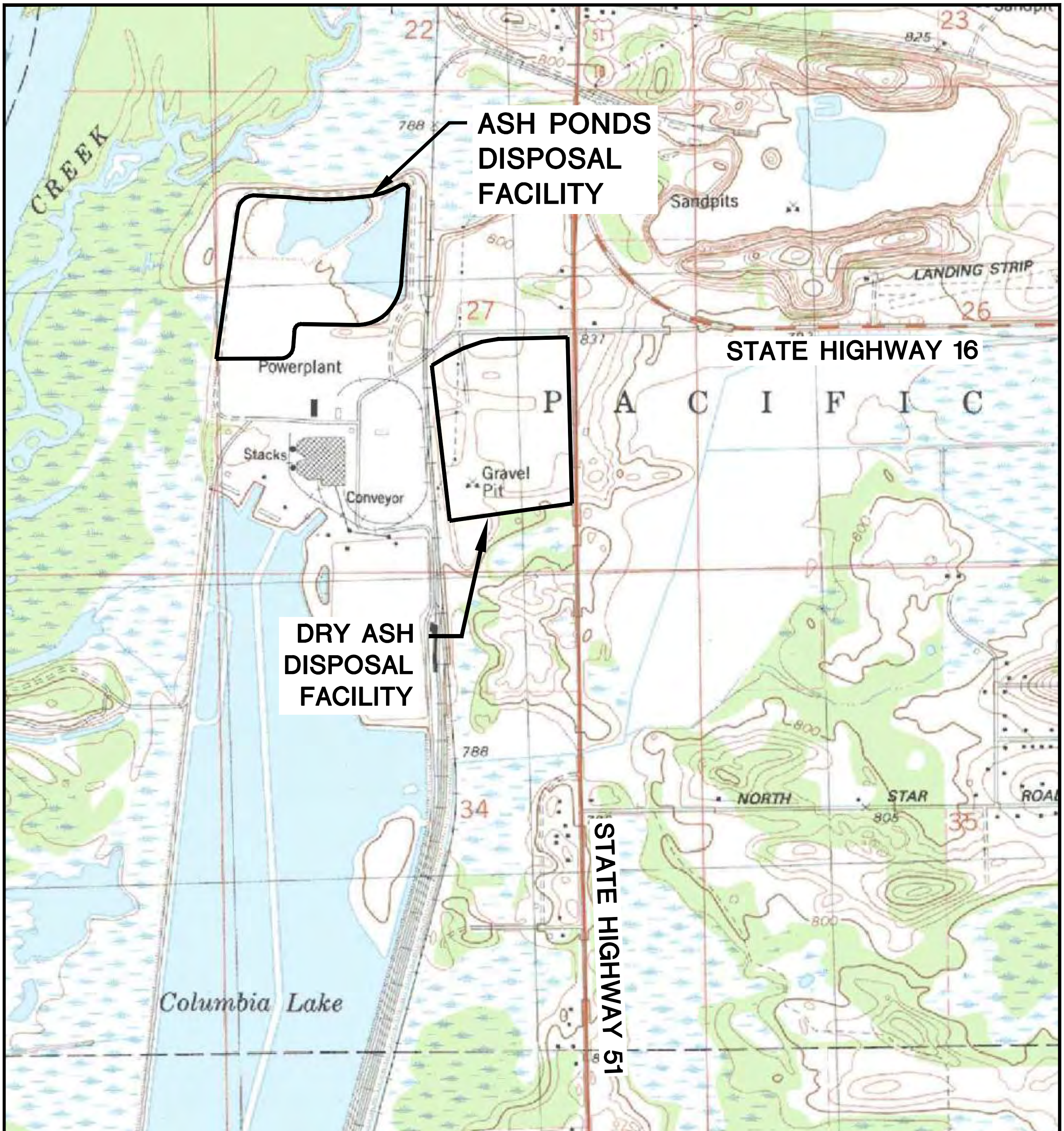
Thomas J. Karwoski, PG
Project Manager
SCS ENGINEERS

TJK/AV_lmh/MDB

cc: Jeff Maxted, Alliant Energy
Jerry Lokenvitz, Columbia Energy Center

Enclosures: Figure 1 – Site Location Map
Figure 2 – Site Plan and Well Location Map
Attachment A – Boring Logs
Attachment B – Well Construction and Development Forms
Attachment C – Hydraulic Conductivity Testing Results

I:\25216067.00\Reports\Operating Record Well Documentation\Sievers_Well Documentation_Op_Record _COL_171010.docx



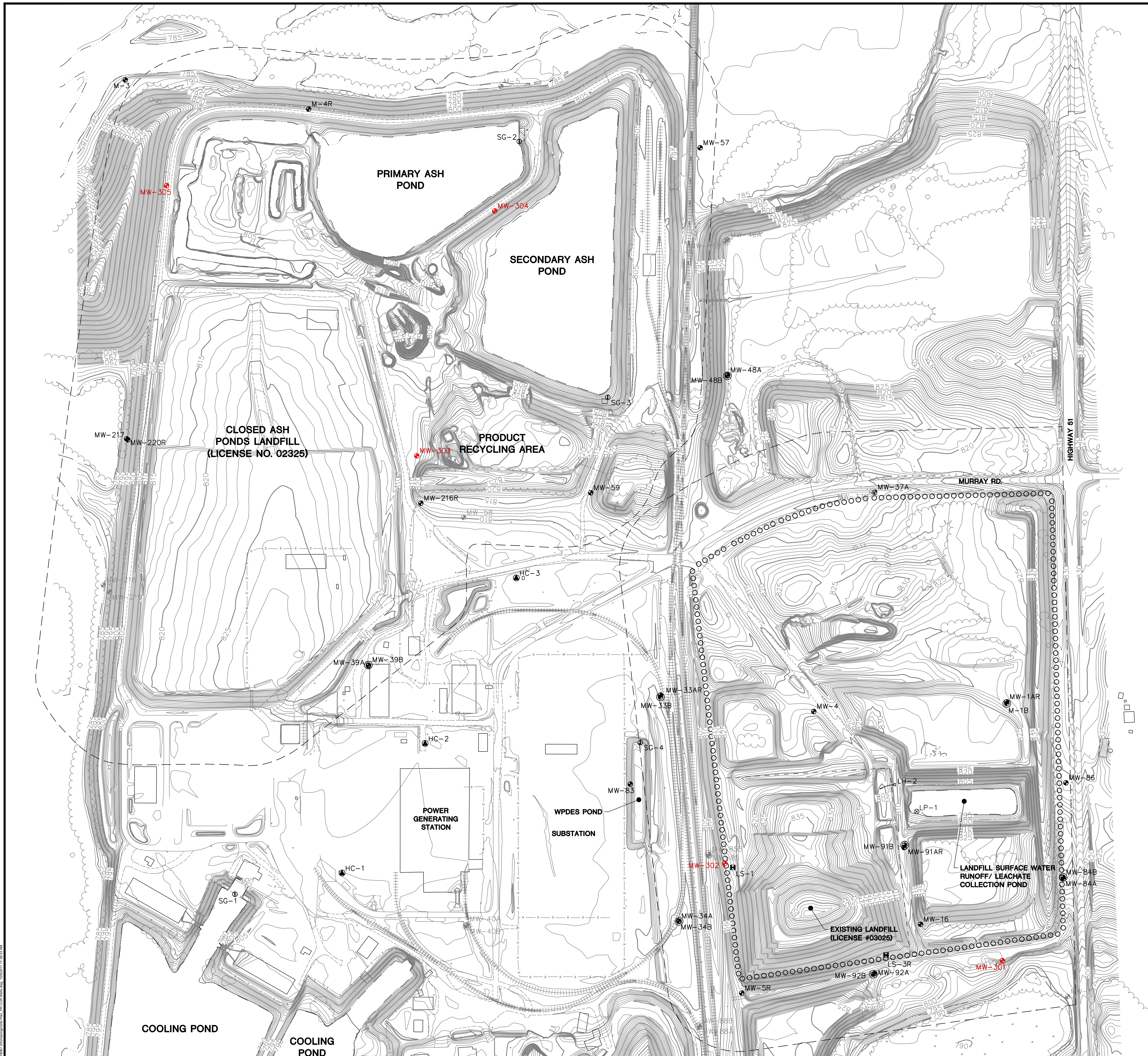
N

POYNETTE QUADRANGLE
WISCONSIN–COLUMBIA CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)
NW/4 POYNETTE 15' QUADRANGLE
1984
SCALE: 1" = 2,000'

CLIENT	ALLIANT ENERGY ALLIANT ENERGY COLUMBIA GENERATING STATION W8375 MURRAY RD. PARDEEVILLE, WISCONSIN 53954	SITE	COLUMBIA ENERGY CENTER ASH PONDS DISPOSAL FACILITY & DRY ASH FACILITY	SITE LOCATION MAP

PROJECT NO.	25215135.00	DRAWN BY:	KP	ENGINEER	SCS ENGINEERS 2830 DAIRY DRIVE MADISON, WI 53718–6751 PHONE: (608) 224–2830	FIGURE
DRAWN:	08/10/09	CHECKED BY:	MDB			1
REVISED:	02/02/16	APPROVED BY:				

I:\25215053\Drawings\Columbia\FIGURE 1_Columbia.dwg, 2/2/2016 2:19:12 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
- DESIGN MANAGEMENT ZONE
- APPROVED LIMITS OF WASTE
- CONSTRUCTED LIMITS OF WASTE
- WATER SUPPLY WELL
- STAFF GAUGE
- WATER TABLE WELL
- PIEZOMETER
- SURFACE WATER SAMPLE LOCATION
- LYSIMETER
- ABANDONED WATER TABLE WELL
- ABANDONED PIEZOMETER
- LEACHATE HEADWELL
- NEW WATERTABLE WELL

NOTES:

1. BASE MAP CREATED FROM AERIAL SURVEY BY KBM, FLOWN DECEMBER 1, 2014.
2. MONITORING WELL LOCATIONS AND ELEVATIONS SURVEYED BY WISCONSIN POWER AND LIGHT, INC. IN DECEMBER 1994, NOVEMBER 1996, APRIL 2003, AND AUGUST 2012.
3. SUPPLY WELL LOCATIONS ARE APPROXIMATE AND ASSUMED BASED ON JANUARY 2013 DRAWINGS BY TRC.
4. THE LOCATIONS OF THE ASH PONDS FACILITY DESIGN MANAGEMENT ZONE DEMARCATION LINES ARE APPROXIMATE AND BASED ON THE WATER TABLE MAP (OCTOBER 2012) FIGURE BY RMT.
5. THE LOCATION OF THE ACTIVE DRY ASH LANDFILL DESIGN MANAGEMENT ZONE DEMARCATION LINE IS BASED ON A 300 FOOT OFFSET FROM THE DESIGN LIMITS OF ASH EXCEPT WHERE OFFSET WOULD EXTEND LINE BEYOND PROPERTY LINE.

PROJECT NO.	25216067.00
DRAWN:	01/06/15
REVISED:	09/22/17
DRAWN BY:	AHB/JMO
CHECKED BY:	MDB
APPROVED BY:	

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

CLIENT: ALLIANT ENERGY
4902 NORTH BILTMORE LN. #1000
MADISON, WI 53718

SITE: COLUMBIA ASH PONDS AND DRY ASH DISPOSAL FACILITIES

SITE PLAN AND WELL LOCATION MAP

FIGURE 2

ATTACHMENT A

Boring Logs

State of Wisconsin
Department of Natural Resources

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

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

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

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

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

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

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

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	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											
			9	Same as above except, 10YR (top), 10YR 4/6 (bottom), trace clay at bottom.										
S4	21	4 5 6 5	10							M				
			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:

SOIL BORING LOG INFORMATION SUPPLEMENT
Form 4400-122A

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

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

State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 7-98

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

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
WPL-Columbia SCS#: 25215135.00		MW-302

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
Kevin Durst Badger State Drilling	11/11/2015	11/12/2015	hollow stem auger

WI Unique Well No.	DNR Well ID No.	Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
VY702			Feet	809.93 Feet	8.5 in.

Local Grid Origin ☐ (estimated: ☐) or Boring Location ☒	Lat / Long	Local Grid 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 ° ' "	☐ N ☐ E Feet ☐ S Feet ☐ W

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

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID/FID	Pocket Penetration (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			0–1	SILTY SAND, fine to medium grained, trace gravel, 10YR 5/6.										
S1	12	10 13 17 16	2							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	Same as above except, 10YR 4/6.	SM					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	Same as above except, 10YR 6/6.						M				
S6	20	3 4 4 7	13.5–15	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	Firm	
[signature] for Zach Watson	SCS Engineers 2830 Dairy Drive Madison, WI 53711	Tel: (608) 224-2830 Fax:

SOIL BORING LOG INFORMATION SUPPLEMENT
Form 4400-122A

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

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

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
WPL-Columbia SCS#: 25215135.00		MW-304

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
Kevin Durst Badger State Drilling	11/12/2015	11/12/2015	hollow stem auger

WI Unique Well No.	DNR Well ID No.	Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
VY703			Feet	802.50 Feet	8.5 in.

Local Grid Origin ☐ (estimated: ☐) or Boring Location ☒
State Plane 544671 N, 2122897 E /C/N
1/4 of 1/4 of Section 27, T 12 N, R 9 E
Lat ° ' "
Long ° ' "
Local Grid Location ☐ N ☐ E
Feet ☐ S Feet ☐ W

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

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID/FID	Pocket Penetration (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
				TOPSOIL.	TOPSOIL									
			1	SILTY SAND, mostly fine, brown/tan (10YR 5/6).										
S1	24	7 8 10 12	2							M				
			3											
S2	24	14 22 26 31	4	Same as above except, trace gravel, brown tan to grey (top to bottom) 10YR 5/4.						M				
			5											
S3	24	16 18 22 24	6	Same as above except, brown/tan/grey assorted coloring.						M				
			7											
			8		SM									
S4	24	11 15 15 14	9	Same as above except, black/grey/brown, saturated area about 2" thick.						M				
			10											
S5	24	23 31 30 29	11	Same as above except, 10YR 5/3.						M				
			12											
			13											
S6	20	9 10 7 5	14	trace gravel.						M				
			15											

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

Signature	Firm	
for Zach Watson	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

Form 4400-122 Rev. 7-98

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

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
WPL-Columbia SCS#: 25215135.00		MW-303

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
Kevin Durst Badger State Drilling	11/12/2015	11/13/2015	hollow stem auger

WI Unique Well No.	DNR Well ID No.	Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
VY714			Feet	808.69 Feet	8.5 in.

Local Grid Origin ☐ (estimated: ☐) or Boring Location ☒
State Plane 543655.7 N, 2122574 E
1/4 of 1/4 of Section 27, T 12 N, R 9 E
Lat ° ' " Long ° ' "
Local Grid Location ☐ N ☐ E Feet ☐ S Feet ☐ W

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

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Pocket Penetration (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			0	SILTY SAND CLAY with GRAVEL, (fill), tan colored 10YR 7/6.										
S1	20	5 8 15 10	2							M				
			3		SM									
			3.7	Same as above except, grey/brown (10YR 5/4).										
S2	24	7 7 7 17	4.5							M				
			6	SILTY SAND, trace gravel, tan color (10YR 5/4).										
S3	20	13 34 50/5	7							M				
S4	14	30 50/5	9.5							M				
			10.5		SM									
S5	15	31 50/3	12							M				
			13.7	Same as above with an inch of rock (limestone).										
S6	15	38 50/3	14.5							M				

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

Signature	Firm	
[signature] for Zach Watson	SCS Engineers 2830 Dairy Drive Madison, WI 53711	Tel: (608) 224-2830 Fax:

State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION SUPPLEMENT
Form 4400-122A

Boring Number MW-303 Use only as an attachment to Form 4400-122.

Sample: Number and Type	Sample: Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID/FID	Soil Properties: Pocket Penetration (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			16	SILTY SAND, trace gravel, tan color (10YR 5/4), with trace gravel.										
S7	10	50/4	17							M				
			18											
			19											
S8	18	28 37 50/4	20							M				
			21											
S9	0	50	22											Lost spoon tip no sample.
			23											
			24	Same as above except, fine to coarse grained sand, little gravel.	SM									
S10	15	35 50/5	25							M				
			26	Same as above except, tan (10YR 5/6).										
S11	14	7 50/3	27							W				
			28											
			29											
			30											
			31											
			32											
			33	End of boring at 33 ft bgs.										

SOIL BORING LOG INFORMATION SUPPLEMENT

Form 4400-122A

Boring Number MW-304 Use only as an attachment to Form 4400-122.

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

State of Wisconsin
Department of Natural Resources

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

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

Facility/Project Name: WPL-Columbia SCS#: 25215135.00		License/Permit/Monitoring Number		Boring Number: MW-305	
Boring Drilled By: Name of crew chief (first, last) and Firm: Kevin Durst, Badger State Drilling		Date Drilling Started: 11/13/2015	Date Drilling Completed: 11/13/2015	Drilling Method: hollow stem auger	
WI Unique Well No.: VY716	DNR Well ID No.	Common Well Name	Final Static Water Level: Feet	Surface Elevation: 803.95 Feet	Borehole Diameter: 8.5 in.
Local Grid Origin ☐ (estimated: ☐) or Boring Location ☒ State Plane 544776.1 N, 2121537 E S/C/N; 1/4 of 1/4 of Section 27, T 12 N, R 9 E		Lat ° ' " Long ° ' "		Local Grid Location ☐ N Feet ☐ S	☐ E Feet ☐ W
Facility ID	County: Columbia	County Code: 11	Civil Town/City/ or Village: Portage		

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID/FID	Pocket Penetration (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
				TOPSOIL	TOPSOIL									
			1	SILTY SAND, mostly fine, brown/tan 10YR 5/8.	SM									
S1	18	5 8 9 7	2							M				
			3											
			4											
S2	18	2 3 3 4	5							M				
			6	Same as above except, trace gravel, tan 10YR 6/8 at bottom.										
S3	18	2 8 9 8	7							M				
			8											
			9	Same as above except, light tan 10YR 6/6, trace gravel, some large gravel chunks.										
S4	20	5 7 6 5	10							M				
			11	POORLY GRADED SAND, tan (10YR 6/8), trace gravel, some saturated areas.	SP									
S5	20	9 12 17 22	12							M				
			13											
			14	SILTY SAND, trace gravel, tan (10YR 5/6).	SM									
S6	24	16 19 22 34	15							W				

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

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

State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION SUPPLEMENT
Form 4400-122A

Boring Number MW-305 Use only as an attachment to Form 4400-122.

Sample: Number and Type	Sample: Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID/FID	Soil Properties: Pocket Penetration (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
S7		31 30 41 50/2	16, 17, 18	SILTY SAND, trace gravel, tan (10YR 5/6), some large dolomite chunks.	SM					W				
				End of boring at 18 ft bgs.										

State of Wisconsin
Department of Natural Resources

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

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

Facility/Project Name	License/Permit/Monitoring Number	Boring Number	
Alliant Energy - Columbia	03025	MW-33AR	
Boring Drilled By: Name of crew chief (first, last) and Firm	**Date Drilling Started**	**Date Drilling Completed**	**Drilling Method**
Ryan Fisher Boart Longyear	4/9/2003	4/9/2003	4 1/4" HSA

WI Unique Well No.	DNR Well ID No.	Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
PE223	138	MW-33AR	Feet MSL	805.4 Feet MSL	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: Feet ☐ N ☐ S Feet ☐ E ☐ W

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

Sample: Number and Type	Sample: Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID/FID	Soil Properties: Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			0–29 (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: [signature] Firm: RMT, Inc. Tel: Fax:

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 ☐

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

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

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

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

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
AUGER	60		0–5											
1 SS	24	4 4 4 4	5	**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											
			15											

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.

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

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID/FID	Compressive Strength	Moisture Content	Liquid Limit	Plasticity Index	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									

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.

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
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 56	**WEATHERED SANDSTONE,** 95% poorly graded medium sand, 5% fines, white to brown, well sorted and rounded, poorly cemented.										
				End of boring at 56 feet.										

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

WARZYN
ENGINEERING INC

LOG OF TEST BORING

Project Wisconsin Power & Light

Location Columbia Generating Station

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

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

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

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

Route To:
☒ Solid Waste ☐ Haz. Waste
☐ Emergency Response ☐ Underground Tanks
☐ Wastewater ☐ Water Resources
☐ Other

Soil Boring Log Information

Form 4400-122 7-91

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
WP&L - Columbia 3024.07		M4R

Boring Drilled By (Firm name and name of crew chief)	Date Drilling Started	Date Drilling Completed	Drilling Method
Environmental & Foundation Drilling, Crew: Frank, Jim, Leon	8/22/96	8/22/96	4 1/4 HSA

DNR Facility Well No.	WI Unique Well No.	Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
		M4R	Feet MSL	803.6 Feet MSL	8.0 Inches

Boring Location
State Plane 545093.90 N, 2122125.90 E
NW 1/4 of NW 1/4 of Section 27 T 12 N,R 9E

Lat ° ' "
Long ° ' "

Local Grid Location (If applicable)
Feet ☐ N ☐ S Feet ☐ E ☐ W

County	DNR County Code	Civil Town/City/ or Village
Columbia	11	Pacific

Sample Number	Length (In) Recovered	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	Plastic Limit	P 200	Comments
1	12	22		**SILTY SAND (SM)**, trace fine gravel, non-plastic, yellowish brown 10YR 5/6, no odor, loose, (Fill).	SM					M				SS
2	24	16	2	As above, occasional thin layers of light brown sand.										SS
3	15	17	4	As above.										SS
				Color change to 10YR 5/4.										
4	24	25	6	As above, occasional 10YR 4/4 dark yellowish brown seams with more silt, trace clay.										SS
5	23	19	8	As above.										SS
			9	1" gravel (dark colored) at about 9.0 feet.										
			12											

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

Signature

Firm RMT
744 Heartland Trail, Madison Wisconsin
Tel: 608-831-4444, Fax: 608-831-3334

Boring Number **M4R** Use only as an attachment to Form 4400-122.

Sample Number	Sample Length (In) Recovered	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	Plastic Limit	P 200	Comments
6	22	34	13	As above.										SS
			15	Color change to 10YR 5/3 brown at 14.8 feet, (Native).						VM				
7	22	9	18	As above, no stratigraphy, 10YR 4/6 dark yellowish brown.						W	NV	NP	9.0%	SS
			23.5	End of boring at 23.5 feet.										

APPENDIX C

ATTACHMENT B

Well Construction and Development Forms

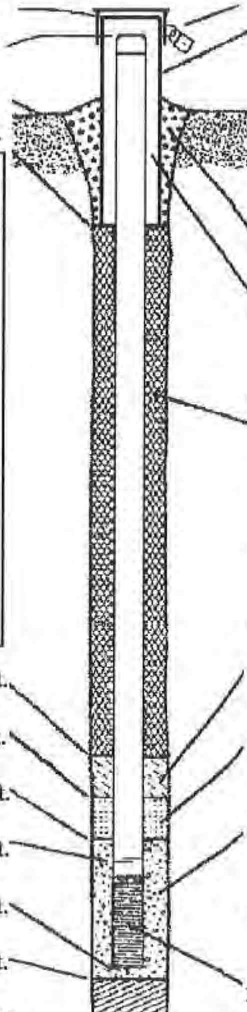
SCS # 25215135

State of Wisconsin
Department of Natural Resources

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

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

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



A. Protective pipe, top elevation 807.16 ft. MSL

B. Well casing, top elevation 806.89 ft. MSL

C. Land surface elevation 803.69 ft. MSL

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

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

13. Sieve analysis performed? ☐ Yes ☐ No

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

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

16. Drilling additives used? ☐ Yes ☒ No

Describe ___

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

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

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

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

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

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

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

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

L. Borehole, diameter 8.5 in.

M. O.D. well casing 2.4 in.

N. I.D. well casing 2.0 in.

1. Cap and lock? ☐ Yes ☒ No

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

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

4. Material between well casing and protective pipe: Bentonite ☒ 3 0
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
[signature]	SCS ENGINEERS, 2830 Dairy Drive, Madison, WI 53718-6751

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

SCS #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)
Type of Well Well Code 11 / MW	Section Location of Waste/Source SE 1/4 of SW 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 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.

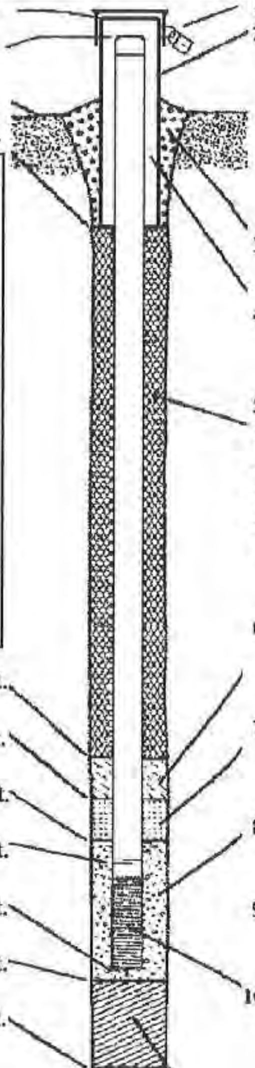
J. Filter pack, bottom 776.93 ft. MSL or 33 ft.

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
steel Other ☐
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
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. 4.7 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
Native Other ☒

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

Signature	Firm
[signature] for Zach Watson	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.

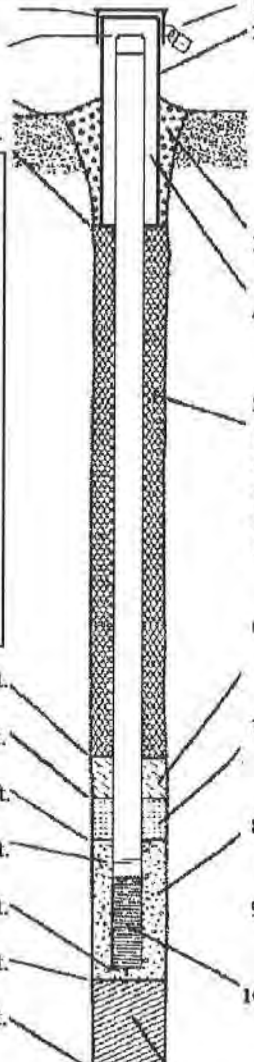
SCS #25215135

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-303
Facility License, Permit or Monitoring No.	Local Grid Origin [ ] (estimated: [ ]) or Well Location [ ] Lat. ___ Long. ___ or	Wis. Unique Well No.: VY714 / DNR Well ID No.
Facility ID	St. Plane 543655.7 ft. N, 2122574 ft. E. S/C/N	Date Well Installed 11 / 13 / 2015 (m m d d y y y y)
Type of Well: Well Code 11 / MW	Section Location of Waste/Source: SW1/4 of NW 1/4 of Sec. 27, T. 12 N, R. 9 [X] 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 811.81 ft. MSL

B. Well casing, top elevation 811.52 ft. MSL

C. Land surface elevation 808.69 ft. MSL

D. Surface seal, bottom 789.69 ft. MSL or 19 ft.

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

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

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

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

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

Describe ___

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

E. Bentonite seal, top 808.69 ft. MSL or 0 ft.

F. Fine sand, top 789.69 ft. MSL or 19 ft.

G. Filter pack, top 787.69 ft. MSL or 21 ft.

H. Screen joint, top 785.69 ft. MSL or 23 ft.

I. Well bottom 775.69 ft. MSL or 33 ft.

J. Filter pack, bottom 775.69 ft. MSL or 33 ft.

K. Borehole, bottom 774.69 ft. MSL or 34 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 [X] No
2. Protective cover pipe:
   a. Inside diameter: 6 in.
   b. Length: 5 ft.
   c. Material: Steel [X] 0 4; Other [ ] steel
   d. Additional protection? [ ] Yes [ ] No. If yes, describe: yes, bumper posts
3. Surface seal: Bentonite [X] 3 0; Concrete [ ] 0 1; Other [ ]
4. Material between well casing and protective pipe: Bentonite [X] 3 0; Other [ ] Bentonite to grade, sand in between
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. [X] 3/8 in. [ ] 1/2 in. Bentonite chips [✓] 3 2
   c. 6.7 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 2.5 ft^3
9. Well casing: Flush threaded PVC schedule 40 [X] 2 3; Flush threaded PVC schedule 80 [ ] 2 4; Other [ ]
10. Screen material: PVC
    a. Screen type: Factory cut [X] 1 1; Continuous slot [ ] 0 1; Other [ ]
    b. Manufacturer Johnson
    c. Slot size: 0.01 in.
    d. Slotted length: 10 ft.
11. Backfill material (below filter pack): None [ ] 1 4; Other [X] Native

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

Signature: [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.

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-304
Facility License, Permit or Monitoring No.	Local Grid Origin [ ] (estimated: [ ]) or Well Location [ ] Lat. ° ' " Long. ° ' " or	Wis. Unique Well No. VY703 / DNR Well ID No.
Facility ID	St. Plane 544671 ft. N, 2122897 ft. E. S/C/N	Date Well Installed 11 / 12 / 2015 (m m d d y y y y)
Type of Well Well Code 11 / MW	Section Location of Waste/Source SE 1/4 of NW 1/4 of Sec. 27, T. 12 N, R. 9 [X] 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 805.67 ft. MSL

B. Well casing, top elevation 805.42 ft. MSL

C. Land surface elevation 802.50 ft. MSL

D. Surface seal, bottom 793.50 ft. MSL or 9 ft.

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

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

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

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

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

Describe

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

E. Bentonite seal, top 802.50 ft. MSL or 0 ft.

F. Fine sand, top 793.50 ft. MSL or 9 ft.

G. Filter pack, top 791.50 ft. MSL or 11 ft.

H. Screen joint, top 789.50 ft. MSL or 13 ft.

I. Well bottom 779.50 ft. MSL or 23 ft.

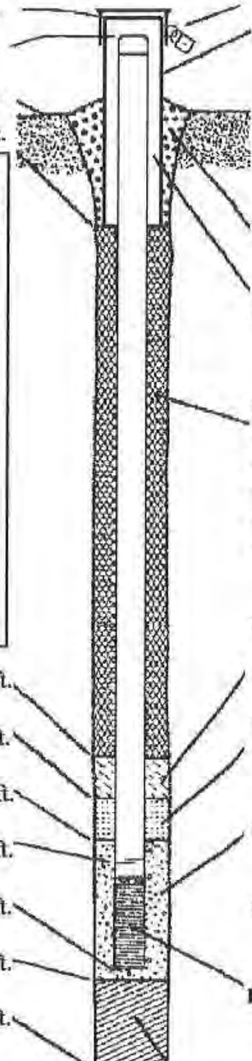
J. Filter pack, bottom 779.50 ft. MSL or 23 ft.

K. Borehole, bottom 779.50 ft. MSL or 23 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 [X] No

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

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

4. Material between well casing and protective pipe:
Bentonite [X] 3 0
Sand. Bentonite to grade 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. [X] 3/8 in. [ ] 1/2 in. Bentonite chips [ ] 3 2
c. 3.4 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 1.5 ft^3

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

10. Screen material: PVC
a. Screen type: Factory cut [X] 1 1
Continuous slot [ ] 0 1
Other [ ]
b. Manufacturer Johnson
c. Slot size: 0.01 in.
d. Slotted length: 10 ft.

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

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

Signature	Firm
[signature] for Zach Watson	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-305
Facility License, Permit or Monitoring No.	Local Grid Origin ☐ (estimated: ☐) or Well Location ☐ Lat. ___ ° ___ ' ___ " Long. ___ ° ___ ' ___ " or	Wis. Unique Well No.: VY716 / DNR Well ID No.
Facility ID	St. Plane 544776.1 ft. N, 2121537 ft. E. S/C/N	Date Well Installed: 11/13/2015 (m m d d y y y y)
Type of Well: Well Code ___ / ___	Section Location of Waste/Source: SW 1/4 of NW 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 806.88 ft. MSL

B. Well casing, top elevation 806.32 ft. MSL

C. Land surface elevation 803.95 ft. MSL

D. Surface seal, bottom 794.95 ft. MSL or 9 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 803.95 ft. MSL or 0 ft.

F. Fine sand, top 794.95 ft. MSL or 9 ft.

G. Filter pack, top 792.95 ft. MSL or 11 ft.

H. Screen joint, top 789.95 ft. MSL or 13 ft.

I. Well bottom 779.95 ft. MSL or 23 ft.

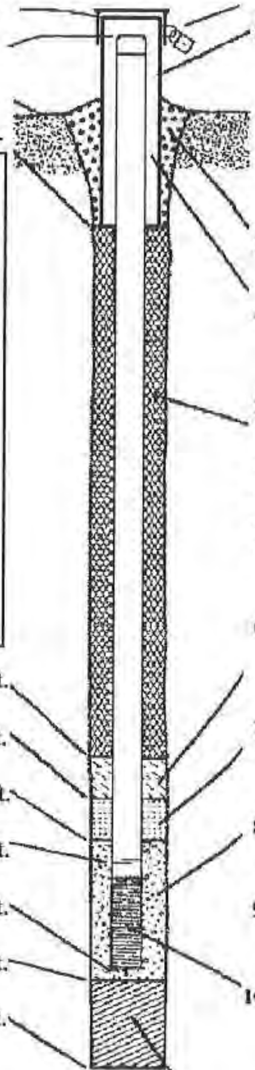
J. Filter pack, bottom 779.95 ft. MSL or 23 ft.

K. Borehole, bottom 779.35 ft. MSL or 23.6 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 ☐ 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 in between
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. 2 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 3 ft^3
9. Well casing: Flush threaded PVC schedule 40 ☒ 2 3; Flush threaded PVC schedule 80 ☐ 2 4; Other ☐
10. Screen material: PVC
   a. Screen type: Factory cut ☒ 1 1; Continuous slot ☐ 0 1; Other ☐
   b. Manufacturer Johnson
   c. Slot size: 0.01 in.
   d. Slotted length: 10 ft.
11. Backfill material (below filter pack): None ☐ 1 4; Other ☒ Native

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

Signature	Firm
[signature] for Zach Watson	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.

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

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 (mm dd yyyy)	12/02/2015 (mm dd yyyy)
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	I hereby certify that the above information is true and correct to the best of my knowledge.
First Name: Nate Last Name: Sievers	Signature: M[illegible] for Gary Sterkel
Facility/Firm: Wisconsin Power and Light	Print Name: Gary Sterkel
Street: W8375 Murray Rd.	Firm: SCS ENGINEERS
City/State/Zip: Pardeville, WI 53954	

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	County Name		Well Name
Alliant - Columbia	Columbia		MW-302
Facility License, Permit or Monitoring Number	**County Code**	**Wis. Unique Well Number**	**DNR Well ID Number**
	11	VY702	

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): 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 (mm/dd/yyyy)	12/02/2015 (mm/dd/yyyy)
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 ☐ 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	I hereby certify that the above information is true and correct to the best of my knowledge.
First Name: Nate Last Name: Sievers	
Facility/Firm: Wisconsin Power and Light	Signature: [signature] for G.S.
Street: W8375 Murray Rd.	Print Name: Gary Sterkel
City/State/Zip: Pardeeville, WI 53954	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	County Name	Well Name
Alliant - Columbia	Columbia	MW-303

Facility License, Permit or Monitoring Number	County Code	Wis. Unique Well Number	DNR Well ID Number
	11	VY714	

1. Can this well be purged dry? [ ] Yes [X] No

2. Well development method
   - surged with bailer and bailed [ ] 41
   - surged with bailer and pumped [X] 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): 35.8 ft.

5. Inside diameter of well: 2.00 in.

6. Volume of water in filter pack and well casing: 7.5 gal.

7. Volume of water removed from well: 83.0 gal.

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

9. Source of water added ________

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

	Before Development	After Development
11. Depth to Water (from top of well casing)	a. 28.30 ft.	28.38 ft.
Date	b. 12/02/2015 (mm dd yyyy)	12/02/2015 (mm dd yyyy)
Time	c. 11:45 [X] a.m. [ ] p.m.	1:45 [ ] a.m. [X] p.m.
12. Sediment in well bottom	___ inches	___ inches
13. Water clarity	Clear [ ] 10 Turbid [X] 15 (Describe)	Clear [X] 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	I hereby certify that the above information is true and correct to the best of my knowledge.
First Name: Nate Last Name: Sievers	Signature: [signature] for G.S.
Facility/Firm: Wisconsin Power and Light	Print Name: Gary Sterkel
Street: W8375 Murray Rd.	Firm: SCS ENGINEERS
City/State/Zip: Pardeeville, WI 53954	

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	County Name	Well Name	
Alliant - Columbia	Columbia	MW-304	
Facility License, Permit or Monitoring Number	**County Code**	**Wis. Unique Well Number**	**DNR Well ID Number**
	11	VY703	

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: 135 min.

4. Depth of well (from top of well casisng): 25.7 ft.

5. Inside diameter of well: 2.00 in.

6. Volume of water in filter pack and well casing: 8.0 gal.

7. Volume of water removed from well: 88.0 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.	17.26 ft.	20.85 ft.
Date	b.	12/03/2015 (mm/dd/yyyy)	12/03/2015 (mm/dd/yyyy)
Time	c.	11:00 ☒ a.m. ☐ p.m.	01:15 ☐ a.m. ☒ p.m.
12. Sediment in well bottom		___ inches	___ 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:

	Before	After
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	I hereby certify that the above information is true and correct to the best of my knowledge.
First Name: Nate Last Name: Sievers	Signature: [signature] for G. S.
Facility/Firm: Wisconsin Power and Light	Print Name: Gary Sterkel
Street: W8375 Murray Rd.	Firm: SCS ENGINEERS
City/State/Zip: Pardeeville, WI 53954	

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	County Name	Well Name
Alliant - Columbia	Columbia	MW-305

Facility License, Permit or Monitoring Number	County Code	Wis. Unique Well Number	DNR Well ID Number
	11	VY716	

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): 25.6 ft.

5. Inside diameter of well: 2.00 in.

6. Volume of water in filter pack and well casing: 7.7 gal.

7. Volume of water removed from well: 85.0 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.	18.61 ft.	18.62 ft.
Date b. (mm/dd/yyyy)	12/02/2015	12/02/2015
Time c.	08:30 ☒ a.m. ☐ p.m.	11:30 ☒ a.m. ☐ p.m.
12. Sediment in well bottom	___ inches	___ 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: Pardeeville, WI 53954

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

Signature: [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.

State of Wisconsin
Department of Natural Resources

GROUNDWATER WELL INFORMATION FORM
Chapter 281 and 289, Wis. Stats.
Form 4400-89

Rev. 7-98

Facility Name	Facility ID Number	License, Permit or Monitoring No.	Date	Completed By (Name and Firm)
Alliant Energy - Columbia Dry Ash	111049180	3025	28-May-03	Pete Chase - RMT, Inc.

WI Unique Well No.	Well Name	DNR Well ID Number	Well Location	Dir. N / E	Dir. S / W	Date Established	Well Casing Diam.	Well Casing Type	Elevation Top of Well Casing	Elevation Ground Surface	Reference MSL (√)	Reference Site Datum (√)	Depths/TOC Screen Top	Depths/TOC Initial Groundwater	Depths/TOC Well Depth	Screen Length	Well Type	Well Status	Enf. Stds.	Gradient	Distance to Waste
			542663.4	N																	
PE223	MW-33AR	063	2123583.8	E		4/9/2003	2	P	808.29	805.4	X		20.9	23.47	30.9	10	MW	A		D	500

Location Coordinates Are:
- [x] State Plane Coordinate
  - [ ] Northern
  - [ ] Central
  - [x] Southern
- [ ] Local Grid System

Grid Origin Location: (Check if estimated: __)

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

SL Plane __________ ft. N. __________ ft. E. S/C/N Zone

Remarks:

Completion of this form is mandatory under s. NR 507.14 and NR 110.25 Wis. Adm. Code. Failure to file this form may result in forfeiture of not less than $10 nor more than $5,000 for each day of violation. Personally identifiable information [illegible]

State of Wisconsin
Department of Natural Resources

GROUNDWATER MONITORING WELL INFORMATION FORM
Chapter 144, Wis. Stats.
Form 4400-89 Rev. 1-90

Facility Name	Facility ID Number	Date	Completed By (Name and Firm)
WP&L - Columbia Dry Ash	03025	January 16, 1998	John C. Oswald - RMT

Well Name	DNR Well ID Number	Well Location	N	S	E	W	Date Established	Well Casing Diam.	Well Casing Type	Elevations Top of Well Casing	Elevations Ground Surface	Reference MSL (3)	Reference Site Datum (3)	Screen Length	Well Depth	Type of Well (3) PIEZ	OW	PW	LYS	Other	Abandoned	Enf. Stds. Apply	Gradient U, S, D or N
MW-34A	020	541,726.56	3				9/28/77	2	P	805.95	804.00	3		10	38.6		3					N	
		2,123,659.12			3																		

Location Coordinates Are:

☐ Local Grid System (preferred)

■ State Plane Coordinate
☐ Northern
■ Southern

Remarks:
Modified July 17, 2003, to reflect abandonment of MW-33A and MW-33B; PMC, RMT, Inc.
NA - Not applicable or unknown
HC - High capacity water supply well

PSS Use:

File Maint. Completed:

Other:

State of Wisconsin
Department of Natural Resources

GROUNDWATER MONITORING WELL INFORMATION FORM
Chapter 144, Wis. Stats.
Form 4400-89 Rev. 1-90

Facility Name	Facility ID Number	Date	Completed By (Name and Firm)
WP&L - Columbia Dry Ash	03025	January 16, 1998	John C. Oswald - RMT

Well Name	DNR Well ID Number	Well Location	N	S	E	W	Date Established	Well Casing: Diam.	Well Casing: Type	Elevations: Top of Well Casing	Elevations: Ground Surface	Reference: MSL (3)	Reference: Site Datum (3)	Screen Length	Well Depth	Type of Well (3): PIEZ	OW	PW	LYS	Other	Aban-doned	Enf. Stds. Apply	Gradient U, S, D or N
MW-84A	038	541,901.52	3				10/5/83	2	P	814.28	812.97	3		10	40.2		3					N	
		2,125,254.65			3																		

Location Coordinates Are:	Remarks:	PSS Use:
☐ Local Grid System (preferred) ■ State Plane Coordinate ☐ Northern ■ Southern	Modified July 17, 2003, to reflect abandonment of MW-91A; PMC, RMT, Inc. NA - Not applicable or unknown HC - High capacity water supply well	File Maint. Completed: Other:

State of Wisconsin
Department of Natural Resources

GROUNDWATER MONITORING WELL INFORMATION FORM

Chapter 144, Wis. Stats.
Form 4400-89 Rev. 1-90

Facility Name	Facility ID Number	Date	Completed By (Name and Firm)
WP&L - Columbia Ash Ponds	02325	January 16, 1998	John C. Oswald – RMT

Well Name	DNR Well ID Number	Well Location	N	S	E	W	Date Established	Well Casing: Diam.	Well Casing: Type	Elevations: Top of Well Casing	Elevations: Ground Surface	Reference: MSL (3)	Reference: Site Datum (3)	Screen Length	Well Depth	Type of Well (3): PIEZ	OW	PW	LYS	Other	Aban-doned	Enf. Stds. Apply	Gradient U, S, D or N
M-4R	133	545,093.94	3				8/22/96	2	P	806.10	803.6	3		10	25.5		3					N	
		2,122,125.89			3																		

Location Coordinates Are:

☐ Local Grid System (preferred)

■ State Plane Coordinate
☐ Northern
■ Southern

Remarks:
Modified July 17, 2003, to reflect abandonment of MW-216; PMC, RMT, Inc.
NA - Not available or unknown

PSS Use:

File Maint. Completed:

Other:

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 ☐

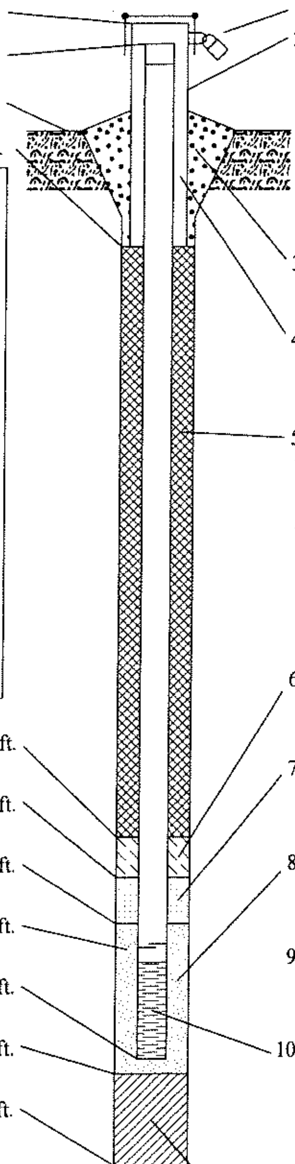
15. Drilling fluid used: Water ☐ 0 2; Air ☐ 0 1; Drilling Mud ☐ 0 3; None ☒ 9 9

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	
Pt McC	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.

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

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: 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 ☐ 10 Turbid ☒ 15 (Describe) Opaque, brown	Clear ☐ 20 Turbid ☒ 25 (Describe) Slight, tan

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

	Before Development	After Development
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: PMC
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 - 30.6' 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:

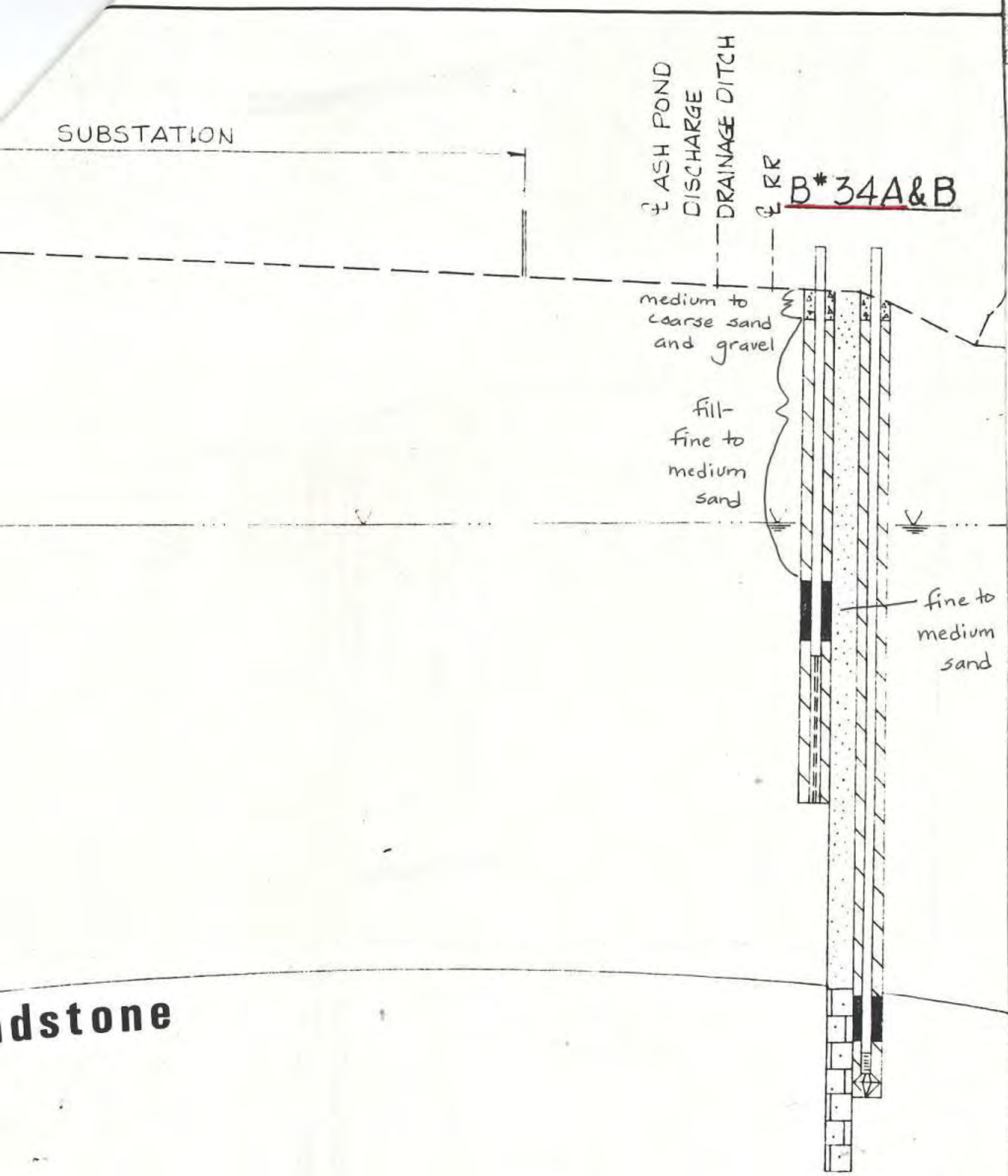
Avg. vol. of water to be bailed:

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

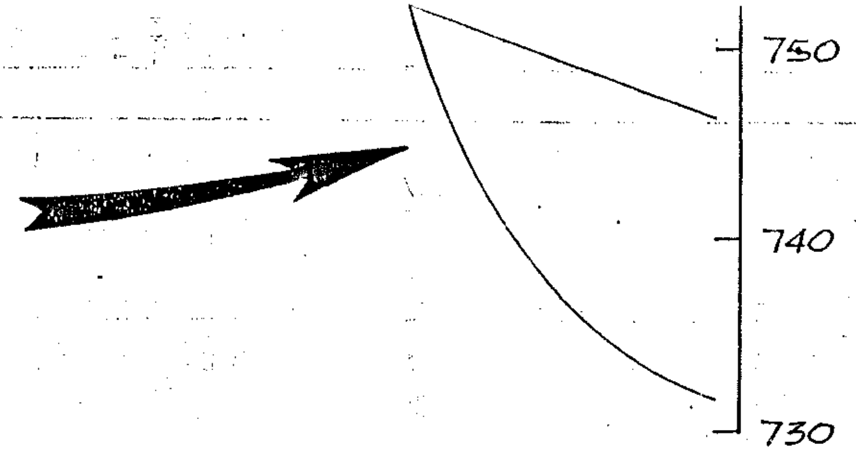
	NO.	PARAMETERS (OTHERS)	MONTHS
■	01022	Boron	1-2-3-4-5-6-7-8-9-10-11-12
■		Color	1-2-3-4-5-6-7-8-9-10-11-12
■		Odor	1-2-3-4-5-6-7-8-9-10-11-12
■		Turbidity	1-2-3-4-5-6-7-8-9-10-11-12
■	01002	Arsenic	1-2-3-4-5-6-7-8-9-10-11-12
■	01007	Barium	1-2-3-4-5-6-7-8-9-10-11-12
■	00312	Cadmium	1-2-3-4-5-6-7-8-9-10-11-12
■	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-

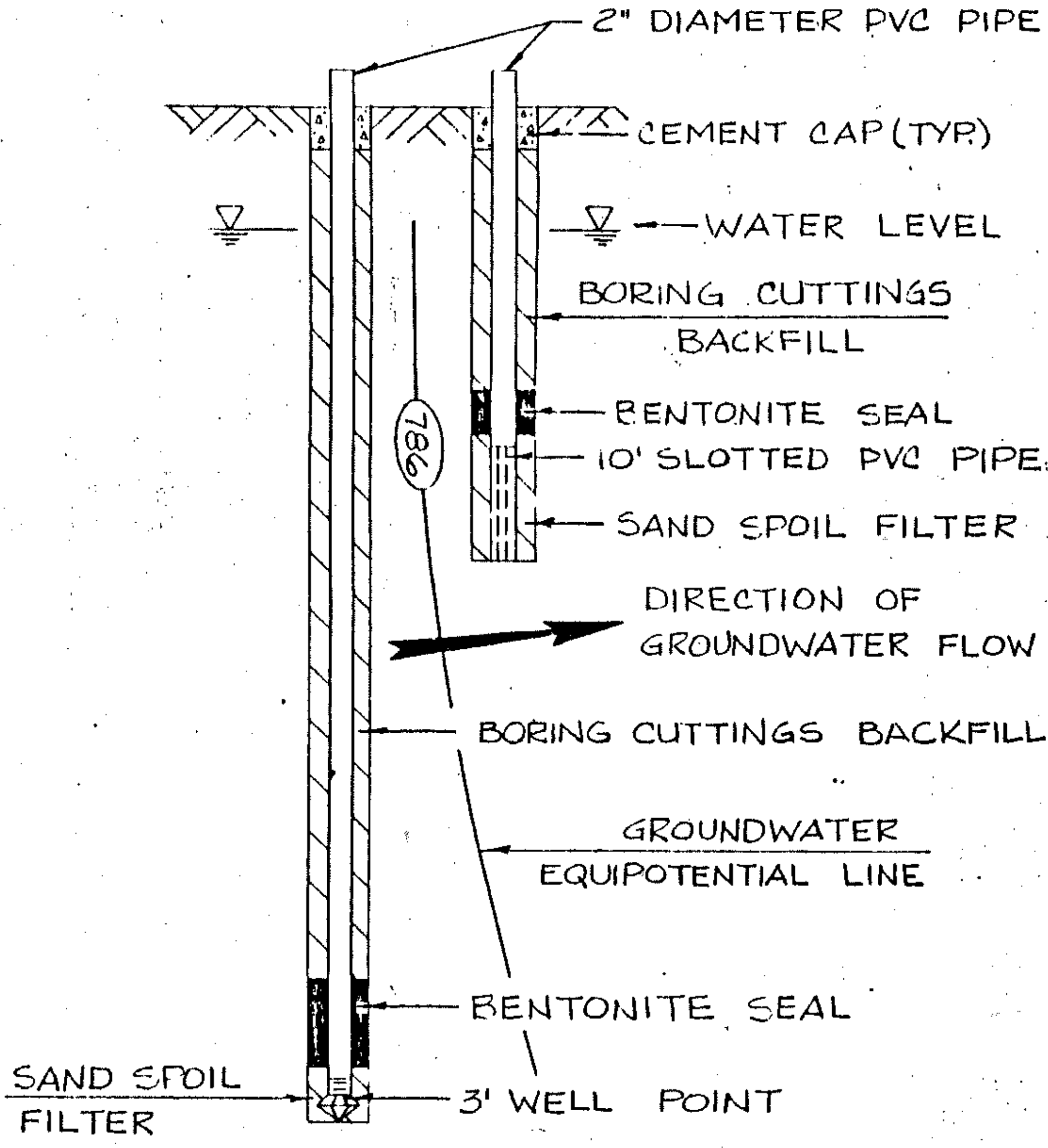


Scale:
Horizontal 1"=100'
Vertical 1"=10'

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

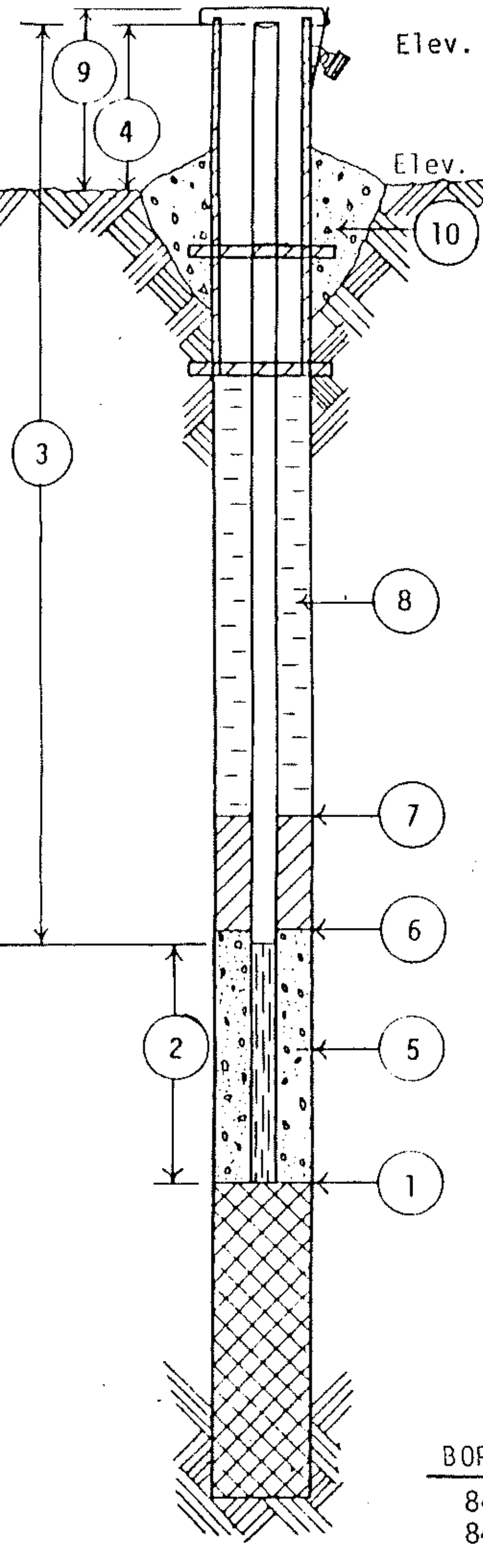
Elev. 814.57 Steel / 814.32 PVC

CHIEF JS

LOCATION WP&L-Columbia Generating Station

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

Elev. 813.4



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

   HEIGHT ABOVE GROUND 2'

   LOCKING CAP YES NO
10. CONCRETE CAP YES NO

WATER LEVEL CHECKS

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

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

WARZYN ENGINEERING IN

F01S.7 461

...te of Wisconsin
...partment of Natural Resources

Route to: Solid Waste ■ Haz. Waste ☐ Wastewater ☐
Env. Response & Repair ☐ Underground Tanks ☐ Other ☐ ____

...ONITORING WELL CONSTRUCTION
Form 4400-113A
Rev. 4-9...

...acility/Project Name ...P&L Columbia	Local Grid Location of Well ■ N. ■ E. 545093.9 ft. ☐ S. 2122125.9 ft. ☐ W.	Well Name M4R
...acility License, Permit or Monitoring Number 2325	Grid Origin Location Lat. __ __ __ Long. __ __ __ or St. Plane ______ ft. N, ______ ft. E.	Wis. Unique Well Number ______ DNR Well Number 133
...ype of Well:Water Table Observation Well ■ 11 Piezometer ☐ 12	Section Location of Waste/Source	Date Well Installed 0 8 / 2 2 / 9 6 M M D D Y Y
...istance Well is From Waste/Source Boundary 120 ft.	NW¼ of NW¼ of Sec.27, T12N, R 9 ■ E. ☐ W.	Well Installed By: (Persons' Name and Firm) Frank Badula Environmental & Foundation Drilling
...s Well A Point of Enforcement Std. Application? ☐ Yes ■ No	Location of Well Relative to Waste/Source U ☐ Upgradient S ☐ Sidegradient D ■ Downgradient N ☐ Not Known	

...Protective pipe, top elevation _8 0 5 . 9 4 ft. MSL

...Well casing, top elevation _8 0 6 . 1 0 ft. MSL

...Land surface elevation _8 0 3 . 6 _ ft. MSL

...Surface seal, bottom _8 0 3 . 1 _ ft. MSL or _0 . 5 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 ☐ 50
Hollow Stem Auger ■ 41
__________ Other ☐

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

16. Drilling additives used? Yes ☐ No ■

Describe __________

17. Source of water (attach analysis):

...Bentonite seal, top _8 0 3 . 1 _ ft. MSL or _ _ 0 . 5 ft.

...Fine sand, top _7 9 4 . 6 _ ft. MSL or _ _ 9 . 0 ft.

...Filter pack, top _7 9 2 . 6 _ ft. MSL or _1 1 . 0 ft.

...Screen joint, top _7 9 0 . 6 _ ft. MSL or _1 3 . 0 ft.

...Well bottom _7 8 0 . 6 _ ft. MSL or _2 3 . 0 ft.

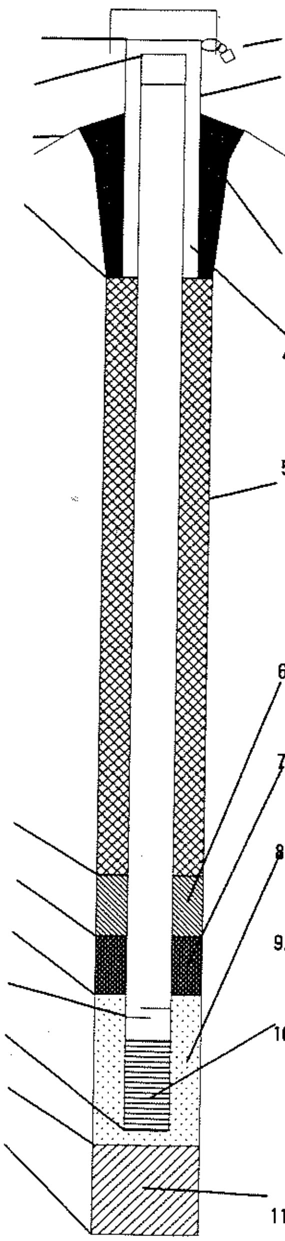
...Filter pack, bottom _7 8 0 . 1 _ ft. MSL or _2 3 . 5 ft.

...Borehole, bottom _7 8 0 . 1 _ ft. MSL or _2 3 . 5 ft.

...Borehole, diameter _8 . 0 in.

...O.D. well casing _2 . 3 8 in.

...I.D. well casing _2 . 0 3 in.



1. Cap and lock? ■ Yes ☐ No

2. Protective cover pipe:
a. Inside diameter: _4 . 0 i...
b. Length: _7 . 0 f...
c. Material: Steel ■ 04; Other ☐
d. Additional protection? ■ Yes ☐ No
If yes, describe: Bumper posts

3. Surface seal: Bentonite ■ 30; Concrete ☐ 01; Other ☐

4. Material between well casing and protective pipe:
Bentonite ■ 30; Annular space seal ☐; Other ☐

5. Annular space seal: a. Granular Bentonite ☐ 33
b. __ Lbs/gal mud weight.... Bentonite-sand slurry ☐ 35
c. __ Lbs/gal mud weight........... Bentonite slurry ☐ 31
d. __ % Bentonite........... Bentonite-cement grout ☐ 50
e. __ lb volume added for any of the above
f. How installed: Tremie ☐ 01; Tremie pumped ☐ 02; Gravity ■ 08

6. Bentonite seal: a. Bentonite granules ☐ 33
b. ☐ 1/4 in. ■ 3/8 in. ☐ 1/2 in. Bentonite pellets ■ 32
c. __________ Other ☐

7. Fine sand material: Manufacturer, product name, mesh size
a. Unimin silica sand
b. Volume added 75 lbs

8. Filter pack material: Manufacturer, product, mesh size
a. Badger Mining Co. (#30)
b. Volume added 400 lbs

9. Well casing: Flush threaded PVC schedule 40 ■ 23
Flush threaded PVC schedule 80 ☐ 24
Other ☐

10. Screen Material: PVC
a. Screen type: Factory cut ■ 11; Continuous slot ☐ 01; Other ☐
b. Manufacturer Timco
c. Slot size: 0. 0 1 0 in
d. Slotted length: 1 0 . 0 ft

11. Backfill material (below filter pack): None ■ 14; Other ☐

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

...ature | Firm
RMT, Inc.

...se complete both sides of this form and return to the appropriate DNR office listed at the top of this form as required by chs. 144, 147 and 160, Wis. Stats., and ch. NR 141, Wis. Adm. ... In accordance with ch. 144, Wis. Stats., failure to file this form may result in a forfeiture of not less than $10, nor more than $5,000 for each day of violation. In accordance with ...147, Wis. Stats., failure to file this form may result in a forfeiture of not more than $10,000 for each day of violation. NOTE: Shaded areas are for DNR use only. See instructions for ... information including where the completed form should be sent.

I:\WPMSN\PJT\00-03024\07\B0003024.07A 12/31/9...

APPENDIX D
APPENDIX E
APPENDIX F
APPENDIX G

...te of Wisconsin
...partment of Natural Resources

MONITORING WELL DEVELOPMENT
Form 4400-113B Rev. 4-90

Route to: Solid Waste ■ Haz. Waste ☐ Wastewater ☐
Env. Response & Repair ☐ Underground Tanks ☐ Other ☐ ________

...cility/Project Name	County Name	Well Name	
...PSL Columbia	Columbia	M4R	
...cility License, Permit or Monitoring Number 2325	County Code 11	Wis. Unique Well Number	DNR Well Number 133

...Can this well be purged dry? ☐ Yes ■ No

...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 ________ ☐

...Time spent developing well 120 min.

...Depth of well (from top of well casing) 25.3 ft.

...Inside diameter of well 2.0 in.

...Volume of water in filter pack and well casing 4.2 gal.

...Volume of water removed from well 70. gal.

...Volume of water added (if any) 0. gal.

...Source of water added ________

	Before Development	After Development
11. Depth to Water (from top of well casing)	a. 19.90 ft.	20.05 ft.
Date	b. 08/23/96 (mm dd yy)	08/23/96 (mm dd yy)
Time	c. 8:30 ■ 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) Brn, very silty	Clear ■ 20 Turbid ☐ 25 (Describe)

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

14. Total suspended solids	______ mg/l	190. mg/l
15. COD	______ mg/l	N/A mg/l

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

... Additional comments on development: Well was surged w/PVC bailer for 30 ...nutes and then pumped.

...me	Volume Removed (gal.)	pH	Temperature (°C)	Conductivity (µmhos)
...30	0 (initial)	6.12	15.2	660
...25	10	6.73	14.0	670
...40	25	6.95	13.7	610
...50	35	6.90	13.7	600
...55	45	6.87	13.6	600
...00	55	6.92	13.6	600
...10	70	6.95	13.7	600

...ll developed by: Person's Name and Firm

...me: Meredith Westover

...m: RMT, Inc.

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

Signature: [signature]

Print Initials: M L W

Firm: RMT, Inc.

...TE: Shaded areas are for DNR use only. See instructions for more information including a list of county codes.

I:\WPMSN\PJT\00-03024\07\B0003024.07A 12/31/96

APPENDIX D

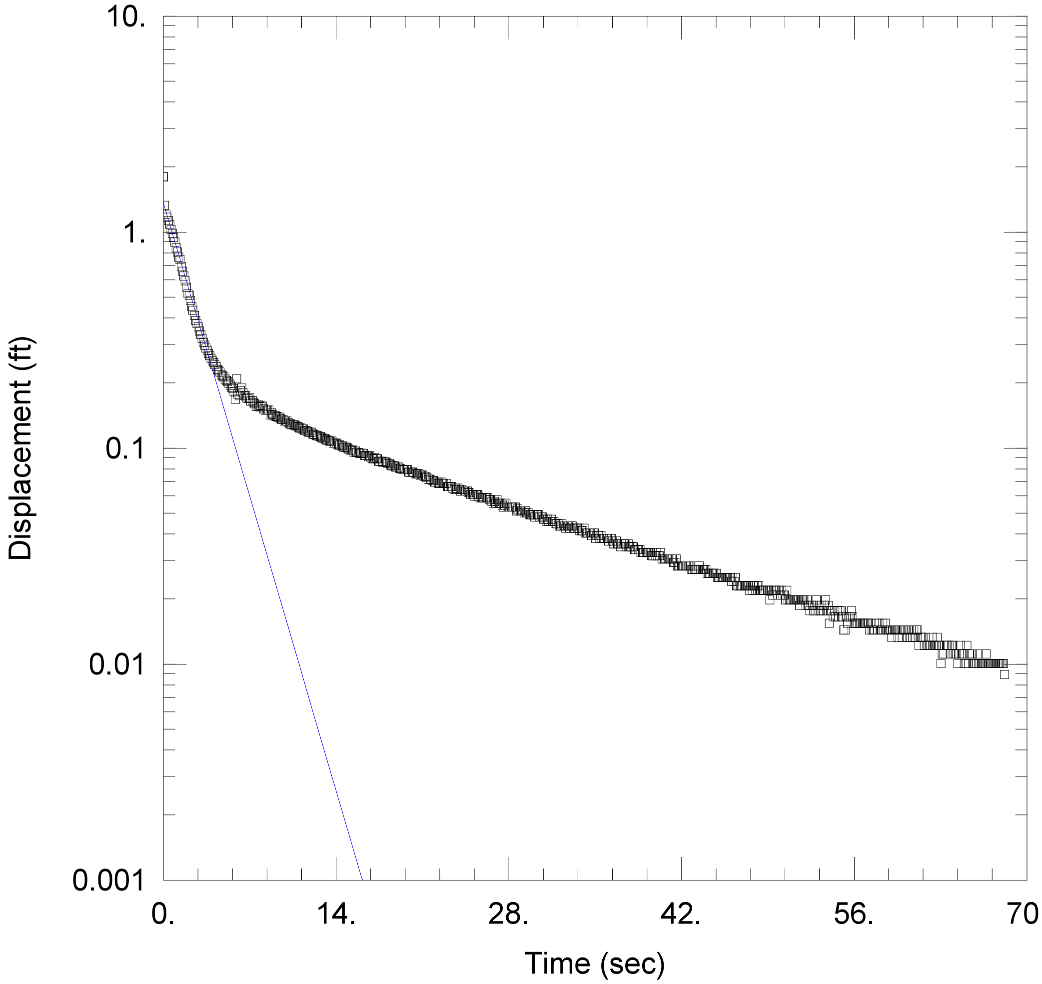
APPENDIX E

APPENDIX F

APPENDIX G

ATTACHMENT C

Hydraulic Conductivity Testing Results



WELL TEST ANALYSIS

Data Set: I:\25215135\Data\Hydraulic Conductivity Testing\COL Slug 160120\MW301.aqt
Date: 01/28/16 Time: 08:46:14

PROJECT INFORMATION

Company: SCS
Client: Alliant Energy - Columbia
Project: 25215135
Location: Portage, WI
Test Well: MW-301
Test Date: 12/20/2015

AQUIFER DATA

Saturated Thickness: 100. ft
Anisotropy Ratio (Kz/Kr): 1.

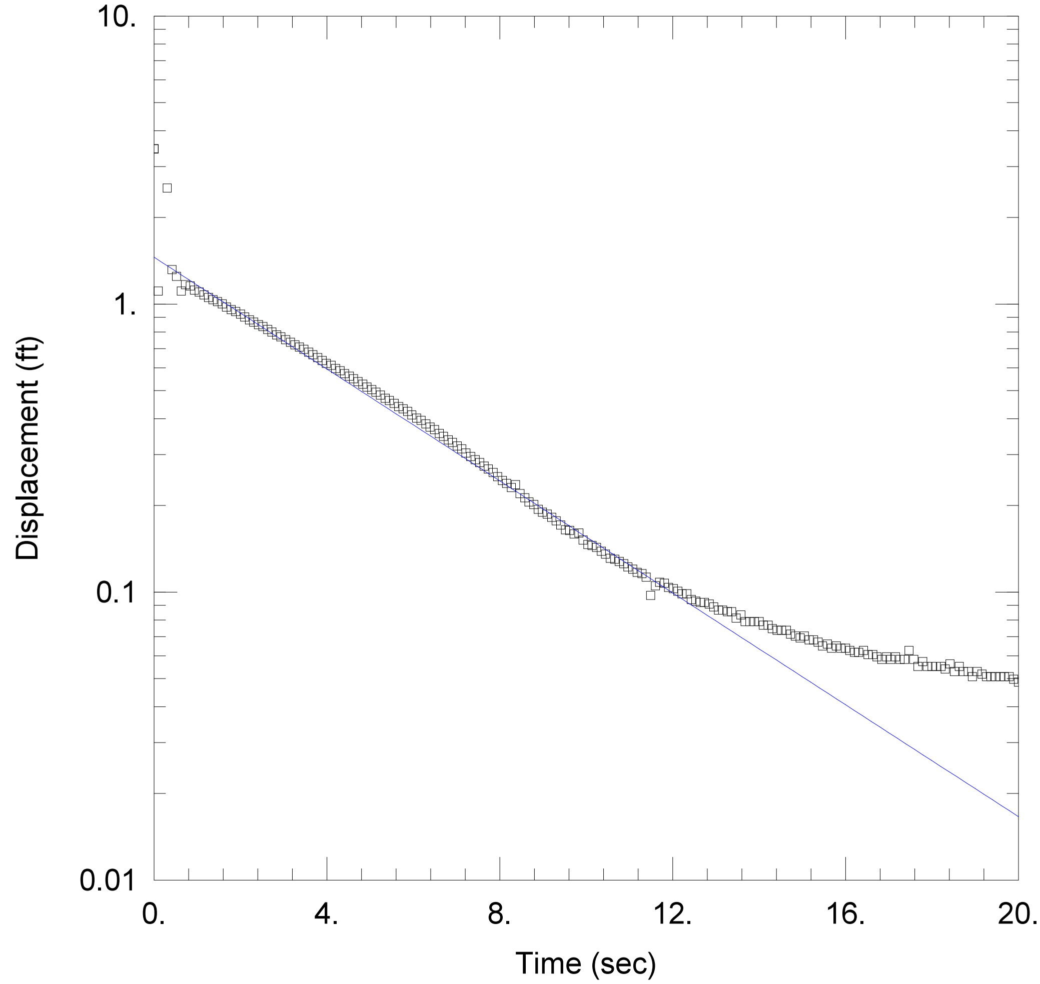
WELL DATA (MW-301 Slug Out)

Initial Displacement: 1.801 ft
Total Well Penetration Depth: 8.75 ft
Casing Radius: 0.09 ft
Static Water Column Height: 8.75 ft
Screen Length: 8.75 ft
Well Radius: 0.35 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.05542 cm/sec
y0 = 1.366 ft



MW-302 SLUG OUT

Data Set: I:\25215135\Data\Hydraulic Conductivity Testing\COL Slug 160120\MW302_Out.aqt
Date: 01/28/16 Time: 08:50:19

PROJECT INFORMATION

Company: SCS
Client: Alliant Energy - Columbia
Project: 25215135
Location: Portage, WI
Test Well: MW-302
Test Date: 12/20/2015

AQUIFER DATA

Saturated Thickness: 100. ft
Anisotropy Ratio (Kz/Kr): 1.

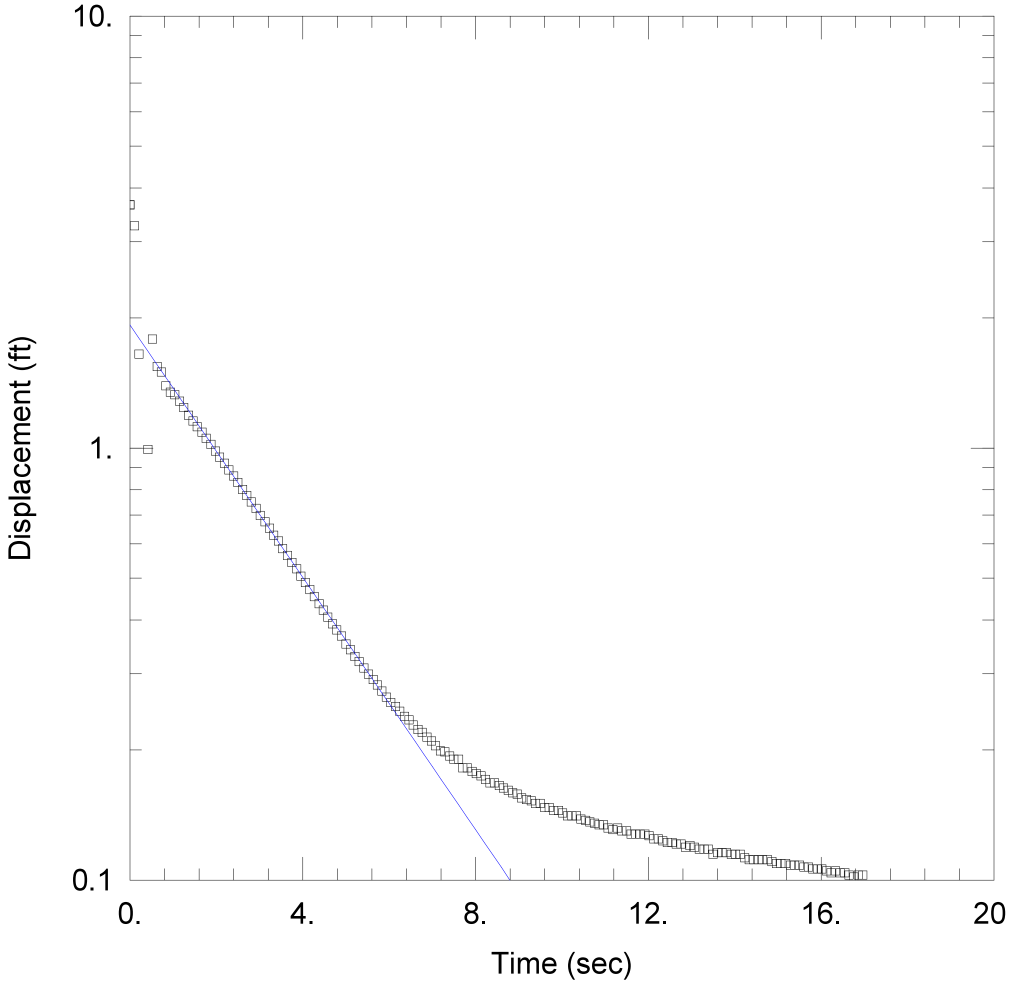
WELL DATA (MW-302 Slug Out)

Initial Displacement: 3.46 ft
Total Well Penetration Depth: 5.85 ft
Casing Radius: 0.09 ft
Static Water Column Height: 5.85 ft
Screen Length: 5.85 ft
Well Radius: 0.33 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.03217 cm/sec
y0 = 1.454 ft



WELL TEST ANALYSIS

Data Set: I:\25215135\Data\Hydraulic Conductivity Testing\COL Slug 160120\MW303_Out.aqt
Date: 01/28/16 Time: 08:52:10

PROJECT INFORMATION

Company: SCS
Client: Alliant Energy - Columbia
Project: 25215135
Location: Portage, WI
Test Well: MW-303 Slug Out
Test Date: 12/20/2015

AQUIFER DATA

Saturated Thickness: 100. ft
Anisotropy Ratio (Kz/Kr): 1.

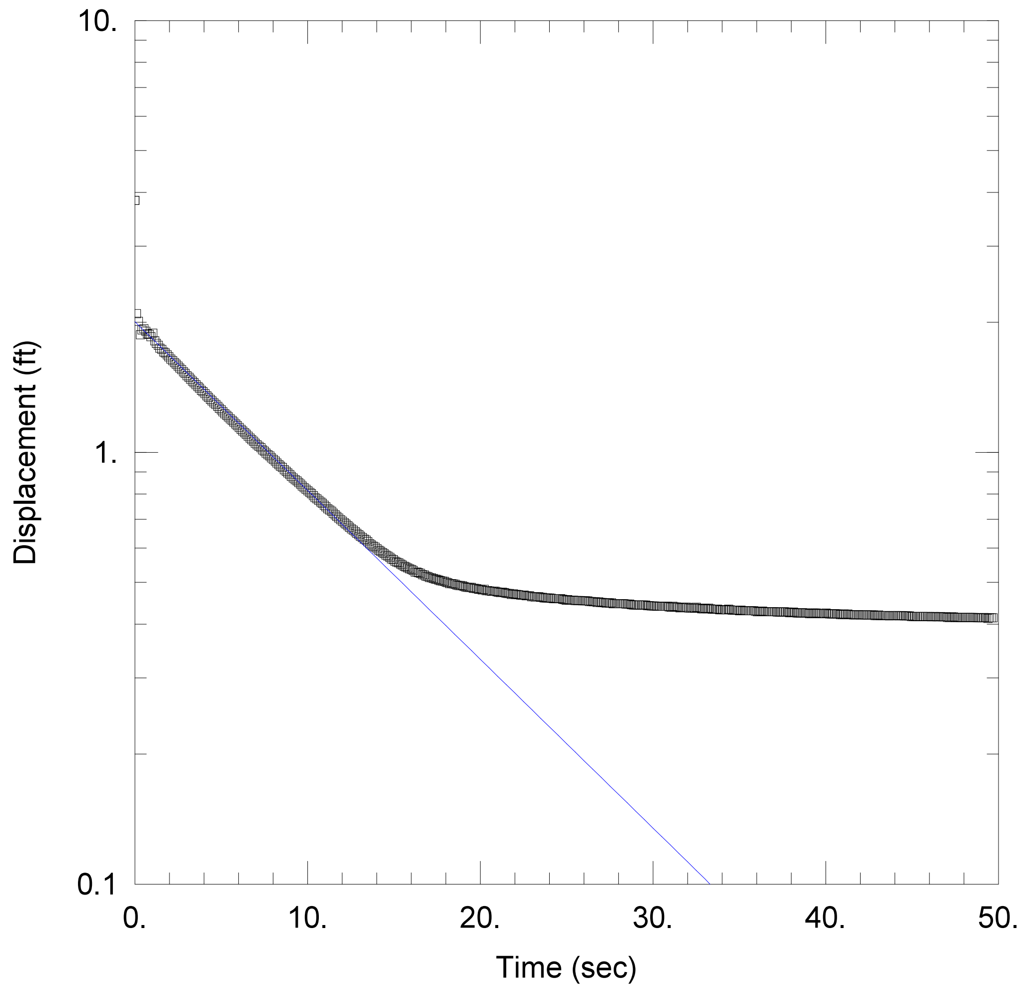
WELL DATA (MW-303 Slug Out)

Initial Displacement: 3.66 ft
Total Well Penetration Depth: 9.35 ft
Casing Radius: 0.09 ft
Static Water Column Height: 9.35 ft
Screen Length: 9.35 ft
Well Radius: 0.35 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.04011 cm/sec
y0 = 1.926 ft



WELL TEST ANALYSIS

Data Set: I:\25215135\Data\Hydraulic Conductivity Testing\COL Slug 160120\MW304_Out.aqt
Date: 01/28/16 Time: 08:52:50

PROJECT INFORMATION

Company: SCS
Client: Alliant Energy - Columbia
Project: 25215135
Location: Portage, WI
Test Well: MW-304 Slug Out
Test Date: 12/20/2015

AQUIFER DATA

Saturated Thickness: 100. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-304 Slug Out)

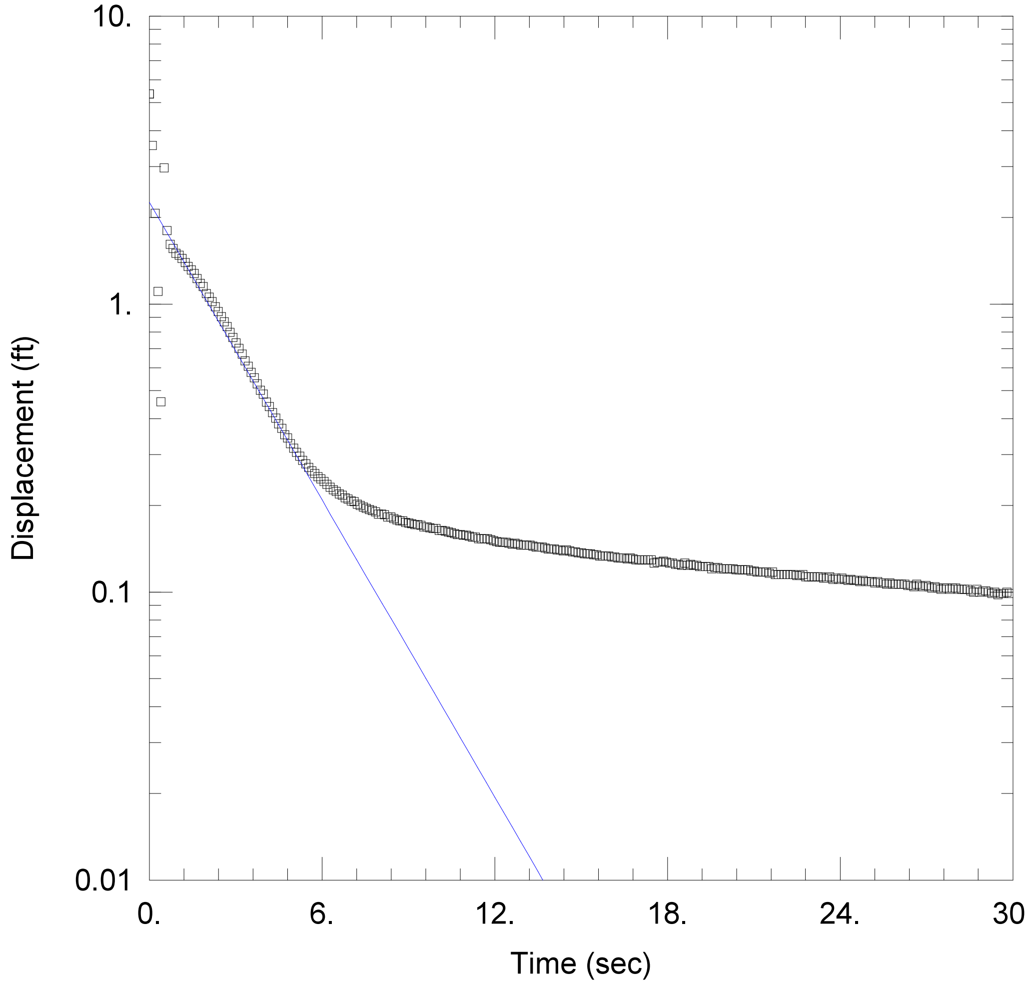
Initial Displacement: 3.83 ft
Total Well Penetration Depth: 7.65 ft
Casing Radius: 0.09 ft

Static Water Column Height: 7.65 ft
Screen Length: 7.65 ft
Well Radius: 0.35 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 0.01204 cm/sec y0 = 2.006 ft



WELL TEST ANALYSIS

Data Set: I:\25215135\Data\Hydraulic Conductivity Testing\COL Slug 160120\MW305_Out.aqt
Date: 01/28/16 Time: 08:53:18

PROJECT INFORMATION

Company: SCS
Client: Alliant Energy - Columbia
Project: 25215135
Location: Portage, WI
Test Well: MW-305 Slug Out
Test Date: 12/20/2015

AQUIFER DATA

Saturated Thickness: 100. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-305 Slug Out)

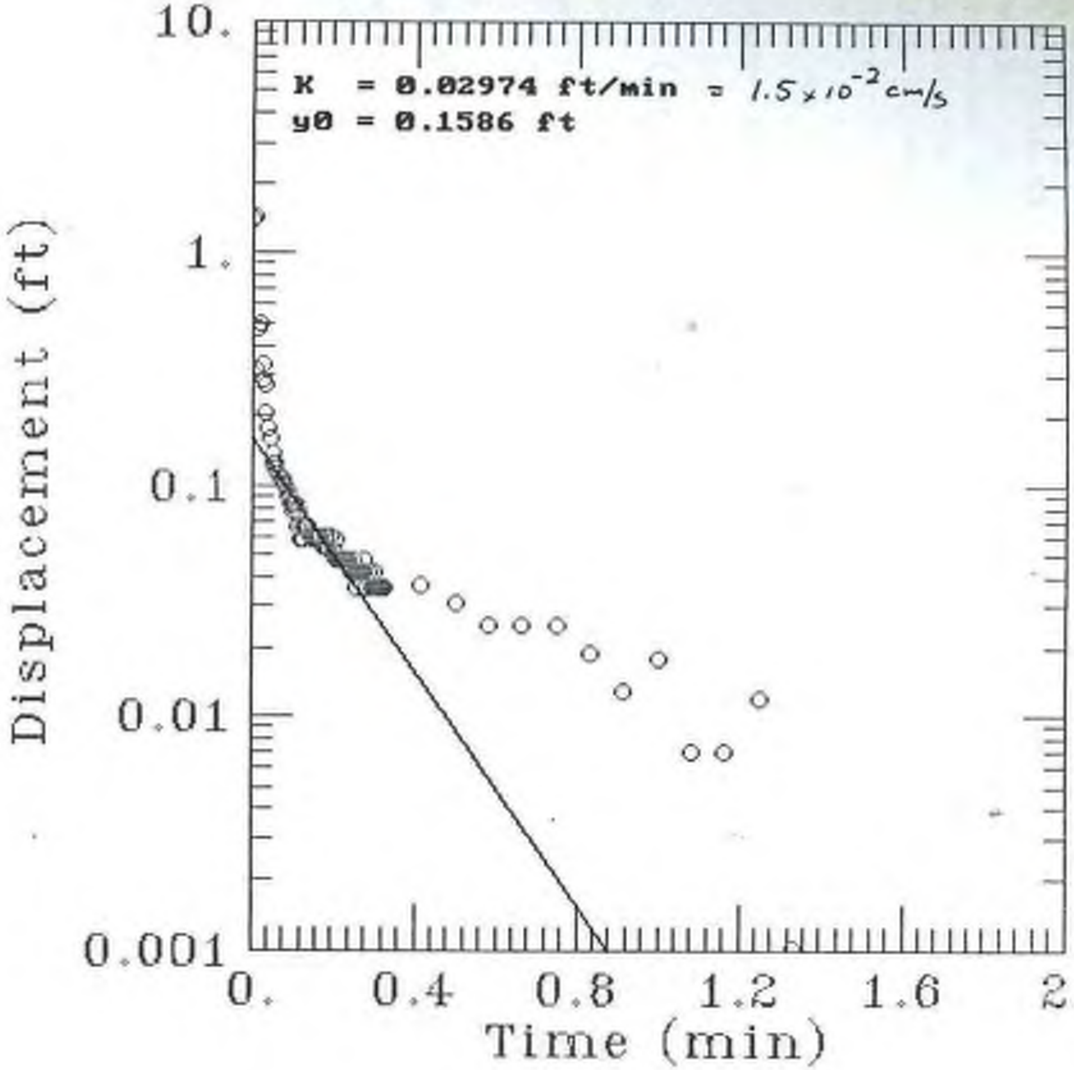
Initial Displacement: 5.37 ft
Total Well Penetration Depth: 8.55 ft
Casing Radius: 0.09 ft
Static Water Column Height: 8.55 ft
Screen Length: 8.55 ft
Well Radius: 0.35 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.04979 cm/sec
y0 = 2.254 ft

WP+L Columbia: M-4R #5



JCO 12/30/96

AQTESOLV

GERAGHTY & MILLER, INC.

Modeling Group

<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<>>

A Q T E S O L V   R E S U L T S
Version 1.10

10:17:2

08/27/96

==

TEST DESCRIPTION

Data set.......... clombo05.dat
Data set title..... WP+L Columbia: M-4R #5

Knowns and Constants:
No. of data points.................. 90
Radius of well casing............... 0.18
Radius of well...................... 0.333
Aquifer saturated thickness......... 8
Well screen length.................. 5.95
Static height of water in well...... 5.95
Log(Re/Rw).......................... 1.882
A, B, C............................. 2.093, 0.322, 0.000

==

ANALYTICAL METHOD

Bouwer and Rice (unconfined aquifer slug test)

==

RESULTS FROM STATISTICAL CURVE MATCHING

STATISTICAL MATCH PARAMETER ESTIMATES

	Estimate		Std. Error
K =	2.9735E-002	+/-	1.4745E-003
y0 =	1.5857E-001	+/-	5.6474E-003

ANALYSIS OF MODEL RESIDUALS

residual = calculated - observed
weighted residual = residual * weight

Weighted Residual Statistics:
Number of residuals............... 49
Number of estimated parameters.... 2
Degrees of freedom................ 47
Residual mean..................... 0.000314
Residual standard deviation....... 0.007687
Residual variance................. 5.91E-005

Model Residuals:

APPENDIX G

April 17, 2019
File No. 25219067.00

Mr. Brian Clepper
Columbia Energy Center
W8375 Murray Road
Pardeeville, WI 53954

Subject: Columbia Energy Center – COL Secondary Pond
Monitoring Well Construction Documentation

Dear Mr. Clepper:

SCS Engineers has completed the installation of three groundwater monitoring wells (MW-306, MW-307, and MW-308) at the Columbia Energy Center in Pardeeville, Wisconsin (**Figure 1**). These wells are downgradient of the Secondary Pond. In addition, the monitoring network includes two pre-existing monitoring wells (MW-301 and MW-84A), which are used to provide background information.

The wells were installed to support compliance with the final Coal Combustion Residuals (CCR) Rule (40 CFR 257.50-107). The monitoring well locations are shown on **Figure 2**. **Appendices A** through **C** include documentation of well design, installation, and development as required by 40 CFR 257.91(e)(1).

This monitoring well construction documentation report is ready to be entered into the operating record as required by 40 CFR 257.105(h)(2).

Please contact us at 608-224-2830 if you have any questions about the well documentation.

Sincerely,

Meghan Blodgett
Hydrogeologist
SCS Engineers

Thomas J. Karwoski
Project Manager
SCS Engineers

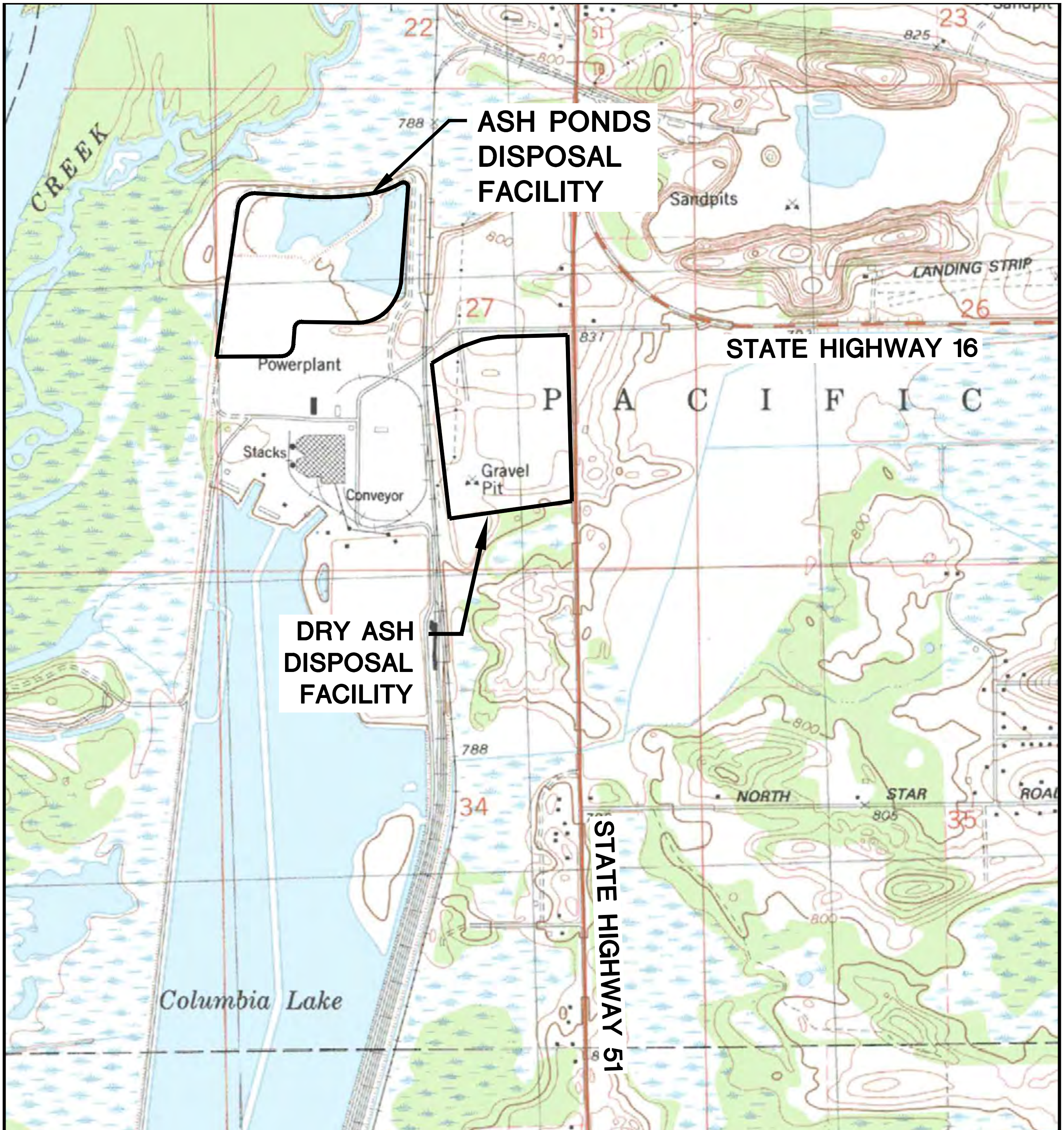
MDB/lmh/TK/SCC

cc: Jeff Maxted, Alliant Energy
Jerry Lokenvitz, Columbia Energy Center

Encl. Figure 1 – Site Location Map
Figure 2 – Monitoring Well Location Map
Appendix A – Boring Logs
Appendix B – Well Construction and Development Documentation
Appendix C – Hydraulic Conductivity Testing Results

I:\25216067.00\Deliverables\Secondary Pond Documentation\Operating Record Well Documentation\190417_Clepper_COL Secondary Pond_Well Documentation for Op Record.docx

Figures



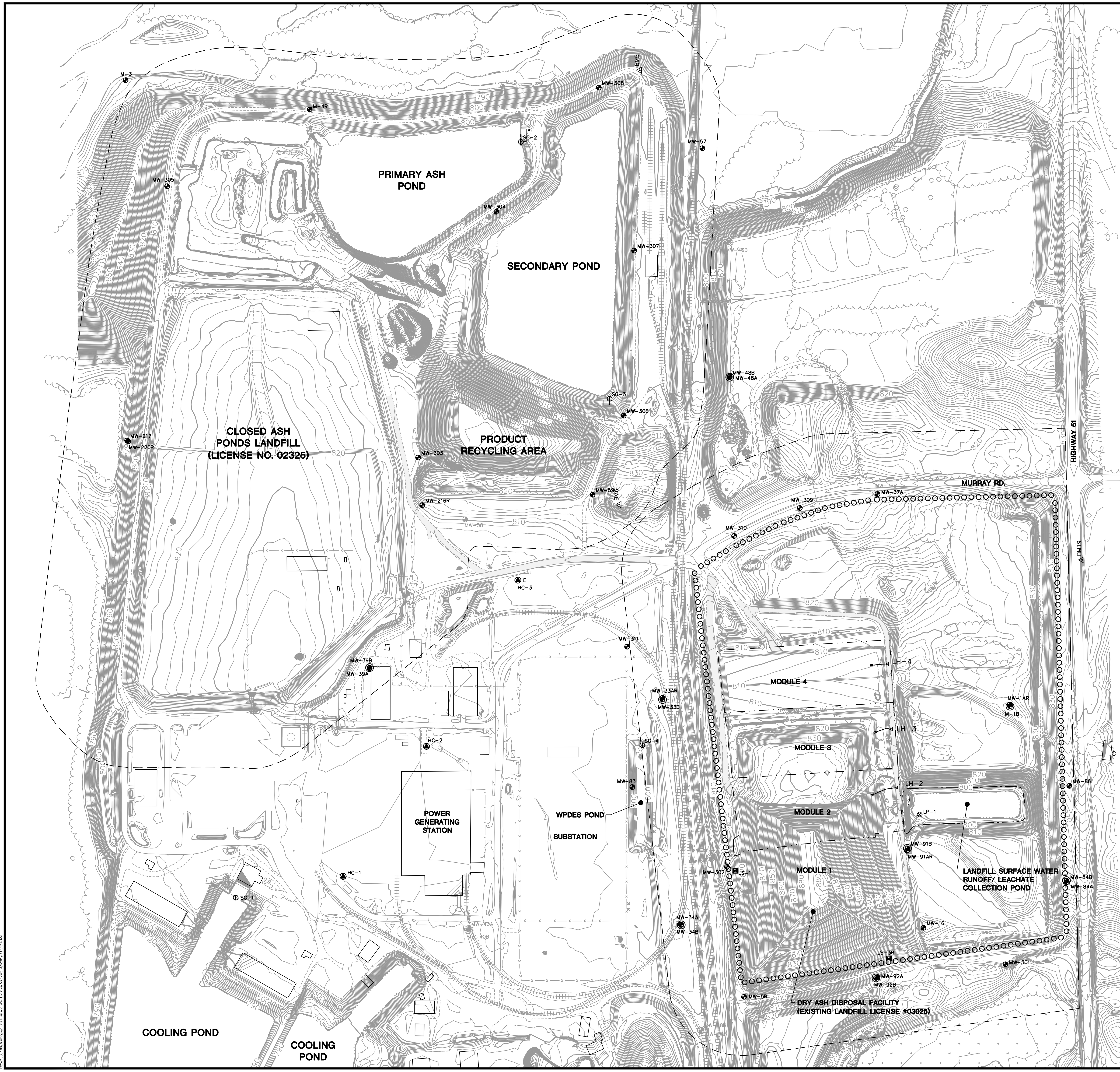
N

POYNETTE QUADRANGLE
WISCONSIN–COLUMBIA CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)
NW/4 POYNETTE 15' QUADRANGLE
1984
SCALE: 1" = 2,000'

CLIENT	ALLIANT ENERGY	ALLIANT ENERGY 4902 NORTH BILTMORE LN. #1000 MADISON, WI 53718	SITE	COLUMBIA ASH PONDS AND DRY ASH DISPOSAL FACILITIES	SITE LOCATION MAP

PROJECT NO.	25216067.00	DRAWN BY:	KP	ENGINEER	SCS ENGINEERS 2830 DAIRY DRIVE MADISON, WI 53718-6751 PHONE: (608) 224-2830	FIGURE
DRAWN:	08/10/09	CHECKED BY:	MDB			1
REVISED:	04/16/18	APPROVED BY:	TK 04/09/19			

I:\25216067.00\Drawings\Site Loc.dwg, 4/9/2019 10:40:27 AM



LEGEND

810	EXISTING MAJOR CONTOUR (10' INTERVAL)
	EXISTING MINOR CONTOUR (2' CONTOUR)
	EXISTING FENCELINE
	EXISTING TRACKS
	EXISTING PAVED ROAD
	EXISTING UNPAVED ROAD
	EDGE OF WATER
	DESIGN MANAGEMENT ZONE
	APPROVED LIMITS OF WASTE
	CONSTRUCTED LIMITS OF WASTE
	WATER SUPPLY WELL
	STAFF GAUGE
	WATER TABLE WELL
	PIEZOMETER
	SURFACE WATER SAMPLE LOCATION
	LYSIMETER
	ABANDONED WATER TABLE WELL
	ABANDONED PIEZOMETER
	LEACHATE HEADWELL

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, AND AUGUST 2018.
2. MONITORING WELL LOCATIONS AND ELEVATIONS SURVEYED BY WISCONSIN POWER AND LIGHT, INC. IN DECEMBER 1994, NOVEMBER 1996, APRIL 2003, JANUARY6 2016 AND BY SCS ENGINEERS IN FEBRUARY 2018.
3. SUPPLY WELL LOCATIONS ARE APPROXIMATE AND ASSUMED BASED ON JANUARY 2013 DRAWINGS BY TRC.
4. THE LOCATIONS OF THE ASH PONDS FACILITY DESIGN MANAGEMENT ZONE DEMARCATION LINES ARE APPROXIMATE AND BASED ON THE WATER TABLE MAP (OCTOBER 2012) FIGURE BY RMT.
5. THE LOCATION OF THE ACTIVE DRY ASH LANDFILL DESIGN MANAGEMENT ZONE DEMARCATION LINE IS BASED ON A 300 FOOT OFFSET FROM THE DESIGN LIMITS OF ASH EXCEPT WHERE OFFSET WOULD EXTEND LINE BEYOND PROPERTY LINE.

FIGURE 2

SITE PLAN AND WELL LOCATION MAP

COLUMBIA ASH PONDS AND DRY ASH DISPOSAL FACILITIES

SITE

ALLIANT ENERGY
4902 NORTH BILTMORE LN. #1000
MADISON, WI 53718

CLIENT

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

ENGINEER

PROJECT NO.	25216067.00	DRAWN BY:	KP/BSS
DRAWN:	01/06/19	CHECKED BY:	MDB
REVISED:	03/12/19	APPROVED BY:	TK 04/09/19

Appendix A

Boring Logs

State of Wisconsin
Department of Natural Resources

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

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

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
WPL- Columbia SCS#: 25216146.00		MW-306

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
Kevin Duerst Badger State Drilling	11/14/2016	11/14/2016	hollow stem auger

WI Unique Well No.	DNR Well ID No.	Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
VY812		MW-306	Feet	805.30 Feet	8.5 in.

Local Grid Origin ☐ (estimated: ☐) or Boring Location ☒
State Plane 543,829 N, 2,123,424 E S/C/N
SE 1/4 of NW 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	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Standard Penetration	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
				TOPSOIL.										
			1	SILTY SAND, yellowish brown (10YR 5/4), medium grained.										
			2											
			3											
S1	23	8 13 11 11	4							M				
			5											
			6											
S2	16	7 5 5 5	7		SM					M				
			8											
S3	16	2 4 8 14	9							M				
			10											
			11											
S4	16	7 10 7 10	12							M				
			13											
S5	23	9 22 31 39	14	POORLY GRADED SAND, light yellowish brown (10YR 6/4), medium grained, dense.	SP					M				
			15											

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

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

State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION SUPPLEMENT
Form 4400-122A

Boring Number MW-306 Use only as an attachment to Form 4400-122.

Sample: Number and Type	Sample: Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID/FID	Soil Properties: Standard Penetration	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			16		SP									
S6	22	17 29 40 42								M				
			17	SILTY SAND, yellowish brown (10YR 5/4), fine to medium grained.	SM									
			18											
S7	24	26 41 47 44	19							M				
			20											wl= 20 ft bgs.
			21											
S8	20	11 25 37 46	22							W				
			23											
S9	24	8 19 31 44	24							W				
			25											
			26											
			27											
			28	End of boring at 28 ft bgs.										

State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 7-98

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

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
WPL- Columbia SCS#: 25216146.00		MW-307

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
Kevin Duerst Badger State Drilling	11/14/2016	11/15/2016	hollow stem auger

WI Unique Well No.	DNR Well ID No.	Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
VY813		MW-307	Feet	804.53 Feet	8.5 in.

Local Grid Origin ☐ (estimated: ☐) or Boring Location ☒
State Plane 544,511 N, 2,123,467 E S/C/N
SE 1/4 of NW 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	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Standard Penetration	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
				TOPSOIL.										
			1	SILTY SAND, yellowish brown (10YR 5/4), medium grained.										
			2											
			3											
S1	23	5 5 7 14	4							M				
			5											
S2	22	11 22 24 38	6	Same as above except, pale brown (10YR 6/3).						M				
			7											
			8		SM									
S3	22	7 25 33 40	9							M				rock in spoon.
			10											
S4	22	14 18 22 26	11–12							M				
			13											
S5	24	12 18 19 22	14							M				
			15											

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

Signature [signature]

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

State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION SUPPLEMENT
Form 4400-122A

Boring Number MW-307 Use only as an attachment to Form 4400-122.

Sample Number and Type	Sample Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID/FID	Standard Penetration	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
S6	23	12 16 16 19	16–17							M				
S7	24	6 8 8 6	18–19	Same as above except, brown (10YR 4/3).						M				wl=19.5 ft bgs.
S8	20	3 4 4 4	21–22		SM					W				
S9	24	2 2 6 8	23–24	Same as above except, brown (10YR 5/3).						W				
S10	24	2 3 3 7	26–27							W				
				End of boring at 27.5 ft bgs.										

State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 7-98

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

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
WPL- Columbia SCS#: 25216146.00		MW-308

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
Kevin Duerst Badger State Drilling	11/15/2016	11/15/2016	hollow stem auger

WI Unique Well No.	DNR Well ID No.	Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
VY814		MW-308	Feet	804.54 Feet	8.5 in.

Local Grid Origin ☐ (estimated: ☐) or Boring Location ☒
State Plane 545,184 N, 2,123,321 E S/C/N
NE 1/4 of NW 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	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Standard Penetration	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
				POORLY GRADED GRAVEL.	GP									
			1	SILTY SAND, brown (10YR 5/3), medium grained.	SM									
S1	23	5 17 23 25	4							M				
S2	23	10 21 17 19	7							M				
S3	24	10 15 18 26	9							M				
S4	24	11 23 19 23	12							M				
			13	Same as above except, brown (10YR 4/3).										
S5	19	9 12 16 16	14							M				
			15											

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

Signature: [signature]

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

State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION SUPPLEMENT
Form 4400-122A

Boring Number MW-308 Use only as an attachment to Form 4400-122.

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID/FID	Standard Penetration	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
S6	24	9 12 11 9	16–17	SITLY SAND, brown (10YR 5/3), medium grained.	SM					M				
S7	22	9 11 10 11	18–19	Same as above except, very dark grayish brown (10YR 3/2).						M				
S8	22	4 10 11 7	21–22							W				wl=21.25 ft bgs.
			23	Same as above except, brown (10YR 5/3).										
S9A / S9B	23	4 3 4 7	24	PEAT, black (10YR 2/1), dense.	PT					W				Fibrous roots
S10A	24	5 6 9 15	26–27	SILT, dark gray (10YR 4/1).	ML					W				
S10B			27	SILTY SAND, grayish brown (10YR 5/2).	SM									
S11	18	5 10 9 9	28–29							W				
			29	End of boring at 29 ft bgs.										

Appendix B

Well Construction and Development Documentation

SCS # 25216146.00

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-306
Facility License, Permit or Monitoring No.	Local Grid Origin ☐ (estimated: ☐) or Well Location ☒ Lat. ° ' " Long. ° ' " or	Wis. Unique Well No.: VY812 / DNR Well ID No.
Facility ID	St. Plane 543828.99 ft. N, 2123423.65 ft. E. S/C/N	Date Well Installed: 11 / 14 / 2016 (m m / d d / y y y y)
Type of Well: Well Code 11 / MW	Section Location of Waste/Source: SE 1/4 of NW 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 807.88 ft. MSL

B. Well casing, top elevation 807.66 ft. MSL

C. Land surface elevation 805.30 ft. MSL

D. Surface seal, bottom 804.8 ft. MSL or 0.5 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 804.8 ft. MSL or 0.5 ft.

F. Fine sand, top 791.3 ft. MSL or 14 ft.

G. Filter pack, top 790.3 ft. MSL or 15 ft.

H. Screen joint, top 788.3 ft. MSL or 17 ft.

I. Well bottom 778.3 ft. MSL or 27 ft.

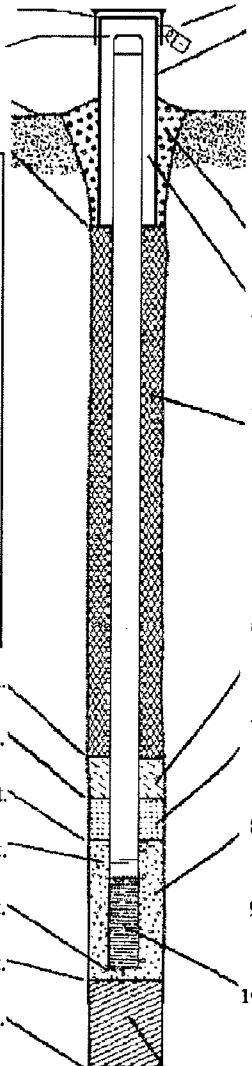
J. Filter pack, bottom 778.3 ft. MSL or 27 ft.

K. Borehole, bottom 777.3 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. ___ 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 3 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 ☒
    RW Sidley #5

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

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

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

SCS # 25216146.00

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 ☐ N. ☐ S. ____ ft. ☐ E. ☐ W. ____ ft.	Well Name MW-307
Facility License, Permit or Monitoring No.	Local Grid Origin ☐ (estimated: ☐) or Well Location ☐ Lat. ___ ° ___ ' ___ " Long. ___ ° ___ ' ___ " or	Wis. Unique Well No. VY813 / DNR Well ID No.
Facility ID	St. Plane 544510.95 ft. N, 2123466.6 ft. E. S/C/N	Date Well Installed 11 / 15 / 2016 (m m d d y y y y)
Type of Well Well Code 11 / MW	Section Location of Waste/Source SE 1/4 of NW 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 806.96 ft. MSL

C. Land surface elevation 804.53 ft. MSL

D. Surface seal, bottom 804.03 ft. MSL or 0.5 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 804.03 ft. MSL or 0.5 ft.

F. Fine sand, top 791.03 ft. MSL or 13.5 ft.

G. Filter pack, top 790.03 ft. MSL or 14.5 ft.

H. Screen joint, top 788.03 ft. MSL or 16.5 ft.

I. Well bottom 778.03 ft. MSL or 26.5 ft.

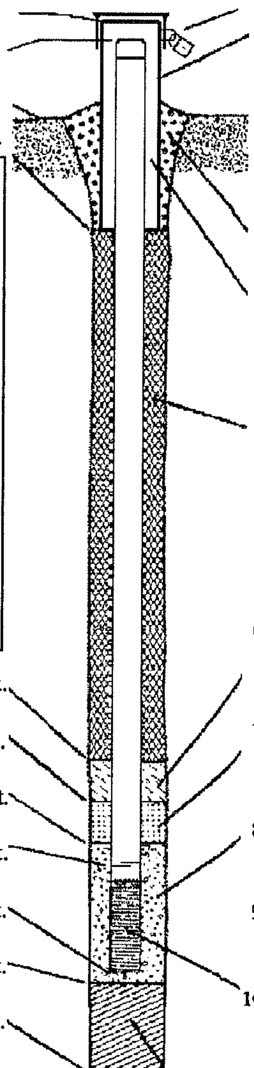
J. Filter pack, bottom 777.03 ft. MSL or 27.5 ft.

K. Borehole, bottom 777.03 ft. MSL or 27.5 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. ____ 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 3.5 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
RW Sidley #5 Other ☒

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

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

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

SCS # 25216146.00

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-308
Facility License, Permit or Monitoring No.	Local Grid Origin [ ] (estimated: [ ]) or Well Location [■] Lat. ° ' " Long. ° ' " or	Wis. Unique Well No. VY814 / DNR Well ID No.
Facility ID	St. Plane 545183.88 ft. N, 2123320.76 ft. E. S/C/N	Date Well Installed 11 / 15 / 2016 (m m / d d / y y y y)
Type of Well Well Code 11 / MW	Section Location of Waste/Source NE 1/4 of NW 1/4 of Sec. 27, T. 12 N, R. 9 [X] E [ ] W	Well Installed By: Name (first, last) and Firm Kevin Duerst
Distance from Waste/Source ft. / Enf. Stds. Apply [X]	Location of Well Relative to Waste/Source u [ ] Upgradient s [ ] Sidegradient d [ ] Downgradient n [ ] Not Known / Gov. Lot Number	Badger State Drilling

A. Protective pipe, top elevation 807.10 ft. MSL
B. Well casing, top elevation 806.92 ft. MSL
C. Land surface elevation 804.54 ft. MSL
D. Surface seal, bottom 804.04 ft. MSL or 0.5 ft.

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

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

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

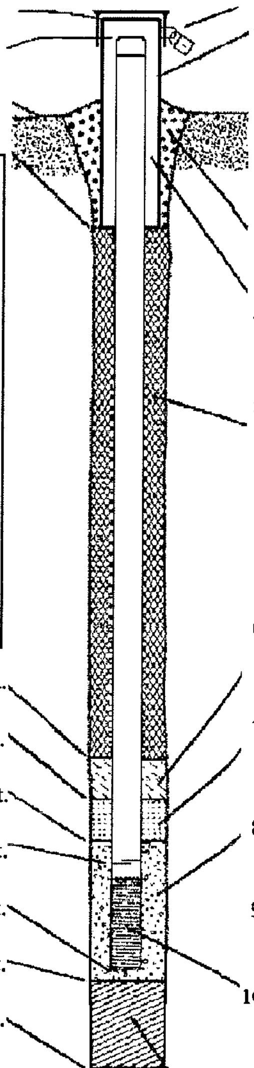
15. Drilling fluid used: Water [ ] 0 2 Air [ ] 0 1
Drilling Mud [ ] 0 3 None [X] 9 9

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

Describe

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

E. Bentonite seal, top 804.04 ft. MSL or 0.5 ft.
F. Fine sand, top 789.54 ft. MSL or 15.0 ft.
G. Filter pack, top 788.54 ft. MSL or 16.0 ft.
H. Screen joint, top 786.54 ft. MSL or 18.0 ft.
I. Well bottom 776.54 ft. MSL or 28.0 ft.
J. Filter pack, bottom 775.54 ft. MSL or 29.0 ft.
K. Borehole, bottom 775.54 ft. MSL or 29.0 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? [X] Yes [ ] No
2. Protective cover pipe:
a. Inside diameter: 6 in.
b. Length: 5 ft.
c. Material: Steel [X] 0 4; Other [ ]
d. Additional protection? [X] Yes [ ] No
If yes, describe: bumper posts
3. Surface seal: Bentonite [X] 3 0; Concrete [ ] 0 1; Other [ ]
4. Material between well casing and protective pipe: Bentonite [X] 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 [X] 0 8
6. Bentonite seal: a. Bentonite granules [ ] 3 3
b. [ ] 1/4 in. [X] 3/8 in. [ ] 1/2 in. Bentonite chips [X] 3 2
c. Other [ ]
7. Fine sand material: Manufacturer, product name & mesh size
a. RW Sidley 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 3 ft^3
9. Well casing: Flush threaded PVC schedule 40 [X] 2 3; Flush threaded PVC schedule 80 [ ] 2 4; Other [ ]
10. Screen material: PVC
a. Screen type: Factory cut [X] 1 1; Continuous slot [ ] 0 1; Other [ ]
b. Manufacturer Johnson
c. Slot size: 0.01 in.
d. Slotted length: 10 ft.
11. Backfill material (below filter pack): None [ ] 1 4
RW Sidley #5 — Other [X]

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

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

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

SCS # 25216146.00

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-Columbia	Columbia	MW-306

Facility License, Permit or Monitoring Number	County Code	Wis. Unique Well Number	DNR Well ID Number
	11	VY812	

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: 133 min.

4. Depth of well (from top of well casisng): 27.0 ft.

5. Inside diameter of well: 2.0 in.

6. Volume of water in filter pack and well casing: 4.65 gal.

7. Volume of water removed from well: 133.0 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.	21.98 ft.	22.87 ft.
Date b. (mm/dd/yyyy)	11/21/2016	11/21/2016
Time c.	9:47 ☒ a.m. ☐ p.m.	12:00 ☐ a.m. ☒ p.m.
12. Sediment in well bottom	___ inches	___ 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: 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: 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: [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 # 25216146.00

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-Columbia	Columbia	MW-307

Facility License, Permit or Monitoring Number	County Code	Wis. Unique Well Number	DNR Well ID Number
	11	VY813	

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 146 min.

4. Depth of well (from top of well casisng) 26.5 ft.

5. Inside diameter of well 2.0 in.

6. Volume of water in filter pack and well casing 4.34 gal.

7. Volume of water removed from well 146.0 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.	21.81 ft.	23.31 ft.
Date b. (mm/dd/yyyy)	11/21/2016	11/21/2016
Time c.	12:00 ☐ a.m. ☒ p.m.	2:26 ☐ a.m. ☒ p.m.
12. Sediment in well bottom	___ inches	___ 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: 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: 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: 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 # 25216146.00

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-Columbia	Columbia		MW-308
Facility License, Permit or Monitoring Number	County Code	Wis. Unique Well Number	DNR Well ID Number
	11	VY814	

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 145 min.

4. Depth of well (from top of well casisng) 28.0 ft.

5. Inside diameter of well 2.0 in.

6. Volume of water in filter pack and well casing 6.51 gal.

7. Volume of water removed from well 18.0 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. 20.97 ft.	-.- ft.
Date	b. 11/21/2016 (mm/dd/yyyy)	11/21/2016 (mm/dd/yyyy)
Time	c. 12:25 ☐ a.m. ☒ p.m.	3:00 ☐ a.m. ☒ p.m.
12. Sediment in well bottom	___.__ inches	___.__ 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: Kyle Last Name: Kramer
Firm: SCS ENGINEERS, 2830 Dairy Drive, Madison, WI 53718

17. Additional comments on development:
Well bails dry.

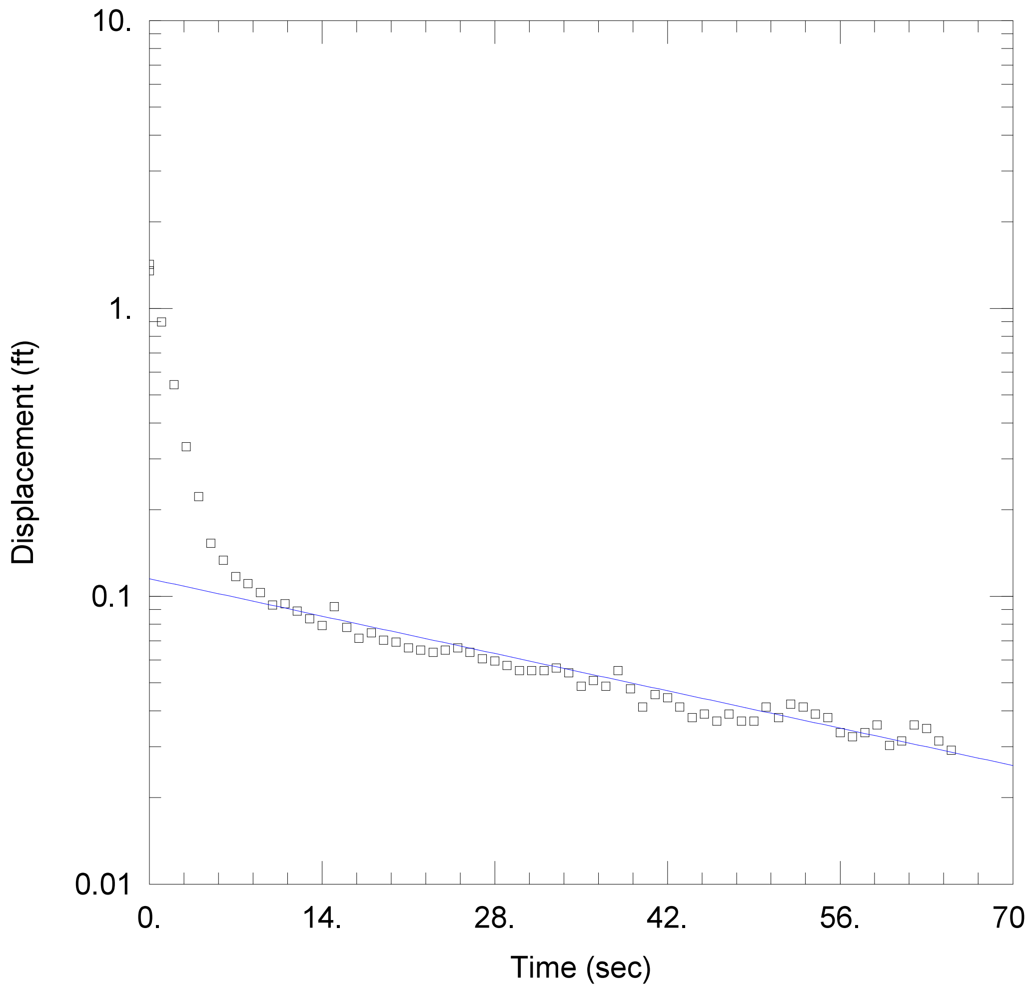
Name and Address of Facility Contact /Owner/Responsible Party
First Name: Nate Last Name: Sievers
Facility/Firm: Wisconsin Power and Light
Street: W8375 Murray Rd.
City/State/Zip: Pardeville, WI 53954

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

Hydraulic Conductivity Testing Results



WELL TEST ANALYSIS

Data Set: I:\25216146.00\Data and Calculations\Slug Tests\MW306.aqt
Date: 01/25/17 Time: 15:28:46

PROJECT INFORMATION

Company: SCS
Client: WPL_Columbia
Project: 25216146
Location: Portage, WI
Test Well: MW-306
Test Date: 12/14/2016

AQUIFER DATA

Saturated Thickness: 100. ft Anisotropy Ratio (Kz/Kr): 0.1

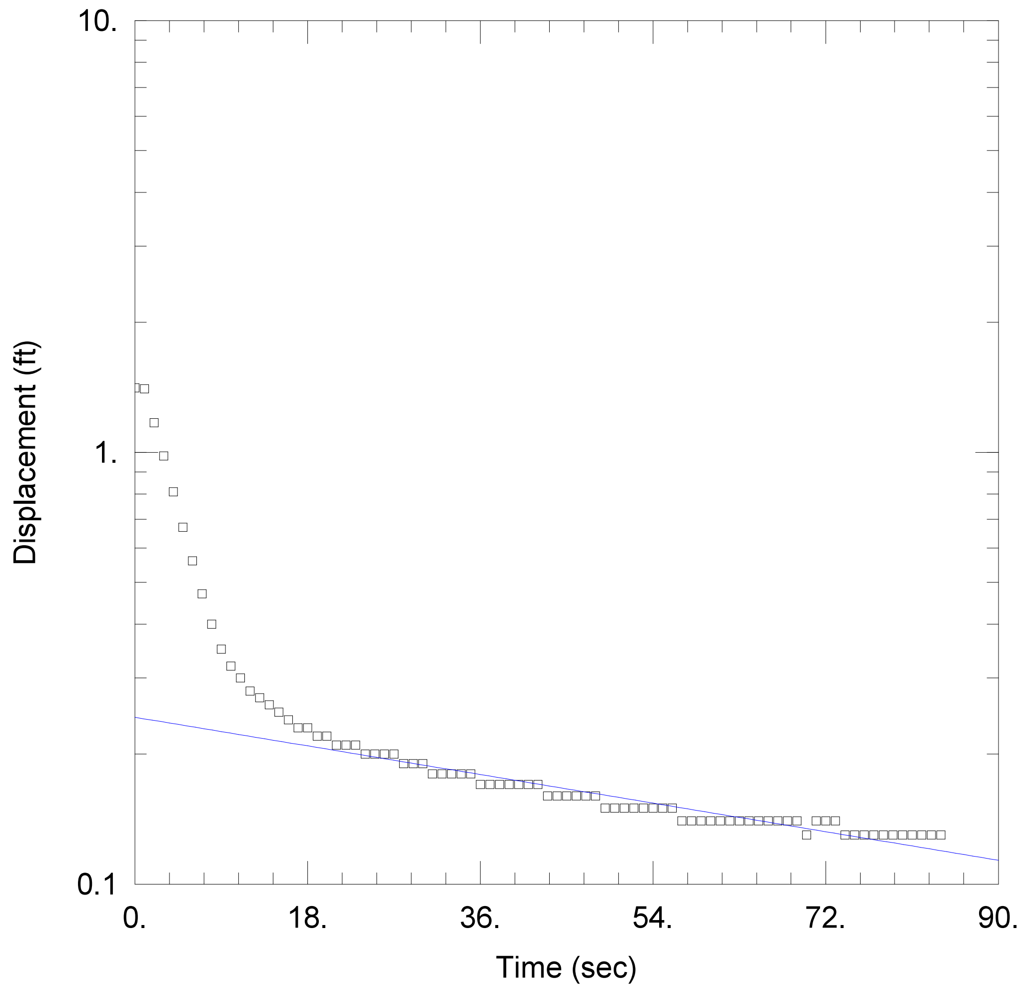
WELL DATA (MW-306)

Initial Displacement: 1.42 ft
Total Well Penetration Depth: 7.51 ft
Casing Radius: 0.09 ft
Static Water Column Height: 7.51 ft
Screen Length: 7.51 ft
Well Radius: 0.35 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 0.004359 cm/sec y0 = 0.115 ft



WELL TEST ANALYSIS

Data Set: I:\25216146.00\Data and Calculations\Slug Tests\MW307.aqt
Date: 01/31/17 Time: 16:06:23

PROJECT INFORMATION

Company: SCS
Client: WPL_Columbia
Project: 25216146
Location: Portage, WI
Test Well: MW-307
Test Date: 12/14/2016

AQUIFER DATA

Saturated Thickness: 100. ft
Anisotropy Ratio (Kz/Kr): 0.1

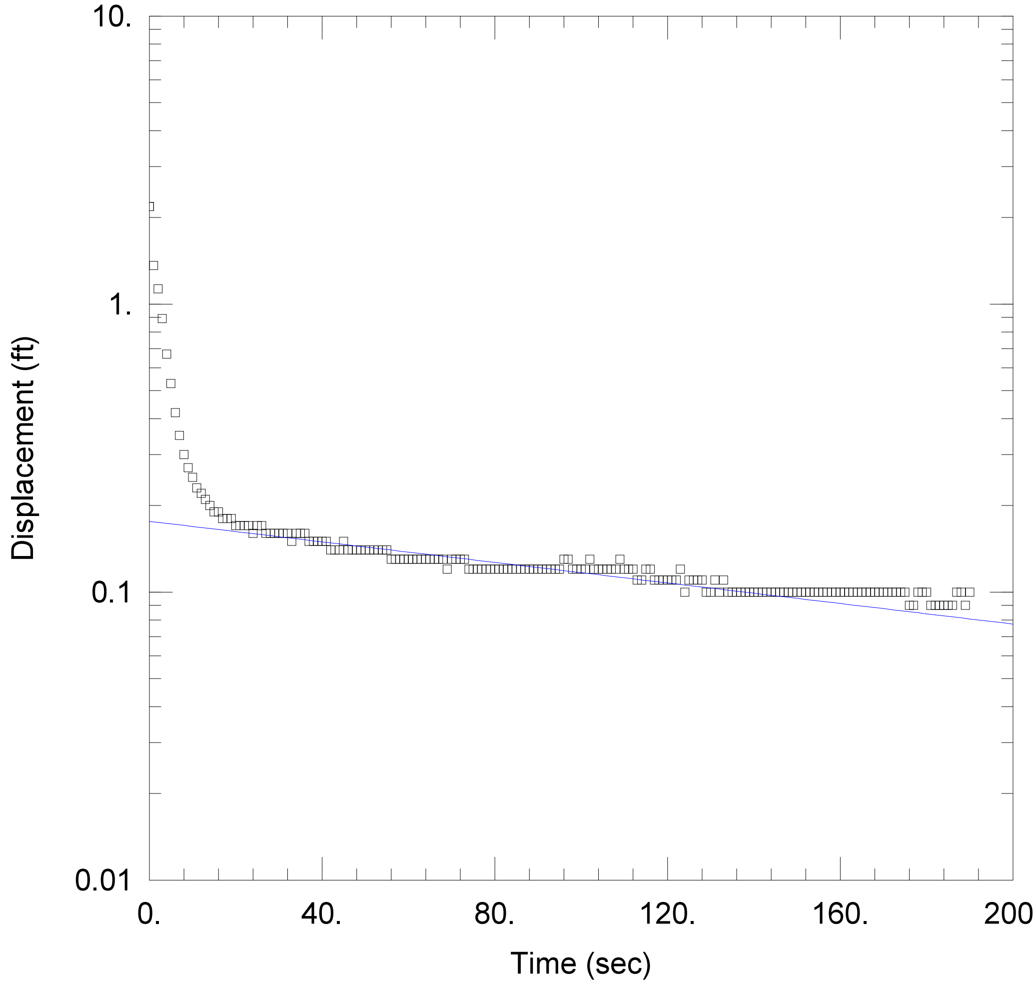
WELL DATA (MW-307)

Initial Displacement: 1.41 ft
Total Well Penetration Depth: 7.46 ft
Casing Radius: 0.09 ft
Static Water Column Height: 7.46 ft
Screen Length: 7.46 ft
Well Radius: 0.35 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.001738 cm/sec
y0 = 0.2434 ft



WELL TEST ANALYSIS

Data Set: I:\25216146.00\Data and Calculations\Slug Tests\MW308.aqt
Date: 01/25/17 Time: 15:32:08

PROJECT INFORMATION

Company: SCS
Client: WPL_Columbia
Project: 25216146
Location: Portage, WI
Test Well: MW-308
Test Date: 12/14/2016

AQUIFER DATA

Saturated Thickness: 100. ft
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (MW-308)

Initial Displacement: 2.18 ft
Total Well Penetration Depth: 9.64 ft
Casing Radius: 0.09 ft
Static Water Column Height: 9.64 ft
Screen Length: 9.64 ft
Well Radius: 0.35 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.0007031 cm/sec
y0 = 0.176 ft

December 27, 2018
File No. 25217156.00

Mr. Nathaniel Sievers
Columbia Energy Center
W8375 Murray Road
Pardeeville, WI 53954

Subject: Columbia Ash Disposal Facility, Module 4 – Monitoring Well Construction Documentation

Dear Mr. Sievers:

SCS Engineers (SCS) has completed the installation of three groundwater monitoring wells (MW-309 through MW-311) at the Columbia Energy Center in Pardeeville, Wisconsin (**Figure 1**). These wells are downgradient of the Ash Disposal Facility, Module 4. In addition, the monitoring network includes two pre-existing monitoring wells (MW-301 and MW-84A), which are used to provide background information.

The new wells were installed to support compliance with the final Coal Combustion Residuals (CCR) Rule (40 CFR 257.50 107). The monitoring well locations are shown on **Figure 2**. **Appendices A** through **C** include documentation of well design, installation, and development as required by 40 CFR 257.91(e)(1).

This monitoring well construction documentation report is ready to be entered into the operating record as required by 40 CFR 257.105(h)(2).

Please contact us at 608-224-2830 if you have any questions about the well documentation.

Sincerely,

Meghan Blodgett, PG
Hydrogeologist
SCS Engineers

Thomas J. Karwoski, PG
Project Manager
SCS Engineers

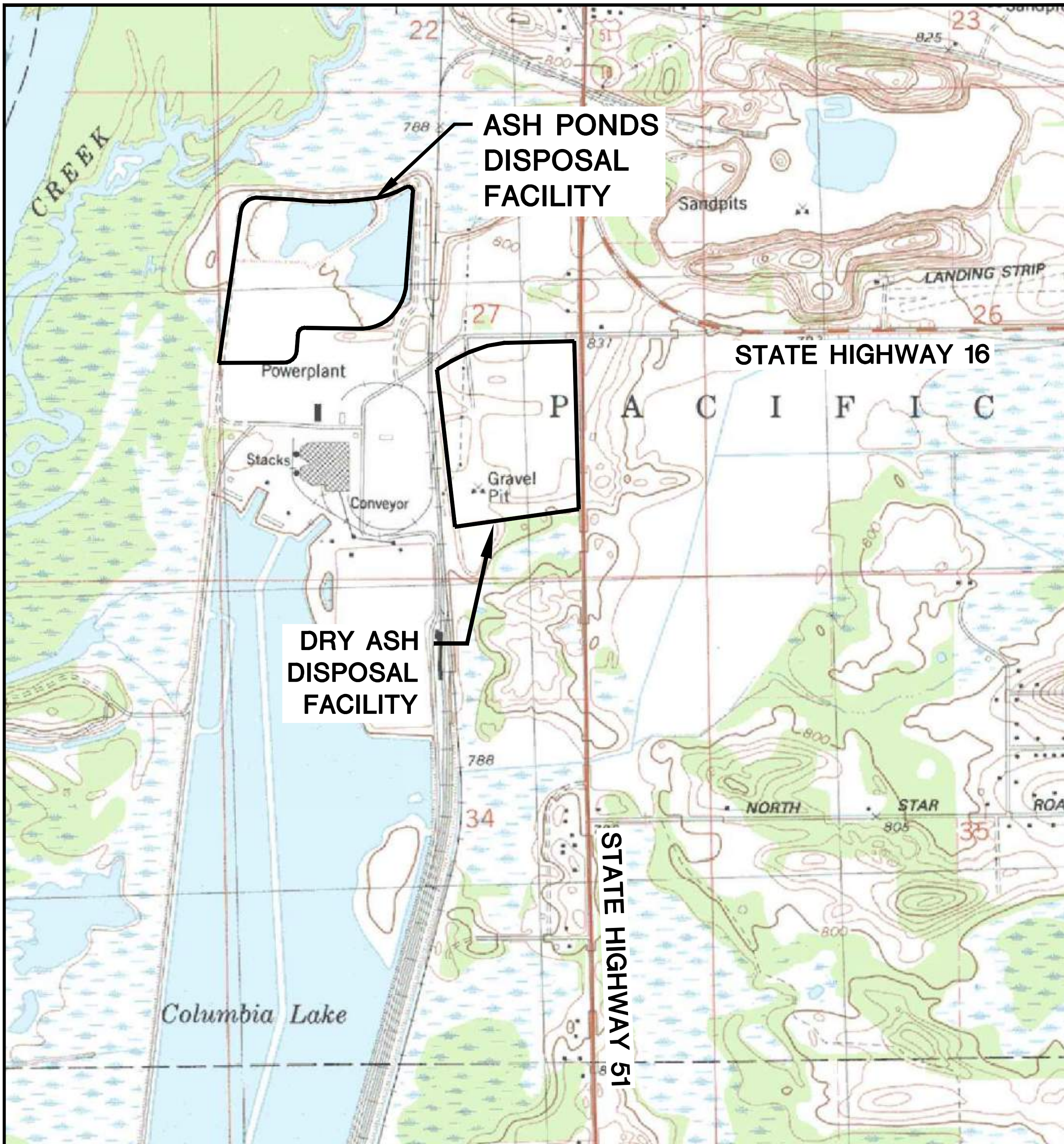
MDB/lmh/TK/SC

cc: Jeff Maxted, Alliant Energy
Jerry Lokenvitz, Columbia Energy Center

Encl. Figure 1 – Site Location Map
Figure 2 – Site Plan and Well Location Map
Attachment A – Boring Logs
Attachment B – Well Construction and Development Forms
Attachment C – Hydraulic Conductivity Testing Results

I:\25217156.00\Deliverables\Mod 4 CCR Wells Operating Record Documentation\Operating Record Well Documentation\181227_Sievers_Well Documentation_Op_Record _COL Mod 4_Final.docx

Figures



N

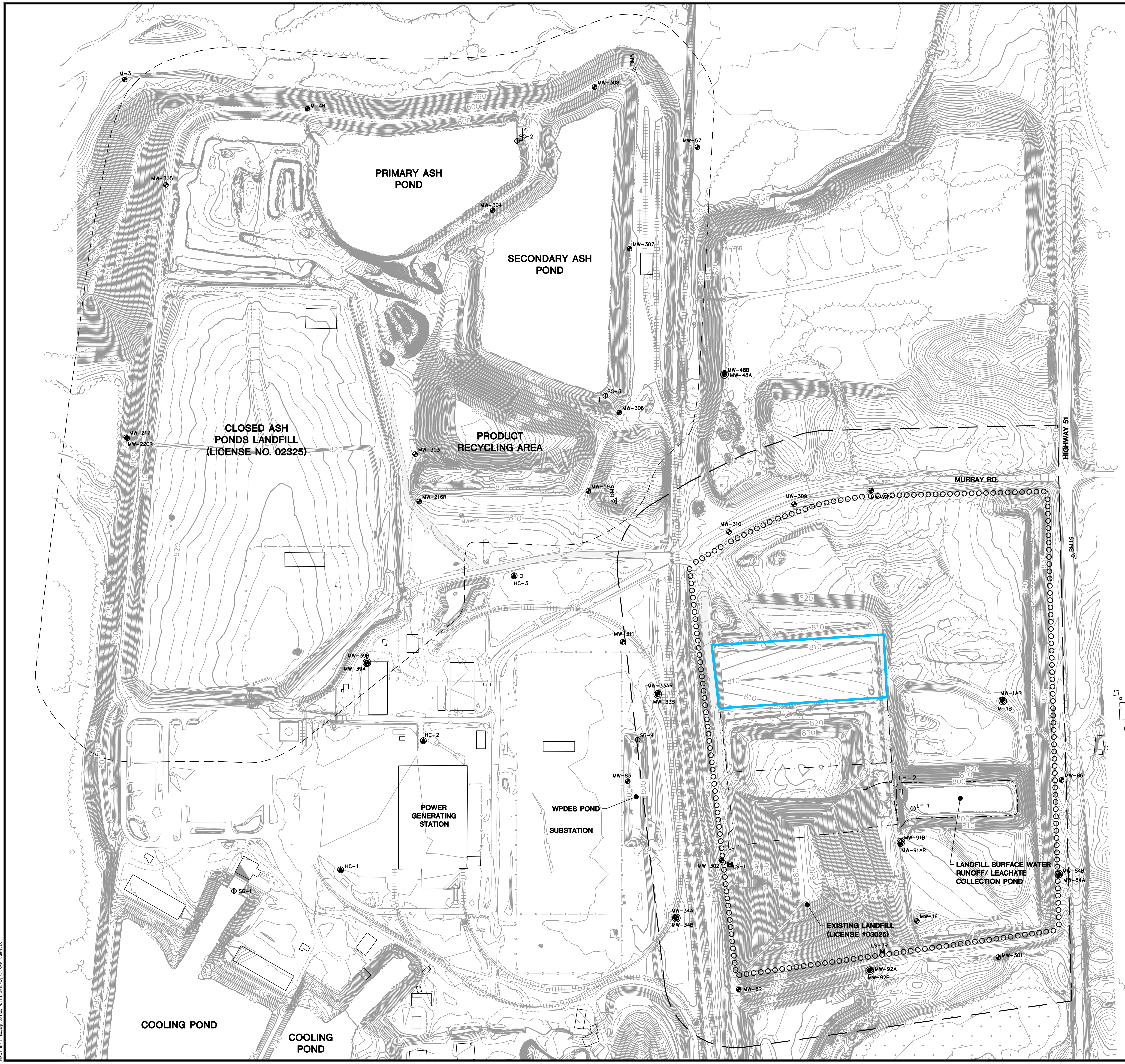
POYNETTE QUADRANGLE
WISCONSIN—COLUMBIA CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)
NW/4 POYNETTE 15' QUADRANGLE
1984
SCALE: 1" = 2,000'

CLIENT	ALLIANT ENERGY ALLIANT ENERGY COLUMBIA GENERATING STATION W8375 MURRAY RD. PARDEEVILLE, WISCONSIN 53954	SITE	COLUMBIA ENERGY CENTER ASH PONDS DISPOSAL FACILITY & DRY ASH FACILITY
			SITE LOCATION MAP

PROJECT NO.	25215135.00	DRAWN BY:	KP	ENGINEER	SCS ENGINEERS 2830 DAIRY DRIVE MADISON, WI 53718-6751 PHONE: (608) 224-2830	FIGURE 1
DRAWN:	08/10/09	CHECKED BY:	MDB			
REVISED:	02/02/16	APPROVED BY:				

I:\25215053\Drawings\Columbia\FIGURE 1_Columbia.dwg, 2/2/2016 2:19:12 PM

11/22/2020 - Classification: Internal - ECRM6537269



LEGEND

810	EXISTING MAJOR CONTOUR (10' INTERVAL)
	EXISTING MINOR CONTOUR (2' CONTOUR)
	EXISTING FENCELINE
	EXISTING TRACKS
	EXISTING PAVED ROAD
	EXISTING UNPAVED ROAD
	EDGE OF WATER
	DESIGN MANAGEMENT ZONE
	APPROVED LIMITS OF WASTE
	CONSTRUCTED LIMITS OF WASTE
	WATER SUPPLY WELL
	STAFF GAUGE
	WATER TABLE WELL
	PIEZOMETER
	SURFACE WATER SAMPLE LOCATION
	LYSIMETER
	ABANDONED WATER TABLE WELL
	ABANDONED PIEZOMETER
	LEACHATE HEADWELL
	MOD 4 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, AND AUGUST 2018.
2. MONITORING WELL LOCATIONS AND ELEVATIONS SURVEYED BY WISCONSIN POWER AND LIGHT, INC. IN DECEMBER 1994, NOVEMBER 1996, APRIL 2003, AND AUGUST 2012.
3. SUPPLY WELL LOCATIONS ARE APPROXIMATE AND ASSUMED BASED ON JANUARY 2013 DRAWINGS BY TRC.
4. THE LOCATIONS OF THE ASH PONDS FACILITY DESIGN MANAGEMENT ZONE DEMARCATION LINES ARE APPROXIMATE AND BASED ON THE WATER TABLE MAP (OCTOBER 2012) FIGURE BY RMT.
5. THE LOCATION OF THE ACTIVE DRY ASH LANDFILL DESIGN MANAGEMENT ZONE DEMARCATION LINE IS BASED ON A 300 FOOT OFFSET FROM THE DESIGN LIMITS OF ASH EXCEPT WHERE OFFSET WOULD EXTEND LINE BEYOND PROPERTY LINE.

N

200 0 200

SCALE: 1" = 200'

PROJECT NO.	25216146.00	DRAWN BY:	AHB
DRAWN:	01/06/15	CHECKED BY:	KK
REVISED:	12/27/18	APPROVED BY:	

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

CLIENT: ALLIANT ENERGY
ALLIANT ENERGY
4902 NORTH BILTMORE LN. #1000
MADISON, WI 53718

SITE: COLUMBIA ASH PONDS AND DRY ASH DISPOSAL FACILITIES

SITE PLAN AND WELL LOCATION MAP

FIGURE 2

Appendix A

Boring Logs

State of Wisconsin
Department of Natural Resources

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

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

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

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

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

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

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

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

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

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

State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION SUPPLEMENT
Form 4400-122A

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

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	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				
S5		22 29 36	19–20						N/A	M				
S6	24	18 20 28 36	22						N/A	M				
S7		18 24 32	24–25						N/A	M				
			26		SP									
S8	22	14 18 30 40	27						N/A	W				Depth to water at ~ 26 feet.
S9	22	22 32 34	29–30						N/A	W				
			36	End of Boring at 36.5 feet bgs.										

State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 7-98

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

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

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

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

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

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

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID/FID	Standard Penetration	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			0–8	Hydrovaced boring to 8 feet below ground surface; open hole.										
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.	SP				N/A	M				
S2	24	18 27 38 40	11–13	Same as above but trace gravel.					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	
[signature]	SCS Engineers 2830 Dairy Drive Madison, WI 53711	Tel: (608) 224-2830 Fax:

State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION SUPPLEMENT
Form 4400-122A

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

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

11/22/2020 - Classification: Internal - ECRM6537269

State of Wisconsin
Department of Natural Resources

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

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

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

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

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

Local Grid Origin ☐ (estimated: ☐) or Boring Location ☒
State Plane 542,874 N, 2,123,437 E S/C/N
NE 1/4 of SW 1/4 of Section 27, T 12 N, R 9 E
Lat ° ' "
Long ° ' "
Local Grid Location
Feet ☐ N ☐ S Feet ☐ E ☐ W

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

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	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	24	12 16 20 24	8–10	POORLY GRADED SAND AND GRAVEL, fine to coarse sand, coarse gravel, yellow, (10YR 7/6), rounded sand, angular gravel.	SP				N/A	M				
S2	24	17 27 30 38	12	Same as above but with trace silt.					N/A	M				
S3	24	18 26 31	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:

SOIL BORING LOG INFORMATION SUPPLEMENT
Form 4400-122A

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

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

Appendix B

Well Construction and Development Forms

SCS # 25217156.01

State of Wisconsin
Department of Natural Resources

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

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

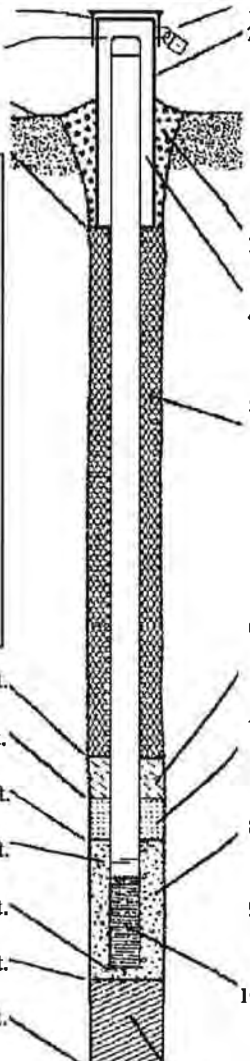
Facility/Project Name WPL-Columbia Generating Station	Local Grid Location of Well 543447.673 ft. ☒ N. ☐ S. 2124151.113 ft. ☒ E. ☐ W.	Well Name MW-309
Facility License, Permit or Monitoring No.	Local Grid Origin ☐ (estimated: ☐) or Well Location ☐ Lat. ___° ___' ___" Long. ___° ___' ___" or	Wis. Unique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

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.

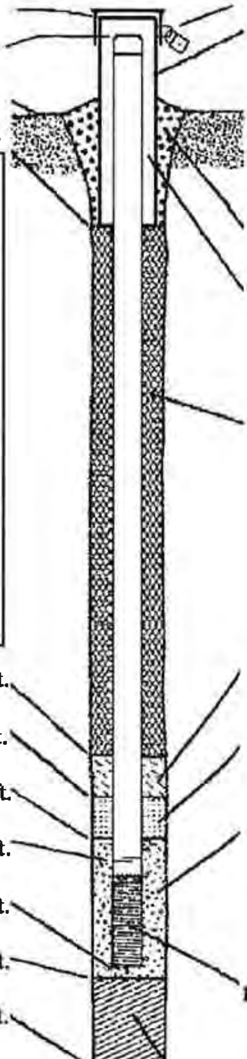
SCS # 25217156.01

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; Other ☒ Filter Sand (#5)
5. Annular space seal: a. Granular/Chipped Bentonite ☒ 3 3
   b. ___ Lbs/gal mud weight . . . Bentonite-sand slurry ☐ 3 5
   c. ___ Lbs/gal mud weight . . . . . Bentonite slurry ☐ 3 1
   d. ___ % Bentonite . . . . . . Bentonite-cement grout ☐ 5 0
   e. 0.369 Ft^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
[signature]	SCS ENGINEERS, 2830 Dairy Drive, Madison, WI 53718

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

SCS # 25217156.01

State of Wisconsin
Department of Natural Resources

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

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

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

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.

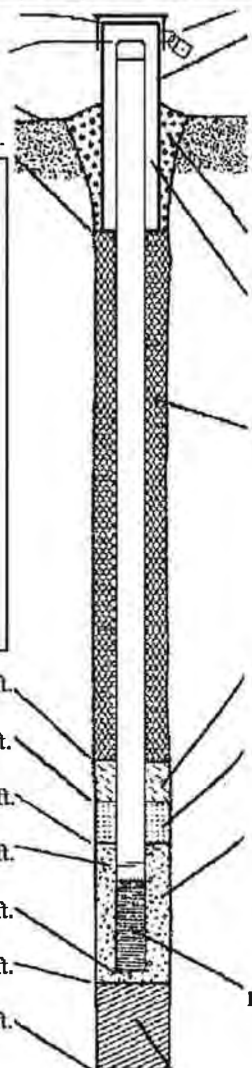
J. Filter pack, bottom 773.53 ft. MSL or 33 ft.

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

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

SCS # 25217156.01

State of Wisconsin
Department of Natural Resources

MONITORING WELL DEVELOPMENT

Form 4400-113B Rev. 7-98

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

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

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

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

3. Time spent developing well: 75 min.

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

5. Inside diameter of well: 2.0 in.

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

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

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

9. Source of water added ____________

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

	Before Development	After Development
11. Depth to Water (from top of well casing)	a. 30.07 ft.	32.29 ft.
Date	b. 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 ☐ 10 Turbid ☒ 15 (Describe) Brown Silty	Clear ☒ 20 Turbid ☐ 25 (Describe)

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

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

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

17. Additional comments on development:
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	County Name	Well Name
WPL - Alliant Columbia Generating Station	Columbia	MW-310

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

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

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

3. Time spent developing well: 171 min.

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

5. Inside diameter of well: 2.0 in.

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

7. Volume of water removed from well: 60.0 gal.

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

9. Source of water added ______

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

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

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

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

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

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

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

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

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

SCS # 25217156.01

State of Wisconsin
Department of Natural Resources

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

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

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

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

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

2. Well development method
   - surged with bailer and bailed ☐ 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. (mm/dd/yyyy)	2/16/2018	2/16/2018
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	Clear ☒ 20 Turbid ☐ 25
(Describe)	brown silly	

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:

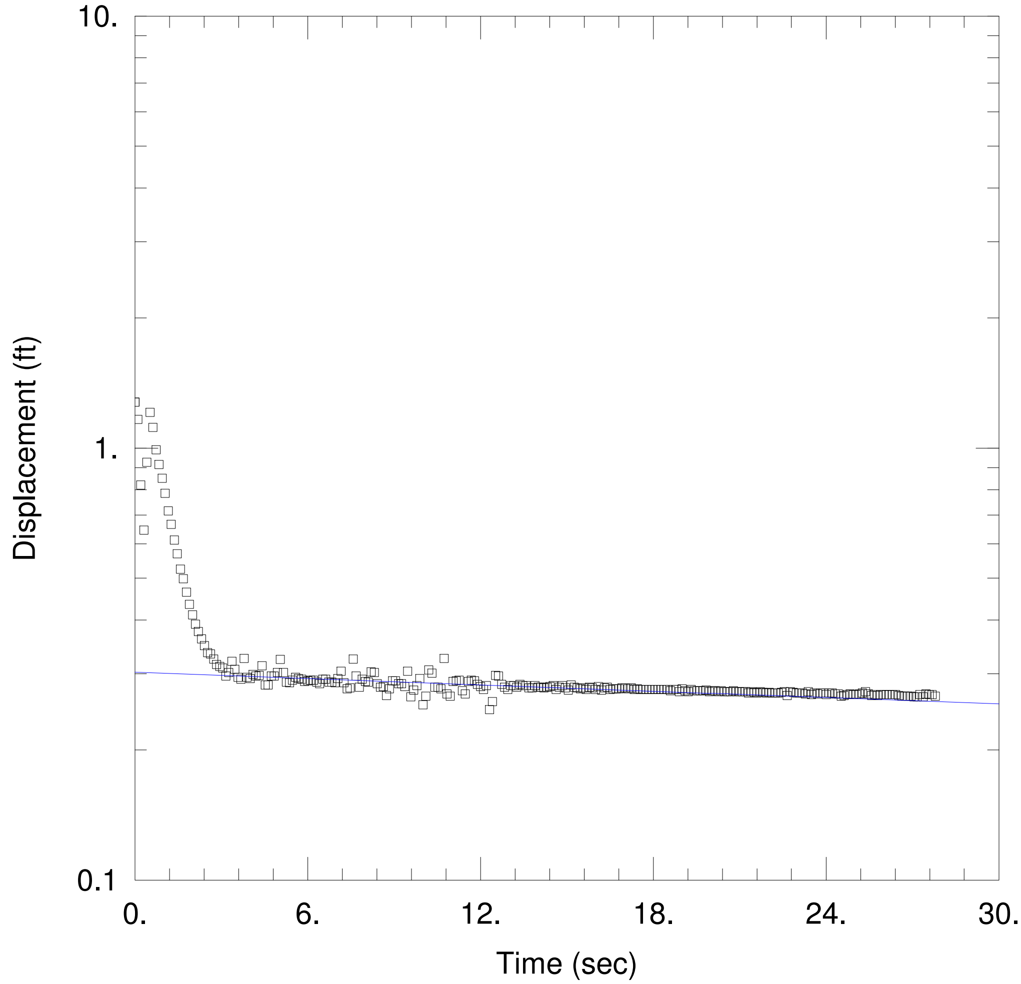
Name and Address of Facility Contact /Owner/Responsible Party
First Name: Nate Last Name: Sievers
Facility/Firm: Columbia Dry Ash & Ash Pond Disposal Facilities
Street: W8375 Murray Road
City/State/Zip: Pardeeville, Wisconsin 53954

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

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

Appendix C

Hydraulic Conductivity Testing Results



WELL TEST ANALYSIS

Data Set: I:\25217156.00\Data and Calculations\Slug Test\180216\MW309.aqt
Date: 05/17/18 Time: 12:55:06

PROJECT INFORMATION

Company: SCS Engineers
Client: WPL-Columbia
Project: 25217156.01
Location: Pardeeville
Test Well: MW-309-Slug Out
Test Date: 2/16/2018

AQUIFER DATA

Saturated Thickness: 100. ft
Anisotropy Ratio (Kz/Kr): 1.

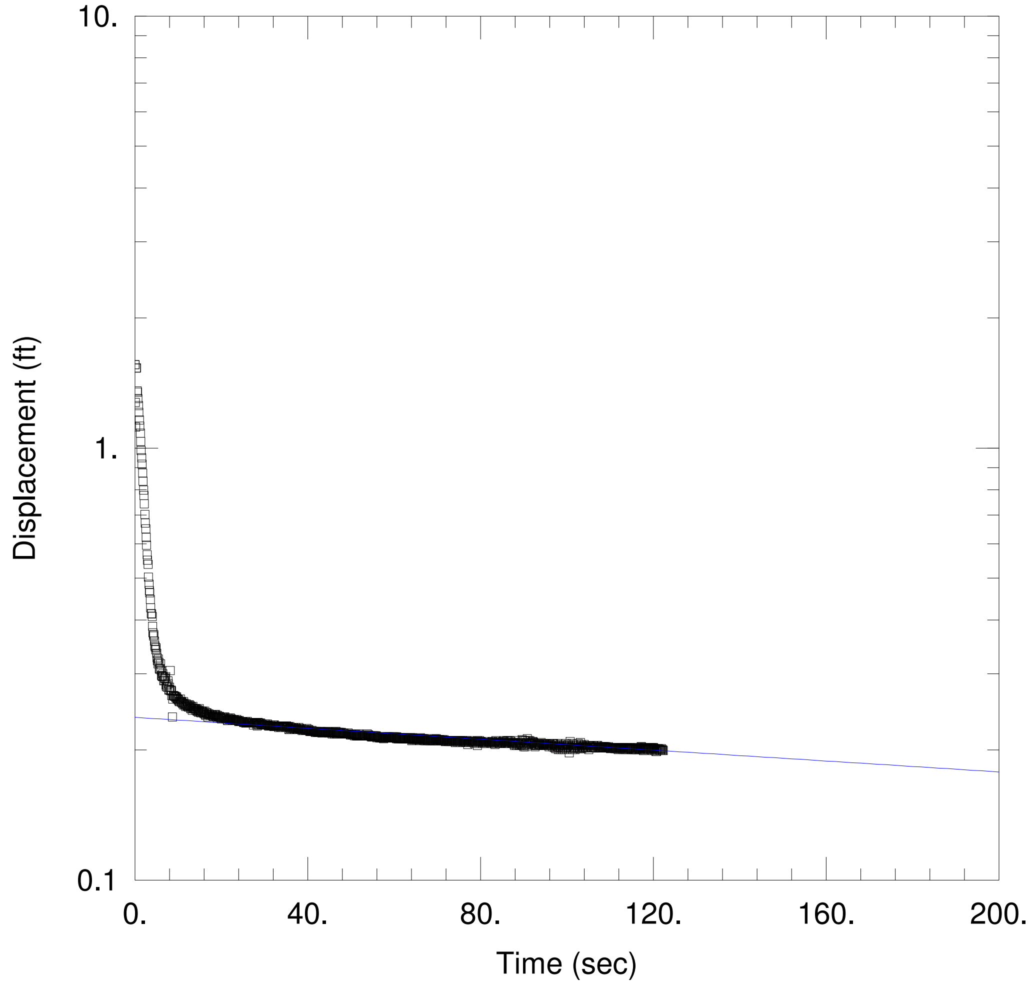
WELL DATA (MW-309)

Initial Displacement: 1.277 ft
Total Well Penetration Depth: 9.97 ft
Casing Radius: 0.099 ft
Static Water Column Height: 7.6 ft
Screen Length: 7.6 ft
Well Radius: 0.35 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.0002122 cm/sec
y0 = 0.3025 ft



WELL TEST ANALYSIS

Data Set: I:\25217156.00\Data and Calculations\Slug Test\180216\MW310.aqt
Date: 05/17/18 Time: 12:55:52

PROJECT INFORMATION

Company: SCS Engineers
Client: WPL-Columbia
Project: 25217156.01
Location: Pardeeville, WI
Test Well: MW-310
Test Date: 2/16/2018

AQUIFER DATA

Saturated Thickness: 100. ft
Anisotropy Ratio (Kz/Kr): 1.

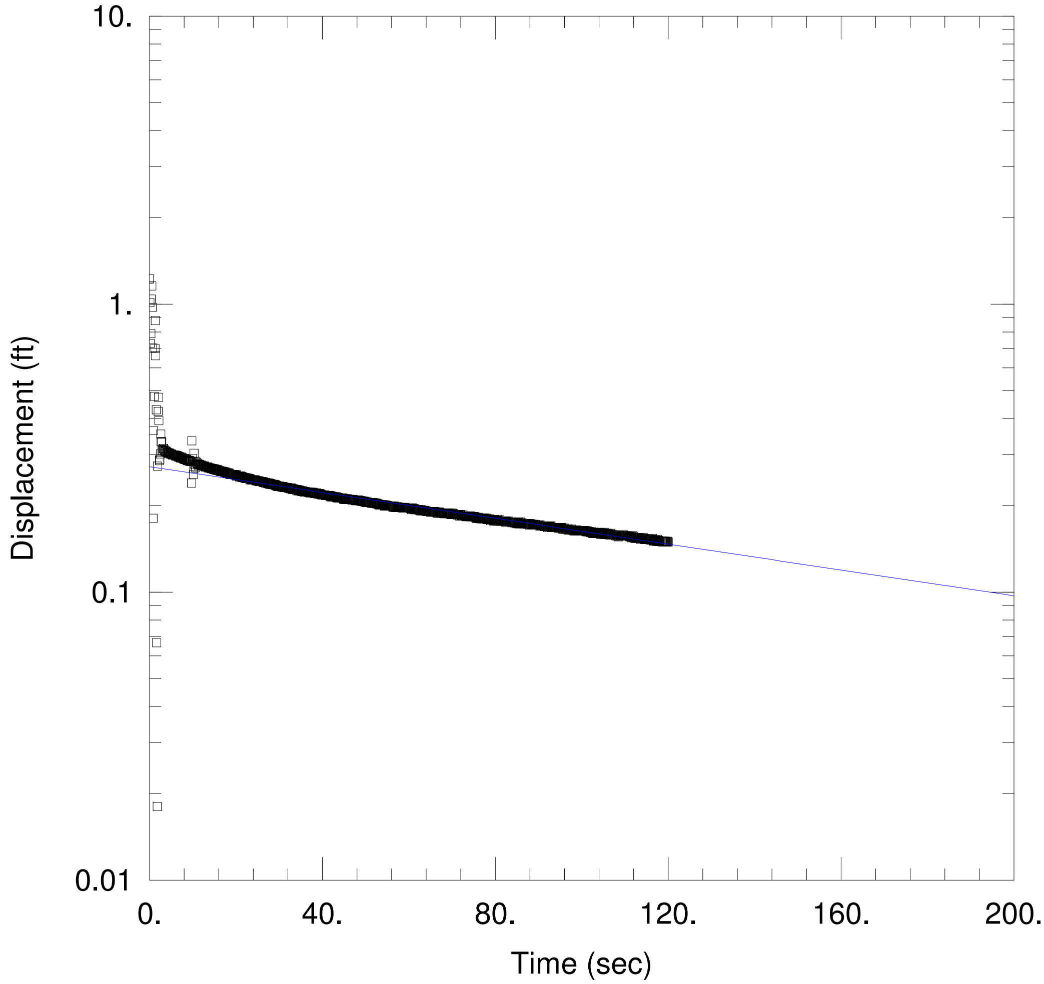
WELL DATA (MW-310)

Initial Displacement: 1.559 ft
Total Well Penetration Depth: 7.9 ft
Casing Radius: 0.09 ft
Static Water Column Height: 7.86 ft
Screen Length: 7.9 ft
Well Radius: 0.35 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 0.0001911 cm/sec
y0 = 0.238 ft



WELL TEST ANALYSIS

Data Set: I:\25217156.00\Data and Calculations\Slug Test\180216\MW311.aqt
Date: 05/17/18 Time: 12:56:06

PROJECT INFORMATION

Company: SCS Engineers
Client: WPL-Columbia
Project: 25217156.01
Location: Pardeeville, WI
Test Well: MW-311
Test Date: 2/16/2018

AQUIFER DATA

Saturated Thickness: 100. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-311)

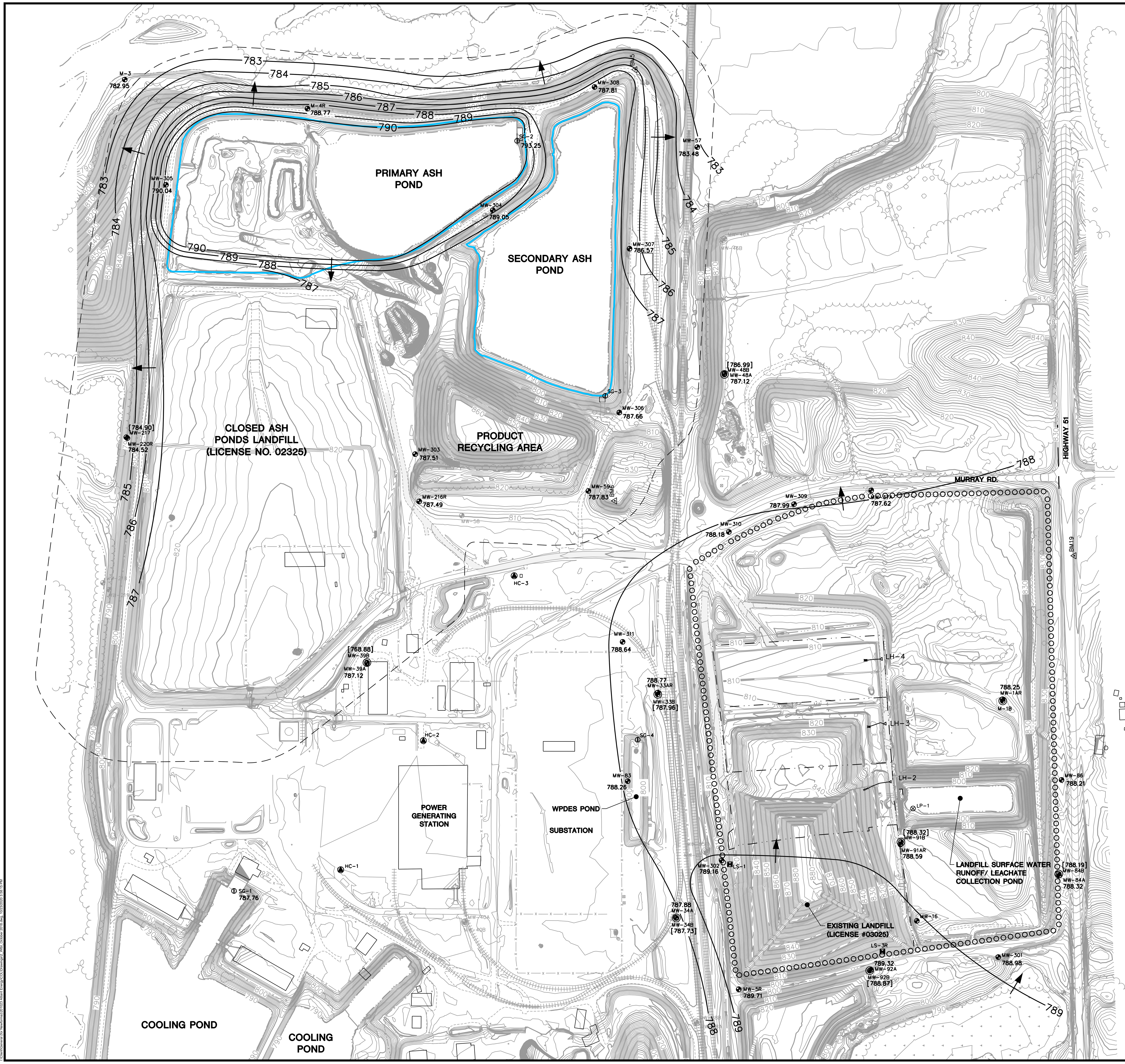
Initial Displacement: 1.221 ft
Total Well Penetration Depth: 9.46 ft
Casing Radius: 0.09 ft
Static Water Column Height: 9.46 ft
Screen Length: 9.46 ft
Well Radius: 0.35 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 0.0006119 cm/sec y0 = 0.2724 ft

Attachment C3



LEGEND

- EXISTING MAJOR CONTOUR (10' INTERVAL)
- EXISTING MINOR CONTOUR (2' CONTOUR)
- EXISTING FENCELINE
- EXISTING TRACKS
- EXISTING PAVED ROAD
- EXISTING UNPAVED ROAD
- EDGE OF WATER
- DESIGN MANAGEMENT ZONE
- APPROVED LIMITS OF WASTE
- CONSTRUCTED LIMITS OF WASTE
- WATER SUPPLY WELL
- STAFF GAUGE
- WATER TABLE WELL
- PIEZOMETER
- SURFACE WATER SAMPLE LOCATION
- LYSIMETER
- ABANDONED WATER TABLE WELL
- ABANDONED PIEZOMETER
- LEACHATE HEADWELL
- 787.62 WATER TABLE ELEVATION MEASURED OCTOBER 2018
- [788.87] POTIENTIOMETRIC SURFACE ELEVATION MEASURED OCOTBER 2018 (NOT CONTOURED)
- WATER TABLE CONTOUR
- APPROXIMATE GROUNDWATER FLOW DIRECTION
- 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, AND AUGUST 2018.
2. MONITORING WELL LOCATIONS AND ELEVATIONS SURVEYED BY WISCONSIN POWER AND LIGHT, INC. IN DECEMBER 1994, NOVEMBER 1996, APRIL 2003, AND AUGUST 2012.
3. SUPPLY WELL LOCATIONS ARE APPROXIMATE AND ASSUMED BASED ON JANUARY 2013 DRAWINGS BY TRC.
4. THE LOCATIONS OF THE ASH PONDS FACILITY DESIGN MANAGEMENT ZONE DEMARCATION LINES ARE APPROXIMATE AND BASED ON THE WATER TABLE MAP (OCTOBER 2012) FIGURE BY RMT.
5. THE LOCATION OF THE ACTIVE DRY ASH LANDFILL DESIGN MANAGEMENT ZONE DEMARCATION LINE IS BASED ON A 300 FOOT OFFSET FROM THE DESIGN LIMITS OF ASH EXCEPT WHERE OFFSET WOULD EXTEND LINE BEYOND PROPERTY LINE.

PROJECT NO.	25216067.00	DRAWN BY:	KP
DRAWN:	01/03/2019	CHECKED BY:	MDB
REVISED:	10/23/2020	APPROVED BY:	TK 10/23/2020

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

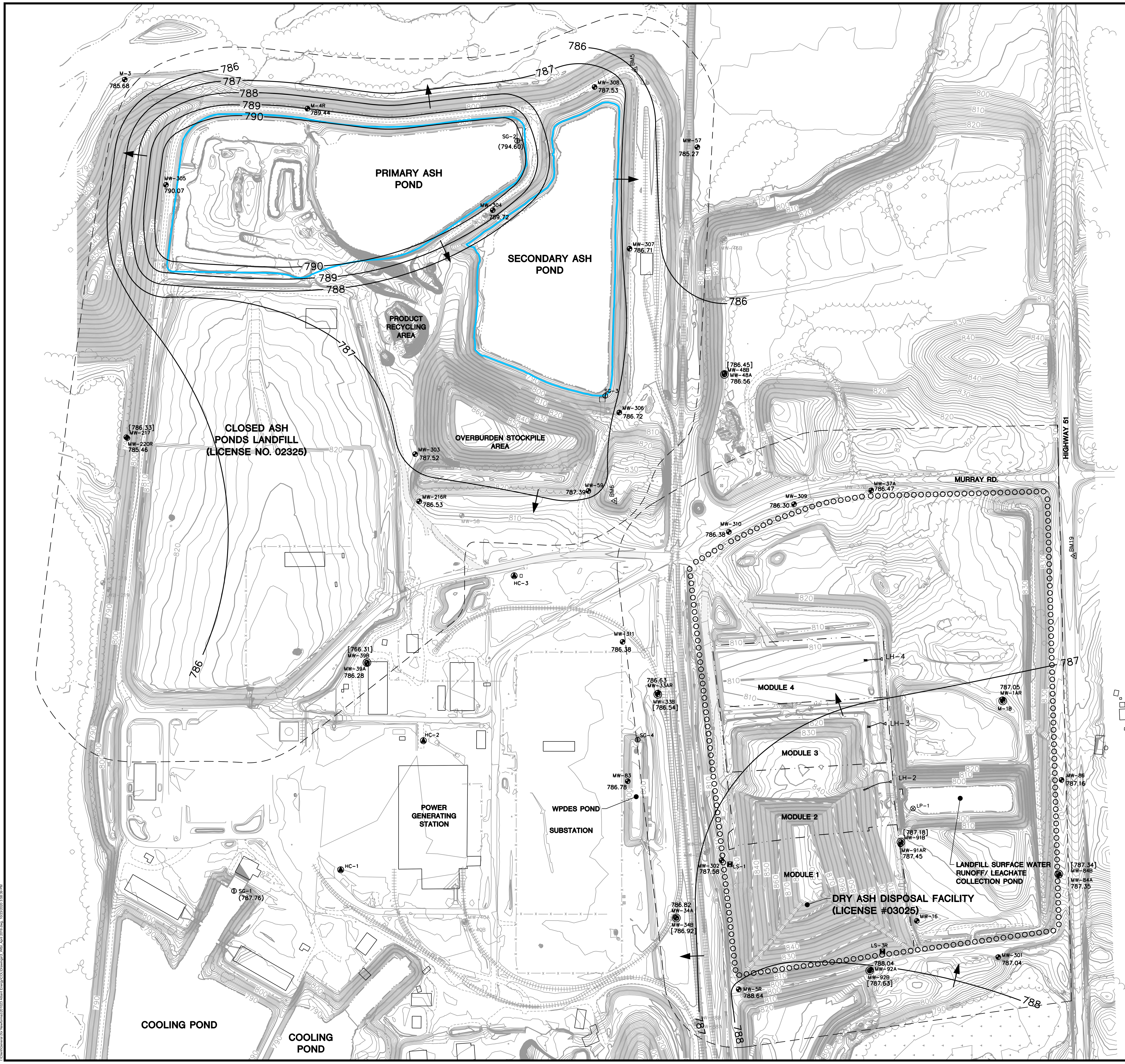
CLIENT: ALLIANT ENERGY
4902 NORTH BILTMORE LN. #1000
MADISON, WI 53718

SITE: ALLIANT ENERGY
COLUMBIA ENERGY CENTER
PARDEEVILLE, WI

WATER TABLE MAP
OCTOBER 2018

FIGURE 2

Attachment C3



LEGEND

—810—	EXISTING MAJOR CONTOUR (10' INTERVAL)
	EXISTING MINOR CONTOUR (2' CONTOUR)
	EXISTING FENCELINE
	EXISTING TRACKS
	EXISTING PAVED ROAD
	EXISTING UNPAVED ROAD
	EDGE OF WATER
	DESIGN MANAGEMENT ZONE
	APPROVED LANDFILL LIMITS
	CONSTRUCTED LANDFILL LIMITS/MODULE LIMITS
	WATER SUPPLY WELL
	STAFF GAUGE
	WATER TABLE WELL
	PIEZOMETER
	SURFACE WATER SAMPLE LOCATION
	LYSIMETER
	ABANDONED WATER TABLE WELL
	ABANDONED PIEZOMETER
	LEACHATE HEADWELL
787.62	WATER TABLE ELEVATION MEASURED APRIL 2019
[788.87]	POTIENTIOMETRIC SURFACE ELEVATION MEASURED APRIL 2019 (NOT CONTOURED)
(794.60)	SURFACE WATER ELEVATION MEASURED APRIL 2019 (NOT CONTOURED)
	WATER TABLE CONTOUR
	APPROXIMATE GROUNDWATER FLOW DIRECTION
	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, AND AUGUST 2018.
2. MONITORING WELL LOCATIONS AND ELEVATIONS SURVEYED BY WISCONSIN POWER AND LIGHT, INC. IN DECEMBER 1994, NOVEMBER 1996, APRIL 2003, JANUARY 6, 2016 AND BY SCS ENGINEERS IN FEBRUARY 2018.
3. SUPPLY WELL LOCATIONS ARE APPROXIMATE AND ASSUMED BASED ON JANUARY 2013 DRAWINGS BY TRC.
4. THE LOCATIONS OF THE ASH PONDS FACILITY DESIGN MANAGEMENT ZONE DEMARCATION LINES ARE APPROXIMATE AND BASED ON THE WATER TABLE MAP (OCTOBER 2012) FIGURE BY RMT.
5. THE LOCATION OF THE ACTIVE DRY ASH LANDFILL DESIGN MANAGEMENT ZONE DEMARCATION LINE IS BASED ON A 300 FOOT OFFSET FROM THE DESIGN LIMITS OF ASH EXCEPT WHERE OFFSET WOULD EXTEND LINE BEYOND PROPERTY LINE.

PROJECT NO. 25219067.00	DRAWN BY: KP/JMO
DRAWN: 08/23/2019	CHECKED BY: NDK
REVISED: 10/23/2020	APPROVED BY: TK 10/23/2020

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

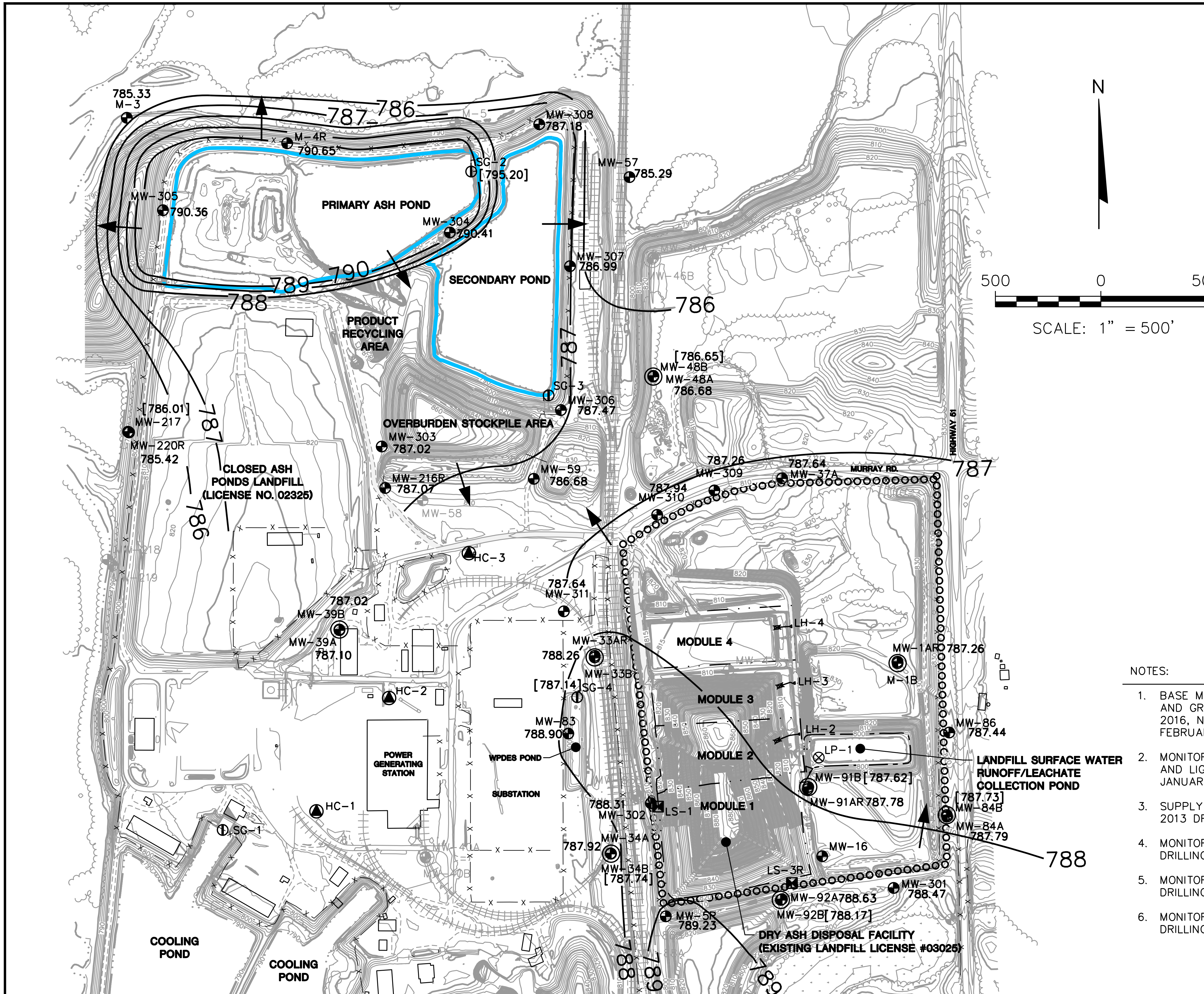
CLIENT: ALLIANT ENERGY, ALLIANT ENERGY 4902 NORTH BILTMORE LN. #1000 MADISON, WI 53718

SITE: ALLIANT ENERGY COLUMBIA ENERGY CENTER PARDEEVILLE, WI

WATER TABLE MAP APRIL 2019

FIGURE 3

Attachment C3



LEGEND

- EXISTING MAJOR CONTOUR (10' INTERVAL)
- EXISTING MINOR CONTOUR (2' CONTOUR)
- EXISTING FENCELINE
- EXISTING TRACKS
- EXISTING PAVED ROAD
- EXISTING UNPAVED ROAD
- EDGE OF WATER
- APPROVED LIMITS OF WASTE (DRY ASH LANDFILL)
- CONSTRUCTED LIMITS OF WASTE (DRY ASH LANDFILL)
- WATER SUPPLY WELL
- STAFF GAUGE
- WATER TABLE WELL
- PIEZOMETER
- SURFACE WATER SAMPLE LOCATION
- LYSIMETER
- ABANDONED WATER TABLE WELL
- ABANDONED PIEZOMETER
- LEACHATE HEADWELL
- 787.62 WATER TABLE ELEVATION MEASURED OCTOBER 2019
- [788.87] POTENTIOMETRIC SURFACE ELEVATION MEASURED OCTOBER 2019 (NOT CONTOURED)
- (795.20) SURFACE WATER ELEVATION MEASURED OCTOBER 2019 (NOT CONTOURED
- WATER TABLE CONTOUR
- APPROXIMATE GROUND WATER FLOW DIRECTION
- 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, 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.

PROJECT NO. 25220067.00	DRAWN BY: BSS/LEC	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 PARDEEVILLE, WI	WATER TABLE MAP OCTOBER 2019
DRAWN: 12/02/2019	CHECKED BY: NDK						FIGURE
REVISED: 10/23/2020	APPROVED BY: TK 10/23/2020						4

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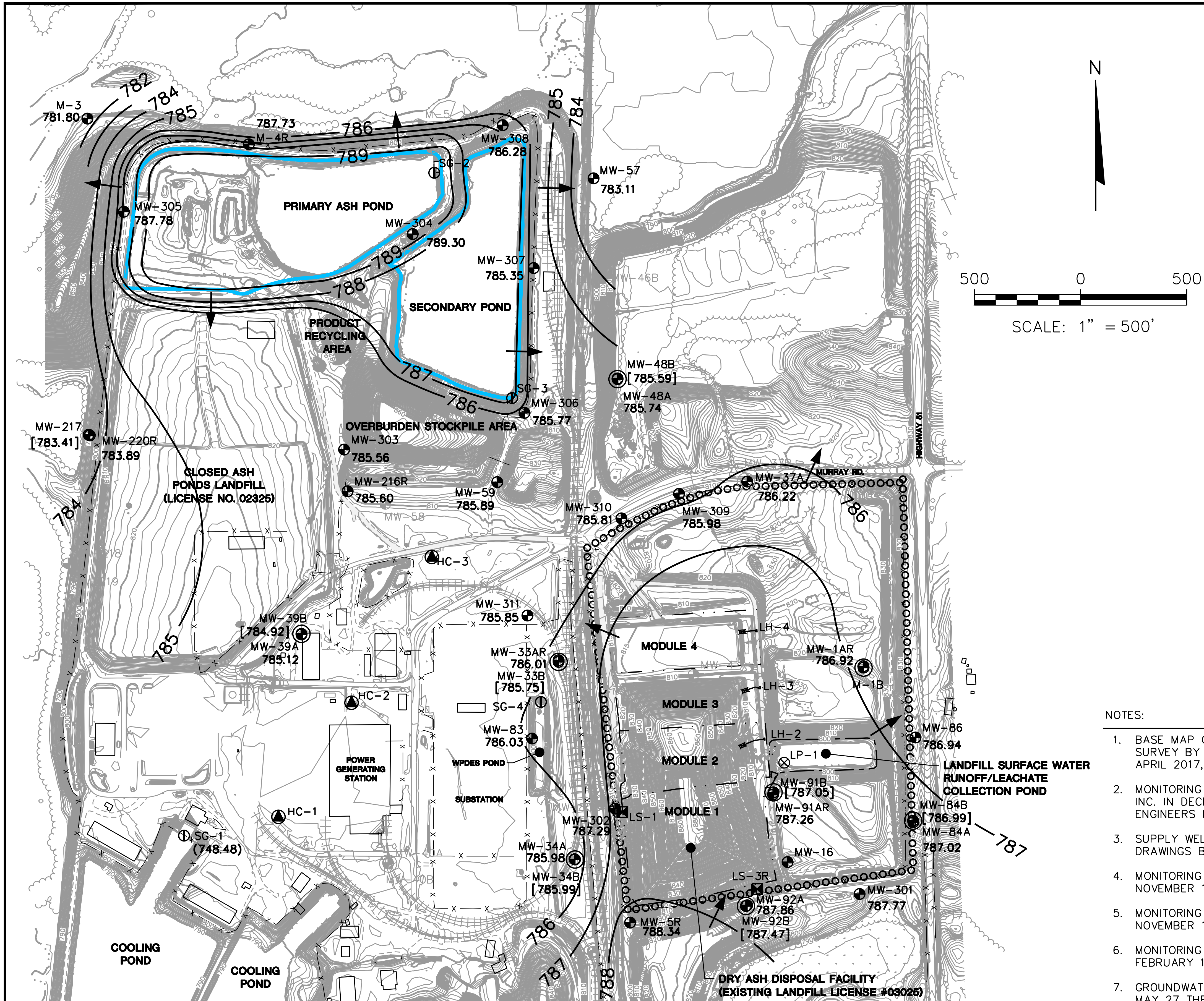
Attachment C3



LEGEND

- EXISTING MAJOR CONTOUR (10' INTERVAL)
- EXISTING MINOR CONTOUR (2' CONTOUR)
- EXISTING FENCE LINE
- EXISTING TRACKS
- EXISTING PAVED ROAD
- EXISTING UNPAVED ROAD
- EDGE OF WATER
- APPROVED LIMITS OF WASTE (DRY ASH LANDFILL)
- CONSTRUCTED LIMITS OF WASTE (DRY ASH LANDFILL)
- WATER SUPPLY WELL
- STAFF GAUGE
- WATER TABLE WELL
- PIEZOMETER
- SURFACE WATER SAMPLE LOCATION
- LYSIMETER
- ABANDONED WATER TABLE WELL
- ABANDONED PIEZOMETER
- LEACHATE HEADWELL
- CCR UNIT
- CCR MONITORING WELL
- 787.62 WATER TABLE ELEVATION MEASURED MAY 2020
- [788.87] POTENTIOMETRIC SURFACE ELEVATION MEASURED MAY 2020 (NOT CONTOURED)
- (795.20) SURFACE WATER ELEVATION MEASURED MAY 2020 (NOT CONTOURED)
- WATER TABLE CONTOUR
- APPROXIMATE GROUNDWATER FLOW DIRECTION
- 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, 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.
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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 ELEVATIONS WERE COLLECTED FROM MONITORING WELLS AND PIEZOMETERS ON MAY 27 THROUGH MAY 29, 2020.

PROJECT NO.	25220067.00	DRAWN BY:	BSS
DRAWN:	08/26/2020	CHECKED BY:	NDK
REVISED:	10/23/2020	APPROVED BY:	TK 10/23/2020

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
PARDEEVILLE, WI

WATER TABLE MAP
MAY 2020

FIGURE
5

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Attachment C4

2019 Annual Groundwater Monitoring and Corrective Action Report

Primary Ash Pond
Columbia Energy Center
Pardeeville, Wisconsin

Prepared for:

Alliant Energy

SCS ENGINEERS

25219067.00 | January 31, 2020

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

Table of Contents

Section Page

Tables

Figures

Appendix A – Laboratory Reports

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1.0 INTRODUCTION

This 2019 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 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 2019 Annual Groundwater Monitoring and Corrective Action Report for the CCR Units.

This report covers the period of groundwater monitoring from January 1, 2019, through December 31, 2019.

The groundwater monitoring system for the Primary Ash Pond at the Columbia Energy Center (COL) monitors a single existing CCR unit:

- COL Primary Ash Pond (existing CCR surface impoundment)

The system is designed to detect monitored constituents at the waste boundary of the Primary Ash Pond as required by 40 CFR 257.91(d). The groundwater monitoring system consists of two upgradient and four downgradient monitoring wells.

2.0 §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:*

2.1 §257.90(E)(1) SITE MAP

A map, aerial image, or diagram showing the CCR unit and all background (or upgradient) and downgradient monitoring wells, to include the well identification numbers, that are part of the groundwater monitoring program for the CCR unit;

A map showing the site location is provided on **Figure 1**. A map showing the 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**.

2.2 §257.90(E)(2) MONITORING SYSTEM CHANGES

Identification of any monitoring wells that were installed or decommissioned during the preceding year, along with a narrative description of why those actions were taken;

No new monitoring wells were installed and no wells were decommissioned as part of the groundwater monitoring program for the CCR unit in 2019.

2.3 §257.90(E)(3) SUMMARY OF SAMPLING EVENTS

In addition to all the monitoring data obtained under §§257.90 through 257.98, a summary including the number of groundwater samples that were collected for analysis for each background and downgradient well, the dates the samples were collected, and whether the sample was required by the detection monitoring or assessment monitoring programs;

Three groundwater sampling events were completed for the Primary Ash Pond CCR unit in 2019. Two semiannual sampling events were completed in April 2019 and October 2019 as required by the assessment monitoring program. A resampling event for monitoring well MW-303 was completed in June 2019.

Groundwater samples collected in the April and October 2019 sampling events were analyzed for both Appendix III and Appendix IV constituents. The sample collected in the MW-303 resampling event in June 2019 was analyzed for selected 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 assessment monitoring programs is included in Table 1. The results of the analytical laboratory analyses are provided in the laboratory reports in Appendix A.

2.4 §257.90(E)(4) MONITORING TRANSITION NARRATIVE

A narrative discussion of any transition between monitoring programs (e.g., the date and circumstances for transitioning from detection monitoring to assessment monitoring in addition to identifying the constituent(s) detected at a statistically significant increase over background levels);

There was no monitoring program transition in 2019.

Assessment monitoring for the Primary Ash Pond was initiated in April 2018 and continued through 2019. The statistical evaluation of the October 2018 detection monitoring results was completed on January 15, 2019. No Appendix IV parameters were detected at statistically significant levels above the groundwater protection standard (GPS) values established under §257.95(h). In accordance with the Unified Guidance for Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities (USEPA, 2009), the comparison of assessment monitoring results to the GPS was based on the lower confidence limit for the arithmetic mean. Although individual results for arsenic in samples from well MW-303 have exceeded the GPS, the lower confidence limit for mean remained below the GPS; therefore, the arsenic concentration is not at a statistically significant level above the GPS.

2.5 §257.90(E)(5) OTHER REQUIREMENTS

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

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 2019 Annual Groundwater Monitoring and Corrective Action Report for the CCR Unit.

2.5.1 §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 is currently in Assessment Monitoring.

Summary of Key Actions Completed.

- Statistical evaluation for the initial assessment monitoring events (April, August, and October 2018), completed January 14, 2019.
- Statistical evaluation for the April 2019 monitoring event, completed July 16, 2019.
- Two semiannual groundwater sampling and analysis events (April and October 2019) specified in §257.95(d)(1).
- Resampling event at MW-303 in June 2019.

Description of Any Problems Encountered: No problems were encountered during the groundwater sampling events in 2019.

Discussion of Actions to Resolve the Problems. Not applicable.

Projection of Key Activities for the Upcoming Year (2020):

- Statistical evaluation and determination of any statistically significant levels exceeding the GPS for the October 2019 monitoring events (by 1/15/2020);
- Statistical evaluation and determination of any statistically significant levels exceeding the GPS for the April 2020 monitoring events (by 7/15/20);
- If one or more Appendix IV constituents is detected at a statistically significant level above the GPS, then within 30 days Wisconsin Power and Light Company (WPL) will prepare a notification in accordance with §257.95(g) and within 90 days complete an alternative source demonstration or initiate an assessment of corrective measures

(§257.95(g)(3)). WPL will also characterize the release pursuant to §257.95(g)(1) and provide notice pursuant to §257.95(g)(2).

- Two semiannual groundwater sampling and analysis events (April and October 2020).

2.5.2 §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. The Primary Ash Pond is no longer in detection monitoring.

2.5.3 §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. The Primary Ash Pond is no longer in detection monitoring.

2.5.4 §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 been initiated at the site, but no alternative assessment monitoring frequency is proposed at this time.

2.5.5 §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).

The recorded concentrations for the assessment monitoring events are in the laboratory reports in **Appendix A**. The background concentrations established under §257.94(b) were provided in Appendix A of the 2017 Annual Groundwater Monitoring and Corrective Action Report for the Primary Ash Pond. The groundwater protection standards established for the Primary Ash Pond are provided in **Table 2**.

2.5.6 §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. No alternative source demonstration evaluation for assessment monitoring was completed in 2019.

2.5.7 §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.

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Tables

Table 1. CCR Rule Groundwater Samples Summary
Columbia Energy Center Primary Ash Pond/ SCS Engineers Project #25219067.00

Sample Dates	**Downgradient Wells**				**Background Wells**	
	MW-4R	MW-303	MW-304	MW-305	MW-84A	MW-301
4/1-3/2019	A	A	A	A	A	A
6/19/2019	--	R-A	--	--	--	--
10/7-10/2019	A	A	A	A	A	A
Total Samples	2	3	2	2	2	2

Abbreviations:
A = Required by Assessment Monitoring Program
R-A = Resample for the Assessment Monitoring Program

Created by:	NDK	Date:	1/4/2018
Last revision by:	JR	Date:	11/13/2019
Checked by:	NDK	Date:	1/8/2020

I:\25219067.00\Deliverables\2019 Federal Annual Report COL - PP\Tables\[Table 1 GW_Samples_Summary_Table_COL_Ponds.xlsx]GW Summary

Table 2. Groundwater Protection Standards - CCR Program - Assessment Monitoring
Columbia Energy Center Primary Ash Pond / SCS Engineers Project #25219067.00

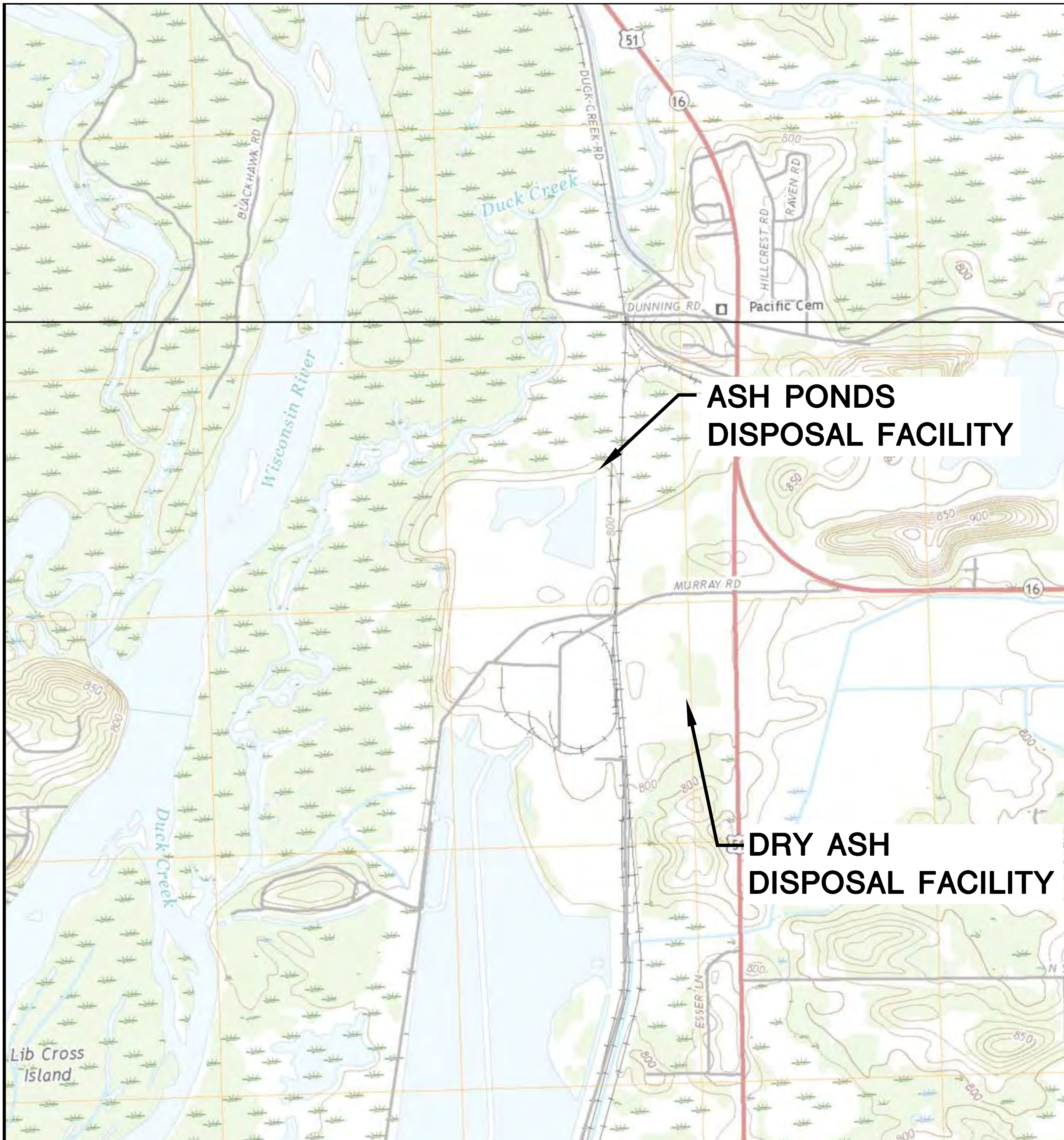
Parameter Name	GPS	Source
Antimony, ug/L	6	MCL
Arsenic, ug/L	10	MCL
Barium, ug/L	2000	MCL
Beryllium, ug/L	4	MCL
Cadmium, ug/L	5	MCL
Chromium, ug/L	100	MCL
Cobalt, ug/L	6	40 CFR 257.95(h)(2)
Fluoride, mg/L	4	MCL
Lead, ug/L	15	40 CFR 257.95(h)(2)
Lithium, ug/L	40	40 CFR 257.95(h)(2)
Mercury, ug/L	2	MCL
Molybdenum, ug/L	100	40 CFR 257.95(h)(2)
Selenium, ug/L	50	MCL
Thallium, ug/L	2	MCL
Radium 226/228 Combined, pCl/L	5	MCL

Abbreviations:
GPS = Groundwater Protection Standard
MCL = Maximum Contaminant Level established under 40 CFR 141.62 and 141.66

Created by: NDK, 9/24/2018
Checked by: SCC, 10/14/2018

I:\25219067.00\Deliverables\2019 Federal Annual Report COL - PP\Tables\[Table 2_GPS_COL Primary Pond.xlsx]Table

Figures



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

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

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

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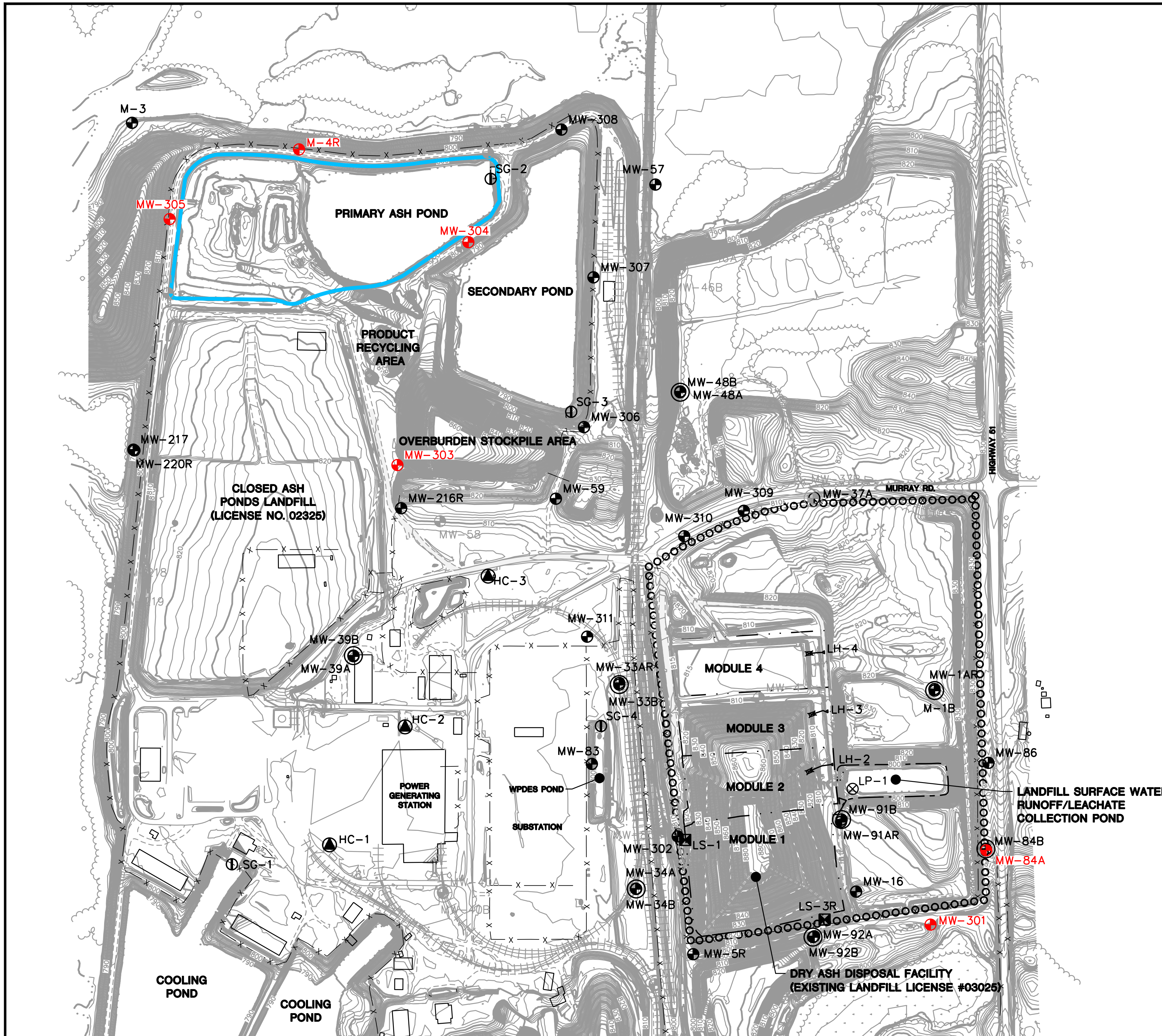

LEGEND

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

NOTES:

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6. MONITORING WELLS MW-309 THROUGH MW-311 INSTALLED BY BADGER STATE DRILLING ON FEBRUARY 13-14, 2018.

500 0 500

SCALE: 1" = 500'

N

PROJECT NO.	25219067.00	DRAWN BY:	BSS
DRAWN:	12/02/2019	CHECKED BY:	MDB
REVISED:	01/13/2020	APPROVED BY:	TK 01/30/2020

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, PRIMARY ASH POND, PARDEEVILLE, WI

SITE PLAN AND MONITORING WELL LOCATIONS

FIGURE 2

I:\25219067.00\Drawings\CCR 2019 Annual Report\Primary Pond\Site Plan and Monitoring Well Locations.dwg, 1/30/2020 3:41:33 PM

Appendix A

Laboratory Reports

A1 Assessment Monitoring Event Round 1, April 2019

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

May 03, 2019

Meghan Blodgett
SCS ENGINEERS
2830 Dairy Drive
Madison, WI 53718

RE: Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185256

Dear Meghan Blodgett:

Enclosed are the analytical results for sample(s) received by the laboratory on April 04, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

Revised Report: Anions for MW-301 were reanalyzed at a lesser dilution.

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

Sincerely,

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

Enclosures

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

REPORT OF LABORATORY ANALYSIS

CERTIFICATIONS

Project:	25219067 ALLIANT-COLUMBIA CCR
Pace Project No.:	40185256

Pennsylvania Certification IDs

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

Green Bay Certification IDs

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

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

SAMPLE SUMMARY

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185256

Lab ID	Sample ID	Matrix	Date Collected	Date Received
40185256001	**MW-301**	Water	04/02/19 17:20	04/04/19 09:30
40185256002	**MW-84A**	Water	04/03/19 09:40	04/04/19 09:30

Pace Analytical®
www.pacelabs.com

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

SAMPLE ANALYTE COUNT

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185256

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
40185256001	**MW-301**	EPA 6020	KXS	14	PASI-G
		EPA 7470	AJT	1	PASI-G
			AXL	7	PASI-G
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	JLW	1	PASI-PA
		Total Radium Calculation	CMC	1	PASI-PA
		SM 2540C	TMK	1	PASI-G
		EPA 9040	ALY	1	PASI-G
		EPA 300.0	HMB	3	PASI-G
40185256002	**MW-84A**	EPA 6020	KXS	14	PASI-G
		EPA 7470	AJT	1	PASI-G
			AXL	7	PASI-G
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	JLW	1	PASI-PA
		Total Radium Calculation	CMC	1	PASI-PA
		SM 2540C	TMK	1	PASI-G
		EPA 9040	ALY	1	PASI-G
		EPA 300.0	HMB	3	PASI-G

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1241 Bellevue Street - Suite 9
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(920)469-2436

ANALYTICAL RESULTS

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185256

Sample: MW-301 **Lab ID: 40185256001** Collected: 04/02/19 17:20 Received: 04/04/19 09:30 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Antimony	**0.32J**	ug/L	1.0	0.15	1	04/05/19 08:40	04/09/19 06:15	7440-36-0	
Arsenic	**0.40J**	ug/L	1.0	0.28	1	04/05/19 08:40	04/09/19 06:15	7440-38-2	
Barium	**11.8**	ug/L	4.9	1.5	1	04/05/19 08:40	04/09/19 06:15	7440-39-3	
Beryllium	**0.28J**	ug/L	1.0	0.18	1	04/05/19 08:40	04/09/19 06:15	7440-41-7	
Boron	**26.9**	ug/L	11.0	3.3	1	04/05/19 08:40	04/09/19 06:15	7440-42-8	
Cadmium	**0.21J**	ug/L	1.0	0.15	1	04/05/19 08:40	04/09/19 06:15	7440-43-9	
Calcium	**126000**	ug/L	2500	698	10	04/05/19 08:40	04/09/19 05:48	7440-70-2	P6
Chromium	**<1.0**	ug/L	3.4	1.0	1	04/05/19 08:40	04/09/19 06:15	7440-47-3	
Cobalt	**0.35J**	ug/L	1.0	0.12	1	04/05/19 08:40	04/09/19 06:15	7440-48-4	
Lead	**0.30J**	ug/L	1.0	0.24	1	04/05/19 08:40	04/09/19 06:15	7439-92-1	
Lithium	**0.90J**	ug/L	1.0	0.19	1	04/05/19 08:40	04/09/19 06:15	7439-93-2	
Molybdenum	**<0.44**	ug/L	1.5	0.44	1	04/05/19 08:40	04/09/19 06:15	7439-98-7	
Selenium	**0.49J**	ug/L	1.1	0.32	1	04/05/19 08:40	04/09/19 06:15	7782-49-2	
Thallium	**0.48J**	ug/L	1.0	0.14	1	04/05/19 08:40	04/09/19 06:15	7440-28-0	
7470 Mercury	Analytical Method: EPA 7470 Preparation Method: EPA 7470								
Mercury	**<0.084**	ug/L	0.28	0.084	1	04/12/19 09:55	04/15/19 10:05	7439-97-6	
Field Data	Analytical Method:								
Field pH	**6.62**	Std. Units			1		04/02/19 17:20		
Field Specific Conductance	**883**	umhos/cm			1		04/02/19 17:20		
Oxygen, Dissolved	**2.20**	mg/L			1		04/02/19 17:20	7782-44-7	
REDOX	**152.1**	mV			1		04/02/19 17:20		
Turbidity	**2.02**	NTU			1		04/02/19 17:20		
Static Water Level	**787.04**	feet			1		04/02/19 17:20		
Temperature, Water (C)	**7.5**	deg C			1		04/02/19 17:20		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**462**	mg/L	20.0	8.7	1		04/09/19 12:34		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**6.8**	Std. Units	0.10	0.010	1		04/08/19 11:21		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**0.79J**	mg/L	2.0	0.50	1		04/30/19 11:06	16887-00-6	
Fluoride	**<0.10**	mg/L	0.30	0.10	1		04/30/19 11:06	16984-48-8	
Sulfate	**4.4**	mg/L	3.0	1.0	1		04/30/19 11:06	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185256

Sample: MW-84A **Lab ID: 40185256002** Collected: 04/03/19 09:40 Received: 04/04/19 09:30 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Antimony	**<0.15**	ug/L	1.0	0.15	1	04/05/19 08:40	04/09/19 06:42	7440-36-0	
Arsenic	**<0.28**	ug/L	1.0	0.28	1	04/05/19 08:40	04/09/19 06:42	7440-38-2	
Barium	**14.7**	ug/L	4.9	1.5	1	04/05/19 08:40	04/09/19 06:42	7440-39-3	
Beryllium	**<0.18**	ug/L	1.0	0.18	1	04/05/19 08:40	04/09/19 06:42	7440-41-7	
Boron	**13.6**	ug/L	11.0	3.3	1	04/05/19 08:40	04/09/19 06:42	7440-42-8	
Cadmium	**<0.15**	ug/L	1.0	0.15	1	04/05/19 08:40	04/09/19 06:42	7440-43-9	
Calcium	**80100**	ug/L	250	69.8	1	04/05/19 08:40	04/09/19 06:42	7440-70-2	
Chromium	**1.8J**	ug/L	3.4	1.0	1	04/05/19 08:40	04/09/19 06:42	7440-47-3	
Cobalt	**<0.12**	ug/L	1.0	0.12	1	04/05/19 08:40	04/09/19 06:42	7440-48-4	
Lead	**<0.24**	ug/L	1.0	0.24	1	04/05/19 08:40	04/09/19 06:42	7439-92-1	
Lithium	**0.56J**	ug/L	1.0	0.19	1	04/05/19 08:40	04/09/19 06:42	7439-93-2	
Molybdenum	**<0.44**	ug/L	1.5	0.44	1	04/05/19 08:40	04/09/19 06:42	7439-98-7	
Selenium	**<0.32**	ug/L	1.1	0.32	1	04/05/19 08:40	04/09/19 06:42	7782-49-2	
Thallium	**<0.14**	ug/L	1.0	0.14	1	04/05/19 08:40	04/09/19 06:42	7440-28-0	
7470 Mercury	Analytical Method: EPA 7470 Preparation Method: EPA 7470								
Mercury	**<0.084**	ug/L	0.28	0.084	1	04/12/19 09:55	04/15/19 10:07	7439-97-6	
Field Data	Analytical Method:								
Field pH	**7.03**	Std. Units			1		04/03/19 09:40		
Field Specific Conductance	**637.2**	umhos/cm			1		04/03/19 09:40		
Oxygen, Dissolved	**9.49**	mg/L			1		04/03/19 09:40	7782-44-7	
REDOX	**103.4**	mV			1		04/03/19 09:40		
Turbidity	**1.90**	NTU			1		04/03/19 09:40		
Static Water Level	**787.35**	feet			1		04/03/19 09:40		
Temperature, Water (C)	**10.2**	deg C			1		04/03/19 09:40		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**318**	mg/L	20.0	8.7	1		04/09/19 12:34		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**7.4**	Std. Units	0.10	0.010	1		04/08/19 11:24		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**3.6**	mg/L	2.0	0.50	1		04/16/19 20:03	16887-00-6	B
Fluoride	**<0.10**	mg/L	0.30	0.10	1		04/16/19 20:03	16984-48-8	
Sulfate	**1.4J**	mg/L	3.0	1.0	1		04/16/19 20:03	14808-79-8	

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QUALITY CONTROL DATA

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185256

QC Batch: 318138 | Analysis Method: EPA 7470
QC Batch Method: EPA 7470 | Analysis Description: 7470 Mercury
Associated Lab Samples: 40185256001, 40185256002

METHOD BLANK: 1849587 | Matrix: Water
Associated Lab Samples: 40185256001, 40185256002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mercury	ug/L	<0.084	0.28	04/15/19 09:25	

LABORATORY CONTROL SAMPLE: 1849588

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury	ug/L	5	5.3	105	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1849589 1849590

Parameter	Units	40185483005 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mercury	ug/L	0.00016J mg/L	5	5	5.4	5.2	105	101	85-115	4	20	

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QUALITY CONTROL DATA

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185256

QC Batch: 317485 Analysis Method: EPA 6020
QC Batch Method: EPA 3010 Analysis Description: 6020 MET
Associated Lab Samples: 40185256001, 40185256002

METHOD BLANK: 1846066 Matrix: Water
Associated Lab Samples: 40185256001, 40185256002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Antimony	ug/L	<0.15	1.0	04/09/19 04:47	
Arsenic	ug/L	<0.28	1.0	04/09/19 04:47	
Barium	ug/L	<1.5	4.9	04/09/19 04:47	
Beryllium	ug/L	<0.18	1.0	04/09/19 04:47	
Boron	ug/L	<3.3	11.0	04/09/19 04:47	
Cadmium	ug/L	<0.15	1.0	04/09/19 04:47	
Calcium	ug/L	<69.8	250	04/09/19 04:47	
Chromium	ug/L	<1.0	3.4	04/09/19 04:47	
Cobalt	ug/L	<0.12	1.0	04/09/19 04:47	
Lead	ug/L	<0.24	1.0	04/09/19 04:47	
Lithium	ug/L	<0.19	1.0	04/09/19 04:47	
Molybdenum	ug/L	<0.44	1.5	04/09/19 04:47	
Selenium	ug/L	<0.32	1.1	04/09/19 04:47	
Thallium	ug/L	<0.14	1.0	04/09/19 04:47	

LABORATORY CONTROL SAMPLE: 1846067

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Antimony	ug/L	500	500	100	80-120	
Arsenic	ug/L	500	474	95	80-120	
Barium	ug/L	500	487	97	80-120	
Beryllium	ug/L	500	492	98	80-120	
Boron	ug/L	500	486	97	80-120	
Cadmium	ug/L	500	500	100	80-120	
Calcium	ug/L	5000	4990	100	80-120	
Chromium	ug/L	500	492	98	80-120	
Cobalt	ug/L	500	485	97	80-120	
Lead	ug/L	500	463	93	80-120	
Lithium	ug/L	500	467	93	80-120	
Molybdenum	ug/L	500	465	93	80-120	
Selenium	ug/L	500	508	102	80-120	
Thallium	ug/L	500	464	93	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1846068 1846069

Parameter	Units	40185256001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Antimony	ug/L	0.32J	500	500	496	496	99	99	75-125	0	20	

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QUALITY CONTROL DATA

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185256

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1846068 1846069

Parameter	Units	40185256001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Arsenic	ug/L	0.40J	500	500	480	478	96	95	75-125	0	20	
Barium	ug/L	11.8	500	500	496	498	97	97	75-125	0	20	
Beryllium	ug/L	0.28J	500	500	481	480	96	96	75-125	0	20	
Boron	ug/L	26.9	500	500	492	498	93	94	75-125	1	20	
Cadmium	ug/L	0.21J	500	500	491	490	98	98	75-125	0	20	
Calcium	ug/L	126000	5000	5000	126000	123000	12	-46	75-125	2	20	P6
Chromium	ug/L	<1.0	500	500	484	483	97	96	75-125	0	20	
Cobalt	ug/L	0.35J	500	500	476	473	95	95	75-125	1	20	
Lead	ug/L	0.30J	500	500	467	468	93	94	75-125	0	20	
Lithium	ug/L	0.90J	500	500	463	463	92	92	75-125	0	20	
Molybdenum	ug/L	<0.44	500	500	465	464	93	93	75-125	0	20	
Selenium	ug/L	0.49J	500	500	512	513	102	103	75-125	0	20	
Thallium	ug/L	0.48J	500	500	474	476	95	95	75-125	0	20	

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QUALITY CONTROL DATA

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185256

QC Batch: 317813 | Analysis Method: SM 2540C
QC Batch Method: SM 2540C | Analysis Description: 2540C Total Dissolved Solids
Associated Lab Samples: 40185256001, 40185256002

METHOD BLANK: 1847582 | Matrix: Water
Associated Lab Samples: 40185256001, 40185256002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	<8.7	20.0	04/09/19 12:32	

LABORATORY CONTROL SAMPLE: 1847583

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Dissolved Solids	mg/L	577	552	96	80-120	

SAMPLE DUPLICATE: 1847584

Parameter	Units	40185256001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	462	462	0	5	

SAMPLE DUPLICATE: 1847585

Parameter	Units	40185260001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	290	284	2	5	

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QUALITY CONTROL DATA

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185256

QC Batch: 317619 | Analysis Method: EPA 9040
QC Batch Method: EPA 9040 | Analysis Description: 9040 pH
Associated Lab Samples: 40185256001, 40185256002

SAMPLE DUPLICATE: 1846956

Parameter	Units	40185113001 Result	Dup Result	RPD	Max RPD	Qualifiers
pH at 25 Degrees C	Std. Units	1.1	1.1	7	20	H6

SAMPLE DUPLICATE: 1846957

Parameter	Units	40185204001 Result	Dup Result	RPD	Max RPD	Qualifiers
pH at 25 Degrees C	Std. Units	7.2	7.2	0	20	H6

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QUALITY CONTROL DATA

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185256

QC Batch: 317955 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 40185256001, 40185256002

METHOD BLANK: 1848305 Matrix: Water
Associated Lab Samples: 40185256001, 40185256002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chloride	mg/L	0.52J	2.0	04/16/19 10:22	
Fluoride	mg/L	<0.10	0.30	04/16/19 10:22	
Sulfate	mg/L	<1.0	3.0	04/16/19 10:22	

LABORATORY CONTROL SAMPLE: 1848306

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	20	21.6	108	90-110	
Fluoride	mg/L	2	2.0	98	90-110	
Sulfate	mg/L	20	21.7	109	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1848307 1848308

Parameter	Units	40185204004 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	43.0	100	100	149	148	106	105	90-110	1	15	
Fluoride	mg/L	<0.50	10	10	10.3	10.4	103	104	90-110	1	15	
Sulfate	mg/L	<5.0	100	100	109	109	105	105	90-110	0	15	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1848309 1848310

Parameter	Units	40185260002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	229	200	200	439	425	105	98	90-110	3	15	
Fluoride	mg/L	<0.10	2	2	1.9	2.0	97	99	90-110	2	15	
Sulfate	mg/L	201	200	200	411	397	105	98	90-110	3	15	

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ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185256

Sample: MW-301 | **Lab ID: 40185256001** | Collected: 04/02/19 17:20 | Received: 04/04/19 09:30 | Matrix: Water
PWS: | Site ID: | Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	**0.000 ± 0.278 (0.565) C:NA T:94%**	pCi/L	04/22/19 23:16	13982-63-3	
Radium-228	EPA 904.0	**0.552 ± 0.391 (0.759) C:75% T:91%**	pCi/L	04/19/19 12:45	15262-20-1	
Total Radium	Total Radium Calculation	**0.552 ± 0.669 (1.32)**	pCi/L	04/25/19 11:01	7440-14-4	

Sample: MW-84A | **Lab ID: 40185256002** | Collected: 04/03/19 09:40 | Received: 04/04/19 09:30 | Matrix: Water
PWS: | Site ID: | Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	**0.199 ± 0.391 (0.715) C:NA T:93%**	pCi/L	04/22/19 23:16	13982-63-3	
Radium-228	EPA 904.0	**0.482 ± 0.511 (1.07) C:72% T:80%**	pCi/L	04/19/19 12:45	15262-20-1	
Total Radium	Total Radium Calculation	**0.681 ± 0.902 (1.79)**	pCi/L	04/25/19 11:01	7440-14-4	

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QUALITY CONTROL - RADIOCHEMISTRY

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185256

QC Batch: 338211 Analysis Method: EPA 904.0
QC Batch Method: EPA 904.0 Analysis Description: 904.0 Radium 228
Associated Lab Samples: 40185256001, 40185256002

METHOD BLANK: 1646527 Matrix: Water
Associated Lab Samples: 40185256001, 40185256002

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-228	-0.0681 ± 0.343 (0.816) C:74% T:84%	pCi/L	04/19/19 12:45	

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QUALITY CONTROL - RADIOCHEMISTRY

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185256

QC Batch: 338210 | Analysis Method: EPA 903.1
QC Batch Method: EPA 903.1 | Analysis Description: 903.1 Radium-226
Associated Lab Samples: 40185256001, 40185256002

METHOD BLANK: 1646526 | Matrix: Water
Associated Lab Samples: 40185256001, 40185256002

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-226	0.212 ± 0.323 (0.520) C:NA T:90%	pCi/L	04/22/19 22:44	

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QUALIFIERS

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185256

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.

LABORATORIES

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

ANALYTE QUALIFIERS

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

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

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185256

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
40185256001	**MW-301**	EPA 3010	317485	EPA 6020	317570
40185256002	**MW-84A**	EPA 3010	317485	EPA 6020	317570
40185256001	**MW-301**	EPA 7470	318138	EPA 7470	318191
40185256002	**MW-84A**	EPA 7470	318138	EPA 7470	318191
40185256001	**MW-301**				
40185256002	**MW-84A**				
40185256001	**MW-301**	EPA 903.1	338210		
40185256002	**MW-84A**	EPA 903.1	338210		
40185256001	**MW-301**	EPA 904.0	338211		
40185256002	**MW-84A**	EPA 904.0	338211		
40185256001	**MW-301**	Total Radium Calculation	339896		
40185256002	**MW-84A**	Total Radium Calculation	339897		
40185256001	**MW-301**	SM 2540C	317813		
40185256002	**MW-84A**	SM 2540C	317813		
40185256001	**MW-301**	EPA 9040	317619		
40185256002	**MW-84A**	EPA 9040	317619		
40185256001	**MW-301**	EPA 300.0	317955		
40185256002	**MW-84A**	EPA 300.0	317955		

(Please Print Clearly)

Company Name:	SCS
Branch/Location:	Madison WI
Project Contact:	Meg Blodgett
Phone:	608 216 7362
Project Number:	25219067
Project Name:	Alliant - Columbia
Project State:	WI
Sampled By (Print):	Adam Watson
Sampled By (Sign):	Paul A. Grover for Adam Watson
PO #:	
Regulatory Program:	

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CHAIN OF CUSTODY

MH

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

40185256

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

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

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

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

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

PACE LAB #	CLIENT FIELD ID	COLLECTION ① DATE	COLLECTION ① TIME	MATRIX ①	Cl, Floride, Ph, SO4, TDS	Metals	Radium 226	Radium 228	CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)	Profile #
FILTERED? (YES/NO) Y/N					No	No	No	No			
PRESERVATION (CODE)* Pick Letter					A	C	C	C			
001	MW 301	4/2/19	1720	W	X	X	X	X			
002	MW 84A	4/3/19	0940		X	X	X	X			
003	MW 303	4/1/19	1800		X	X	X	X			
004	MW 304	4/2/19	1230								
005	MW 305	4/1/19	1410								
006	M-4R	4/1/19	1515								
007	Field Blank PPond	4/2/19	1230								

① Filled in by Lab from labels 4/4/19 SMW

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

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

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

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

Relinquished By:	Date/Time:	Received By:	Date/Time:
Paul A. Grover	4-3-19 19:00		
Fed Ex	4/4/19 0930	Susan Kuyler Pace	4/4/19 0930

PACE Project No. 40185256

Receipt Temp = ROI °C

Sample Receipt pH: OK / Adjusted

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

C019a(27Jun2006)

Version 6.0 06/14/06

ORIGINAL

(Please Print Clearly)

Company Name:	SCS
Branch/Location:	Madison WI
Project Contact:	Meg Blodgett
Phone:	608 216 7362
Project Number:	25219067
Project Name:	Alliant - Columbia
Project State:	WI
Sampled By (Print):	Adam Watson
Sampled By (Sign):	Paul A. Groom for Adam Watson
PO #:	Regulatory Program:

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Page 1 of

40185256

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

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

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

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

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

					Analyses Requested	Cl, Floride, Ph, SO4, TDS	Metals	Radium 226	Radium 228						CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)	Profile #
				FILTERED? (YES/NO)	Y/N	No	No	No	No								
				PRESERVATION (CODE)*	Pick Letter	A	C	C	C								
PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX													
	MW 301	4-2-19	17:20	GW		X	X	X	X								
	MW 84A	4-3-19	9:40	GW		X	X	X	X								
	MW 303	4-1-19	18:00	GW		X	X	X	X								
	MW 304	4-2-19	12:30														
	MW 305	4-1-19	14:10														
	M-4R	4-1-19	15:15														
	Field Blank PPond	4-2-19	12:30	DI													

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

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

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

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

Relinquished By:	Date/Time:	Received By:	Date/Time:
Paul A. Groom	4-3-19 19:00		
Fed Ex	4/4/19 0930	[illegible] Pace	4/4/19 0930

PACE Project No. 40185256

Receipt Temp = °C

Sample Receipt pH
OK / Adjusted

Cooler Custody Seal
Present / Not Present
Intact / Not Intact

Version 6.0 06/14/06

ORIGINAL

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

Sample Preservation Receipt Form

Client Name: SCS

Project # 40185256

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

Lab Lot# of pH paper: 10065358 Lab Std #ID of preservation (if pH adjusted):

Initial when completed: SKW

Date/ Time:

Pace Lab #	AG1U	AG1H	AG4S	AG4U	AG5U	AG2S	BG3U	BP1U	BP2N	BP2Z	BP3U	BP3C	BP3N	BP3S	DG9A	DG9T	VG9U	VG9H	VG9M	VG9D	JGFU	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)
	Glass							Plastic							Vials						Jars			General									
001									4		2		1																		X		2.5 / 5 / 10
002									4		2		1																		X		2.5 / 5 / 10
003									4		2		1																		X		2.5 / 5 / 10
004									4		2		1																		X		2.5 / 5 / 10
005									4		2		1																		X		2.5 / 5 / 10
006									4		2		1																		X		2.5 / 5 / 10
007									4		2		1																		X		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

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
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
BP2N	500 mL plastic HNO3
BP2Z	500 mL plastic NaOH, Znact
BP3U	250 mL plastic unpres
BP3C	250 mL plastic NaOH
BP3N	250 mL plastic HNO3
BP3S	250 mL plastic H2SO4

DG9A	40 mL amber 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
WGFU	4 oz clear jar unpres
WPFU	4 oz plastic jar unpres

SP5T	120 mL plastic Na Thiosulfate
ZPLC	ziploc bag
GN:	

Page 1 of 2

Pace Analytical 1241 Bellevue Street, Green Bay, WI 54302	Document Name: **Sample Condition Upon Receipt (SCUR)**	Document Revised: 25Apr2018
	Document No.: **F-GB-C-031-Rev.07**	Issuing Authority: Pace Green Bay Quality Office

Sample Condition Upon Receipt Form (SCUR)

Project #:

WO# : 40185256

40185256

Client Name: SCS

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

Tracking #: 7864 3720 0524

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 - N/A **Type of Ice:** Wet Blue Dry None ☑ Samples on ice, cooling process has begun

Cooler Temperature Uncorr: ROI /Corr:

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.

Person examining contents:
Date: 4-4-19
Initials: SLL

Chain of Custody Present:	☑Yes ☐No ☐N/A	1.
Chain of Custody Filled Out:	☐Yes ☑No ☐N/A	2. No po# Mail, Invoice, Collect date & time, Lab added to coc 4-4-19 SLL
Chain of Custody Relinquished:	☑Yes ☐No ☐N/A	3.
Sampler Name & Signature on COC:	☑Yes ☐No ☐N/A	4. Recieved updated COC via email from client 4-4-19 SLL
Samples Arrived within Hold Time:	☑Yes ☐No	5.
- VOA Samples frozen upon receipt	☐Yes ☐No	Date/Time:
Short Hold Time Analysis (<72hr):	☑Yes ☐No	6.
Rush Turn Around Time Requested:	☐Yes ☑No	7.
Sufficient Volume: For Analysis: ☑Yes ☐No	MS/MSD: ☐Yes ☑No ☐N/A	8.
Correct Containers Used:	☑Yes ☐No	9.
-Pace Containers Used:	☑Yes ☐No ☐N/A	
-Pace IR Containers Used:	☐Yes ☐No ☑N/A	
Containers Intact:	☑Yes ☐No	10.
Filtered volume received for Dissolved tests	☐Yes ☐No ☑N/A	11.
Sample Labels match COC:	☑Yes ☐No ☐N/A	12.
-Includes date/time/ID/Analysis Matrix: W		
Trip Blank Present:	☐Yes ☐No ☑N/A	13.
Trip Blank Custody Seals Present	☐Yes ☐No ☑N/A	
Pace Trip Blank Lot # (if purchased):		

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

Person Contacted: Date/Time:

Comments/ Resolution:

Project Manager Review: AL for DM **Date:** 4/4/19

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Pace Analytical Services, LLC
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May 03, 2019

Meghan Blodgett
SCS ENGINEERS
2830 Dairy Drive
Madison, WI 53718

RE: Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185520

Dear Meghan Blodgett:

Enclosed are the analytical results for sample(s) received by the laboratory on April 04, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

Revised Report: Anions for MW-303 were reanalyzed at a lesser dilution.

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

Sincerely,

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

Enclosures

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

Pace Analytical Services, LLC
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CERTIFICATIONS

Project:	25219067 ALLIANT-COLUMBIA CCR
Pace Project No.:	40185520

Pennsylvania Certification IDs

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

Green Bay Certification IDs

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

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SAMPLE SUMMARY

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185520

Lab ID	Sample ID	Matrix	Date Collected	Date Received
40185256003	**MW-303**	Water	04/01/19 18:00	04/04/19 09:30
40185256004	**MW-304**	Water	04/02/19 12:30	04/04/19 09:30
40185256005	**MW-305**	Water	04/01/19 14:10	04/04/19 09:30
40185256006	**M-4R**	Water	04/01/19 15:15	04/04/19 09:30
40185256007	**FIELD BLANK PPOND**	Water	04/02/19 12:30	04/04/19 09:30

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SAMPLE ANALYTE COUNT

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185520

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
40185256003	**MW-303**	EPA 6020	KXS	14	PASI-G
		EPA 7470	AJT	1	PASI-G
			AXL	7	PASI-G
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	JLW	1	PASI-PA
		Total Radium Calculation	CMC	1	PASI-PA
		SM 2540C	TMK	1	PASI-G
		EPA 9040	ALY	1	PASI-G
		EPA 300.0	HMB	3	PASI-G
40185256004	**MW-304**	EPA 6020	KXS	14	PASI-G
		EPA 7470	AJT	1	PASI-G
			AXL	7	PASI-G
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	JLW	1	PASI-PA
		Total Radium Calculation	CMC	1	PASI-PA
		SM 2540C	TMK	1	PASI-G
		EPA 9040	ALY	1	PASI-G
		EPA 300.0	HMB	3	PASI-G
40185256005	**MW-305**	EPA 6020	KXS	14	PASI-G
		EPA 7470	AJT	1	PASI-G
			AXL	7	PASI-G
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	JLW	1	PASI-PA
		Total Radium Calculation	CMC	1	PASI-PA
		SM 2540C	TMK	1	PASI-G
		EPA 9040	ALY	1	PASI-G
		EPA 300.0	HMB	3	PASI-G
40185256006	**M-4R**	EPA 6020	KXS	14	PASI-G
		EPA 7470	AJT	1	PASI-G
			AXL	7	PASI-G
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	JLW	1	PASI-PA
		Total Radium Calculation	CMC	1	PASI-PA
		SM 2540C	TMK	1	PASI-G
		EPA 9040	ALY	1	PASI-G
		EPA 300.0	HMB	3	PASI-G
40185256007	**FIELD BLANK PPOND**	EPA 6020	KXS	14	PASI-G

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(920)469-2436

SAMPLE ANALYTE COUNT

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185520

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
		EPA 7470	AJT	1	PASI-G
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	JLW	1	PASI-PA
		Total Radium Calculation	CMC	1	PASI-PA
		SM 2540C	TMK	1	PASI-G
		EPA 9040	ALY	1	PASI-G
		EPA 300.0	HMB	3	PASI-G

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ANALYTICAL RESULTS

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185520

Sample: MW-303 **Lab ID: 40185256003** Collected: 04/01/19 18:00 Received: 04/04/19 09:30 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Antimony	**0.29J**	ug/L	1.0	0.15	1	04/05/19 08:40	04/09/19 07:09	7440-36-0	
Arsenic	**33.2**	ug/L	1.0	0.28	1	04/05/19 08:40	04/09/19 07:09	7440-38-2	
Barium	**6.5**	ug/L	4.9	1.5	1	04/05/19 08:40	04/09/19 07:09	7440-39-3	
Beryllium	**<0.18**	ug/L	1.0	0.18	1	04/05/19 08:40	04/09/19 07:09	7440-41-7	
Boron	**2770**	ug/L	11.0	3.3	1	04/05/19 08:40	04/09/19 07:09	7440-42-8	
Cadmium	**<0.15**	ug/L	1.0	0.15	1	04/05/19 08:40	04/09/19 07:09	7440-43-9	
Calcium	**9290**	ug/L	250	69.8	1	04/05/19 08:40	04/09/19 07:09	7440-70-2	
Chromium	**71.2**	ug/L	3.4	1.0	1	04/05/19 08:40	04/09/19 07:09	7440-47-3	
Cobalt	**0.54J**	ug/L	1.0	0.12	1	04/05/19 08:40	04/09/19 07:09	7440-48-4	
Lead	**<0.24**	ug/L	1.0	0.24	1	04/05/19 08:40	04/09/19 07:09	7439-92-1	
Lithium	**0.74J**	ug/L	1.0	0.19	1	04/05/19 08:40	04/09/19 07:09	7439-93-2	
Molybdenum	**106**	ug/L	1.5	0.44	1	04/05/19 08:40	04/09/19 07:09	7439-98-7	
Selenium	**36.5**	ug/L	1.1	0.32	1	04/05/19 08:40	04/09/19 07:09	7782-49-2	
Thallium	**<0.14**	ug/L	1.0	0.14	1	04/05/19 08:40	04/09/19 07:09	7440-28-0	
7470 Mercury	Analytical Method: EPA 7470 Preparation Method: EPA 7470								
Mercury	**<0.084**	ug/L	0.28	0.084	1	04/12/19 09:55	04/15/19 10:09	7439-97-6	
Field Data	Analytical Method:								
Field pH	**9.92**	Std. Units			1		04/01/19 18:00		
Field Specific Conductance	**1176**	umhos/cm			1		04/01/19 18:00		
Oxygen, Dissolved	**5.59**	mg/L			1		04/01/19 18:00	7782-44-7	
REDOX	**19.9**	mV			1		04/01/19 18:00		
Turbidity	**2.40**	NTU			1		04/01/19 18:00		
Static Water Level	**786.52**	feet			1		04/01/19 18:00		
Temperature, Water (C)	**10.8**	deg C			1		04/01/19 18:00		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**726**	mg/L	20.0	8.7	1		04/08/19 15:37		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**9.1**	Std. Units	0.10	0.010	1		04/08/19 11:39		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**3.7J**	mg/L	4.0	1.0	2		04/30/19 11:19	16887-00-6	D3
Fluoride	**0.54J**	mg/L	0.60	0.20	2		04/30/19 11:19	16984-48-8	D3
Sulfate	**390**	mg/L	30.0	10.0	10		04/17/19 11:48	14808-79-8	

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ANALYTICAL RESULTS

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185520

Sample: MW-304 **Lab ID: 40185256004** Collected: 04/02/19 12:30 Received: 04/04/19 09:30 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Antimony	**<0.15**	ug/L	1.0	0.15	1	04/05/19 08:40	04/09/19 07:16	7440-36-0	
Arsenic	**0.63J**	ug/L	1.0	0.28	1	04/05/19 08:40	04/09/19 07:16	7440-38-2	
Barium	**26.7**	ug/L	4.9	1.5	1	04/05/19 08:40	04/09/19 07:16	7440-39-3	
Beryllium	**<0.18**	ug/L	1.0	0.18	1	04/05/19 08:40	04/09/19 07:16	7440-41-7	
Boron	**413**	ug/L	11.0	3.3	1	04/05/19 08:40	04/09/19 07:16	7440-42-8	
Cadmium	**<0.15**	ug/L	1.0	0.15	1	04/05/19 08:40	04/09/19 07:16	7440-43-9	
Calcium	**88300**	ug/L	250	69.8	1	04/05/19 08:40	04/09/19 07:16	7440-70-2	
Chromium	**<1.0**	ug/L	3.4	1.0	1	04/05/19 08:40	04/09/19 07:16	7440-47-3	
Cobalt	**0.67J**	ug/L	1.0	0.12	1	04/05/19 08:40	04/09/19 07:16	7440-48-4	
Lead	**<0.24**	ug/L	1.0	0.24	1	04/05/19 08:40	04/09/19 07:16	7439-92-1	
Lithium	**<0.19**	ug/L	1.0	0.19	1	04/05/19 08:40	04/09/19 07:16	7439-93-2	
Molybdenum	**3.0**	ug/L	1.5	0.44	1	04/05/19 08:40	04/09/19 07:16	7439-98-7	
Selenium	**<0.32**	ug/L	1.1	0.32	1	04/05/19 08:40	04/09/19 07:16	7782-49-2	
Thallium	**<0.14**	ug/L	1.0	0.14	1	04/05/19 08:40	04/09/19 07:16	7440-28-0	
7470 Mercury	Analytical Method: EPA 7470 Preparation Method: EPA 7470								
Mercury	**<0.084**	ug/L	0.28	0.084	1	04/12/19 09:55	04/15/19 10:12	7439-97-6	
Field Data	Analytical Method:								
Field pH	**7.28**	Std. Units			1		04/02/19 12:30		
Field Specific Conductance	**747.0**	umhos/cm			1		04/02/19 12:30		
Oxygen, Dissolved	**0.30**	mg/L			1		04/02/19 12:30	7782-44-7	
REDOX	**14.2**	mV			1		04/02/19 12:30		
Turbidity	**5.27**	NTU			1		04/02/19 12:30		
Static Water Level	**789.72**	feet			1		04/02/19 12:30		
Temperature, Water (C)	**8.3**	deg C			1		04/02/19 12:30		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**394**	mg/L	20.0	8.7	1		04/09/19 12:34		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**7.3**	Std. Units	0.10	0.010	1		04/08/19 11:41		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**30.8**	mg/L	2.0	0.50	1		04/16/19 20:28	16887-00-6	
Fluoride	**<0.10**	mg/L	0.30	0.10	1		04/16/19 20:28	16984-48-8	
Sulfate	**33.1**	mg/L	3.0	1.0	1		04/16/19 20:28	14808-79-8	

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ANALYTICAL RESULTS

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185520

Sample: MW-305 **Lab ID: 40185256005** Collected: 04/01/19 14:10 Received: 04/04/19 09:30 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Antimony	**0.16J**	ug/L	1.0	0.15	1	04/05/19 08:40	04/09/19 07:23	7440-36-0	
Arsenic	**<0.28**	ug/L	1.0	0.28	1	04/05/19 08:40	04/09/19 07:23	7440-38-2	
Barium	**8.4**	ug/L	4.9	1.5	1	04/05/19 08:40	04/09/19 07:23	7440-39-3	
Beryllium	**<0.18**	ug/L	1.0	0.18	1	04/05/19 08:40	04/09/19 07:23	7440-41-7	
Boron	**692**	ug/L	11.0	3.3	1	04/05/19 08:40	04/09/19 07:23	7440-42-8	
Cadmium	**<0.15**	ug/L	1.0	0.15	1	04/05/19 08:40	04/09/19 07:23	7440-43-9	
Calcium	**74700**	ug/L	250	69.8	1	04/05/19 08:40	04/09/19 07:23	7440-70-2	
Chromium	**1.3J**	ug/L	3.4	1.0	1	04/05/19 08:40	04/09/19 07:23	7440-47-3	
Cobalt	**<0.12**	ug/L	1.0	0.12	1	04/05/19 08:40	04/09/19 07:23	7440-48-4	
Lead	**<0.24**	ug/L	1.0	0.24	1	04/05/19 08:40	04/09/19 07:23	7439-92-1	
Lithium	**<0.19**	ug/L	1.0	0.19	1	04/05/19 08:40	04/09/19 07:23	7439-93-2	
Molybdenum	**47.7**	ug/L	1.5	0.44	1	04/05/19 08:40	04/09/19 07:23	7439-98-7	
Selenium	**3.2**	ug/L	1.1	0.32	1	04/05/19 08:40	04/09/19 07:23	7782-49-2	
Thallium	**<0.14**	ug/L	1.0	0.14	1	04/05/19 08:40	04/09/19 07:23	7440-28-0	
7470 Mercury	Analytical Method: EPA 7470 Preparation Method: EPA 7470								
Mercury	**<0.084**	ug/L	0.28	0.084	1	04/12/19 09:55	04/15/19 10:14	7439-97-6	
Field Data	Analytical Method:								
Field pH	**8.04**	Std. Units			1		04/01/19 14:10		
Field Specific Conductance	**683**	umhos/cm			1		04/01/19 14:10		
Oxygen, Dissolved	**5.14**	mg/L			1		04/01/19 14:10	7782-44-7	
REDOX	**164.8**	mV			1		04/01/19 14:10		
Turbidity	**1.34**	NTU			1		04/01/19 14:10		
Static Water Level	**790.07**	feet			1		04/01/19 14:10		
Temperature, Water (C)	**11.8**	deg C			1		04/01/19 14:10		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**418**	mg/L	20.0	8.7	1		04/08/19 15:38		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**7.9**	Std. Units	0.10	0.010	1		04/08/19 11:43		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**35.8**	mg/L	2.0	0.50	1		04/16/19 21:17	16887-00-6	
Fluoride	**0.33**	mg/L	0.30	0.10	1		04/16/19 21:17	16984-48-8	
Sulfate	**200**	mg/L	30.0	10.0	10		04/16/19 21:29	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185520

Sample: M-4R **Lab ID: 40185256006** Collected: 04/01/19 15:15 Received: 04/04/19 09:30 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Antimony	**<0.15**	ug/L	1.0	0.15	1	04/05/19 08:40	04/09/19 07:30	7440-36-0	
Arsenic	**<0.28**	ug/L	1.0	0.28	1	04/05/19 08:40	04/09/19 07:30	7440-38-2	
Barium	**24.1**	ug/L	4.9	1.5	1	04/05/19 08:40	04/09/19 07:30	7440-39-3	
Beryllium	**<0.18**	ug/L	1.0	0.18	1	04/05/19 08:40	04/09/19 07:30	7440-41-7	
Boron	**788**	ug/L	11.0	3.3	1	04/05/19 08:40	04/09/19 07:30	7440-42-8	
Cadmium	**<0.15**	ug/L	1.0	0.15	1	04/05/19 08:40	04/09/19 07:30	7440-43-9	
Calcium	**106000**	ug/L	250	69.8	1	04/05/19 08:40	04/09/19 07:30	7440-70-2	
Chromium	**<1.0**	ug/L	3.4	1.0	1	04/05/19 08:40	04/09/19 07:30	7440-47-3	
Cobalt	**<0.12**	ug/L	1.0	0.12	1	04/05/19 08:40	04/09/19 07:30	7440-48-4	
Lead	**<0.24**	ug/L	1.0	0.24	1	04/05/19 08:40	04/09/19 07:30	7439-92-1	
Lithium	**1.8**	ug/L	1.0	0.19	1	04/05/19 08:40	04/09/19 07:30	7439-93-2	
Molybdenum	**29.4**	ug/L	1.5	0.44	1	04/05/19 08:40	04/09/19 07:30	7439-98-7	
Selenium	**12.6**	ug/L	1.1	0.32	1	04/05/19 08:40	04/09/19 07:30	7782-49-2	
Thallium	**<0.14**	ug/L	1.0	0.14	1	04/05/19 08:40	04/09/19 07:30	7440-28-0	
7470 Mercury	Analytical Method: EPA 7470 Preparation Method: EPA 7470								
Mercury	**<0.084**	ug/L	0.28	0.084	1	04/12/19 09:55	04/15/19 10:16	7439-97-6	
Field Data	Analytical Method:								
Field pH	**7.24**	Std. Units			1		04/01/19 15:15		
Field Specific Conductance	**888**	umhos/cm			1		04/01/19 15:15		
Oxygen, Dissolved	**1.21**	mg/L			1		04/01/19 15:15	7782-44-7	
REDOX	**190.4**	mV			1		04/01/19 15:15		
Turbidity	**1.56**	NTU			1		04/01/19 15:15		
Static Water Level	**789.44**	feet			1		04/01/19 15:15		
Temperature, Water (C)	**11.2**	deg C			1		04/01/19 15:15		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**524**	mg/L	20.0	8.7	1		04/08/19 15:38		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**7.4**	Std. Units	0.10	0.010	1		04/08/19 11:44		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**31.4**	mg/L	2.0	0.50	1		04/16/19 21:41	16887-00-6	
Fluoride	**0.17J**	mg/L	0.30	0.10	1		04/16/19 21:41	16984-48-8	
Sulfate	**149**	mg/L	30.0	10.0	10		04/17/19 12:00	14808-79-8	

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ANALYTICAL RESULTS

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185520

Sample: FIELD BLANK PPOND **Lab ID: 40185256007** Collected: 04/02/19 12:30 Received: 04/04/19 09:30 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Antimony	**<0.15**	ug/L	1.0	0.15	1	04/05/19 08:40	04/09/19 04:54	7440-36-0	
Arsenic	**<0.28**	ug/L	1.0	0.28	1	04/05/19 08:40	04/09/19 04:54	7440-38-2	
Barium	**<1.5**	ug/L	4.9	1.5	1	04/05/19 08:40	04/09/19 04:54	7440-39-3	
Beryllium	**<0.18**	ug/L	1.0	0.18	1	04/05/19 08:40	04/09/19 04:54	7440-41-7	
Boron	**<3.3**	ug/L	11.0	3.3	1	04/05/19 08:40	04/09/19 04:54	7440-42-8	
Cadmium	**<0.15**	ug/L	1.0	0.15	1	04/05/19 08:40	04/09/19 04:54	7440-43-9	
Calcium	**<69.8**	ug/L	250	69.8	1	04/05/19 08:40	04/09/19 04:54	7440-70-2	
Chromium	**<1.0**	ug/L	3.4	1.0	1	04/05/19 08:40	04/09/19 04:54	7440-47-3	
Cobalt	**<0.12**	ug/L	1.0	0.12	1	04/05/19 08:40	04/09/19 04:54	7440-48-4	
Lead	**<0.24**	ug/L	1.0	0.24	1	04/05/19 08:40	04/09/19 04:54	7439-92-1	
Lithium	**<0.19**	ug/L	1.0	0.19	1	04/05/19 08:40	04/09/19 04:54	7439-93-2	
Molybdenum	**<0.44**	ug/L	1.5	0.44	1	04/05/19 08:40	04/09/19 04:54	7439-98-7	
Selenium	**<0.32**	ug/L	1.1	0.32	1	04/05/19 08:40	04/09/19 04:54	7782-49-2	
Thallium	**<0.14**	ug/L	1.0	0.14	1	04/05/19 08:40	04/09/19 04:54	7440-28-0	
7470 Mercury	Analytical Method: EPA 7470 Preparation Method: EPA 7470								
Mercury	**<0.084**	ug/L	0.28	0.084	1	04/12/19 09:55	04/15/19 10:19	7439-97-6	
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**<8.7**	mg/L	20.0	8.7	1		04/09/19 12:35		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**7.4**	Std. Units	0.10	0.010	1		04/08/19 11:48		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**<0.50**	mg/L	2.0	0.50	1		04/16/19 21:53	16887-00-6	
Fluoride	**<0.10**	mg/L	0.30	0.10	1		04/16/19 21:53	16984-48-8	
Sulfate	**<1.0**	mg/L	3.0	1.0	1		04/16/19 21:53	14808-79-8	

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QUALITY CONTROL DATA

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185520

QC Batch: 318138 | Analysis Method: EPA 7470
QC Batch Method: EPA 7470 | Analysis Description: 7470 Mercury
Associated Lab Samples: 40185256003, 40185256004, 40185256005, 40185256006, 40185256007

METHOD BLANK: 1849587 | Matrix: Water
Associated Lab Samples: 40185256003, 40185256004, 40185256005, 40185256006, 40185256007

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mercury	ug/L	<0.084	0.28	04/15/19 09:25	

LABORATORY CONTROL SAMPLE: 1849588

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury	ug/L	5	5.3	105	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1849589 1849590

Parameter	Units	40185483005 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mercury	ug/L	0.00016J mg/L	5	5	5.4	5.2	105	101	85-115	4	20	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185520

QC Batch: 317485 Analysis Method: EPA 6020
QC Batch Method: EPA 3010 Analysis Description: 6020 MET
Associated Lab Samples: 40185256003, 40185256004, 40185256005, 40185256006, 40185256007

METHOD BLANK: 1846066 Matrix: Water
Associated Lab Samples: 40185256003, 40185256004, 40185256005, 40185256006, 40185256007

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Antimony	ug/L	<0.15	1.0	04/09/19 04:47	
Arsenic	ug/L	<0.28	1.0	04/09/19 04:47	
Barium	ug/L	<1.5	4.9	04/09/19 04:47	
Beryllium	ug/L	<0.18	1.0	04/09/19 04:47	
Boron	ug/L	<3.3	11.0	04/09/19 04:47	
Cadmium	ug/L	<0.15	1.0	04/09/19 04:47	
Calcium	ug/L	<69.8	250	04/09/19 04:47	
Chromium	ug/L	<1.0	3.4	04/09/19 04:47	
Cobalt	ug/L	<0.12	1.0	04/09/19 04:47	
Lead	ug/L	<0.24	1.0	04/09/19 04:47	
Lithium	ug/L	<0.19	1.0	04/09/19 04:47	
Molybdenum	ug/L	<0.44	1.5	04/09/19 04:47	
Selenium	ug/L	<0.32	1.1	04/09/19 04:47	
Thallium	ug/L	<0.14	1.0	04/09/19 04:47	

LABORATORY CONTROL SAMPLE: 1846067

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Antimony	ug/L	500	500	100	80-120	
Arsenic	ug/L	500	474	95	80-120	
Barium	ug/L	500	487	97	80-120	
Beryllium	ug/L	500	492	98	80-120	
Boron	ug/L	500	486	97	80-120	
Cadmium	ug/L	500	500	100	80-120	
Calcium	ug/L	5000	4990	100	80-120	
Chromium	ug/L	500	492	98	80-120	
Cobalt	ug/L	500	485	97	80-120	
Lead	ug/L	500	463	93	80-120	
Lithium	ug/L	500	467	93	80-120	
Molybdenum	ug/L	500	465	93	80-120	
Selenium	ug/L	500	508	102	80-120	
Thallium	ug/L	500	464	93	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1846068 1846069

Parameter	Units	40185256001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Antimony	ug/L	0.32J	500	500	496	496	99	99	75-125	0	20	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185520

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1846068 1846069

Parameter	Units	40185256001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Arsenic	ug/L	0.40J	500	500	480	478	96	95	75-125	0	20	
Barium	ug/L	11.8	500	500	496	498	97	97	75-125	0	20	
Beryllium	ug/L	0.28J	500	500	481	480	96	96	75-125	0	20	
Boron	ug/L	26.9	500	500	492	498	93	94	75-125	1	20	
Cadmium	ug/L	0.21J	500	500	491	490	98	98	75-125	0	20	
Calcium	ug/L	126000	5000	5000	126000	123000	12	-46	75-125	2	20	P6
Chromium	ug/L	<1.0	500	500	484	483	97	96	75-125	0	20	
Cobalt	ug/L	0.35J	500	500	476	473	95	95	75-125	1	20	
Lead	ug/L	0.30J	500	500	467	468	93	94	75-125	0	20	
Lithium	ug/L	0.90J	500	500	463	463	92	92	75-125	0	20	
Molybdenum	ug/L	<0.44	500	500	465	464	93	93	75-125	0	20	
Selenium	ug/L	0.49J	500	500	512	513	102	103	75-125	0	20	
Thallium	ug/L	0.48J	500	500	474	476	95	95	75-125	0	20	

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QUALITY CONTROL DATA

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185520

QC Batch: 317697 | Analysis Method: SM 2540C
QC Batch Method: SM 2540C | Analysis Description: 2540C Total Dissolved Solids
Associated Lab Samples: 40185256003, 40185256005, 40185256006

METHOD BLANK: 1847172 | Matrix: Water
Associated Lab Samples: 40185256003, 40185256005, 40185256006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	<8.7	20.0	04/08/19 15:37	

LABORATORY CONTROL SAMPLE: 1847173

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Dissolved Solids	mg/L	577	550	95	80-120	

SAMPLE DUPLICATE: 1847174

Parameter	Units	40185256003 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	726	726	0	5	

SAMPLE DUPLICATE: 1847175

Parameter	Units	40185155001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	576	580	1	5	

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.

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Green Bay, WI 54302
(920)469-2436

QUALITY CONTROL DATA

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185520

QC Batch: 317813 — Analysis Method: SM 2540C
QC Batch Method: SM 2540C — Analysis Description: 2540C Total Dissolved Solids
Associated Lab Samples: 40185256004, 40185256007

METHOD BLANK: 1847582 — Matrix: Water
Associated Lab Samples: 40185256004, 40185256007

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	<8.7	20.0	04/09/19 12:32	

LABORATORY CONTROL SAMPLE: 1847583

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Dissolved Solids	mg/L	577	552	96	80-120	

SAMPLE DUPLICATE: 1847584

Parameter	Units	40185256001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	462	462	0	5	

SAMPLE DUPLICATE: 1847585

Parameter	Units	40185260001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	290	284	2	5	

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.

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QUALITY CONTROL DATA

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185520

QC Batch: 317619 Analysis Method: EPA 9040
QC Batch Method: EPA 9040 Analysis Description: 9040 pH
Associated Lab Samples: 40185256003, 40185256004, 40185256005, 40185256006, 40185256007

SAMPLE DUPLICATE: 1846956

Parameter	Units	40185113001 Result	Dup Result	RPD	Max RPD	Qualifiers
pH at 25 Degrees C	Std. Units	1.1	1.1	7	20	H6

SAMPLE DUPLICATE: 1846957

Parameter	Units	40185204001 Result	Dup Result	RPD	Max RPD	Qualifiers
pH at 25 Degrees C	Std. Units	7.2	7.2	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.

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QUALITY CONTROL DATA

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185520

QC Batch: 317955 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 40185256003, 40185256004, 40185256005, 40185256006, 40185256007

METHOD BLANK: 1848305 Matrix: Water
Associated Lab Samples: 40185256003, 40185256004, 40185256005, 40185256006, 40185256007

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chloride	mg/L	0.52J	2.0	04/16/19 10:22	
Fluoride	mg/L	<0.10	0.30	04/16/19 10:22	
Sulfate	mg/L	<1.0	3.0	04/16/19 10:22	

LABORATORY CONTROL SAMPLE: 1848306

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	20	21.6	108	90-110	
Fluoride	mg/L	2	2.0	98	90-110	
Sulfate	mg/L	20	21.7	109	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1848307 1848308

Parameter	Units	40185204004 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	43.0	100	100	149	148	106	105	90-110	1	15	
Fluoride	mg/L	<0.50	10	10	10.3	10.4	103	104	90-110	1	15	
Sulfate	mg/L	<5.0	100	100	109	109	105	105	90-110	0	15	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1848309 1848310

Parameter	Units	40185260002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	229	200	200	439	425	105	98	90-110	3	15	
Fluoride	mg/L	<0.10	2	2	1.9	2.0	97	99	90-110	2	15	
Sulfate	mg/L	201	200	200	411	397	105	98	90-110	3	15	

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ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185520

Sample: MW-303 **Lab ID: 40185256003** Collected: 04/01/19 18:00 Received: 04/04/19 09:30 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	**0.390 ± 0.331 (0.410) C:NA T:98%**	pCi/L	04/22/19 23:16	13982-63-3	
Radium-228	EPA 904.0	**0.287 ± 0.396 (0.848) C:70% T:86%**	pCi/L	04/19/19 12:45	15262-20-1	
Total Radium	Total Radium Calculation	**0.677 ± 0.727 (1.26)**	pCi/L	04/25/19 11:01	7440-14-4	

Sample: MW-304 **Lab ID: 40185256004** Collected: 04/02/19 12:30 Received: 04/04/19 09:30 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	**0.703 ± 0.484 (0.517) C:NA T:87%**	pCi/L	04/22/19 23:16	13982-63-3	
Radium-228	EPA 904.0	**0.208 ± 0.356 (0.776) C:74% T:88%**	pCi/L	04/19/19 12:46	15262-20-1	
Total Radium	Total Radium Calculation	**0.911 ± 0.840 (1.29)**	pCi/L	04/25/19 11:01	7440-14-4	

Sample: MW-305 **Lab ID: 40185256005** Collected: 04/01/19 14:10 Received: 04/04/19 09:30 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	**0.390 ± 0.407 (0.574) C:NA T:75%**	pCi/L	04/22/19 23:16	13982-63-3	
Radium-228	EPA 904.0	**0.409 ± 0.412 (0.849) C:72% T:77%**	pCi/L	04/19/19 12:46	15262-20-1	
Total Radium	Total Radium Calculation	**0.799 ± 0.819 (1.42)**	pCi/L	04/25/19 11:01	7440-14-4	

Sample: M-4R **Lab ID: 40185256006** Collected: 04/01/19 15:15 Received: 04/04/19 09:30 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	**0.211 ± 0.322 (0.518) C:NA T:84%**	pCi/L	04/22/19 23:30	13982-63-3	
Radium-228	EPA 904.0	**0.549 ± 0.385 (0.737) C:75% T:85%**	pCi/L	04/19/19 12:46	15262-20-1	
Total Radium	Total Radium Calculation	**0.760 ± 0.707 (1.26)**	pCi/L	04/25/19 11:01	7440-14-4	

Sample: FIELD BLANK PPOND **Lab ID: 40185256007** Collected: 04/02/19 12:30 Received: 04/04/19 09:30 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	**0.241 ± 0.291 (0.443) C:NA T:104%**	pCi/L	04/22/19 23:30	13982-63-3	
Radium-228	EPA 904.0	**-0.0384 ± 0.337 (0.793) C:75% T:89%**	pCi/L	04/19/19 12:46	15262-20-1	

REPORT OF LABORATORY ANALYSIS

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1241 Bellevue Street - Suite 9
Green Bay, WI 54302
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ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185520

Sample: FIELD BLANK PPOND **Lab ID: 40185256007** Collected: 04/02/19 12:30 Received: 04/04/19 09:30 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Total Radium	Total Radium Calculation	**0.241 ± 0.628 (1.24)**	pCi/L	04/25/19 11:01	7440-14-4	

REPORT OF LABORATORY ANALYSIS

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

QUALITY CONTROL - RADIOCHEMISTRY

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185520

QC Batch: 338211 Analysis Method: EPA 904.0
QC Batch Method: EPA 904.0 Analysis Description: 904.0 Radium 228
Associated Lab Samples: 40185256003, 40185256004, 40185256005, 40185256006, 40185256007

METHOD BLANK: 1646527 Matrix: Water
Associated Lab Samples: 40185256003, 40185256004, 40185256005, 40185256006, 40185256007

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-228	-0.0681 ± 0.343 (0.816) C:74% T:84%	pCi/L	04/19/19 12:45	

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QUALITY CONTROL - RADIOCHEMISTRY

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185520

QC Batch: 338210 Analysis Method: EPA 903.1
QC Batch Method: EPA 903.1 Analysis Description: 903.1 Radium-226
Associated Lab Samples: 40185256003, 40185256004, 40185256005, 40185256006, 40185256007

METHOD BLANK: 1646526 Matrix: Water
Associated Lab Samples: 40185256003, 40185256004, 40185256005, 40185256006, 40185256007

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-226	0.212 ± 0.323 (0.520) C:NA T:90%	pCi/L	04/22/19 22:44	

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QUALIFIERS

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185520

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.

LABORATORIES

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

ANALYTE QUALIFIERS

D3	Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.
H6	Analysis initiated outside of the 15 minute EPA required holding time.
P6	Matrix spike recovery was outside laboratory control limits due to a parent sample concentration notably higher than the spike level.

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185520

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
40185256003	**MW-303**	EPA 3010	317485	EPA 6020	317570
40185256004	**MW-304**	EPA 3010	317485	EPA 6020	317570
40185256005	**MW-305**	EPA 3010	317485	EPA 6020	317570
40185256006	**M-4R**	EPA 3010	317485	EPA 6020	317570
40185256007	**FIELD BLANK PPOND**	EPA 3010	317485	EPA 6020	317570
40185256003	**MW-303**	EPA 7470	318138	EPA 7470	318191
40185256004	**MW-304**	EPA 7470	318138	EPA 7470	318191
40185256005	**MW-305**	EPA 7470	318138	EPA 7470	318191
40185256006	**M-4R**	EPA 7470	318138	EPA 7470	318191
40185256007	**FIELD BLANK PPOND**	EPA 7470	318138	EPA 7470	318191
40185256003	**MW-303**				
40185256004	**MW-304**				
40185256005	**MW-305**				
40185256006	**M-4R**				
40185256003	**MW-303**	EPA 903.1	338210		
40185256004	**MW-304**	EPA 903.1	338210		
40185256005	**MW-305**	EPA 903.1	338210		
40185256006	**M-4R**	EPA 903.1	338210		
40185256007	**FIELD BLANK PPOND**	EPA 903.1	338210		
40185256003	**MW-303**	EPA 904.0	338211		
40185256004	**MW-304**	EPA 904.0	338211		
40185256005	**MW-305**	EPA 904.0	338211		
40185256006	**M-4R**	EPA 904.0	338211		
40185256007	**FIELD BLANK PPOND**	EPA 904.0	338211		
40185256003	**MW-303**	Total Radium Calculation	339897		
40185256004	**MW-304**	Total Radium Calculation	339897		
40185256005	**MW-305**	Total Radium Calculation	339897		
40185256006	**M-4R**	Total Radium Calculation	339897		
40185256007	**FIELD BLANK PPOND**	Total Radium Calculation	339897		
40185256003	**MW-303**	SM 2540C	317697		
40185256004	**MW-304**	SM 2540C	317813		
40185256005	**MW-305**	SM 2540C	317697		
40185256006	**M-4R**	SM 2540C	317697		
40185256007	**FIELD BLANK PPOND**	SM 2540C	317813		
40185256003	**MW-303**	EPA 9040	317619		
40185256004	**MW-304**	EPA 9040	317619		
40185256005	**MW-305**	EPA 9040	317619		
40185256006	**M-4R**	EPA 9040	317619		
40185256007	**FIELD BLANK PPOND**	EPA 9040	317619		
40185256003	**MW-303**	EPA 300.0	317955		
40185256004	**MW-304**	EPA 300.0	317955		
40185256005	**MW-305**	EPA 300.0	317955		
40185256006	**M-4R**	EPA 300.0	317955		

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185520

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
40185256007	**FIELD BLANK PPOND**	EPA 300.0	317955		

4018S256

MH

(Please Print Clearly)

Company Name:	SCS
Branch/Location:	Madison WI
Project Contact:	Meg Blodgett
Phone:	608 216 7362
Project Number:	25219067
Project Name:	Alliant - Columbia
Project State:	WI
Sampled By (Print):	Adam Watson
Sampled By (Sign):	Paul A. Grover for Adam Watson
PO #:	
Regulatory Program:	

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

CHAIN OF CUSTODY

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

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

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

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

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

FILTERED? (YES/NO) — Y/N: No, No, No, No
PRESERVATION (CODE)* — Pick Letter: A, C, C, C

PACE LAB #	CLIENT FIELD ID	COLLECTION ① DATE	COLLECTION ① TIME	MATRIX ①	Cl, Floride, pH, SO4, TDS	Metals	Radium 226	Radium 228					CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)	Profile #
001	MW 301	4/2/19	1720	W	X	X	X	X							
002	MW 84A	4/3/19	0940		X	X	X	X							
003	MW 303	4/1/19	1800		X	X	X	X							
004	MW 304	4/2/19	1230												
005	MW 305	4/1/19	1410												
006	M-4R	4/1/19	1515												
007	Field Blank P Pond	4/2/19	1230												

① Filled in by Lab from labels 4/4/19 SMW

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

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

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

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

Relinquished By:	Date/Time:	Received By:	Date/Time:
Paul A. Grover	4-3-19 19:00		
Fed Ex	4/4/19 0930	Susan Kyle Pace	4/4/19 0930

PACE Project No. 4018S256

Receipt Temp = ROI °C

Sample Receipt pH: OK / Adjusted

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

Version 6.0 06/14/06

C019a(27Jun2006)

ORIGINAL

(Please Print Clearly)

Company Name:	SCS
Branch/Location:	Madison WI
Project Contact:	Meg Blodgett
Phone:	608 216 7362
Project Number:	25219067
Project Name:	Alliant - Columbia
Project State:	WI
Sampled By (Print):	Adam Watson
Sampled By (Sign):	Paul A. Groom for Adam Watson
PO #:	Regulatory Program:

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Page 1 of

40185256

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

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

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

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

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

FILTERED? (YES/NO) — Y/N: No, No, No, No
PRESERVATION (CODE)* — Pick Letter: A, C, C, C

Analyses Requested: Cl, Floride, Ph, SO4, TDS | Metals | Radium 226 | Radium 228

PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX	Cl, Floride, Ph, SO4, TDS	Metals	Radium 226	Radium 228					CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)	Profile #
	MW 301	4-2-19	17:20	GW	X	X	X	X							
	MW 84A	4-3-19	9:40	GW	X	X	X	X							
	MW 303	4-1-19	18:00	GW	X	X	X	X							
	MW 304	4-2-19	12:30												
	MW 305	4-1-19	14:10												
	M-4R	4-1-19	15:15												
	Field Blank P Pond	4-2-19	12:30	DI											

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

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

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

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

Relinquished By:	Date/Time:	Received By:	Date/Time:
Paul A. Groom	4-3-19 19:00		
Fed Ex	4/4/19 0930	[illegible] Pace	4/4/19 0930

PACE Project No. 40185256

Receipt Temp = °C

Sample Receipt pH
OK / Adjusted

Cooler Custody Seal
Present / Not Present
Intact / Not Intact

ORIGINAL

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Sample Preservation Receipt Form

Client Name: SCS

Project # 40185256

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

Lab Lot# of pH paper: 10453581 Lab Std #ID of preservation (if pH adjusted):

Initial when completed: SKW

Date/ Time:

	Glass							Plastic							Vials						Jars			General									
Pace Lab #	AG1U	AG1H	AG4S	AG4U	AG5U	AG2S	BG3U	BP1U	BP2N	BP2Z	BP3U	BP3C	BP3N	BP3S	DG9A	DG9T	VG9U	VG9H	VG9M	VG9D	JGFU	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									4		2		1																		X		2.5 / 5 / 10
002									4		2		1																		X		2.5 / 5 / 10
003									4		2		1																		X		2.5 / 5 / 10
004									4		2		1																		X		2.5 / 5 / 10
005									4		2		1																		X		2.5 / 5 / 10
006									4		2		1																		X		2.5 / 5 / 10
007									4		2		1																		X		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

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	DG9A	40 mL amber ascorbic	JGFU	4 oz amber jar unpres
AG1H	1 liter amber glass HCL	BP2N	500 mL plastic HNO3	DG9T	40 mL amber Na Thio	WGFU	4 oz clear jar unpres
AG4S	125 mL amber glass H2SO4	BP2Z	500 mL plastic NaOH, Znact	VG9U	40 mL clear vial unpres	WPFU	4 oz plastic jar unpres
AG4U	120 mL amber glass unpres	BP3U	250 mL plastic unpres	VG9H	40 mL clear vial HCL		
AG5U	100 mL amber glass unpres	BP3C	250 mL plastic NaOH	VG9M	40 mL clear vial MeOH	SP5T	120 mL plastic Na Thiosulfate
AG2S	500 mL amber glass H2SO4	BP3N	250 mL plastic HNO3	VG9D	40 mL clear vial DI	ZPLC	ziploc bag
BG3U	250 mL clear glass unpres	BP3S	250 mL plastic H2SO4			GN:	

Pace Analytical 1241 Bellevue Street, Green Bay, WI 54302	Document Name: **Sample Condition Upon Receipt (SCUR)**	Document Revised: 25Apr2018
	Document No.: **F-GB-C-031-Rev.07**	Issuing Authority: Pace Green Bay Quality Office

Sample Condition Upon Receipt Form (SCUR)

Project #:

WO# : 40185256

40185256

Client Name: SCS

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

Tracking #: 7864 3720 0524

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 - N/A **Type of Ice:** Wet Blue Dry None ☑ Samples on ice, cooling process has begun

Cooler Temperature Uncorr: ROI /Corr:

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.

Person examining contents:
Date: 4-4-19
Initials: SD

Chain of Custody Present:	☑Yes ☐No ☐N/A	1.
Chain of Custody Filled Out:	☐Yes ☑No ☐N/A	2. No po#, Mail Invoice, Collect date & time, Lab added to COC 4-4-19 SD
Chain of Custody Relinquished:	☑Yes ☐No ☐N/A	3.
Sampler Name & Signature on COC:	☑Yes ☐No ☐N/A	4. Recieved updated COC via email from client 4-4-19 SD
Samples Arrived within Hold Time:	☑Yes ☐No	5.
- VOA Samples frozen upon receipt	☐Yes ☐No	Date/Time:
Short Hold Time Analysis (<72hr):	☑Yes ☐No	6.
Rush Turn Around Time Requested:	☐Yes ☑No	7.
Sufficient Volume: For Analysis: ☑Yes ☐No	MS/MSD: ☐Yes ☑No ☐N/A	8.
Correct Containers Used:	☑Yes ☐No	9.
-Pace Containers Used:	☑Yes ☐No ☐N/A	
-Pace IR Containers Used:	☐Yes ☐No ☑N/A	
Containers Intact:	☑Yes ☐No	10.
Filtered volume received for Dissolved tests	☐Yes ☐No ☑N/A	11.
Sample Labels match COC:	☑Yes ☐No ☐N/A	12.
-Includes date/time/ID/Analysis Matrix: W		
Trip Blank Present:	☐Yes ☐No ☑N/A	13.
Trip Blank Custody Seals Present	☐Yes ☐No ☑N/A	
Pace Trip Blank Lot # (if purchased):		

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

Person Contacted: Date/Time:

Comments/ Resolution:

Project Manager Review: AL for DM **Date:** 4/4/19

A2 Assessment Monitoring Resample Event, June 2019

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

June 27, 2019

Meghan Blodgett
SCS ENGINEERS
2830 Dairy Drive
Madison, WI 53718

RE: Project: ALLIANT COLUMBIA CCR
Pace Project No.: 40189799

Dear Meghan Blodgett:

Enclosed are the analytical results for sample(s) received by the laboratory on June 20, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

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

Sincerely,

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

Enclosures

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

CERTIFICATIONS

Project:	ALLIANT COLUMBIA CCR
Pace Project No.:	40189799

Green Bay Certification IDs

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

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

SAMPLE SUMMARY

Project: ALLIANT COLUMBIA CCR
Pace Project No.: 40189799

Lab ID	Sample ID	Matrix	Date Collected	Date Received
40189799001	**MW-303**	Water	06/19/19 12:50	06/20/19 09:15
40189799002	**FIELD BLANK**	Water	06/19/19 12:50	06/20/19 09:15

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(920)469-2436

SAMPLE ANALYTE COUNT

Project: ALLIANT COLUMBIA CCR
Pace Project No.: 40189799

Lab ID	Sample ID	Method	Analysts	Analytes Reported
40189799001	**MW-303**	EPA 6020	KXS	2
			RMW	7
40189799002	**FIELD BLANK**	EPA 6020	KXS	2

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(920)469-2436

ANALYTICAL RESULTS

Project: ALLIANT COLUMBIA CCR
Pace Project No.: 40189799

Sample: MW-303 **Lab ID: 40189799001** Collected: 06/19/19 12:50 Received: 06/20/19 09:15 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Arsenic	**5.3**	ug/L	1.0	0.28	1	06/24/19 08:09	06/25/19 05:23	7440-38-2	
Molybdenum	**64.1**	ug/L	1.5	0.44	1	06/24/19 08:09	06/25/19 05:23	7439-98-7	
Field Data	Analytical Method:								
Field pH	**8.98**	Std. Units			1		06/19/19 12:50		
Field Specific Conductance	**712**	umhos/cm			1		06/19/19 12:50		
Oxygen, Dissolved	**7.21**	mg/L			1		06/19/19 12:50	7782-44-7	
REDOX	**206.4**	mV			1		06/19/19 12:50		
Turbidity	**2.24**	NTU			1		06/19/19 12:50		
Static Water Level	**786.81**	feet			1		06/19/19 12:50		
Temperature, Water (C)	**13.0**	deg C			1		06/19/19 12:50		

Sample: FIELD BLANK **Lab ID: 40189799002** Collected: 06/19/19 12:50 Received: 06/20/19 09:15 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Arsenic	**<0.28**	ug/L	1.0	0.28	1	06/24/19 08:09	06/25/19 03:27	7440-38-2	
Molybdenum	**<0.44**	ug/L	1.5	0.44	1	06/24/19 08:09	06/25/19 03:27	7439-98-7	

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QUALITY CONTROL DATA

Project: ALLIANT COLUMBIA CCR
Pace Project No.: 40189799

QC Batch: 325373 Analysis Method: EPA 6020
QC Batch Method: EPA 3010 Analysis Description: 6020 MET
Associated Lab Samples: 40189799001, 40189799002

METHOD BLANK: 1889559 Matrix: Water
Associated Lab Samples: 40189799001, 40189799002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Arsenic	ug/L	<0.28	1.0	06/25/19 03:14	
Molybdenum	ug/L	<0.44	1.5	06/25/19 03:14	

LABORATORY CONTROL SAMPLE: 1889560

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Arsenic	ug/L	500	476	95	80-120	
Molybdenum	ug/L	500	456	91	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1889561 1889562

Parameter	Units	40189826017 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Arsenic	ug/L	<0.00028 mg/L	500	500	473	474	95	95	75-125	0	20	
Molybdenum	ug/L	0.56J	500	500	466	464	93	93	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.

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(920)469-2436

QUALIFIERS

Project: ALLIANT COLUMBIA CCR
Pace Project No.: 40189799

DEFINITIONS

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

ND - Not Detected at or above LOD.

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

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

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

S - Surrogate

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

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

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

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

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

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

TNI - The NELAC Institute.

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

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: ALLIANT COLUMBIA CCR
Pace Project No.: 40189799

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
40189799001	**MW-303**	EPA 3010	325373	EPA 6020	325499
40189799002	**FIELD BLANK**	EPA 3010	325373	EPA 6020	325499
40189799001	**MW-303**				

40189799

Pace Analytical

CHAIN-OF-CUSTODY / Analytical Request Document

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

Page : 1 Of 1

Section A Required Client Information:	Section B Required Project Information:	Section C Invoice Information:
Company: SCS ENGINEERS	Report To: Meghan Blodgett	Attention:
Address: 2830 Dairy Drive	Copy To:	Company Name:
Madison, WI 53718		Address:
Email: mblodgett@scsengineers.com	Purchase Order #:	Pace Quote:
Phone: 608-216-7362 Fax	Project Name: Alliant Columbia CCR	Pace Project Manager: dan.milewsky@pacelabs.com,
Requested Due Date:	Project #:	Pace Profile #: x

Regulatory Agency

State / Location

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

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

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED START DATE	START TIME	END DATE	END TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H2SO4	HNO3	HCl	NaOH	Na2S2O3	Methanol	Other	Analyses Test Y/N	Metals (As/Mo 6020)	Residual Chlorine (Y/N)	MH
1	MW-303	WT		6/19	12:50							X							x		001
2	FIELD BLANK	WT		6/19	12:50							X							x		002
3																					
4																					
5																					
6																					
7																					
8																					
9																					
10																					
11																					
12																					

Requested Analysis Filtered (Y/N)

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	TEMP in C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)
	CS Logistics	06/20/19	09:15	[signature] Pace	06/20/19	09:15	ROI	Y	N	Y

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Adam Watson

SIGNATURE of SAMPLER: [signature]

DATE Signed: 6/19/19

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

Sample Preservation Receipt Form

Client Name: SCS Engineers Project # 40189799

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

Lab Lot# of pH paper: 10US3581 Lab Std #ID of preservation (if pH adjusted): Initial when completed: Date/ Time:

	Glass							Plastic							Vials						Jars			General									
Pace Lab #	AG1U	AG1H	AG4S	AG4U	AG5U	AG2S	BG3U	BP1U	BP2N	BP2Z	BP3U	BP3B	BP3N	BP3S	DG9A	DG9T	VG9U	VG9H	VG9M	VG9D	JGFU	WGFU	WPFU	SP5T	ZPLC	GN	VOA Vials (>6mm) *	H2SO4 pH ≤2	NaOH+Zn Act pH ≥9	NaOH pH ≥12	HNO3 pH ≤2	pH after adjusted	Volume (mL)
001													1																		✓		2.5 / 5 / 10
002													1																		✓		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
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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

MSC 06/20/19

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	**DG9A**	40 mL amber ascorbic	**JGFU**	4 oz amber jar unpres
AG1H	1 liter amber glass HCL	**BP2N**	500 mL plastic HNO3	**DG9T**	40 mL amber Na Thio	**WGFU**	4 oz clear jar unpres
AG4S	125 mL amber glass H2SO4	**BP2Z**	500 mL plastic NaOH, Znact	**VG9U**	40 mL clear vial unpres	**WPFU**	4 oz plastic jar unpres
AG4U	120 mL amber glass unpres	**BP3U**	250 mL plastic unpres	**VG9H**	40 mL clear vial HCL		
AG5U	100 mL amber glass unpres	**BP3B**	250 mL plastic NaOH	**VG9M**	40 mL clear vial MeOH	**SP5T**	120 mL plastic Na Thiosulfate
AG2S	500 mL amber glass H2SO4	**BP3N**	250 mL plastic HNO3	**VG9D**	40 mL clear vial DI	**ZPLC**	ziploc bag
BG3U	250 mL clear glass unpres	**BP3S**	250 mL plastic H2SO4			**GN:**	

Pace Analytical™ 1241 Bellevue Street, Green Bay, WI 54302	Document Name: **Sample Condition Upon Receipt (SCUR)**	Document Revised: 25Apr2018
	Document No.: **F-GB-C-031-Rev.07**	Issuing Authority: Pace Green Bay Quality Office

Sample Condition Upon Receipt Form (SCUR)

Project #:

WO# : 40189799

40189799

Client Name: ~~SCS~~ SCS Engineers

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

Tracking #: 1980-061919

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 - N/A **Type of Ice:** Wet Blue Dry None ☑ Samples on ice, cooling process has begun

Cooler Temperature Uncorr: ROI /Corr:

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.

Person examining contents:
Date: 06/20/19
Initials: MSC

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

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

Person Contacted: Date/Time:

Comments/ Resolution:

Project Manager Review: Run for [illegible] **Date:** 06/20/19

A3 Assessment Monitoring Event Round 2, October 2019

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

November 04, 2019

Meghan Blodgett
SCS ENGINEERS
2830 Dairy Drive
Madison, WI 53718

RE: Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196967

Dear Meghan Blodgett:

Enclosed are the analytical results for sample(s) received by the laboratory on October 10, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

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

Sincerely,

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

Enclosures

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

Pace Analytical www.pacelabs.com

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

CERTIFICATIONS

Project:	25219067.00 COLUMBIA CCR
Pace Project No.:	40196967

Pennsylvania Certification IDs

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

Green Bay Certification IDs

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

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

SAMPLE SUMMARY

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196967

Lab ID	Sample ID	Matrix	Date Collected	Date Received
40196967001	**MW-303**	Water	10/07/19 16:30	10/10/19 09:15
40196967002	**MW-304**	Water	10/07/19 15:05	10/10/19 09:15
40196967003	**MW-305**	Water	10/07/19 11:25	10/10/19 09:15
40196967004	**MW-4R**	Water	10/07/19 12:40	10/10/19 09:15
40196967005	**FIELD BLANK P POND**	Water	10/07/19 12:40	10/10/19 09:15

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SAMPLE ANALYTE COUNT

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196967

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
40196967001	**MW-303**	EPA 6020	DS1	14	PASI-G
			HMG	7	PASI-G
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
		Total Radium Calculation	CMC	1	PASI-PA
		SM 2540C	TMK	1	PASI-G
		EPA 9040	ALY	1	PASI-G
		EPA 300.0	HMB	3	PASI-G
40196967002	**MW-304**	EPA 6020	DS1	14	PASI-G
			HMG	7	PASI-G
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
		Total Radium Calculation	CMC	1	PASI-PA
		SM 2540C	TMK	1	PASI-G
		EPA 9040	ALY	1	PASI-G
		EPA 300.0	HMB	3	PASI-G
40196967003	**MW-305**	EPA 6020	DS1	14	PASI-G
			HMG	7	PASI-G
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
		Total Radium Calculation	CMC	1	PASI-PA
		SM 2540C	TMK	1	PASI-G
		EPA 9040	ALY	1	PASI-G
		EPA 300.0	HMB	3	PASI-G
40196967004	**MW-4R**	EPA 6020	DS1	14	PASI-G
			HMG	7	PASI-G
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
		Total Radium Calculation	CMC	1	PASI-PA
		SM 2540C	TMK	1	PASI-G
		EPA 9040	ALY	1	PASI-G
		EPA 300.0	HMB	3	PASI-G
40196967005	**FIELD BLANK P POND**	EPA 6020	DS1	14	PASI-G
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
		Total Radium Calculation	CMC	1	PASI-PA
		SM 2540C	TMK	1	PASI-G

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SAMPLE ANALYTE COUNT

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196967

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
		EPA 9040	ALY	1	PASI-G
		EPA 300.0	HMB	3	PASI-G

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ANALYTICAL RESULTS

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196967

Sample: MW-303 **Lab ID: 40196967001** Collected: 10/07/19 16:30 Received: 10/10/19 09:15 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Antimony	**0.31J**	ug/L	1.0	0.15	1	10/14/19 07:07	10/14/19 22:57	7440-36-0	
Arsenic	**10.2**	ug/L	1.0	0.28	1	10/14/19 07:07	10/15/19 12:29	7440-38-2	
Barium	**11.4**	ug/L	2.3	0.70	1	10/14/19 07:07	10/14/19 22:57	7440-39-3	
Beryllium	**<0.25**	ug/L	1.0	0.25	1	10/14/19 07:07	10/15/19 12:29	7440-41-7	
Boron	**2560**	ug/L	10.0	3.0	1	10/14/19 07:07	10/15/19 12:29	7440-42-8	
Cadmium	**<0.15**	ug/L	1.0	0.15	1	10/14/19 07:07	10/14/19 22:57	7440-43-9	
Calcium	**22300**	ug/L	254	76.2	1	10/14/19 07:07	10/15/19 12:29	7440-70-2	
Chromium	**62.0**	ug/L	3.4	1.0	1	10/14/19 07:07	10/15/19 12:29	7440-47-3	
Cobalt	**0.51J**	ug/L	1.0	0.12	1	10/14/19 07:07	10/15/19 12:29	7440-48-4	
Lead	**<0.24**	ug/L	1.0	0.24	1	10/14/19 07:07	10/14/19 22:57	7439-92-1	
Lithium	**1.0**	ug/L	1.0	0.22	1	10/14/19 07:07	10/15/19 12:29	7439-93-2	
Molybdenum	**87.0**	ug/L	1.5	0.44	1	10/14/19 07:07	10/14/19 22:57	7439-98-7	
Selenium	**16.4**	ug/L	1.1	0.32	1	10/14/19 07:07	10/15/19 12:29	7782-49-2	
Thallium	**<0.14**	ug/L	1.0	0.14	1	10/14/19 07:07	10/14/19 22:57	7440-28-0	
Field Data	Analytical Method:								
Field pH	**9.33**	Std. Units			1		10/07/19 16:30		
Field Specific Conductance	**865**	umhos/cm			1		10/07/19 16:30		
Oxygen, Dissolved	**7.93**	mg/L			1		10/07/19 16:30	7782-44-7	
REDOX	**65.9**	mV			1		10/07/19 16:30		
Turbidity	**3.31**	NTU			1		10/07/19 16:30		
Static Water Level	**787.02**	feet			1		10/07/19 16:30		
Temperature, Water (C)	**12.4**	deg C			1		10/07/19 16:30		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**574**	mg/L	20.0	8.7	1		10/11/19 18:19		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**8.8**	Std. Units	0.10	0.010	1		10/15/19 11:50		H6
300.0 IC Anions	Analytical Method: EPA 300.0								
Chloride	**2.7**	mg/L	2.0	0.50	1		10/21/19 17:05	16887-00-6	
Fluoride	**0.19J**	mg/L	0.30	0.10	1		10/21/19 17:05	16984-48-8	
Sulfate	**299**	mg/L	60.0	20.0	20		10/22/19 13:10	14808-79-8	

Sample: MW-304 **Lab ID: 40196967002** Collected: 10/07/19 15:05 Received: 10/10/19 09:15 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Antimony	**0.29J**	ug/L	1.0	0.15	1	10/14/19 07:07	10/14/19 23:04	7440-36-0	
Arsenic	**3.2**	ug/L	1.0	0.28	1	10/14/19 07:07	10/15/19 12:36	7440-38-2	
Barium	**34.8**	ug/L	2.3	0.70	1	10/14/19 07:07	10/14/19 23:04	7440-39-3	
Beryllium	**<0.25**	ug/L	1.0	0.25	1	10/14/19 07:07	10/15/19 12:36	7440-41-7	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196967

Sample: MW-304 **Lab ID: 40196967002** Collected: 10/07/19 15:05 Received: 10/10/19 09:15 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Boron	**613**	ug/L	10.0	3.0	1	10/14/19 07:07	10/15/19 12:36	7440-42-8	
Cadmium	**<0.15**	ug/L	1.0	0.15	1	10/14/19 07:07	10/14/19 23:04	7440-43-9	
Calcium	**82900**	ug/L	254	76.2	1	10/14/19 07:07	10/15/19 12:36	7440-70-2	
Chromium	**<1.0**	ug/L	3.4	1.0	1	10/14/19 07:07	10/15/19 12:36	7440-47-3	
Cobalt	**0.92J**	ug/L	1.0	0.12	1	10/14/19 07:07	10/15/19 12:36	7440-48-4	
Lead	**<0.24**	ug/L	1.0	0.24	1	10/14/19 07:07	10/14/19 23:04	7439-92-1	
Lithium	**<0.22**	ug/L	1.0	0.22	1	10/14/19 07:07	10/15/19 12:36	7439-93-2	
Molybdenum	**4.8**	ug/L	1.5	0.44	1	10/14/19 07:07	10/14/19 23:04	7439-98-7	
Selenium	**<0.32**	ug/L	1.1	0.32	1	10/14/19 07:07	10/15/19 12:36	7782-49-2	
Thallium	**<0.14**	ug/L	1.0	0.14	1	10/14/19 07:07	10/14/19 23:04	7440-28-0	
Field Data	Analytical Method:								
Field pH	**7.35**	Std. Units			1		10/07/19 15:05		
Field Specific Conductance	**729**	umhos/cm			1		10/07/19 15:05		
Oxygen, Dissolved	**0.28**	mg/L			1		10/07/19 15:05	7782-44-7	
REDOX	**-97.0**	mV			1		10/07/19 15:05		
Turbidity	**2.61**	NTU			1		10/07/19 15:05		
Static Water Level	**790.41**	feet			1		10/07/19 15:05		
Temperature, Water (C)	**18.5**	deg C			1		10/07/19 15:05		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**428**	mg/L	20.0	8.7	1		10/11/19 18:19		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**7.3**	Std. Units	0.10	0.010	1		10/18/19 09:28		H6
300.0 IC Anions	Analytical Method: EPA 300.0								
Chloride	**29.4**	mg/L	2.0	0.50	1		10/21/19 17:18	16887-00-6	
Fluoride	**<0.10**	mg/L	0.30	0.10	1		10/21/19 17:18	16984-48-8	
Sulfate	**40.0**	mg/L	3.0	1.0	1		10/21/19 17:18	14808-79-8	

Sample: MW-305 **Lab ID: 40196967003** Collected: 10/07/19 11:25 Received: 10/10/19 09:15 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Antimony	**0.46J**	ug/L	1.0	0.15	1	10/14/19 07:07	10/14/19 23:11	7440-36-0	
Arsenic	**0.49J**	ug/L	1.0	0.28	1	10/14/19 07:07	10/15/19 12:43	7440-38-2	
Barium	**15.0**	ug/L	2.3	0.70	1	10/14/19 07:07	10/14/19 23:11	7440-39-3	
Beryllium	**<0.25**	ug/L	1.0	0.25	1	10/14/19 07:07	10/15/19 12:43	7440-41-7	
Boron	**1430**	ug/L	10.0	3.0	1	10/14/19 07:07	10/15/19 12:43	7440-42-8	
Cadmium	**<0.15**	ug/L	1.0	0.15	1	10/14/19 07:07	10/14/19 23:11	7440-43-9	
Calcium	**93000**	ug/L	254	76.2	1	10/14/19 07:07	10/15/19 12:43	7440-70-2	
Chromium	**1.1J**	ug/L	3.4	1.0	1	10/14/19 07:07	10/15/19 12:43	7440-47-3	

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ANALYTICAL RESULTS

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196967

Sample: MW-305 **Lab ID: 40196967003** Collected: 10/07/19 11:25 Received: 10/10/19 09:15 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Cobalt	**<0.12**	ug/L	1.0	0.12	1	10/14/19 07:07	10/15/19 12:43	7440-48-4	
Lead	**<0.24**	ug/L	1.0	0.24	1	10/14/19 07:07	10/14/19 23:11	7439-92-1	
Lithium	**<0.22**	ug/L	1.0	0.22	1	10/14/19 07:07	10/15/19 12:43	7439-93-2	
Molybdenum	**56.2**	ug/L	1.5	0.44	1	10/14/19 07:07	10/14/19 23:11	7439-98-7	
Selenium	**7.7**	ug/L	1.1	0.32	1	10/14/19 07:07	10/15/19 12:43	7782-49-2	
Thallium	**<0.14**	ug/L	1.0	0.14	1	10/14/19 07:07	10/14/19 23:11	7440-28-0	
Field Data	Analytical Method:								
Field pH	**7.75**	Std. Units			1		10/07/19 11:25		
Field Specific Conductance	**751**	umhos/cm			1		10/07/19 11:25		
Oxygen, Dissolved	**3.53**	mg/L			1		10/07/19 11:25	7782-44-7	
REDOX	**165.5**	mV			1		10/07/19 11:25		
Turbidity	**1.97**	NTU			1		10/07/19 11:25		
Static Water Level	**790.36**	feet			1		10/07/19 11:25		
Temperature, Water (C)	**23.4**	deg C			1		10/07/19 11:25		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**496**	mg/L	20.0	8.7	1		10/11/19 18:19		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**7.7**	Std. Units	0.10	0.010	1		10/18/19 09:31		H6
300.0 IC Anions	Analytical Method: EPA 300.0								
Chloride	**29.3**	mg/L	2.0	0.50	1		10/21/19 17:31	16887-00-6	
Fluoride	**0.36**	mg/L	0.30	0.10	1		10/21/19 17:31	16984-48-8	
Sulfate	**480**	mg/L	60.0	20.0	20		10/22/19 13:23	14808-79-8	

Sample: MW-4R **Lab ID: 40196967004** Collected: 10/07/19 12:40 Received: 10/10/19 09:15 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Antimony	**<0.15**	ug/L	1.0	0.15	1	10/14/19 07:07	10/14/19 23:18	7440-36-0	
Arsenic	**0.37J**	ug/L	1.0	0.28	1	10/14/19 07:07	10/15/19 12:50	7440-38-2	
Barium	**21.0**	ug/L	2.3	0.70	1	10/14/19 07:07	10/14/19 23:18	7440-39-3	
Beryllium	**<0.25**	ug/L	1.0	0.25	1	10/14/19 07:07	10/15/19 12:50	7440-41-7	
Boron	**1120**	ug/L	10.0	3.0	1	10/14/19 07:07	10/15/19 12:50	7440-42-8	
Cadmium	**<0.15**	ug/L	1.0	0.15	1	10/14/19 07:07	10/14/19 23:18	7440-43-9	
Calcium	**82400**	ug/L	254	76.2	1	10/14/19 07:07	10/15/19 12:50	7440-70-2	
Chromium	**1.4J**	ug/L	3.4	1.0	1	10/14/19 07:07	10/15/19 12:50	7440-47-3	
Cobalt	**<0.12**	ug/L	1.0	0.12	1	10/14/19 07:07	10/15/19 12:50	7440-48-4	
Lead	**<0.24**	ug/L	1.0	0.24	1	10/14/19 07:07	10/14/19 23:18	7439-92-1	
Lithium	**1.8**	ug/L	1.0	0.22	1	10/14/19 07:07	10/15/19 12:50	7439-93-2	
Molybdenum	**27.6**	ug/L	1.5	0.44	1	10/14/19 07:07	10/14/19 23:18	7439-98-7	

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ANALYTICAL RESULTS

Project: 25219067.00 COLUMBIA CCR

Pace Project No.: 40196967

Sample: MW-4R **Lab ID: 40196967004** Collected: 10/07/19 12:40 Received: 10/10/19 09:15 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Selenium	**1.8**	ug/L	1.1	0.32	1	10/14/19 07:07	10/15/19 12:50	7782-49-2	
Thallium	**<0.14**	ug/L	1.0	0.14	1	10/14/19 07:07	10/14/19 23:18	7440-28-0	
Field Data	Analytical Method:								
Field pH	**7.44**	Std. Units			1		10/07/19 12:40		
Field Specific Conductance	**705**	umhos/cm			1		10/07/19 12:40		
Oxygen, Dissolved	**2.65**	mg/L			1		10/07/19 12:40	7782-44-7	
REDOX	**177.4**	mV			1		10/07/19 12:40		
Turbidity	**1.60**	NTU			1		10/07/19 12:40		
Static Water Level	**790.65**	feet			1		10/07/19 12:40		
Temperature, Water (C)	**15.0**	deg C			1		10/07/19 12:40		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**432**	mg/L	20.0	8.7	1		10/11/19 18:19		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**7.4**	Std. Units	0.10	0.010	1		10/18/19 09:32		H6
300.0 IC Anions	Analytical Method: EPA 300.0								
Chloride	**33.9**	mg/L	2.0	0.50	1		10/21/19 17:44	16887-00-6	
Fluoride	**0.17J**	mg/L	0.30	0.10	1		10/21/19 17:44	16984-48-8	
Sulfate	**128**	mg/L	15.0	5.0	5		10/22/19 14:16	14808-79-8	

Sample: FIELD BLANK P POND **Lab ID: 40196967005** Collected: 10/07/19 12:40 Received: 10/10/19 09:15 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Antimony	**<0.15**	ug/L	1.0	0.15	1	10/14/19 07:07	10/14/19 19:08	7440-36-0	
Arsenic	**<0.28**	ug/L	1.0	0.28	1	10/14/19 07:07	10/14/19 19:08	7440-38-2	
Barium	**<0.70**	ug/L	2.3	0.70	1	10/14/19 07:07	10/14/19 19:08	7440-39-3	
Beryllium	**<0.25**	ug/L	1.0	0.25	1	10/14/19 07:07	10/14/19 19:08	7440-41-7	
Boron	**<3.0**	ug/L	10.0	3.0	1	10/14/19 07:07	10/14/19 19:08	7440-42-8	
Cadmium	**<0.15**	ug/L	1.0	0.15	1	10/14/19 07:07	10/14/19 19:08	7440-43-9	
Calcium	**<76.2**	ug/L	254	76.2	1	10/14/19 07:07	10/14/19 19:08	7440-70-2	
Chromium	**<1.0**	ug/L	3.4	1.0	1	10/14/19 07:07	10/14/19 19:08	7440-47-3	
Cobalt	**<0.12**	ug/L	1.0	0.12	1	10/14/19 07:07	10/14/19 19:08	7440-48-4	
Lead	**<0.24**	ug/L	1.0	0.24	1	10/14/19 07:07	10/14/19 19:08	7439-92-1	
Lithium	**<0.22**	ug/L	1.0	0.22	1	10/14/19 07:07	10/14/19 19:08	7439-93-2	
Molybdenum	**<0.44**	ug/L	1.5	0.44	1	10/14/19 07:07	10/14/19 19:08	7439-98-7	
Selenium	**<0.32**	ug/L	1.1	0.32	1	10/14/19 07:07	10/14/19 19:08	7782-49-2	
Thallium	**<0.14**	ug/L	1.0	0.14	1	10/14/19 07:07	10/14/19 19:08	7440-28-0	

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ANALYTICAL RESULTS

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196967

Sample: FIELD BLANK P POND **Lab ID: 40196967005** Collected: 10/07/19 12:40 Received: 10/10/19 09:15 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**<8.7**	mg/L	20.0	8.7	1		10/11/19 18:20		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**6.5**	Std. Units	0.10	0.010	1		10/18/19 09:38		H6
300.0 IC Anions	Analytical Method: EPA 300.0								
Chloride	**<0.50**	mg/L	2.0	0.50	1		10/21/19 17:57	16887-00-6	
Fluoride	**<0.10**	mg/L	0.30	0.10	1		10/21/19 17:57	16984-48-8	
Sulfate	**<1.0**	mg/L	3.0	1.0	1		10/21/19 17:57	14808-79-8	

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QUALITY CONTROL DATA

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196967

QC Batch: 337277 | Analysis Method: EPA 6020
QC Batch Method: EPA 3010 | Analysis Description: 6020 MET
Associated Lab Samples: 40196967001, 40196967002, 40196967003, 40196967004, 40196967005

METHOD BLANK: 1959950 | Matrix: Water
Associated Lab Samples: 40196967001, 40196967002, 40196967003, 40196967004, 40196967005

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Antimony	ug/L	<0.15	1.0	10/14/19 18:40	
Arsenic	ug/L	<0.28	1.0	10/14/19 18:40	
Barium	ug/L	<0.70	2.3	10/14/19 18:40	
Beryllium	ug/L	<0.25	1.0	10/14/19 18:40	
Boron	ug/L	<3.0	10.0	10/14/19 18:40	
Cadmium	ug/L	<0.15	1.0	10/14/19 18:40	
Calcium	ug/L	<76.2	254	10/14/19 18:40	
Chromium	ug/L	<1.0	3.4	10/14/19 18:40	
Cobalt	ug/L	<0.12	1.0	10/14/19 18:40	
Lead	ug/L	<0.24	1.0	10/14/19 18:40	
Lithium	ug/L	<0.22	1.0	10/14/19 18:40	
Molybdenum	ug/L	<0.44	1.5	10/14/19 18:40	
Selenium	ug/L	<0.32	1.1	10/14/19 18:40	
Thallium	ug/L	<0.14	1.0	10/14/19 18:40	

LABORATORY CONTROL SAMPLE: 1959951

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Antimony	ug/L	500	497	99	80-120	
Arsenic	ug/L	500	478	96	80-120	
Barium	ug/L	500	477	95	80-120	
Beryllium	ug/L	500	488	98	80-120	
Boron	ug/L	500	464	93	80-120	
Cadmium	ug/L	500	501	100	80-120	
Calcium	ug/L	5000	5080	102	80-120	
Chromium	ug/L	500	478	96	80-120	
Cobalt	ug/L	500	467	93	80-120	
Lead	ug/L	500	470	94	80-120	
Lithium	ug/L	500	477	95	80-120	
Molybdenum	ug/L	500	452	90	80-120	
Selenium	ug/L	500	494	99	80-120	
Thallium	ug/L	500	476	95	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1959952 1959953

Parameter	Units	40196861005 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Antimony	ug/L	<0.15	500	500	513	510	103	102	75-125	1	20	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196967

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1959952 1959953

Parameter	Units	40196861005 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Arsenic	ug/L	2.4	500	500	512	504	102	100	75-125	2	20	
Barium	ug/L	169	500	500	671	672	100	101	75-125	0	20	
Beryllium	ug/L	<0.25	500	500	513	469	103	94	75-125	9	20	
Boron	ug/L	73.0	500	500	582	529	102	91	75-125	10	20	
Cadmium	ug/L	<0.15	500	500	514	512	103	102	75-125	0	20	
Calcium	ug/L	90300	5000	5000	96800	99900	130	192	75-125	3	20	P6
Chromium	ug/L	<1.0	500	500	492	486	98	97	75-125	1	20	
Cobalt	ug/L	<0.12	500	500	488	484	98	97	75-125	1	20	
Lead	ug/L	<0.24	500	500	489	489	98	98	75-125	0	20	
Lithium	ug/L	12.4	500	500	518	476	101	93	75-125	8	20	
Molybdenum	ug/L	2.6	500	500	477	476	95	95	75-125	0	20	
Selenium	ug/L	<0.32	500	500	524	521	105	104	75-125	1	20	
Thallium	ug/L	<0.14	500	500	502	502	100	100	75-125	0	20	

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QUALITY CONTROL DATA

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196967

QC Batch: 337218 Analysis Method: SM 2540C
QC Batch Method: SM 2540C Analysis Description: 2540C Total Dissolved Solids
Associated Lab Samples: 40196967001, 40196967002, 40196967003, 40196967004, 40196967005

METHOD BLANK: 1959158 Matrix: Water
Associated Lab Samples: 40196967001, 40196967002, 40196967003, 40196967004, 40196967005

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	<8.7	20.0	10/11/19 18:18	

LABORATORY CONTROL SAMPLE: 1959159

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Dissolved Solids	mg/L	547	560	102	80-120	

SAMPLE DUPLICATE: 1959160

Parameter	Units	40196967001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	574	564	2	10	

SAMPLE DUPLICATE: 1959161

Parameter	Units	40196971001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	274	278	1	10	

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QUALITY CONTROL DATA

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196967

QC Batch: 337490 | Analysis Method: EPA 9040
QC Batch Method: EPA 9040 | Analysis Description: 9040 pH
Associated Lab Samples: 40196967001

SAMPLE DUPLICATE: 1960489

Parameter	Units	40196734001 Result	Dup Result	RPD	Max RPD	Qualifiers
pH at 25 Degrees C	Std. Units	7.8	7.8	0	20	H6

SAMPLE DUPLICATE: 1960490

Parameter	Units	40196949002 Result	Dup Result	RPD	Max RPD	Qualifiers
pH at 25 Degrees C	Std. Units	7.3	7.4	1	20	H6

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QUALITY CONTROL DATA

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196967

QC Batch: 337952 Analysis Method: EPA 9040
QC Batch Method: EPA 9040 Analysis Description: 9040 pH
Associated Lab Samples: 40196967002, 40196967003, 40196967004, 40196967005

SAMPLE DUPLICATE: 1962801

Parameter	Units	40196967002 Result	Dup Result	RPD	Max RPD	Qualifiers
pH at 25 Degrees C	Std. Units	7.3	7.3	0	20	H6

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QUALITY CONTROL DATA

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196967

QC Batch: 337822 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 40196967001, 40196967002, 40196967003, 40196967004, 40196967005

METHOD BLANK: 1962191 Matrix: Water
Associated Lab Samples: 40196967001, 40196967002, 40196967003, 40196967004, 40196967005

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chloride	mg/L	<0.50	2.0	10/21/19 11:34	
Fluoride	mg/L	<0.10	0.30	10/21/19 11:34	
Sulfate	mg/L	<1.0	3.0	10/21/19 11:34	

LABORATORY CONTROL SAMPLE: 1962192

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	20	20.1	101	90-110	
Fluoride	mg/L	2	2.0	102	90-110	
Sulfate	mg/L	20	20.1	100	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1962193 1962194

Parameter	Units	40196954007 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	14.1	20	20	33.8	33.6	99	98	90-110	1	15	
Fluoride	mg/L	<0.10	2	2	2.1	2.1	102	102	90-110	0	15	
Sulfate	mg/L	7.2	20	20	27.0	26.9	99	98	90-110	0	15	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1962195 1962196

Parameter	Units	40196971011 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	1.6J	20	20	20.9	21.3	97	99	90-110	2	15	
Fluoride	mg/L	<0.10	2	2	2.1	2.1	102	102	90-110	0	15	
Sulfate	mg/L	<1.0	20	20	20.6	20.4	102	101	90-110	1	15	

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ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196967

Sample: MW-303 **Lab ID: 40196967001** Collected: 10/07/19 16:30 Received: 10/10/19 09:15 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	**0.0995 ± 0.227 (0.366) C:NA T:99%**	pCi/L	10/31/19 12:20	13982-63-3	
Radium-228	EPA 904.0	**0.322 ± 0.354 (0.739) C:78% T:92%**	pCi/L	10/30/19 14:33	15262-20-1	
Total Radium	Total Radium Calculation	**0.422 ± 0.581 (1.11)**	pCi/L	11/01/19 15:00	7440-14-4	

Sample: MW-304 **Lab ID: 40196967002** Collected: 10/07/19 15:05 Received: 10/10/19 09:15 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	**-0.154 ± 0.334 (0.769) C:NA T:97%**	pCi/L	10/31/19 12:20	13982-63-3	
Radium-228	EPA 904.0	**0.443 ± 0.395 (0.797) C:78% T:86%**	pCi/L	10/30/19 14:33	15262-20-1	
Total Radium	Total Radium Calculation	**0.443 ± 0.729 (1.57)**	pCi/L	11/01/19 14:59	7440-14-4	

Sample: MW-305 **Lab ID: 40196967003** Collected: 10/07/19 11:25 Received: 10/10/19 09:15 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	**0.232 ± 0.483 (0.871) C:NA T:85%**	pCi/L	10/31/19 12:20	13982-63-3	
Radium-228	EPA 904.0	**0.495 ± 0.400 (0.799) C:78% T:87%**	pCi/L	10/30/19 14:33	15262-20-1	
Total Radium	Total Radium Calculation	**0.727 ± 0.883 (1.67)**	pCi/L	11/01/19 14:59	7440-14-4	

Sample: MW-4R **Lab ID: 40196967004** Collected: 10/07/19 12:40 Received: 10/10/19 09:15 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	**0.103 ± 0.236 (0.140) C:NA T:97%**	pCi/L	10/31/19 12:36	13982-63-3	
Radium-228	EPA 904.0	**0.141 ± 0.533 (1.20) C:78% T:76%**	pCi/L	10/30/19 14:33	15262-20-1	
Total Radium	Total Radium Calculation	**0.244 ± 0.769 (1.34)**	pCi/L	11/01/19 14:59	7440-14-4	

Sample: FIELD BLANK P POND **Lab ID: 40196967005** Collected: 10/07/19 12:40 Received: 10/10/19 09:15 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	**0.0533 ± 0.243 (0.392) C:NA T:96%**	pCi/L	10/31/19 12:36	13982-63-3	
Radium-228	EPA 904.0	**0.248 ± 0.423 (0.922) C:81% T:78%**	pCi/L	10/30/19 14:33	15262-20-1	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
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ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196967

Sample: FIELD BLANK P POND **Lab ID: 40196967005** Collected: 10/07/19 12:40 Received: 10/10/19 09:15 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Total Radium	Total Radium Calculation	**0.301 ± 0.666 (1.31)**	pCi/L	11/01/19 14:59	7440-14-4	

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QUALITY CONTROL - RADIOCHEMISTRY

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196967

QC Batch: 366494 | Analysis Method: EPA 903.1
QC Batch Method: EPA 903.1 | Analysis Description: 903.1 Radium-226
Associated Lab Samples: 40196967001, 40196967002, 40196967003, 40196967004, 40196967005

METHOD BLANK: 1777728 | Matrix: Water
Associated Lab Samples: 40196967001, 40196967002, 40196967003, 40196967004, 40196967005

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-226	0.0468 ± 0.331 (0.660) C:NA T:87%	pCi/L	10/31/19 12:20	

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QUALITY CONTROL - RADIOCHEMISTRY

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196967

QC Batch: 366493 Analysis Method: EPA 904.0
QC Batch Method: EPA 904.0 Analysis Description: 904.0 Radium 228
Associated Lab Samples: 40196967001, 40196967002, 40196967003, 40196967004, 40196967005

METHOD BLANK: 1777725 Matrix: Water
Associated Lab Samples: 40196967001, 40196967002, 40196967003, 40196967004, 40196967005

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-228	-0.00340 ± 0.362 (0.843) C:80% T:79%	pCi/L	10/30/19 14:21	

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REPORT OF LABORATORY ANALYSIS

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QUALIFIERS

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196967

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.

LABORATORIES

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

ANALYTE QUALIFIERS

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

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196967

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
40196967001	**MW-303**	EPA 3010	337277	EPA 6020	337400
40196967002	**MW-304**	EPA 3010	337277	EPA 6020	337400
40196967003	**MW-305**	EPA 3010	337277	EPA 6020	337400
40196967004	**MW-4R**	EPA 3010	337277	EPA 6020	337400
40196967005	**FIELD BLANK P POND**	EPA 3010	337277	EPA 6020	337400
40196967001	**MW-303**				
40196967002	**MW-304**				
40196967003	**MW-305**				
40196967004	**MW-4R**				
40196967001	**MW-303**	EPA 903.1	366494		
40196967002	**MW-304**	EPA 903.1	366494		
40196967003	**MW-305**	EPA 903.1	366494		
40196967004	**MW-4R**	EPA 903.1	366494		
40196967005	**FIELD BLANK P POND**	EPA 903.1	366494		
40196967001	**MW-303**	EPA 904.0	366493		
40196967002	**MW-304**	EPA 904.0	366493		
40196967003	**MW-305**	EPA 904.0	366493		
40196967004	**MW-4R**	EPA 904.0	366493		
40196967005	**FIELD BLANK P POND**	EPA 904.0	366493		
40196967001	**MW-303**	Total Radium Calculation	369027		
40196967002	**MW-304**	Total Radium Calculation	369028		
40196967003	**MW-305**	Total Radium Calculation	369028		
40196967004	**MW-4R**	Total Radium Calculation	369028		
40196967005	**FIELD BLANK P POND**	Total Radium Calculation	369028		
40196967001	**MW-303**	SM 2540C	337218		
40196967002	**MW-304**	SM 2540C	337218		
40196967003	**MW-305**	SM 2540C	337218		
40196967004	**MW-4R**	SM 2540C	337218		
40196967005	**FIELD BLANK P POND**	SM 2540C	337218		
40196967001	**MW-303**	EPA 9040	337490		
40196967002	**MW-304**	EPA 9040	337952		
40196967003	**MW-305**	EPA 9040	337952		
40196967004	**MW-4R**	EPA 9040	337952		
40196967005	**FIELD BLANK P POND**	EPA 9040	337952		
40196967001	**MW-303**	EPA 300.0	337822		
40196967002	**MW-304**	EPA 300.0	337822		
40196967003	**MW-305**	EPA 300.0	337822		
40196967004	**MW-4R**	EPA 300.0	337822		
40196967005	**FIELD BLANK P POND**	EPA 300.0	337822		

(Please Print Clearly)

Company Name:	SCS Engineers
Branch/Location:	Madison, WI.
Project Contact:	Tom Karwoski
Phone:	608-224-2830
Project Number:	25219067.00
Project Name:	Columbia
Project State:	Wisconsin
Sampled By (Print):	Adam Watson
Sampled By (Sign):	[signature]
PO #:	
Regulatory Program:	

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CHAIN OF CUSTODY

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

Page 1 of

*Preservation Codes
A=None B=HCL C=H2SO4 D=HND3 E=DI Water F=Methanol G=NaOH
H=Sodium Bisulfata Solution I=Sodium Thiosulfate J=Other

Quote #:	
Mail To Contact:	Tom Karwoski
Mail To Company:	SCS Engineers
Mail To Address:	2830 Dairy Dr. Madison, WI 53718
Invoice To Contact:	Same
Invoice To Company:	
Invoice To Address:	
Invoice To Phone:	

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

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

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

				FILTERED? (YES/NO) Y/N	N	N	N	N	
				PRESERVATION (CODE)* Pick Letter	D	D	A	A	
				Analyses Requested	Radium 226 & 228	Metals See attached table	pH	TDS, Cl, F, SO4	
PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX					CLIENT COMMENTS / LAB COMMENTS (Lab Use Only) / Profile #
001	MW-303	10/7/19	1630	W	X	X	X	X	
002	MW-304	10/7/19	1505	W	X	X	X	X	
003	MW-305	10/7/19	1125	W	X	X	X	X	
004	MW-4R	↓	1240	W	X	X	X	X	
005	~~[illegible]~~ Field blank P Pond	↓	1240	W	X	X	X	X	

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

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

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

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

Relinquished By:	Date/Time:	Received By:	Date/Time:
[signature]	10/9/19 1600		
CS Logistics	10/10/19 0915	John T. Brunette Pace	10/10/19 0915

PACE Project No. 40196967

Receipt Temp = ROI °C

Sample Receipt pH
OK / Adjusted

Cooler Custody Seal
Present / Not Present
Intact / Not Intact

Version 6.0 06/14/06

C019a(27Jun2006)

ORIGINAL

40196967

Table 2. Sampling Points and Parameters - CCR Rule Sampling Program
Groundwater Monitoring - Columbia Energy Center / SCS Engineers Project #25219067

		COC #1 - Background Wells		COC #2 - Landfill Modules 1-3				COC #3 - Landfill Module 4				COC #4 - Primary Pond					COC #5 - Secondary Pond			
	Parameter	MW-301	MW-84A	MW-302	MW-33AR	MW-34A	FIELD BLANK - MOD1-3LF	MW-309	MW-310	MW-311	FIELD BLANK-MOD4	MW-303	MW-304	MW-305	M-4R	FIELD BLANK - PPOND	MW-306	MW-307	MW-308	FIELD BLANK - SCPOND
Appendix III Parameters (Detection Monitoring)	Boron	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Calcium	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Chloride	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Fluoride	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	pH	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Sulfate	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	TDS	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Appendix IV Parameters (Assessment Monitoring)	Antimony	X	X									X	X	X	X	X				
	Arsenic	X	X									X	X	X	X	X				
	Barium	X	X									X	X	X	X	X				
	Beryllium	X	X									X	X	X	X	X				
	Cadmium	X	X									X	X	X	X	X				
	Chromium	X	X									X	X	X	X	X				
	Cobalt	X	X									X	X	X	X	X				
	Fluoride	X	X									X	X	X	X	X				
	Lead	X	X									X	X	X	X	X				
	Lithium	X	X									X	X	X	X	X				
	Mercury	X	X									X	X	X	X	X				
	Molybdenum	X	X									X	X	X	X	X				
	Selenium	X	X									X	X	X	X	X				
	Thallium	X	X									X	X	X	X	X				
	Radium 226+228	X	X									X	X	X	X	X				
CCR Rule Field Parameters	Groundwater Elevation	X	X	X	X	X		X	X	X		X	X	X	X		X	X	X	
	pH	X	X	X	X	X		X	X	X		X	X	X	X		X	X	X	
Low-Flow Sampling Field Parameters	Well Depth	X	X	X	X	X		X	X	X		X	X	X	X		X	X	X	
	Specific Conductance	X	X	X	X	X		X	X	X		X	X	X	X		X	X	X	
	Dissolved Oxygen	X	X	X	X	X		X	X	X		X	X	X	X		X	X	X	
	ORP	X	X	X	X	X		X	X	X		X	X	X	X		X	X	X	
	Temperature	X	X	X	X	X		X	X	X		X	X	X	X		X	X	X	
	Turbidity	X	X	X	X	X		X	X	X		X	X	X	X		X	X	X	
	Color	X	X	X	X	X		X	X	X		X	X	X	X		X	X	X	
	Odor	X	X	X	X	X		X	X	X		X	X	X	X		X	X	X	

Notes: All samples are unfiltered (total).

I:\25219067.00\Data and Calculations\Tables\Lab Bottle Orders\[2019 April_COL CCR.xls]Sheet1

Sample Preservation Receipt Form

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

Client Name: SCS Project # 40176967

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

Lab Lot# of pH paper: 10050891 Lab Std #ID of preservation (if pH adjusted):

Initial when completed: JTB Date/ Time:

Pace Lab #	Glass AG1U	AG1H	AG4S	AG4U	AG5U	AG2S	BG3U	Plastic BP1U	BP2N	BP2Z	BP3U	BP3B	BP3N	BP3S	Vials DG9A	DG9T	VG9U	VG9H	VG9M	VG9D	Jars JGFU	WGFU	WPFU	General SP5T	ZPLC	GN	VOA Vials (>6mm) *	H2SO4 pH ≤2	NaOH+Zn Act pH ≥9	NaOH pH ≥12	HNO3 pH ≤2	pH after adjusted	Volume (mL)
001											2		1													2					✓		2.5 / 5 / 10
002											2		1													2					✓		2.5 / 5 / 10
003											2		1													2					✓		2.5 / 5 / 10
004											2		1													2					✓		2.5 / 5 / 10
005											2		1													2					✓		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																												JTB 10/10/18							2.5 / 5 / 10

Exceptions to preservation check: VOA, Coliform, TOC, TOX, TOH, O&G, WI DRO, Phenolics, Other: ______

Headspace in VOA Vials (>6mm) : ☐Yes ☐No ☒N/A *If yes look in headspace column

AG1U	1 liter amber glass	BP1U	1 liter plastic unpres	DG9A	40 mL amber ascorbic	JGFU	4 oz amber jar unpres
AG1H	1 liter amber glass HCL	BP2N	500 mL plastic HNO3	DG9T	40 mL amber Na Thio	WGFU	4 oz clear jar unpres
AG4S	125 mL amber glass H2SO4	BP2Z	500 mL plastic NaOH, Znact	VG9U	40 mL clear vial unpres	WPFU	4 oz plastic jar unpres
AG4U	120 mL amber glass unpres	BP3U	250 mL plastic unpres	VG9H	40 mL clear vial HCL		
AG5U	100 mL amber glass unpres	BP3B	250 mL plastic NaOH	VG9M	40 mL clear vial MeOH	SP5T	120 mL plastic Na Thiosulfate
AG2S	500 mL amber glass H2SO4	BP3N	250 mL plastic HNO3	VG9D	40 mL clear vial DI	ZPLC	ziploc bag
BG3U	250 mL clear glass unpres	BP3S	250 mL plastic H2SO4			GN:	1 liter plastic HNO3

Pace Analytical™ 1241 Bellevue Street, Green Bay, WI 54302	Document Name: **Sample Condition Upon Receipt (SCUR)**	Document Revised: 25Apr2018
	Document No.: **F-GB-C-031-Rev.07**	Issuing Authority: Pace Green Bay Quality Office

Sample Condition Upon Receipt Form (SCUR)

Project #: **WO# : 40196967**

40196967

Client Name: SCS

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

Tracking #: N/A

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 Ziploc Bags 10/10/19

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

Cooler Temperature Uncorr: ROI /Corr:

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.

Person examining contents:
Date: 10/10/19
Initials: JTB

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

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

Person Contacted: ______ Date/Time: ______

Comments/ Resolution: ______

40196967

Project Manager Review: BB for DM **Date:** 10-10-19

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

November 01, 2019

Meghan Blodgett
SCS ENGINEERS
2830 Dairy Drive
Madison, WI 53718

RE: Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196970

Dear Meghan Blodgett:

Enclosed are the analytical results for sample(s) received by the laboratory on October 10, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

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

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(920)469-2436

CERTIFICATIONS

Project:	25219067.00 COLUMBIA CCR
Pace Project No.:	40196970

Pennsylvania Certification IDs

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

Green Bay Certification IDs

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

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SAMPLE SUMMARY

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196970

Lab ID	Sample ID	Matrix	Date Collected	Date Received
40196970001	**MW-301**	Water	10/09/19 12:00	10/10/19 09:15
40196970002	**MW-84A**	Water	10/09/19 13:10	10/10/19 09:15

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SAMPLE ANALYTE COUNT

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196970

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
40196970001	**MW-301**	EPA 6020	DS1	14	PASI-G
		EPA 7470	AJT	1	PASI-G
			HMG	7	PASI-G
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
		Total Radium Calculation	CMC	1	PASI-PA
		SM 2540C	TMK	1	PASI-G
		EPA 9040	ALY	1	PASI-G
		EPA 300.0	HMB	3	PASI-G
40196970002	**MW-84A**	EPA 6020	DS1	14	PASI-G
		EPA 7470	AJT	1	PASI-G
			HMG	7	PASI-G
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
		Total Radium Calculation	CMC	1	PASI-PA
		SM 2540C	TMK	1	PASI-G
		EPA 9040	ALY	1	PASI-G
		EPA 300.0	HMB	3	PASI-G

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ANALYTICAL RESULTS

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196970

Sample: MW-301 **Lab ID: 40196970001** Collected: 10/09/19 12:00 Received: 10/10/19 09:15 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Antimony	**<0.15**	ug/L	1.0	0.15	1	10/14/19 07:07	10/14/19 23:25	7440-36-0	
Arsenic	**0.42J**	ug/L	1.0	0.28	1	10/14/19 07:07	10/15/19 12:57	7440-38-2	
Barium	**10**	ug/L	2.3	0.70	1	10/14/19 07:07	10/14/19 23:25	7440-39-3	
Beryllium	**<0.25**	ug/L	1.0	0.25	1	10/14/19 07:07	10/15/19 12:57	7440-41-7	
Boron	**35.9**	ug/L	10.0	3.0	1	10/14/19 07:07	10/15/19 12:57	7440-42-8	
Cadmium	**<0.15**	ug/L	1.0	0.15	1	10/14/19 07:07	10/14/19 23:25	7440-43-9	
Calcium	**114000**	ug/L	254	76.2	1	10/14/19 07:07	10/15/19 12:57	7440-70-2	
Chromium	**<1.0**	ug/L	3.4	1.0	1	10/14/19 07:07	10/15/19 12:57	7440-47-3	
Cobalt	**<0.12**	ug/L	1.0	0.12	1	10/14/19 07:07	10/15/19 12:57	7440-48-4	
Lead	**<0.24**	ug/L	1.0	0.24	1	10/14/19 07:07	10/14/19 23:25	7439-92-1	
Lithium	**0.61J**	ug/L	1.0	0.22	1	10/14/19 07:07	10/15/19 12:57	7439-93-2	
Molybdenum	**<0.44**	ug/L	1.5	0.44	1	10/14/19 07:07	10/14/19 23:25	7439-98-7	
Selenium	**<0.32**	ug/L	1.1	0.32	1	10/14/19 07:07	10/15/19 12:57	7782-49-2	
Thallium	**<0.14**	ug/L	1.0	0.14	1	10/14/19 07:07	10/14/19 23:25	7440-28-0	
7470 Mercury	Analytical Method: EPA 7470 Preparation Method: EPA 7470								
Mercury	**<0.084**	ug/L	0.28	0.084	1	10/22/19 14:50	10/23/19 09:18	7439-97-6	
Field Data	Analytical Method:								
Field pH	**6.67**	Std. Units			1		10/09/19 12:00		
Field Specific Conductance	**801**	umhos/cm			1		10/09/19 12:00		
Oxygen, Dissolved	**1.67**	mg/L			1		10/09/19 12:00	7782-44-7	
REDOX	**173.0**	mV			1		10/09/19 12:00		
Turbidity	**2.12**	NTU			1		10/09/19 12:00		
Static Water Level	**788.47**	feet			1		10/09/19 12:00		
Temperature, Water (C)	**11.3**	deg C			1		10/09/19 12:00		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**418**	mg/L	20.0	8.7	1		10/15/19 16:41		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**7.0**	Std. Units	0.10	0.010	1		10/18/19 09:42		H6
300.0 IC Anions	Analytical Method: EPA 300.0								
Chloride	**1.7J**	mg/L	2.0	0.50	1		10/21/19 18:26	16887-00-6	
Fluoride	**<0.10**	mg/L	0.30	0.10	1		10/21/19 18:26	16984-48-8	
Sulfate	**8.4**	mg/L	3.0	1.0	1		10/21/19 18:26	14808-79-8	

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ANALYTICAL RESULTS

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196970

Sample: MW-84A **Lab ID: 40196970002** Collected: 10/09/19 13:10 Received: 10/10/19 09:15 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Antimony	**<0.15**	ug/L	1.0	0.15	1	10/14/19 07:07	10/14/19 23:46	7440-36-0	
Arsenic	**0.46J**	ug/L	1.0	0.28	1	10/14/19 07:07	10/15/19 13:34	7440-38-2	
Barium	**13.2**	ug/L	2.3	0.70	1	10/14/19 07:07	10/14/19 23:46	7440-39-3	
Beryllium	**<0.25**	ug/L	1.0	0.25	1	10/14/19 07:07	10/15/19 13:34	7440-41-7	
Boron	**12.0**	ug/L	10.0	3.0	1	10/14/19 07:07	10/15/19 13:34	7440-42-8	
Cadmium	**<0.15**	ug/L	1.0	0.15	1	10/14/19 07:07	10/15/19 13:34	7440-43-9	
Calcium	**73500**	ug/L	254	76.2	1	10/14/19 07:07	10/15/19 13:34	7440-70-2	
Chromium	**1.6J**	ug/L	3.4	1.0	1	10/14/19 07:07	10/15/19 13:34	7440-47-3	
Cobalt	**<0.12**	ug/L	1.0	0.12	1	10/14/19 07:07	10/15/19 13:34	7440-48-4	
Lead	**<0.24**	ug/L	1.0	0.24	1	10/14/19 07:07	10/14/19 23:46	7439-92-1	
Lithium	**0.52J**	ug/L	1.0	0.22	1	10/14/19 07:07	10/15/19 13:34	7439-93-2	
Molybdenum	**<0.44**	ug/L	1.5	0.44	1	10/14/19 07:07	10/15/19 13:34	7439-98-7	
Selenium	**<0.32**	ug/L	1.1	0.32	1	10/14/19 07:07	10/15/19 13:34	7782-49-2	
Thallium	**<0.14**	ug/L	1.0	0.14	1	10/14/19 07:07	10/14/19 23:46	7440-28-0	
7470 Mercury	Analytical Method: EPA 7470 Preparation Method: EPA 7470								
Mercury	**<0.084**	ug/L	0.28	0.084	1	10/22/19 14:50	10/23/19 09:25	7439-97-6	
Field Data	Analytical Method:								
Field pH	**7.23**	Std. Units			1		10/09/19 13:10		
Field Specific Conductance	**614.1**	umhos/cm			1		10/09/19 13:10		
Oxygen, Dissolved	**11.36**	mg/L			1		10/09/19 13:10	7782-44-7	
REDOX	**181.7**	mV			1		10/09/19 13:10		
Turbidity	**2.41**	NTU			1		10/09/19 13:10		
Static Water Level	**787.79**	feet			1		10/09/19 13:10		
Temperature, Water (C)	**11.8**	deg C			1		10/09/19 13:10		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**310**	mg/L	20.0	8.7	1		10/15/19 16:41		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**7.5**	Std. Units	0.10	0.010	1		10/18/19 09:44		H6
300.0 IC Anions	Analytical Method: EPA 300.0								
Chloride	**3.9**	mg/L	2.0	0.50	1		10/21/19 19:19	16887-00-6	
Fluoride	**<0.10**	mg/L	0.30	0.10	1		10/21/19 19:19	16984-48-8	
Sulfate	**1.3J**	mg/L	3.0	1.0	1		10/21/19 19:19	14808-79-8	

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QUALITY CONTROL DATA

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196970

QC Batch:	338359	Analysis Method:	EPA 7470
QC Batch Method:	EPA 7470	Analysis Description:	7470 Mercury

Associated Lab Samples: 40196970001, 40196970002

METHOD BLANK: 1964880 Matrix: Water
Associated Lab Samples: 40196970001, 40196970002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mercury	ug/L	<0.084	0.28	10/23/19 09:14	

LABORATORY CONTROL SAMPLE: 1964881

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury	ug/L	5	5.3	105	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1964882 1964883

Parameter	Units	40196970001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mercury	ug/L	<0.084	5	5	5.1	5.0	101	100	85-115	1	20	

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

QUALITY CONTROL DATA

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196970

QC Batch: 337277 Analysis Method: EPA 6020
QC Batch Method: EPA 3010 Analysis Description: 6020 MET
Associated Lab Samples: 40196970001, 40196970002

METHOD BLANK: 1959950 Matrix: Water
Associated Lab Samples: 40196970001, 40196970002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Antimony	ug/L	<0.15	1.0	10/14/19 18:40	
Arsenic	ug/L	<0.28	1.0	10/14/19 18:40	
Barium	ug/L	<0.70	2.3	10/14/19 18:40	
Beryllium	ug/L	<0.25	1.0	10/14/19 18:40	
Boron	ug/L	<3.0	10.0	10/14/19 18:40	
Cadmium	ug/L	<0.15	1.0	10/14/19 18:40	
Calcium	ug/L	<76.2	254	10/14/19 18:40	
Chromium	ug/L	<1.0	3.4	10/14/19 18:40	
Cobalt	ug/L	<0.12	1.0	10/14/19 18:40	
Lead	ug/L	<0.24	1.0	10/14/19 18:40	
Lithium	ug/L	<0.22	1.0	10/14/19 18:40	
Molybdenum	ug/L	<0.44	1.5	10/14/19 18:40	
Selenium	ug/L	<0.32	1.1	10/14/19 18:40	
Thallium	ug/L	<0.14	1.0	10/14/19 18:40	

LABORATORY CONTROL SAMPLE: 1959951

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Antimony	ug/L	500	497	99	80-120	
Arsenic	ug/L	500	478	96	80-120	
Barium	ug/L	500	477	95	80-120	
Beryllium	ug/L	500	488	98	80-120	
Boron	ug/L	500	464	93	80-120	
Cadmium	ug/L	500	501	100	80-120	
Calcium	ug/L	5000	5080	102	80-120	
Chromium	ug/L	500	478	96	80-120	
Cobalt	ug/L	500	467	93	80-120	
Lead	ug/L	500	470	94	80-120	
Lithium	ug/L	500	477	95	80-120	
Molybdenum	ug/L	500	452	90	80-120	
Selenium	ug/L	500	494	99	80-120	
Thallium	ug/L	500	476	95	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1959952 1959953

Parameter	Units	40196861005 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Antimony	ug/L	<0.15	500	500	513	510	103	102	75-125	1	20	

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REPORT OF LABORATORY ANALYSIS

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

QUALITY CONTROL DATA

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196970

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1959952 1959953

Parameter	Units	40196861005 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Arsenic	ug/L	2.4	500	500	512	504	102	100	75-125	2	20	
Barium	ug/L	169	500	500	671	672	100	101	75-125	0	20	
Beryllium	ug/L	<0.25	500	500	513	469	103	94	75-125	9	20	
Boron	ug/L	73.0	500	500	582	529	102	91	75-125	10	20	
Cadmium	ug/L	<0.15	500	500	514	512	103	102	75-125	0	20	
Calcium	ug/L	90300	5000	5000	96800	99900	130	192	75-125	3	20	P6
Chromium	ug/L	<1.0	500	500	492	486	98	97	75-125	1	20	
Cobalt	ug/L	<0.12	500	500	488	484	98	97	75-125	1	20	
Lead	ug/L	<0.24	500	500	489	489	98	98	75-125	0	20	
Lithium	ug/L	12.4	500	500	518	476	101	93	75-125	8	20	
Molybdenum	ug/L	2.6	500	500	477	476	95	95	75-125	0	20	
Selenium	ug/L	<0.32	500	500	524	521	105	104	75-125	1	20	
Thallium	ug/L	<0.14	500	500	502	502	100	100	75-125	0	20	

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QUALITY CONTROL DATA

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196970

QC Batch: 337571 Analysis Method: SM 2540C
QC Batch Method: SM 2540C Analysis Description: 2540C Total Dissolved Solids
Associated Lab Samples: 40196970001, 40196970002

METHOD BLANK: 1960873 Matrix: Water
Associated Lab Samples: 40196970001, 40196970002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	<8.7	20.0	10/15/19 16:39	

LABORATORY CONTROL SAMPLE: 1960874

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Dissolved Solids	mg/L	547	558	102	80-120	

SAMPLE DUPLICATE: 1960875

Parameter	Units	40196939001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	354	368	4	10	

SAMPLE DUPLICATE: 1960876

Parameter	Units	40196970001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	418	406	3	10	

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QUALITY CONTROL DATA

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196970

QC Batch: 337952 | Analysis Method: EPA 9040
QC Batch Method: EPA 9040 | Analysis Description: 9040 pH
Associated Lab Samples: 40196970001, 40196970002

SAMPLE DUPLICATE: 1962801

Parameter	Units	40196967002 Result	Dup Result	RPD	Max RPD	Qualifiers
pH at 25 Degrees C	Std. Units	7.3	7.3	0	20	H6

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QUALITY CONTROL DATA

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196970

QC Batch: 337822 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 40196970001, 40196970002

METHOD BLANK: 1962191 Matrix: Water
Associated Lab Samples: 40196970001, 40196970002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chloride	mg/L	<0.50	2.0	10/21/19 11:34	
Fluoride	mg/L	<0.10	0.30	10/21/19 11:34	
Sulfate	mg/L	<1.0	3.0	10/21/19 11:34	

LABORATORY CONTROL SAMPLE: 1962192

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	20	20.1	101	90-110	
Fluoride	mg/L	2	2.0	102	90-110	
Sulfate	mg/L	20	20.1	100	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1962193 1962194

Parameter	Units	40196954007 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	14.1	20	20	33.8	33.6	99	98	90-110	1	15	
Fluoride	mg/L	<0.10	2	2	2.1	2.1	102	102	90-110	0	15	
Sulfate	mg/L	7.2	20	20	27.0	26.9	99	98	90-110	0	15	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1962195 1962196

Parameter	Units	40196971011 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	1.6J	20	20	20.9	21.3	97	99	90-110	2	15	
Fluoride	mg/L	<0.10	2	2	2.1	2.1	102	102	90-110	0	15	
Sulfate	mg/L	<1.0	20	20	20.6	20.4	102	101	90-110	1	15	

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ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196970

Sample: MW-301 **Lab ID: 40196970001** Collected: 10/09/19 12:00 Received: 10/10/19 09:15 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	**0.252 ± 0.351 (0.585) C:NA T:83%**	pCi/L	10/31/19 12:20	13982-63-3	
Radium-228	EPA 904.0	**0.449 ± 0.363 (0.723) C:77% T:95%**	pCi/L	10/30/19 14:23	15262-20-1	
Total Radium	Total Radium Calculation	**0.701 ± 0.714 (1.31)**	pCi/L	11/01/19 15:00	7440-14-4	

Sample: MW-84A **Lab ID: 40196970002** Collected: 10/09/19 13:10 Received: 10/10/19 09:15 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	**0.247 ± 0.292 (0.459) C:NA T:101%**	pCi/L	10/31/19 12:20	13982-63-3	
Radium-228	EPA 904.0	**-0.0240 ± 0.355 (0.827) C:78% T:89%**	pCi/L	10/30/19 14:24	15262-20-1	
Total Radium	Total Radium Calculation	**0.247 ± 0.647 (1.29)**	pCi/L	11/01/19 15:00	7440-14-4	

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QUALITY CONTROL - RADIOCHEMISTRY

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196970

QC Batch: 366494 Analysis Method: EPA 903.1
QC Batch Method: EPA 903.1 Analysis Description: 903.1 Radium-226
Associated Lab Samples: 40196970001, 40196970002

METHOD BLANK: 1777728 Matrix: Water
Associated Lab Samples: 40196970001, 40196970002

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-226	0.0468 ± 0.331 (0.660) C:NA T:87%	pCi/L	10/31/19 12:20	

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QUALITY CONTROL - RADIOCHEMISTRY

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196970

QC Batch:	366493	Analysis Method:	EPA 904.0
QC Batch Method:	EPA 904.0	Analysis Description:	904.0 Radium 228

Associated Lab Samples: 40196970001, 40196970002

METHOD BLANK: 1777725 Matrix: Water

Associated Lab Samples: 40196970001, 40196970002

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-228	-0.00340 ± 0.362 (0.843) C:80% T:79%	pCi/L	10/30/19 14:21	

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QUALIFIERS

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196970

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.

LABORATORIES

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

ANALYTE QUALIFIERS

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

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196970

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
40196970001	**MW-301**	EPA 3010	337277	EPA 6020	337400
40196970002	**MW-84A**	EPA 3010	337277	EPA 6020	337400
40196970001	**MW-301**	EPA 7470	338359	EPA 7470	338406
40196970002	**MW-84A**	EPA 7470	338359	EPA 7470	338406
40196970001	**MW-301**				
40196970002	**MW-84A**				
40196970001	**MW-301**	EPA 903.1	366494		
40196970002	**MW-84A**	EPA 903.1	366494		
40196970001	**MW-301**	EPA 904.0	366493		
40196970002	**MW-84A**	EPA 904.0	366493		
40196970001	**MW-301**	Total Radium Calculation	369027		
40196970002	**MW-84A**	Total Radium Calculation	369027		
40196970001	**MW-301**	SM 2540C	337571		
40196970002	**MW-84A**	SM 2540C	337571		
40196970001	**MW-301**	EPA 9040	337952		
40196970002	**MW-84A**	EPA 9040	337952		
40196970001	**MW-301**	EPA 300.0	337822		
40196970002	**MW-84A**	EPA 300.0	337822		

(Please Print Clearly)

Company Name:	SCS Engineers
Branch/Location:	Madison, WI
Project Contact:	Tom Karwoski
Phone:	608-224-2830
Project Number:	25219067.00
Project Name:	Columbia
Project State:	Wisconsin
Sampled By (Print):	Adam Watson
Sampled By (Sign):	
PO #:	
Regulatory Program:	

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MN: 612-607-1700 WI: 920-469-2436

Page 1 of

CHAIN OF CUSTODY

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

Quote #:	
Mail To Contact:	Tom Karwoski
Mail To Company:	SCS Engineers
Mail To Address:	2830 Dairy Dr. Madison, WI 53718
Invoice To Contact:	
Invoice To Company:	
Invoice To Address:	
Invoice To Phone:	

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

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

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

					Analyses Requested	Radium 226 & 228	Metals See attached table	pH	TDS, Cl, F, SO4					CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)	Profile #
					FILTERED? (YES/NO) Y/N	N	N	N	N							
					PRESERVATION (CODE)* Pick Letter	D	D	A	A							
PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX												
001	MW-301	10/9/19	1200	W		X	X	X	X						001	
002	MW-84A	10/9/19	1316	W		X	X	X	X						002	

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

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

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

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

Relinquished By:	Date/Time:	Received By:	Date/Time:
	10/9/19 1600		
CS Logistics	10/10/19 0915	PACE	10/10/19 0915

PACE Project No. 40196970

Receipt Temp = ROI °C

Sample Receipt pH: OK / Adjusted

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

Version 6.0 06/14/06

ORIGINAL

40196970

Table 2. Sampling Points and Parameters - CCR Rule Sampling Program
Groundwater Monitoring - Columbia Energy Center / SCS Engineers Project #25219067

		COC #1 - Background Wells		COC #2 - Landfill Modules 1-3				COC #3 - Landfill Module 4				COC #4 - Primary Pond					COC #5 - Secondary Pond			
	Parameter	MW-301	MW-84A	MW-302	MW-33AR	MW-34A	FIELD BLANK - MOD1-3LF	MW-309	MW-310	MW-311	FIELD BLANK-MOD4	MW-303	MW-304	MW-305	MW-4R	FIELD BLANK - PPOND	MW-306	MW-307	MW-308	FIELD BLANK - SCPOND
Appendix III Parameters (Detection Monitoring)	Boron	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Calcium	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Chloride	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Fluoride	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	pH	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Sulfate	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	TDS	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Appendix IV Parameters (Assessment Monitoring)	Antimony	x	x									x	x	x	x	x				
	Arsenic	x	x									x	x	x	x	x				
	Barium	x	x									x	x	x	x	x				
	Beryllium	x	x									x	x	x	x	x				
	Cadmium	x	x									x	x	x	x	x				
	Chromium	x	x									x	x	x	x	x				
	Cobalt	x	x									x	x	x	x	x				
	Fluoride	x	x									x	x	x	x	x				
	Lead	x	x									x	x	x	x	x				
	Lithium	x	x									x	x	x	x	x				
	Mercury	x	x									x	x	x	x	x				
	Molybdenum	x	x									x	x	x	x	x				
	Selenium	x	x									x	x	x	x	x				
	Thallium	x	x									x	x	x	x	x				
	Radium 226+228	x	x									x	x	x	x	x				
CCR Rule Field Parameters	Groundwater Elevation	x	x	x	x	x		x	x	x		x	x	x	x		x	x	x	
	pH	x	x	x	x	x		x	x	x		x	x	x	x		x	x	x	
Low-Flow Sampling Field Parameters	Well Depth	x	x	x	x	x		x	x	x		x	x	x	x		x	x	x	
	Specific Conductance	x	x	x	x	x		x	x	x		x	x	x	x		x	x	x	
	Dissolved Oxygen	x	x	x	x	x		x	x	x		x	x	x	x		x	x	x	
	ORP	x	x	x	x	x		x	x	x		x	x	x	x		x	x	x	
	Temperature	x	x	x	x	x		x	x	x		x	x	x	x		x	x	x	
	Turbidity	x	x	x	x	x		x	x	x		x	x	x	x		x	x	x	
	Color	x	x	x	x	x		x	x	x		x	x	x	x		x	x	x	
	Odor	x	x	x	x	x		x	x	x		x	x	x	x		x	x	x	

Notes: All samples are unfiltered (total).

I:\25219067.00\Data and Calculations\Tables\Lab Bottle Orders\[2019 April_COL CCR.xls]Sheet1

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

Sample Preservation Receipt Form

Client Name: SC Engineers

Project # 40196920

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

Lab Lot# of pH paper: 10US089 Lab Std #ID of preservation (if pH adjusted):

Initial when completed:

Date/Time:

Pace Lab #	AG1U	AG1H	AG4S	AG4U	AG5U	AG2S	BG3U	BP1U	BP2N	BP2Z	BP3U	BP3B	BP3N	BP3S	DG9A	DG9T	VG9U	VG9H	VG9M	VG9D	JGFU	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)
	Glass							Plastic							Vials						Jars			General									
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
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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

10/10/17

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	**DG9A**	40 mL amber ascorbic	**JGFU**	4 oz amber jar unpres				
AG1H	1 liter amber glass HCL	**BP2N**	500 mL plastic HNO3	**DG9T**	40 mL amber Na Thio	**WGFU**	4 oz clear jar unpres				
AG4S	125 mL amber glass H2SO4	**BP2Z**	500 mL plastic NaOH, Znact	**VG9U**	40 mL clear vial unpres	**WPFU**	4 oz plastic jar unpres				
AG4U	120 mL amber glass unpres	**BP3U**	250 mL plastic unpres	**VG9H**	40 mL clear vial HCL						
AG5U	100 mL amber glass unpres	**BP3B**	250 mL plastic NaOH	**VG9M**	40 mL clear vial MeOH	**SP5T**	120 mL plastic Na Thiosulfate				
AG2S	500 mL amber glass H2SO4	**BP3N**	250 mL plastic HNO3	**VG9D**	40 mL clear vial DI	**ZPLC**	ziploc bag				
BG3U	250 mL clear glass unpres	**BP3S**	250 mL plastic H2SO4			**GN:**	1 liter plastic HNO3 pres				

Pace Analytical 1241 Bellevue Street, Green Bay, WI 54302	Document Name: **Sample Condition Upon Receipt (SCUR)**	Document Revised: 25Apr2018
	Document No.: **F-GB-C-031-Rev.07**	Issuing Authority: Pace Green Bay Quality Office

Sample Condition Upon Receipt Form (SCUR)

Project #:

WO# : 40196970

40196970

Client Name: SCS Engineers

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

Tracking #: 2120.100919

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 zip lock / plastic bag

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

Cooler Temperature Uncorr: ROI /Corr: —

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.

Person examining contents:
Date: 10/10/19
Initials: JW

Chain of Custody Present:	☒Yes ☐No ☐N/A	1.
Chain of Custody Filled Out:	☐Yes ☒No ☐N/A	2. invoice details not documented w/lotek &
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:

Project Manager Review: [signature] for DM **Date:** 10-10-19

2019 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

25219067.00 | January 31, 2020

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

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Tables

Figures

Appendices

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1.0 INTRODUCTION

This 2019 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 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 2019 Annual Groundwater Monitoring and Corrective Action Report for the CCR Units.

This report covers the period of groundwater monitoring from January 1, 2019, through December 31, 2019.

The groundwater monitoring system for the Columbia Energy Center (COL) Dry Ash Disposal Facility Modules 1 through 3 is a multiunit system, monitoring three existing CCR units:

- COL Dry Ash Disposal Facility – Module 1 (existing CCR Landfill)
- COL Dry Ash Disposal Facility – Module 2 (existing CCR Landfill)
- COL Dry Ash Disposal Facility – Module 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. A separate groundwater monitoring system evaluates groundwater conditions for Module 4 of the COL Dry Ash Disposal Facility.

2.0 §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:*

2.1 §257.90(e)(1) SITE MAP

A map, aerial image, or diagram showing the CCR unit and all background (or upgradient) and downgradient monitoring wells, to include the well identification numbers, that are part of the groundwater monitoring program for the CCR unit;

A 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**.

2.2 §257.90(e)(2) MONITORING SYSTEM CHANGES

Identification of any monitoring wells that were installed or decommissioned during the preceding year, along with a narrative description of why those actions were taken;

No new monitoring wells were installed, and no wells were decommissioned as part of the groundwater monitoring program for Modules 1 through 3 of the Dry Ash Disposal Facility in 2019.

2.3 §257.90(e)(3) SUMMARY OF SAMPLING EVENTS

In addition to all the monitoring data obtained under §§ 257.90 through 257.98, a summary including the number of groundwater samples that were collected for analysis for each background and downgradient well, the dates the samples were collected, and whether the sample was required by the detection monitoring or assessment monitoring programs;

Two groundwater sampling events were completed in 2019 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 2019, were analyzed for the 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 monitoring program is included in **Table 1**. The results of the analytical laboratory analyses are provided in the laboratory reports in **Appendices A1** through **A2**.

Assessment monitoring has not been initiated for Modules 1 through 3 of the Dry Ash Disposal Facility.

2.4 §257.90(e)(4) MONITORING TRANSITION NARRATIVE

A narrative discussion of any transition between monitoring programs (e.g., the date and circumstances for transitioning from detection monitoring to assessment monitoring in addition to identifying the constituent(s) detected at a statistically significant increase over background levels);

There were no transitions between monitoring programs during 2019. The COL Dry Ash Disposal Facility, Modules 1 through 3, remained in the detection monitoring program.

In 2019, the monitoring results for the October 2018 and April 2019 monitoring events were evaluated for statistically significant increases (SSIs) in detection monitoring parameters relative to background. For both events, SSIs for boron, chloride, and sulfate were identified, and an SSI for total dissolved solids (TDS) was identified for the April 2019 event. However, alternative source demonstrations (ASDs) were completed, demonstrating that sources other than the CCR units were the likely cause of the observed concentrations. The ASD reports are provided in **Appendix B.**

2.5 §257.90(e)(5) OTHER REQUIREMENTS

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

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 2019 Annual Groundwater Monitoring and Corrective Action Report for the CCR Units.

2.5.1 § 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 2019.

Summary of Key Actions Completed:

- Statistical evaluation and determination of SSIs for the October 2018 and April 2019 monitoring events.
- ASD reports for the SSIs identified from the October 2018 and April 2019 monitoring events.
- Two semiannual groundwater sampling and analysis events (April and October 2019).

Description of Any Problems Encountered: No problems were encountered in 2019.

Discussion of Actions to Resolve the Problems: Not applicable.

Projection of Key Activities for the Upcoming Year (2020):

- Statistical evaluation and determination of any SSIs for the October 2019 and April 2020 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 2020).

2.5.2 §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.

2.5.3 §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 2018 and April 2019 sampling events are provided in **Appendix B**. The ASD reports are certified by a qualified professional engineer.

2.5.4 §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.

2.5.5 §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.

2.5.6 §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.

2.5.7 §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.

Table 1

CCR Rule Groundwater Samples Summary

Table 1. CCR Rule Groundwater Samples Summary
Columbia Energy Center Dry Ash Disposal Facility, Modules 1-3 /
SCS Engineers Project #25219067.00

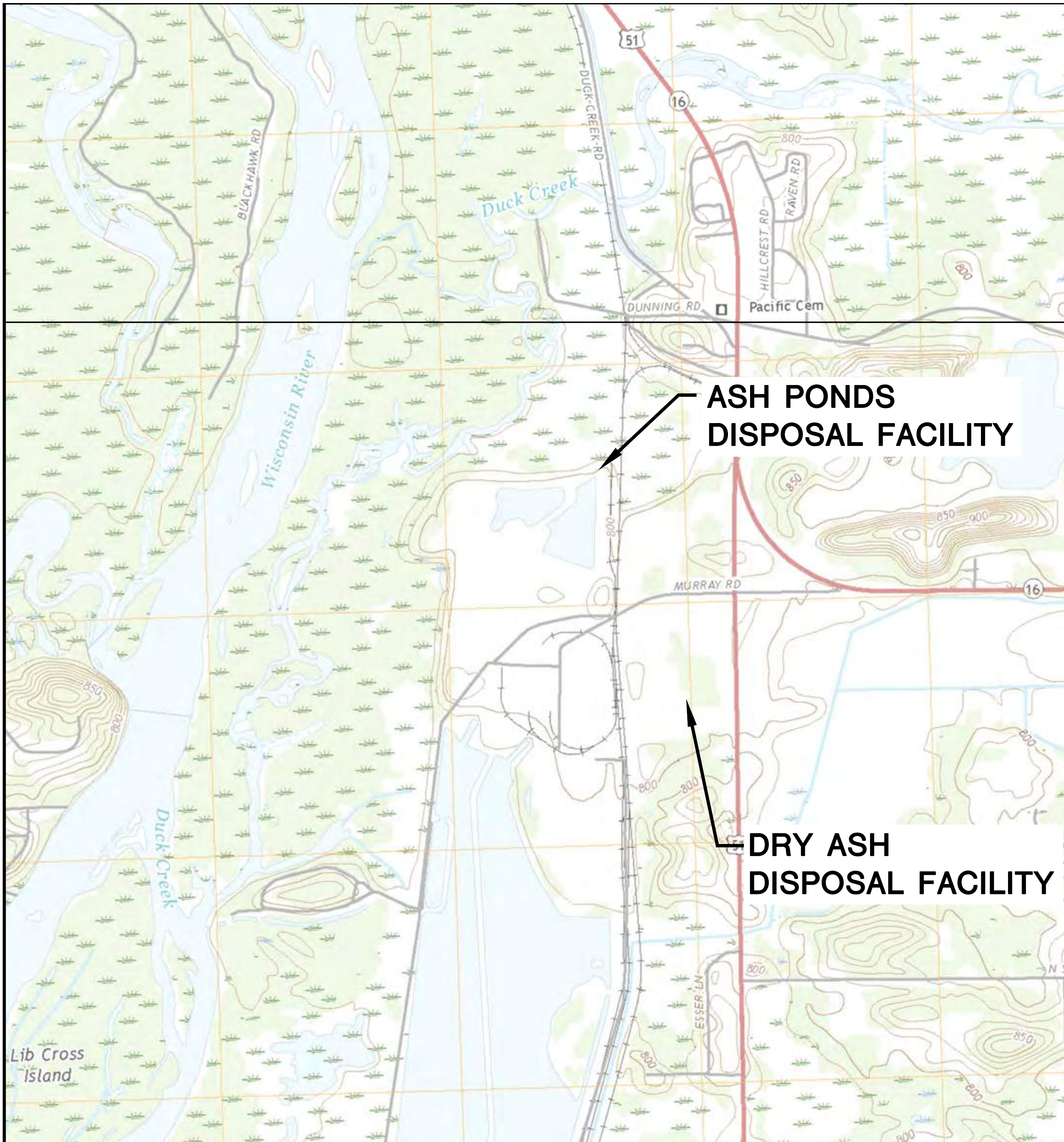
Sample Dates	Downgradient Wells			Background Wells	
	MW-302	MW-34A	MW-33AR	MW-84A	MW-301
April 2-3, 2019	D	D	D	D	D
October 8-9, 2019	D	D	D	D	D
Total Samples	2	2	2	2	2

Abbreviations:
D = Required by Detection Monitoring Program

Created by:	ACW	Date:	11/18/2019
Last revision by:	ACW	Date:	11/18/2019
Checked by:	MDB	Date:	1/8/2020

I:\25219067.00\Deliverables\2019 Federal Annual Report - MOD 1-3 LF\Tables\[Table 1 - 2019_GW_Samples_Summary_LF-1-3.xlsx]GW Summary

Figures



N

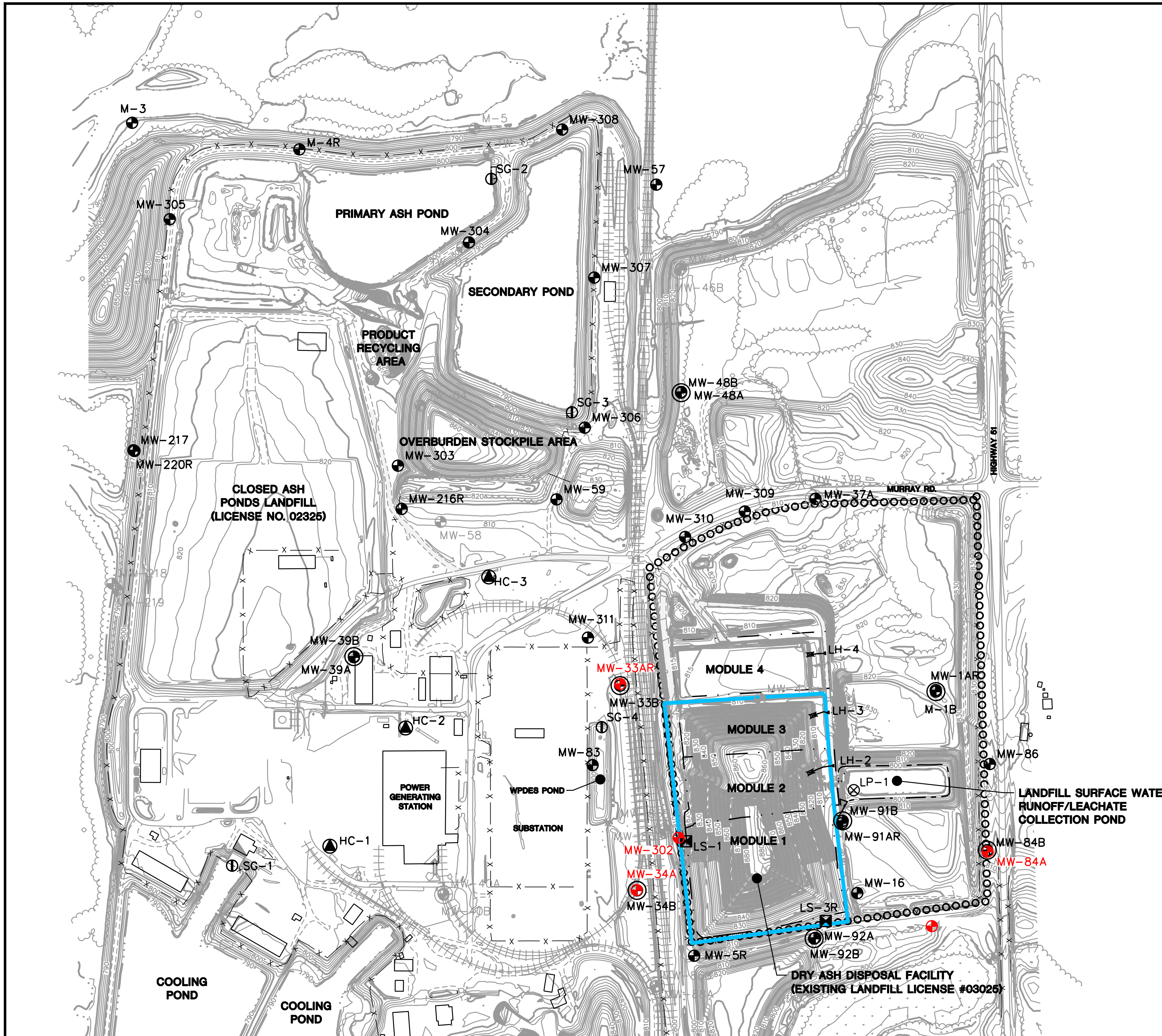
POYNETTE QUADRANGLE
WISCONSIN–COLUMBIA CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)
2018
SCALE: 1" = 2,000'

WISCONSIN

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	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 01/30/2020		

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



LEGEND

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

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.

PROJECT NO.	25219067.00	DRAWN BY:	BSS
DRAWN:	12/02/2019	CHECKED BY:	MDB
REVISED:	01/13/2020	APPROVED BY:	TK 01/30/2020

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

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

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

SITE PLAN AND MONITORING WELL LOCATIONS

FIGURE 2

I:\25219067.00\Drawings\CCR 2019 Annual Report\Mod 1-3 LF\Site Plan and Monitoring Well Locations.dwg, 1/30/2020 3:39:43 PM

Appendix A

Laboratory Reports

A1 April 2019 Detection Monitoring

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

April 18, 2019

Meghan Blodgett
SCS ENGINEERS
2830 Dairy Drive
Madison, WI 53718

RE: Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185260

Dear Meghan Blodgett:

Enclosed are the analytical results for sample(s) received by the laboratory on April 04, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

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

Sincerely,

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

Enclosures

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

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

CERTIFICATIONS

Project:	25219067 ALLIANT-COLUMBIA CCR
Pace Project No.:	40185260

Green Bay Certification IDs

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

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

SAMPLE SUMMARY

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185260

Lab ID	Sample ID	Matrix	Date Collected	Date Received
40185260001	**MW-302**	Water	04/02/19 16:25	04/04/19 09:30
40185260002	**MW-33AR**	Water	04/02/19 15:30	04/04/19 09:30
40185260003	**MW-34A**	Water	04/02/19 14:30	04/04/19 09:30
40185260004	**FIELD BLANK MOD1-3LF**	Water	04/02/19 16:25	04/04/19 09:30

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

SAMPLE ANALYTE COUNT

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185260

Lab ID	Sample ID	Method	Analysts	Analytes Reported
40185260001	**MW-302**	EPA 6020	KXS	2
			AXL	7
		SM 2540C	TMK	1
		EPA 9040	ALY	1
		EPA 300.0	HMB	3
40185260002	**MW-33AR**	EPA 6020	KXS	2
			AXL	7
		SM 2540C	TMK	1
		EPA 9040	ALY	1
		EPA 300.0	HMB	3
40185260003	**MW-34A**	EPA 6020	KXS	2
			AXL	7
		SM 2540C	TMK	1
		EPA 9040	ALY	1
		EPA 300.0	HMB	3
40185260004	**FIELD BLANK MOD1-3LF**	EPA 6020	KXS	2
		SM 2540C	TMK	1
		EPA 9040	ALY	1
		EPA 300.0	HMB	3

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

ANALYTICAL RESULTS

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185260

Sample: MW-302 **Lab ID: 40185260001** Collected: 04/02/19 16:25 Received: 04/04/19 09:30 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Boron	**254**	ug/L	11.0	3.3	1	04/05/19 08:40	04/09/19 07:37	7440-42-8	
Calcium	**62400**	ug/L	250	69.8	1	04/05/19 08:40	04/09/19 07:37	7440-70-2	
Field Data	Analytical Method:								
Field pH	**7.32**	Std. Units			1		04/02/19 16:25		
Field Specific Conductance	**538.6**	umhos/cm			1		04/02/19 16:25		
Oxygen, Dissolved	**9.65**	mg/L			1		04/02/19 16:25	7782-44-7	
REDOX	**126.7**	mV			1		04/02/19 16:25		
Turbidity	**9.72**	NTU			1		04/02/19 16:25		
Static Water Level	**787.56**	feet			1		04/02/19 16:25		
Temperature, Water (C)	**9.8**	deg C			1		04/02/19 16:25		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**290**	mg/L	20.0	8.7	1		04/09/19 12:35		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**7.4**	Std. Units	0.10	0.010	1		04/09/19 10:46		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**1.5J**	mg/L	2.0	0.50	1		04/16/19 22:05	16887-00-6	B
Fluoride	**<0.10**	mg/L	0.30	0.10	1		04/16/19 22:05	16984-48-8	
Sulfate	**25.2**	mg/L	3.0	1.0	1		04/16/19 22:05	14808-79-8	

Sample: MW-33AR **Lab ID: 40185260002** Collected: 04/02/19 15:30 Received: 04/04/19 09:30 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Boron	**568**	ug/L	11.0	3.3	1	04/05/19 08:40	04/09/19 07:43	7440-42-8	
Calcium	**131000**	ug/L	250	69.8	1	04/05/19 08:40	04/09/19 07:43	7440-70-2	
Field Data	Analytical Method:								
Field pH	**7.72**	Std. Units			1		04/02/19 15:30		
Field Specific Conductance	**1312**	umhos/cm			1		04/02/19 15:30		
Oxygen, Dissolved	**10.22**	mg/L			1		04/02/19 15:30	7782-44-7	
REDOX	**129.0**	mV			1		04/02/19 15:30		
Turbidity	**2.71**	NTU			1		04/02/19 15:30		
Static Water Level	**786.63**	feet			1		04/02/19 15:30		
Temperature, Water (C)	**10.3**	deg C			1		04/02/19 15:30		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**784**	mg/L	20.0	8.7	1		04/09/19 12:35		

Pace Analytical
www.pacelabs.com

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

ANALYTICAL RESULTS

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185260

Sample: MW-33AR **Lab ID: 40185260002** Collected: 04/02/19 15:30 Received: 04/04/19 09:30 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**7.6**	Std. Units	0.10	0.010	1		04/09/19 10:51		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**229**	mg/L	20.0	5.0	10		04/17/19 12:12	16887-00-6	
Fluoride	**<0.10**	mg/L	0.30	0.10	1		04/16/19 22:18	16984-48-8	
Sulfate	**201**	mg/L	30.0	10.0	10		04/17/19 12:12	14808-79-8	

Sample: MW-34A **Lab ID: 40185260003** Collected: 04/02/19 14:30 Received: 04/04/19 09:30 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Boron	**204**	ug/L	11.0	3.3	1	04/05/19 08:40	04/09/19 07:50	7440-42-8	
Calcium	**67500**	ug/L	250	69.8	1	04/05/19 08:40	04/09/19 07:50	7440-70-2	
Field Data	Analytical Method:								
Field pH	**7.73**	Std. Units			1		04/02/19 14:30		
Field Specific Conductance	**531.7**	umhos/cm			1		04/02/19 14:30		
Oxygen, Dissolved	**10.22**	mg/L			1		04/02/19 14:30	7782-44-7	
REDOX	**104.4**	mV			1		04/02/19 14:30		
Turbidity	**64.77**	NTU			1		04/02/19 14:30		
Static Water Level	**786.82**	feet			1		04/02/19 14:30		
Temperature, Water (C)	**10.6**	deg C			1		04/02/19 14:30		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**310**	mg/L	20.0	8.7	1		04/09/19 12:35		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**7.7**	Std. Units	0.10	0.010	1		04/09/19 10:59		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**18.7**	mg/L	2.0	0.50	1		04/15/19 12:12	16887-00-6	
Fluoride	**<0.10**	mg/L	0.30	0.10	1		04/15/19 12:12	16984-48-8	
Sulfate	**70.4**	mg/L	15.0	5.0	5		04/15/19 18:00	14808-79-8	

Sample: FIELD BLANK MOD1-3LF **Lab ID: 40185260004** Collected: 04/02/19 16:25 Received: 04/04/19 09:30 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Boron	**<3.3**	ug/L	11.0	3.3	1	04/05/19 08:40	04/09/19 05:00	7440-42-8	
Calcium	**<69.8**	ug/L	250	69.8	1	04/05/19 08:40	04/09/19 05:00	7440-70-2	

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ANALYTICAL RESULTS

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185260

Sample: FIELD BLANK MOD1-3LF **Lab ID: 40185260004** Collected: 04/02/19 16:25 Received: 04/04/19 09:30 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**<8.7**	mg/L	20.0	8.7	1		04/09/19 12:35		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**7.0**	Std. Units	0.10	0.010	1		04/09/19 11:04		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**<0.50**	mg/L	2.0	0.50	1		04/15/19 12:24	16887-00-6	
Fluoride	**<0.10**	mg/L	0.30	0.10	1		04/15/19 12:24	16984-48-8	
Sulfate	**<1.0**	mg/L	3.0	1.0	1		04/15/19 12:24	14808-79-8	

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QUALITY CONTROL DATA

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185260

QC Batch: 317485 Analysis Method: EPA 6020
QC Batch Method: EPA 3010 Analysis Description: 6020 MET
Associated Lab Samples: 40185260001, 40185260002, 40185260003, 40185260004

METHOD BLANK: 1846066 Matrix: Water
Associated Lab Samples: 40185260001, 40185260002, 40185260003, 40185260004

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Boron	ug/L	<3.3	11.0	04/09/19 04:47	
Calcium	ug/L	<69.8	250	04/09/19 04:47	

LABORATORY CONTROL SAMPLE: 1846067

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Boron	ug/L	500	486	97	80-120	
Calcium	ug/L	5000	4990	100	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1846068 1846069

Parameter	Units	40185256001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Boron	ug/L	26.9	500	500	492	498	93	94	75-125	1	20	
Calcium	ug/L	126000	5000	5000	126000	123000	12	-46	75-125	2	20	P6

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

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QUALITY CONTROL DATA

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185260

QC Batch: 317813 Analysis Method: SM 2540C
QC Batch Method: SM 2540C Analysis Description: 2540C Total Dissolved Solids
Associated Lab Samples: 40185260001, 40185260002, 40185260003, 40185260004

METHOD BLANK: 1847582 Matrix: Water
Associated Lab Samples: 40185260001, 40185260002, 40185260003, 40185260004

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	<8.7	20.0	04/09/19 12:32	

LABORATORY CONTROL SAMPLE: 1847583

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Dissolved Solids	mg/L	577	552	96	80-120	

SAMPLE DUPLICATE: 1847584

Parameter	Units	40185256001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	462	462	0	5	

SAMPLE DUPLICATE: 1847585

Parameter	Units	40185260001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	290	284	2	5	

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.

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QUALITY CONTROL DATA

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185260

QC Batch: 317736 | Analysis Method: EPA 9040
QC Batch Method: EPA 9040 | Analysis Description: 9040 pH
Associated Lab Samples: 40185260001, 40185260002, 40185260003, 40185260004

SAMPLE DUPLICATE: 1847351

Parameter	Units	40185260001 Result	Dup Result	RPD	Max RPD	Qualifiers
pH at 25 Degrees C	Std. Units	7.4	7.4	0	20	H6

SAMPLE DUPLICATE: 1847381

Parameter	Units	40185339014 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.

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QUALITY CONTROL DATA

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185260

QC Batch: 317955 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 40185260001, 40185260002

METHOD BLANK: 1848305 Matrix: Water
Associated Lab Samples: 40185260001, 40185260002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chloride	mg/L	0.52J	2.0	04/16/19 10:22	
Fluoride	mg/L	<0.10	0.30	04/16/19 10:22	
Sulfate	mg/L	<1.0	3.0	04/16/19 10:22	

LABORATORY CONTROL SAMPLE: 1848306

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	20	21.6	108	90-110	
Fluoride	mg/L	2	2.0	98	90-110	
Sulfate	mg/L	20	21.7	109	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1848307 1848308

Parameter	Units	40185204004 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	43.0	100	100	149	148	106	105	90-110	1	15	
Fluoride	mg/L	<0.50	10	10	10.3	10.4	103	104	90-110	1	15	
Sulfate	mg/L	<5.0	100	100	109	109	105	105	90-110	0	15	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1848309 1848310

Parameter	Units	40185260002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	229	200	200	439	425	105	98	90-110	3	15	
Fluoride	mg/L	<0.10	2	2	1.9	2.0	97	99	90-110	2	15	
Sulfate	mg/L	201	200	200	411	397	105	98	90-110	3	15	

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

QUALITY CONTROL DATA

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185260

QC Batch: 318035 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 40185260003, 40185260004

METHOD BLANK: 1848956 Matrix: Water
Associated Lab Samples: 40185260003, 40185260004

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chloride	mg/L	<0.50	2.0	04/15/19 11:11	
Fluoride	mg/L	<0.10	0.30	04/15/19 11:11	
Sulfate	mg/L	<1.0	3.0	04/15/19 11:11	

LABORATORY CONTROL SAMPLE: 1848957

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	20	21.2	106	90-110	
Fluoride	mg/L	2	2.1	104	90-110	
Sulfate	mg/L	20	21.4	107	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1848958 1848959

Parameter	Units	40185548003 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	261	200	200	438	463	88	101	90-110	6	15	M0
Fluoride	mg/L	<1.0	20	20	18.0	19.8	90	99	90-110	9	15	
Sulfate	mg/L	54.2	200	200	232	252	89	99	90-110	8	15	M0

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1848960 1848961

Parameter	Units	40185308003 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	106	200	200	313	318	104	106	90-110	1	15	
Fluoride	mg/L	<1.0	20	20	20.6	21.5	103	108	90-110	4	15	
Sulfate	mg/L	94.8	200	200	298	309	102	107	90-110	3	15	

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

QUALIFIERS

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185260

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

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

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185260

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
40185260001	**MW-302**	EPA 3010	317485	EPA 6020	317570
40185260002	**MW-33AR**	EPA 3010	317485	EPA 6020	317570
40185260003	**MW-34A**	EPA 3010	317485	EPA 6020	317570
40185260004	**FIELD BLANK MOD1-3LF**	EPA 3010	317485	EPA 6020	317570
40185260001	**MW-302**				
40185260002	**MW-33AR**				
40185260003	**MW-34A**				
40185260001	**MW-302**	SM 2540C	317813		
40185260002	**MW-33AR**	SM 2540C	317813		
40185260003	**MW-34A**	SM 2540C	317813		
40185260004	**FIELD BLANK MOD1-3LF**	SM 2540C	317813		
40185260001	**MW-302**	EPA 9040	317736		
40185260002	**MW-33AR**	EPA 9040	317736		
40185260003	**MW-34A**	EPA 9040	317736		
40185260004	**FIELD BLANK MOD1-3LF**	EPA 9040	317736		
40185260001	**MW-302**	EPA 300.0	317955		
40185260002	**MW-33AR**	EPA 300.0	317955		
40185260003	**MW-34A**	EPA 300.0	318035		
40185260004	**FIELD BLANK MOD1-3LF**	EPA 300.0	318035		

(Please Print Clearly)

Company Name:	SCS
Branch/Location:	Madison, WI
Project Contact:	Meg Blodgett
Phone:	608-216-7362
Project Number:	25219067
Project Name:	Alliant - Columbia
Project State:	WI
Sampled By (Print):	Adam Watson
Sampled By (Sign):	Paul A. Groom for Adam Watson
PO #:	
Regulatory Program:	

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CHAIN OF CUSTODY

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

MN

40185260

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

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

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

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

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

				FILTERED? (YES/NO) Y/N	No	No	No		
				PRESERVATION (CODE)* Pick Letter	A	A	D		
PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX	Analyses Requested: TDS, SO4, Ph	Floride, CL	Ca, B	CLIENT COMMENTS	LAB COMMENTS (Lab Use Only) / Profile #
001	MW 302	4-2-19	16:25	GW	X	X	X		
002	MW 33AR	4-2-19	15:30	↓					
003	MW 34A	4-2-19	14:30	↓					
004	Field Blank Mod 1	4-2-19	16:25	DI					
005	MW 309	4-2-19	9:10	GW					
006	MW 310	4-2-19	9:55	↓					
007	MW 311	4-2-19	10:50	↓					
008	Field Blank Mod 4	4-2-19	9:55	DI					
009	MW 306	4-1-19	18:15	GW					
010	MW 307	4-1-19	17:25	↓					
011	MW 308	4-1-19	16:50	↓					
012	Field Blank SC Pond	4-1-19	16:50	DI	↓	↓	↓		
~~013~~ 4/4/19 sw									

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

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

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

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

Relinquished By:	Date/Time:	Received By:	Date/Time:
Paul A. Groom	4-3-19 18:30		
Fed Ex	4-4-19 0930	Susan Wiley	4-4-19 0930

PACE Project No. 40185260

Receipt Temp = ROI °C

Sample Receipt pH
OK / Adjusted

Cooler Custody Seal
Present / Not Present
Intact / Not Intact

Version 6.0 06/14/06

C019a(27Jun2006)

ORIGINAL

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Green Bay, WI 54302

Sample Preservation Receipt Form

Client Name: SCS

Project # 40185260

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

Lab Lot# of pH paper: 10045358 Lab Std #ID of preservation (if pH adjusted):

Initial when completed: SKW Date/ Time:

	Glass							Plastic							Vials						Jars			General									
Pace Lab #	AG1U	AG1H	AG4S	AG4U	AG5U	AG2S	BG3U	BP1U	BP2N	BP2Z	BP3U	BP3C	BP3N	BP3S	DG9A	DG9T	VG9U	VG9H	VG9M	VG9D	JGFU	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		1																		X		2.5 / 5 / 10
006											2		1																		X		2.5 / 5 / 10
007											2		1																		X		2.5 / 5 / 10
008											2		1																		X		2.5 / 5 / 10
009											2		1																		X		2.5 / 5 / 10
010											2		1																		X		2.5 / 5 / 10
011											2		1																		X		2.5 / 5 / 10
012											2		1																		X		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

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	DG9A	40 mL amber ascorbic	JGFU	4 oz amber jar unpres
AG1H	1 liter amber glass HCL	BP2N	500 mL plastic HNO3	DG9T	40 mL amber Na Thio	WGFU	4 oz clear jar unpres
AG4S	125 mL amber glass H2SO4	BP2Z	500 mL plastic NaOH, Znact	VG9U	40 mL clear vial unpres	WPFU	4 oz plastic jar unpres
AG4U	120 mL amber glass unpres	BP3U	250 mL plastic unpres	VG9H	40 mL clear vial HCL		
AG5U	100 mL amber glass unpres	BP3C	250 mL plastic NaOH	VG9M	40 mL clear vial MeOH	SP5T	120 mL plastic Na Thiosulfate
AG2S	500 mL amber glass H2SO4	BP3N	250 mL plastic HNO3	VG9D	40 mL clear vial DI	ZPLC	ziploc bag
BG3U	250 mL clear glass unpres	BP3S	250 mL plastic H2SO4			GN:	

1610

Pace Analytical 1241 Bellevue Street, Green Bay, WI 54302	Document Name: **Sample Condition Upon Receipt (SCUR)**	Document Revised: 25Apr2018
	Document No.: **F-GB-C-031-Rev.07**	Issuing Authority: Pace Green Bay Quality Office

Sample Condition Upon Receipt Form (SCUR)

Project #:

WO# : 40185260

40185260

Client Name: SCS

Courier: [ ] CS Logistics [x] Fed Ex [ ] Speedee [ ] UPS [ ] Waltco [ ] Client [ ] Pace Other:

Tracking #: 7864 3720 0524

Custody Seal on Cooler/Box Present: [ ] yes [x] no Seals intact: [ ] yes [ ] no

Custody Seal on Samples Present: [ ] yes [x] no Seals intact: [ ] yes [ ] no

Packing Material: [x] Bubble Wrap [ ] Bubble Bags [ ] None [ ] Other

Thermometer Used SR - N/A **Type of Ice:** Wet Blue Dry None [x] Samples on ice, cooling process has begun

Cooler Temperature Uncorr: ROI /Corr:

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.

Person examining contents:
Date: 4-4-19
Initials: SW

Chain of Custody Present:	[x] Yes	[ ] No	[ ] N/A	1.
Chain of Custody Filled Out:	[ ] Yes	[x] No	[ ] N/A	2. No pg#, Mail, Invoice 4-4-19 SW
Chain of Custody Relinquished:	[x] Yes	[ ] No	[ ] N/A	3.
Sampler Name & Signature on COC:	[x] Yes	[ ] No	[ ] N/A	4.
Samples Arrived within Hold Time:	[x] Yes	[ ] No		5.
- VOA Samples frozen upon receipt	[ ] Yes	[ ] No		Date/Time:
Short Hold Time Analysis (<72hr):	[x] Yes	[ ] No		6.
Rush Turn Around Time Requested:	[ ] Yes	[x] No		7.
Sufficient Volume: For Analysis: [x] Yes [ ] No MS/MSD:	[ ] Yes	[x] No	[ ] N/A	8.
Correct Containers Used:	[x] Yes	[ ] No		9.
-Pace Containers Used:	[x] Yes	[ ] No	[ ] N/A	
-Pace IR Containers Used:	[ ] Yes	[ ] No	[x] N/A	
Containers Intact:	[x] Yes	[ ] No		10.
Filtered volume received for Dissolved tests	[ ] Yes	[ ] No	[x] N/A	11.
Sample Labels match COC: -Includes date/time/ID/Analysis Matrix: W	[ ] Yes	[x] No	[ ] N/A	12. 004-ID is ~~Field Blank MOD1 3LF~~ 009-No date + time on 250ml 4-4-19 SW
Trip Blank Present:	[ ] Yes	[ ] No	[x] N/A	13.
Trip Blank Custody Seals Present	[ ] Yes	[ ] No	[x] N/A	
Pace Trip Blank Lot # (if purchased):				

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

Person Contacted: Date/Time:

Comments/ Resolution:

Project Manager Review: AL for DM **Date:** 4/4/19

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

April 25, 2019

Meghan Blodgett
SCS ENGINEERS
2830 Dairy Drive
Madison, WI 53718

RE: Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185256

Dear Meghan Blodgett:

Enclosed are the analytical results for sample(s) received by the laboratory on April 04, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

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

Sincerely,

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

Enclosures

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

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CERTIFICATIONS

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185256

Pennsylvania Certification IDs

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

Green Bay Certification IDs

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

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SAMPLE SUMMARY

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185256

Lab ID	Sample ID	Matrix	Date Collected	Date Received
40185256001	**MW-301**	Water	04/02/19 17:20	04/04/19 09:30
40185256002	**MW-84A**	Water	04/03/19 09:40	04/04/19 09:30

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SAMPLE ANALYTE COUNT

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185256

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
40185256001	**MW-301**	EPA 6020	KXS	14	PASI-G
		EPA 7470	AJT	1	PASI-G
			AXL	7	PASI-G
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	JLW	1	PASI-PA
		Total Radium Calculation	CMC	1	PASI-PA
		SM 2540C	TMK	1	PASI-G
		EPA 9040	ALY	1	PASI-G
		EPA 300.0	HMB	3	PASI-G
40185256002	**MW-84A**	EPA 6020	KXS	14	PASI-G
		EPA 7470	AJT	1	PASI-G
			AXL	7	PASI-G
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	JLW	1	PASI-PA
		Total Radium Calculation	CMC	1	PASI-PA
		SM 2540C	TMK	1	PASI-G
		EPA 9040	ALY	1	PASI-G
		EPA 300.0	HMB	3	PASI-G

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ANALYTICAL RESULTS

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185256

Sample: MW-301 **Lab ID: 40185256001** Collected: 04/02/19 17:20 Received: 04/04/19 09:30 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Antimony	**0.32J**	ug/L	1.0	0.15	1	04/05/19 08:40	04/09/19 06:15	7440-36-0	
Arsenic	**0.40J**	ug/L	1.0	0.28	1	04/05/19 08:40	04/09/19 06:15	7440-38-2	
Barium	**11.8**	ug/L	4.9	1.5	1	04/05/19 08:40	04/09/19 06:15	7440-39-3	
Beryllium	**0.28J**	ug/L	1.0	0.18	1	04/05/19 08:40	04/09/19 06:15	7440-41-7	
Boron	**26.9**	ug/L	11.0	3.3	1	04/05/19 08:40	04/09/19 06:15	7440-42-8	
Cadmium	**0.21J**	ug/L	1.0	0.15	1	04/05/19 08:40	04/09/19 06:15	7440-43-9	
Calcium	**126000**	ug/L	2500	698	10	04/05/19 08:40	04/09/19 05:48	7440-70-2	P6
Chromium	**<1.0**	ug/L	3.4	1.0	1	04/05/19 08:40	04/09/19 06:15	7440-47-3	
Cobalt	**0.35J**	ug/L	1.0	0.12	1	04/05/19 08:40	04/09/19 06:15	7440-48-4	
Lead	**0.30J**	ug/L	1.0	0.24	1	04/05/19 08:40	04/09/19 06:15	7439-92-1	
Lithium	**0.90J**	ug/L	1.0	0.19	1	04/05/19 08:40	04/09/19 06:15	7439-93-2	
Molybdenum	**<0.44**	ug/L	1.5	0.44	1	04/05/19 08:40	04/09/19 06:15	7439-98-7	
Selenium	**0.49J**	ug/L	1.1	0.32	1	04/05/19 08:40	04/09/19 06:15	7782-49-2	
Thallium	**0.48J**	ug/L	1.0	0.14	1	04/05/19 08:40	04/09/19 06:15	7440-28-0	
7470 Mercury	Analytical Method: EPA 7470 Preparation Method: EPA 7470								
Mercury	**<0.084**	ug/L	0.28	0.084	1	04/12/19 09:55	04/15/19 10:05	7439-97-6	
Field Data	Analytical Method:								
Field pH	**6.62**	Std. Units			1		04/02/19 17:20		
Field Specific Conductance	**883**	umhos/cm			1		04/02/19 17:20		
Oxygen, Dissolved	**2.20**	mg/L			1		04/02/19 17:20	7782-44-7	
REDOX	**152.1**	mV			1		04/02/19 17:20		
Turbidity	**2.02**	NTU			1		04/02/19 17:20		
Static Water Level	**787.04**	feet			1		04/02/19 17:20		
Temperature, Water (C)	**7.5**	deg C			1		04/02/19 17:20		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**462**	mg/L	20.0	8.7	1		04/09/19 12:34		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**6.8**	Std. Units	0.10	0.010	1		04/08/19 11:21		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**2.9J**	mg/L	10.0	2.5	5		04/16/19 19:51	16887-00-6	B,D3
Fluoride	**<0.50**	mg/L	1.5	0.50	5		04/16/19 19:51	16984-48-8	D3
Sulfate	**5.3J**	mg/L	15.0	5.0	5		04/16/19 19:51	14808-79-8	D3

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ANALYTICAL RESULTS

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185256

Sample: MW-84A **Lab ID: 40185256002** Collected: 04/03/19 09:40 Received: 04/04/19 09:30 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Antimony	**<0.15**	ug/L	1.0	0.15	1	04/05/19 08:40	04/09/19 06:42	7440-36-0	
Arsenic	**<0.28**	ug/L	1.0	0.28	1	04/05/19 08:40	04/09/19 06:42	7440-38-2	
Barium	**14.7**	ug/L	4.9	1.5	1	04/05/19 08:40	04/09/19 06:42	7440-39-3	
Beryllium	**<0.18**	ug/L	1.0	0.18	1	04/05/19 08:40	04/09/19 06:42	7440-41-7	
Boron	**13.6**	ug/L	11.0	3.3	1	04/05/19 08:40	04/09/19 06:42	7440-42-8	
Cadmium	**<0.15**	ug/L	1.0	0.15	1	04/05/19 08:40	04/09/19 06:42	7440-43-9	
Calcium	**80100**	ug/L	250	69.8	1	04/05/19 08:40	04/09/19 06:42	7440-70-2	
Chromium	**1.8J**	ug/L	3.4	1.0	1	04/05/19 08:40	04/09/19 06:42	7440-47-3	
Cobalt	**<0.12**	ug/L	1.0	0.12	1	04/05/19 08:40	04/09/19 06:42	7440-48-4	
Lead	**<0.24**	ug/L	1.0	0.24	1	04/05/19 08:40	04/09/19 06:42	7439-92-1	
Lithium	**0.56J**	ug/L	1.0	0.19	1	04/05/19 08:40	04/09/19 06:42	7439-93-2	
Molybdenum	**<0.44**	ug/L	1.5	0.44	1	04/05/19 08:40	04/09/19 06:42	7439-98-7	
Selenium	**<0.32**	ug/L	1.1	0.32	1	04/05/19 08:40	04/09/19 06:42	7782-49-2	
Thallium	**<0.14**	ug/L	1.0	0.14	1	04/05/19 08:40	04/09/19 06:42	7440-28-0	
7470 Mercury	Analytical Method: EPA 7470 Preparation Method: EPA 7470								
Mercury	**<0.084**	ug/L	0.28	0.084	1	04/12/19 09:55	04/15/19 10:07	7439-97-6	
Field Data	Analytical Method:								
Field pH	**7.03**	Std. Units			1		04/03/19 09:40		
Field Specific Conductance	**637.2**	umhos/cm			1		04/03/19 09:40		
Oxygen, Dissolved	**9.49**	mg/L			1		04/03/19 09:40	7782-44-7	
REDOX	**103.4**	mV			1		04/03/19 09:40		
Turbidity	**1.90**	NTU			1		04/03/19 09:40		
Static Water Level	**787.35**	feet			1		04/03/19 09:40		
Temperature, Water (C)	**10.2**	deg C			1		04/03/19 09:40		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**318**	mg/L	20.0	8.7	1		04/09/19 12:34		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**7.4**	Std. Units	0.10	0.010	1		04/08/19 11:24		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**3.6**	mg/L	2.0	0.50	1		04/16/19 20:03	16887-00-6	B
Fluoride	**<0.10**	mg/L	0.30	0.10	1		04/16/19 20:03	16984-48-8	
Sulfate	**1.4J**	mg/L	3.0	1.0	1		04/16/19 20:03	14808-79-8	

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QUALITY CONTROL DATA

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185256

QC Batch: 318138 — Analysis Method: EPA 7470
QC Batch Method: EPA 7470 — Analysis Description: 7470 Mercury
Associated Lab Samples: 40185256001, 40185256002

METHOD BLANK: 1849587 — Matrix: Water
Associated Lab Samples: 40185256001, 40185256002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mercury	ug/L	<0.084	0.28	04/15/19 09:25	

LABORATORY CONTROL SAMPLE: 1849588

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury	ug/L	5	5.3	105	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1849589 1849590

Parameter	Units	40185483005 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mercury	ug/L	0.00016J mg/L	5	5	5.4	5.2	105	101	85-115	4	20	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185256

QC Batch: 317485 Analysis Method: EPA 6020
QC Batch Method: EPA 3010 Analysis Description: 6020 MET
Associated Lab Samples: 40185256001, 40185256002

METHOD BLANK: 1846066 Matrix: Water
Associated Lab Samples: 40185256001, 40185256002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Antimony	ug/L	<0.15	1.0	04/09/19 04:47	
Arsenic	ug/L	<0.28	1.0	04/09/19 04:47	
Barium	ug/L	<1.5	4.9	04/09/19 04:47	
Beryllium	ug/L	<0.18	1.0	04/09/19 04:47	
Boron	ug/L	<3.3	11.0	04/09/19 04:47	
Cadmium	ug/L	<0.15	1.0	04/09/19 04:47	
Calcium	ug/L	<69.8	250	04/09/19 04:47	
Chromium	ug/L	<1.0	3.4	04/09/19 04:47	
Cobalt	ug/L	<0.12	1.0	04/09/19 04:47	
Lead	ug/L	<0.24	1.0	04/09/19 04:47	
Lithium	ug/L	<0.19	1.0	04/09/19 04:47	
Molybdenum	ug/L	<0.44	1.5	04/09/19 04:47	
Selenium	ug/L	<0.32	1.1	04/09/19 04:47	
Thallium	ug/L	<0.14	1.0	04/09/19 04:47	

LABORATORY CONTROL SAMPLE: 1846067

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Antimony	ug/L	500	500	100	80-120	
Arsenic	ug/L	500	474	95	80-120	
Barium	ug/L	500	487	97	80-120	
Beryllium	ug/L	500	492	98	80-120	
Boron	ug/L	500	486	97	80-120	
Cadmium	ug/L	500	500	100	80-120	
Calcium	ug/L	5000	4990	100	80-120	
Chromium	ug/L	500	492	98	80-120	
Cobalt	ug/L	500	485	97	80-120	
Lead	ug/L	500	463	93	80-120	
Lithium	ug/L	500	467	93	80-120	
Molybdenum	ug/L	500	465	93	80-120	
Selenium	ug/L	500	508	102	80-120	
Thallium	ug/L	500	464	93	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1846068 1846069

Parameter	Units	40185256001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Antimony	ug/L	0.32J	500	500	496	496	99	99	75-125	0	20	

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QUALITY CONTROL DATA

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185256

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1846068 1846069

Parameter	Units	40185256001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Arsenic	ug/L	0.40J	500	500	480	478	96	95	75-125	0	20	
Barium	ug/L	11.8	500	500	496	498	97	97	75-125	0	20	
Beryllium	ug/L	0.28J	500	500	481	480	96	96	75-125	0	20	
Boron	ug/L	26.9	500	500	492	498	93	94	75-125	1	20	
Cadmium	ug/L	0.21J	500	500	491	490	98	98	75-125	0	20	
Calcium	ug/L	126000	5000	5000	126000	123000	12	-46	75-125	2	20	P6
Chromium	ug/L	<1.0	500	500	484	483	97	96	75-125	0	20	
Cobalt	ug/L	0.35J	500	500	476	473	95	95	75-125	1	20	
Lead	ug/L	0.30J	500	500	467	468	93	94	75-125	0	20	
Lithium	ug/L	0.90J	500	500	463	463	92	92	75-125	0	20	
Molybdenum	ug/L	<0.44	500	500	465	464	93	93	75-125	0	20	
Selenium	ug/L	0.49J	500	500	512	513	102	103	75-125	0	20	
Thallium	ug/L	0.48J	500	500	474	476	95	95	75-125	0	20	

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QUALITY CONTROL DATA

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185256

QC Batch: 317813 Analysis Method: SM 2540C
QC Batch Method: SM 2540C Analysis Description: 2540C Total Dissolved Solids
Associated Lab Samples: 40185256001, 40185256002

METHOD BLANK: 1847582 Matrix: Water
Associated Lab Samples: 40185256001, 40185256002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	<8.7	20.0	04/09/19 12:32	

LABORATORY CONTROL SAMPLE: 1847583

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Dissolved Solids	mg/L	577	552	96	80-120	

SAMPLE DUPLICATE: 1847584

Parameter	Units	40185256001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	462	462	0	5	

SAMPLE DUPLICATE: 1847585

Parameter	Units	40185260001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	290	284	2	5	

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QUALITY CONTROL DATA

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185256

QC Batch: 317619 | Analysis Method: EPA 9040
QC Batch Method: EPA 9040 | Analysis Description: 9040 pH
Associated Lab Samples: 40185256001, 40185256002

SAMPLE DUPLICATE: 1846956

Parameter	Units	40185113001 Result	Dup Result	RPD	Max RPD	Qualifiers
pH at 25 Degrees C	Std. Units	1.1	1.1	7	20	H6

SAMPLE DUPLICATE: 1846957

Parameter	Units	40185204001 Result	Dup Result	RPD	Max RPD	Qualifiers
pH at 25 Degrees C	Std. Units	7.2	7.2	0	20	H6

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QUALITY CONTROL DATA

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185256

QC Batch: 317955 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 40185256001, 40185256002

METHOD BLANK: 1848305 Matrix: Water
Associated Lab Samples: 40185256001, 40185256002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chloride	mg/L	0.52J	2.0	04/16/19 10:22	
Fluoride	mg/L	<0.10	0.30	04/16/19 10:22	
Sulfate	mg/L	<1.0	3.0	04/16/19 10:22	

LABORATORY CONTROL SAMPLE: 1848306

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	20	21.6	108	90-110	
Fluoride	mg/L	2	2.0	98	90-110	
Sulfate	mg/L	20	21.7	109	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1848307 1848308

Parameter	Units	40185204004 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	43.0	100	100	149	148	106	105	90-110	1	15	
Fluoride	mg/L	<0.50	10	10	10.3	10.4	103	104	90-110	1	15	
Sulfate	mg/L	<5.0	100	100	109	109	105	105	90-110	0	15	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1848309 1848310

Parameter	Units	40185260002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	229	200	200	439	425	105	98	90-110	3	15	
Fluoride	mg/L	<0.10	2	2	1.9	2.0	97	99	90-110	2	15	
Sulfate	mg/L	201	200	200	411	397	105	98	90-110	3	15	

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

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Green Bay, WI 54302
(920)469-2436

ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185256

Sample: MW-301 | **Lab ID: 40185256001** | Collected: 04/02/19 17:20 | Received: 04/04/19 09:30 | Matrix: Water
PWS: | Site ID: | Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	**0.000 ± 0.278 (0.565) C:NA T:94%**	pCi/L	04/22/19 23:16	13982-63-3	
Radium-228	EPA 904.0	**0.552 ± 0.391 (0.759) C:75% T:91%**	pCi/L	04/19/19 12:45	15262-20-1	
Total Radium	Total Radium Calculation	**0.552 ± 0.669 (1.32)**	pCi/L	04/25/19 11:01	7440-14-4	

Sample: MW-84A | **Lab ID: 40185256002** | Collected: 04/03/19 09:40 | Received: 04/04/19 09:30 | Matrix: Water
PWS: | Site ID: | Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	**0.199 ± 0.391 (0.715) C:NA T:93%**	pCi/L	04/22/19 23:16	13982-63-3	
Radium-228	EPA 904.0	**0.482 ± 0.511 (1.07) C:72% T:80%**	pCi/L	04/19/19 12:45	15262-20-1	
Total Radium	Total Radium Calculation	**0.681 ± 0.902 (1.79)**	pCi/L	04/25/19 11:01	7440-14-4	

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QUALITY CONTROL - RADIOCHEMISTRY

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185256

QC Batch: 338211 Analysis Method: EPA 904.0
QC Batch Method: EPA 904.0 Analysis Description: 904.0 Radium 228
Associated Lab Samples: 40185256001, 40185256002

METHOD BLANK: 1646527 Matrix: Water
Associated Lab Samples: 40185256001, 40185256002

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-228	-0.0681 ± 0.343 (0.816) C:74% T:84%	pCi/L	04/19/19 12:45	

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.

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QUALITY CONTROL - RADIOCHEMISTRY

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185256

QC Batch: 338210 Analysis Method: EPA 903.1
QC Batch Method: EPA 903.1 Analysis Description: 903.1 Radium-226
Associated Lab Samples: 40185256001, 40185256002

METHOD BLANK: 1646526 Matrix: Water
Associated Lab Samples: 40185256001, 40185256002

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-226	0.212 ± 0.323 (0.520) C:NA T:90%	pCi/L	04/22/19 22:44	

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.

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Green Bay, WI 54302
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QUALIFIERS

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185256

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.

LABORATORIES

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

ANALYTE QUALIFIERS

B	Analyte was detected in the associated method blank.
D3	Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.
H6	Analysis initiated outside of the 15 minute EPA required holding time.
P6	Matrix spike recovery was outside laboratory control limits due to a parent sample concentration notably higher than the spike level.

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185256

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
40185256001	**MW-301**	EPA 3010	317485	EPA 6020	317570
40185256002	**MW-84A**	EPA 3010	317485	EPA 6020	317570
40185256001	**MW-301**	EPA 7470	318138	EPA 7470	318191
40185256002	**MW-84A**	EPA 7470	318138	EPA 7470	318191
40185256001	**MW-301**				
40185256002	**MW-84A**				
40185256001	**MW-301**	EPA 903.1	338210		
40185256002	**MW-84A**	EPA 903.1	338210		
40185256001	**MW-301**	EPA 904.0	338211		
40185256002	**MW-84A**	EPA 904.0	338211		
40185256001	**MW-301**	Total Radium Calculation	339896		
40185256002	**MW-84A**	Total Radium Calculation	339897		
40185256001	**MW-301**	SM 2540C	317813		
40185256002	**MW-84A**	SM 2540C	317813		
40185256001	**MW-301**	EPA 9040	317619		
40185256002	**MW-84A**	EPA 9040	317619		
40185256001	**MW-301**	EPA 300.0	317955		
40185256002	**MW-84A**	EPA 300.0	317955		

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CHAIN OF CUSTODY

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

Page 1 of

40185256

MY

(Please Print Clearly)

Company Name:	SCS
Branch/Location:	Madison WI
Project Contact:	Meg Blodgett
Phone:	608 216 7362
Project Number:	25219067
Project Name:	Alliant - Columbia
Project State:	WI
Sampled By (Print):	Adam Watson
Sampled By (Sign):	Paul A. Brown for Adam Watson
PO #:	
Regulatory Program:	

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

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

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

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

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

			FILTERED? (YES/NO)	Y/N	No	No	No	No	
			PRESERVATION (CODE)*	Pick Letter	A	C	C	C	
PACE LAB #	CLIENT FIELD ID	COLLECTION ① DATE	TIME	MATRIX	Cl, Floride, Ph, SO4, TDS	Metals	Radium 226	Radium 228	CLIENT COMMENTS / LAB COMMENTS (Lab Use Only) / Profile #
001	MW 301	4/3/19	1720	W	X	X	X	X	
002	MW 84A	4/3/19	0940		X	X	X	X	
003	MW 303	4/1/19	1800		X	X	X	X	
004	MW 304	4/2/19	1230						
005	MW 305	4/1/19	1410						
006	M-4R	4/1/19	1515						
007	Field Blank PPond	4/2/19	1230						

① Filled in by Lab from labels 4/4/19 SMW

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

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

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

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

Relinquished By:	Date/Time:	Received By:	Date/Time:
Paul A. Brown	4-3-19 19:00		
Fed X	4/4/19 0930	Susan Kluge Pace	4/4/19 0930

PACE Project No. 40185256

Receipt Temp = ROI °C

Sample Receipt pH
OK / Adjusted

Cooler Custody Seal
Present / Not Present
Intact / Not Intact

C019a(27Jun2006)

Version 6.0 06/14/06

ORIGINAL

Page 1 of 40185256

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

(Please Print Clearly)

Company Name:	SCS
Branch/Location:	Madison WI
Project Contact:	Meg Blodgett
Phone:	608 216 7362
Project Number:	25219067
Project Name:	Alliant - Columbia
Project State:	WI
Sampled By (Print):	Adam Watson
Sampled By (Sign):	Paul A. Groom for Adam Watson
PO #:	
Regulatory Program:	

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

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

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

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

FILTERED? (YES/NO): No | No | No | No
PRESERVATION (CODE)* Pick Letter: A | C | C | C

PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX	CL, Floride, Ph, SO4, TDS	Metals	Radium 226	Radium 228	CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)	Profile #
	MW 301	4-2-19	17:20	GW	X	X	X	X			
	MW 84A	4-3-19	9:40	GW	X	X	X	X			
	MW 303	4-1-19	18:00	GW	X	X	X	X			
	MW 304	4-2-19	12:30								
	MW 305	4-1-19	14:10								
	M-4R	4-1-19	15:15								
	Field Blank PPond	4-2-19	12:30	DI							

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

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

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

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

Relinquished By:	Date/Time:	Received By:	Date/Time:
Paul A. Groom	4-3-19 19:00		
Fed Ex	4/4/19 0930	Sweat Wieg Pace	4/4/19 0930

PACE Project No. 40185256
Receipt Temp = °C
Sample Receipt pH OK / Adjusted
Cooler Custody Seal
Present / Not Present
Intact / Not Intact

Version 6.0 06/14/06
ORIGINAL

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Sample Preservation Receipt Form

Client Name: SCS

Project # 40185256

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

Initial when completed: SKW

Date/ Time:

Lab Lot# of pH paper: 10053581 Lab Std #ID of preservation (if pH adjusted):

	Glass							Plastic							Vials						Jars			General									
Pace Lab #	AG1U	AG1H	AG4S	AG4U	AG5U	AG2S	BG3U	BP1U	BP2N	BP2Z	BP3U	BP3C	BP3N	BP3S	DG9A	DG9T	VG9U	VG9H	VG9M	VG9D	JGFU	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									4		2		1																		X		2.5 / 5 / 10
002									4		2		1																		X		2.5 / 5 / 10
003									4		2		1																		X		2.5 / 5 / 10
004									4		2		1																		X		2.5 / 5 / 10
005									4		2		1																		X		2.5 / 5 / 10
006									4		2		1																		X		2.5 / 5 / 10
007									4		2		1																		X		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

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	DG9A	40 mL amber ascorbic	JGFU	4 oz amber jar unpres
AG1H	1 liter amber glass HCL	BP2N	500 mL plastic HNO3	DG9T	40 mL amber Na Thio	WGFU	4 oz clear jar unpres
AG4S	125 mL amber glass H2SO4	BP2Z	500 mL plastic NaOH, Znact	VG9U	40 mL clear vial unpres	WPFU	4 oz plastic jar unpres
AG4U	120 mL amber glass unpres	BP3U	250 mL plastic unpres	VG9H	40 mL clear vial HCL		
AG5U	100 mL amber glass unpres	BP3C	250 mL plastic NaOH	VG9M	40 mL clear vial MeOH	SP5T	120 mL plastic Na Thiosulfate
AG2S	500 mL amber glass H2SO4	BP3N	250 mL plastic HNO3	VG9D	40 mL clear vial DI	ZPLC	ziploc bag
BG3U	250 mL clear glass unpres	BP3S	250 mL plastic H2SO4			GN:	

Sample Condition Upon Receipt Form (SCUR)

Project #:

WO# : 40185256

40185256

Client Name: SCS

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

Tracking #: 7864 3720 0524

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 - N/A **Type of Ice:** Wet Blue Dry None ☑ Samples on ice, cooling process has begun

Cooler Temperature Uncorr: ROI /Corr:

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.

Person examining contents:
Date: 4-4-19
Initials: SW

Chain of Custody Present:	☑ Yes ☐ No ☐ N/A	1.
Chain of Custody Filled Out:	☐ Yes ☑ No ☐ N/A	2. No po#, Mail, Invoice, Collect date & time, Lab added to COC 4-4-19 SW
Chain of Custody Relinquished:	☑ Yes ☐ No ☐ N/A	3.
Sampler Name & Signature on COC:	☑ Yes ☐ No ☐ N/A	4. Recieved updated COC via email from client 4-4-19 SW
Samples Arrived within Hold Time:	☑ Yes ☐ No	5.
- VOA Samples frozen upon receipt	☐ Yes ☐ No	Date/Time:
Short Hold Time Analysis (<72hr):	☑ Yes ☐ No	6.
Rush Turn Around Time Requested:	☐ Yes ☑ No	7.
Sufficient Volume: For Analysis: ☑ Yes ☐ No	MS/MSD: ☐ Yes ☑ No ☐ N/A	8.
Correct Containers Used:	☑ Yes ☐ No	9.
-Pace Containers Used:	☑ Yes ☐ No ☐ N/A	
-Pace IR Containers Used:	☐ Yes ☐ No ☑ N/A	
Containers Intact:	☑ Yes ☐ No	10.
Filtered volume received for Dissolved tests	☐ Yes ☐ No ☑ N/A	11.
Sample Labels match COC:	☑ Yes ☐ No ☐ N/A	12.
-Includes date/time/ID/Analysis Matrix: W		
Trip Blank Present:	☐ Yes ☐ No ☑ N/A	13.
Trip Blank Custody Seals Present	☐ Yes ☐ No ☑ N/A	
Pace Trip Blank Lot # (if purchased):		

Client Notification/ Resolution:

If checked, see attached form for additional comments ☐

Person Contacted: Date/Time:

Comments/ Resolution:

Project Manager Review: AR for DM **Date:** 4/4/19

A2 October 2019 Detection Monitoring

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

October 28, 2019

Meghan Blodgett
SCS ENGINEERS
2830 Dairy Drive
Madison, WI 53718

RE: Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196971

Dear Meghan Blodgett:

Enclosed are the analytical results for sample(s) received by the laboratory on October 10, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

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

Sincerely,

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

Enclosures

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

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

CERTIFICATIONS

Project:	25219067.00 COLUMBIA CCR
Pace Project No.:	40196971

Green Bay Certification IDs

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

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Green Bay, WI 54302
(920)469-2436

SAMPLE SUMMARY

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196971

Lab ID	Sample ID	Matrix	Date Collected	Date Received
40196971001	**MW-302**	Water	10/09/19 11:00	10/10/19 09:15
40196971002	**MW-33AR**	Water	10/08/19 15:40	10/10/19 09:15
40196971003	**MW-34A**	Water	10/08/19 14:35	10/10/19 09:15
40196971004	**FIELD BLANK MOD 1-3 LF**	Water	10/08/19 14:35	10/10/19 09:15

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

SAMPLE ANALYTE COUNT

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196971

Lab ID	Sample ID	Method	Analysts	Analytes Reported
40196971001	**MW-302**	EPA 6020	DS1	2
			HMG	7
		SM 2540C	TMK	1
		EPA 9040	ALY	1
		EPA 300.0	HMB	3
40196971002	**MW-33AR**	EPA 6020	DS1	2
			HMG	7
		SM 2540C	TMK	1
		EPA 9040	ALY	1
		EPA 300.0	HMB	3
40196971003	**MW-34A**	EPA 6020	DS1	2
			HMG	7
		SM 2540C	TMK	1
		EPA 9040	ALY	1
		EPA 300.0	HMB	3
40196971004	**FIELD BLANK MOD 1-3 LF**	EPA 6020	DS1	2
		SM 2540C	TMK	1
		EPA 9040	ALY	1
		EPA 300.0	HMB	3

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

ANALYTICAL RESULTS

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196971

Sample: MW-302 **Lab ID: 40196971001** Collected: 10/09/19 11:00 Received: 10/10/19 09:15 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Boron	**246**	ug/L	10.0	3.0	1	10/11/19 07:55	10/15/19 10:39	7440-42-8	
Calcium	**61400**	ug/L	254	76.2	1	10/11/19 07:55	10/15/19 10:39	7440-70-2	
Field Data	Analytical Method:								
Field pH	**7.08**	Std. Units			1		10/09/19 11:00		
Field Specific Conductance	**515.4**	umhos/cm			1		10/09/19 11:00		
Oxygen, Dissolved	**11.38**	mg/L			1		10/09/19 11:00	7782-44-7	
REDOX	**134.5**	mV			1		10/09/19 11:00		
Turbidity	**2.01**	NTU			1		10/09/19 11:00		
Static Water Level	**788.31**	feet			1		10/09/19 11:00		
Temperature, Water (C)	**12.6**	deg C			1		10/09/19 11:00		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**274**	mg/L	20.0	8.7	1		10/11/19 18:20		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**7.4**	Std. Units	0.10	0.010	1		10/18/19 09:46		H6
300.0 IC Anions	Analytical Method: EPA 300.0								
Chloride	**1.1J**	mg/L	2.0	0.50	1		10/21/19 19:32	16887-00-6	
Fluoride	**<0.10**	mg/L	0.30	0.10	1		10/21/19 19:32	16984-48-8	
Sulfate	**16.7**	mg/L	3.0	1.0	1		10/21/19 19:32	14808-79-8	

Sample: MW-33AR **Lab ID: 40196971002** Collected: 10/08/19 15:40 Received: 10/10/19 09:15 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Boron	**548**	ug/L	10.0	3.0	1	10/11/19 07:55	10/15/19 10:46	7440-42-8	
Calcium	**121000**	ug/L	254	76.2	1	10/11/19 07:55	10/15/19 10:46	7440-70-2	
Field Data	Analytical Method:								
Field pH	**7.74**	Std. Units			1		10/08/19 15:40		
Field Specific Conductance	**1102**	umhos/cm			1		10/08/19 15:40		
Oxygen, Dissolved	**12.19**	mg/L			1		10/08/19 15:40	7782-44-7	
REDOX	**165.1**	mV			1		10/08/19 15:40		
Turbidity	**2.13**	NTU			1		10/08/19 15:40		
Static Water Level	**788.26**	feet			1		10/08/19 15:40		
Temperature, Water (C)	**12.8**	deg C			1		10/08/19 15:40		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**634**	mg/L	20.0	8.7	1		10/11/19 18:20		

REPORT OF LABORATORY ANALYSIS

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(920)469-2436

ANALYTICAL RESULTS

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196971

Sample: MW-33AR **Lab ID: 40196971002** Collected: 10/08/19 15:40 Received: 10/10/19 09:15 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**7.6**	Std. Units	0.10	0.010	1		10/18/19 09:48		H6
300.0 IC Anions	Analytical Method: EPA 300.0								
Chloride	**153**	mg/L	20.0	5.0	10		10/22/19 14:29	16887-00-6	
Fluoride	**<0.10**	mg/L	0.30	0.10	1		10/21/19 19:45	16984-48-8	
Sulfate	**182**	mg/L	30.0	10.0	10		10/22/19 14:29	14808-79-8	

Sample: MW-34A **Lab ID: 40196971003** Collected: 10/08/19 14:35 Received: 10/10/19 09:15 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Boron	**207**	ug/L	10.0	3.0	1	10/11/19 07:55	10/15/19 10:52	7440-42-8	
Calcium	**78800**	ug/L	254	76.2	1	10/11/19 07:55	10/15/19 10:52	7440-70-2	
Field Data	Analytical Method:								
Field pH	**7.79**	Std. Units			1		10/08/19 14:35		
Field Specific Conductance	**572.9**	umhos/cm			1		10/08/19 14:35		
Oxygen, Dissolved	**11.71**	mg/L			1		10/08/19 14:35	7782-44-7	
REDOX	**150.9**	mV			1		10/08/19 14:35		
Turbidity	**52.88**	NTU			1		10/08/19 14:35		
Static Water Level	**787.92**	feet			1		10/08/19 14:35		
Temperature, Water (C)	**13.4**	deg C			1		10/08/19 14:35		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**314**	mg/L	20.0	8.7	1		10/11/19 18:21		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**7.7**	Std. Units	0.10	0.010	1		10/18/19 09:50		H6
300.0 IC Anions	Analytical Method: EPA 300.0								
Chloride	**57.9**	mg/L	2.0	0.50	1		10/21/19 19:58	16887-00-6	
Fluoride	**<0.10**	mg/L	0.30	0.10	1		10/21/19 19:58	16984-48-8	
Sulfate	**39.8**	mg/L	3.0	1.0	1		10/21/19 19:58	14808-79-8	

Sample: FIELD BLANK MOD 1-3 LF **Lab ID: 40196971004** Collected: 10/08/19 14:35 Received: 10/10/19 09:15 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Boron	**<3.0**	ug/L	10.0	3.0	1	10/11/19 07:55	10/15/19 08:07	7440-42-8	
Calcium	**<76.2**	ug/L	254	76.2	1	10/11/19 07:55	10/15/19 08:07	7440-70-2	

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ANALYTICAL RESULTS

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196971

Sample: FIELD BLANK MOD 1-3 LF **Lab ID: 40196971004** Collected: 10/08/19 14:35 Received: 10/10/19 09:15 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**<8.7**	mg/L	20.0	8.7	1		10/11/19 18:21		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**6.3**	Std. Units	0.10	0.010	1		10/18/19 09:55		H6
300.0 IC Anions	Analytical Method: EPA 300.0								
Chloride	**<0.50**	mg/L	2.0	0.50	1		10/21/19 20:11	16887-00-6	
Fluoride	**<0.10**	mg/L	0.30	0.10	1		10/21/19 20:11	16984-48-8	
Sulfate	**<1.0**	mg/L	3.0	1.0	1		10/21/19 20:11	14808-79-8	

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QUALITY CONTROL DATA

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196971

QC Batch: 337095 Analysis Method: EPA 6020
QC Batch Method: EPA 3010 Analysis Description: 6020 MET
Associated Lab Samples: 40196971001, 40196971002, 40196971003, 40196971004

METHOD BLANK: 1957892 Matrix: Water
Associated Lab Samples: 40196971001, 40196971002, 40196971003, 40196971004

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Boron	ug/L	<3.0	10.0	10/15/19 07:53	
Calcium	ug/L	<76.2	254	10/15/19 07:53	

LABORATORY CONTROL SAMPLE: 1957893

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Boron	ug/L	500	474	95	80-120	
Calcium	ug/L	5000	5060	101	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1957894 1957895

Parameter	Units	40196734001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Boron	ug/L	7220	500	500	7950	8800	146	316	75-125	10	20	P6
Calcium	ug/L	87600	5000	5000	95700	98200	161	210	75-125	3	20	P6

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

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QUALITY CONTROL DATA

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196971

QC Batch: 337218 | Analysis Method: SM 2540C
QC Batch Method: SM 2540C | Analysis Description: 2540C Total Dissolved Solids
Associated Lab Samples: 40196971001, 40196971002, 40196971003, 40196971004

METHOD BLANK: 1959158 | Matrix: Water
Associated Lab Samples: 40196971001, 40196971002, 40196971003, 40196971004

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	<8.7	20.0	10/11/19 18:18	

LABORATORY CONTROL SAMPLE: 1959159

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Dissolved Solids	mg/L	547	560	102	80-120	

SAMPLE DUPLICATE: 1959160

Parameter	Units	40196967001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	574	564	2	10	

SAMPLE DUPLICATE: 1959161

Parameter	Units	40196971001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	274	278	1	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.

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QUALITY CONTROL DATA

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196971

QC Batch: 337952 Analysis Method: EPA 9040
QC Batch Method: EPA 9040 Analysis Description: 9040 pH
Associated Lab Samples: 40196971001, 40196971002, 40196971003, 40196971004

SAMPLE DUPLICATE: 1962801

Parameter	Units	40196967002 Result	Dup Result	RPD	Max RPD	Qualifiers
pH at 25 Degrees C	Std. Units	7.3	7.3	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.

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QUALITY CONTROL DATA

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196971

QC Batch: 337822 — Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 — Analysis Description: 300.0 IC Anions
Associated Lab Samples: 40196971001, 40196971002, 40196971003, 40196971004

METHOD BLANK: 1962191 — Matrix: Water
Associated Lab Samples: 40196971001, 40196971002, 40196971003, 40196971004

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chloride	mg/L	<0.50	2.0	10/21/19 11:34	
Fluoride	mg/L	<0.10	0.30	10/21/19 11:34	
Sulfate	mg/L	<1.0	3.0	10/21/19 11:34	

LABORATORY CONTROL SAMPLE: 1962192

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	20	20.1	101	90-110	
Fluoride	mg/L	2	2.0	102	90-110	
Sulfate	mg/L	20	20.1	100	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1962193 1962194

Parameter	Units	40196954007 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	14.1	20	20	33.8	33.6	99	98	90-110	1	15	
Fluoride	mg/L	<0.10	2	2	2.1	2.1	102	102	90-110	0	15	
Sulfate	mg/L	7.2	20	20	27.0	26.9	99	98	90-110	0	15	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1962195 1962196

Parameter	Units	40196971011 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	1.6J	20	20	20.9	21.3	97	99	90-110	2	15	
Fluoride	mg/L	<0.10	2	2	2.1	2.1	102	102	90-110	0	15	
Sulfate	mg/L	<1.0	20	20	20.6	20.4	102	101	90-110	1	15	

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

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QUALIFIERS

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196971

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.

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TNI - The NELAC Institute.

ANALYTE QUALIFIERS

H6 Analysis initiated outside of the 15 minute EPA required holding time.

P6 Matrix spike recovery was outside laboratory control limits due to a parent sample concentration notably higher than the spike level.

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196971

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
40196971001	**MW-302**	EPA 3010	337095	EPA 6020	337193
40196971002	**MW-33AR**	EPA 3010	337095	EPA 6020	337193
40196971003	**MW-34A**	EPA 3010	337095	EPA 6020	337193
40196971004	**FIELD BLANK MOD 1-3 LF**	EPA 3010	337095	EPA 6020	337193
40196971001	**MW-302**				
40196971002	**MW-33AR**				
40196971003	**MW-34A**				
40196971001	**MW-302**	SM 2540C	337218		
40196971002	**MW-33AR**	SM 2540C	337218		
40196971003	**MW-34A**	SM 2540C	337218		
40196971004	**FIELD BLANK MOD 1-3 LF**	SM 2540C	337218		
40196971001	**MW-302**	EPA 9040	337952		
40196971002	**MW-33AR**	EPA 9040	337952		
40196971003	**MW-34A**	EPA 9040	337952		
40196971004	**FIELD BLANK MOD 1-3 LF**	EPA 9040	337952		
40196971001	**MW-302**	EPA 300.0	337822		
40196971002	**MW-33AR**	EPA 300.0	337822		
40196971003	**MW-34A**	EPA 300.0	337822		
40196971004	**FIELD BLANK MOD 1-3 LF**	EPA 300.0	337822		

REPORT OF LABORATORY ANALYSIS

(Please Print Clearly)

Company Name:	SCS Engineers
Branch/Location:	Madison, WI.
Project Contact:	Tom Karwoski
Phone:	608-224-2830
Project Number:	25219067.00
Project Name:	Columbia
Project State:	Wisconsin
Sampled By (Print):	Adam Watson
Sampled By (Sign):	
PO #:	Regulatory Program:

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CHAIN OF CUSTODY

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

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

Quote #:	
Mail To Contact:	Tom Karwoski
Mail To Company:	SCS Engineers
Mail To Address:	2830 Dairy Dr Madison, WI 53718
Invoice To Contact:	Same
Invoice To Company:	
Invoice To Address:	
Invoice To Phone:	

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

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

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

PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX	Analyses Requested	Boron/Calcium	pH	TDS, Cl, F, SO4						CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)	Profile #
					FILTERED? (YES/NO) Y/N	N	N	N								
					PRESERVATION (CODE)* Pick Letter	D	A	A								
	MW-302	10/9/19	1100	W		X	X	X							001	
	MW-33AR	10/8/19	1540	W		X	X	X							002	
	MW-34A	10/8/19	1435	W		X	X	X							003	
	Field blank Mod 1-3LF	10/8/19	1435	W		X	X	X							004	
	MW-309	10/8/19	1150	W		X	X	X							005	
	MW-310	10/8/19	1250	W		X	X	X							006	
	MW-311	10/8/19	1340	W		X	X	X							007	
	Field blank Mod 4	10/8/19	1150	W		X	X	X							008	
	MW-306	10/8/19	1055	W		X	X	X							009	
	MW-307	10/7/19	1005	W		X	X	X							010	
	MW-308	10/7/19	1355	W		X	X	X							011	
	Field blank SCPOND	10/8/19	1055	W		X	X	X							012	

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

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

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

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

Relinquished By:	Date/Time:	Received By:	Date/Time:
	10/9/19 1600		
CS Logistics	10/10/19 0915		10/10/19 0915

PACE Project No. 4096971
Receipt Temp = ROI °C
Sample Receipt pH
OK / Adjusted
Cooler Custody Seal
Present / Not Present
Intact / Not Intact

Version 6.0 06/14/06
C019a(27Jun2006)
ORIGINAL

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Green Bay, WI 54302

Sample Preservation Receipt Form

Client Name: SCS Engineers

Project # 40196971

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

Lab Lot# of pH paper: 10US0891

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

Initial when completed: [initials]

Date/ Time:

Pace Lab #	Glass: AG1U	AG1H	AG4S	AG4U	AG5U	AG2S	BG3U	Plastic: BP1U	BP2N	BP2Z	BP3U	BP3B	BP3N	BP3S	Vials: DG9A	DG9T	VG9U	VG9H	VG9M	VG9D	Jars: JGFU	WGFU	WPFU	General: SP5T	ZPLC	GN	VOA Vials (>6mm) *	H2SO4 pH ≤2	NaOH+Zn Act pH ≥9	NaOH pH ≥12	HNO3 pH ≤2	pH after adjusted	Volume (mL)
001											2		1																		X		2.5 / 5 / 10
002											2		1																		X		2.5 / 5 / 10
003											2		1																		X		2.5 / 5 / 10
004											2		1																		X		2.5 / 5 / 10
005											2		1																		X		2.5 / 5 / 10
006											2		1																		X		2.5 / 5 / 10
007											2		1																		X		2.5 / 5 / 10
008											2		1																		X		2.5 / 5 / 10
009											2		1																		X		2.5 / 5 / 10
010											2		1																		X		2.5 / 5 / 10
011											2		1																		X		2.5 / 5 / 10
012											2		1																		X		2.5 / 5 / 10
013																																	2.5 / 5 / 10
014																																	2.5 / 5 / 10
015																																	2.5 / 5 / 10
016																																	2.5 / 5 / 10
017																																	2.5 / 5 / 10
018																																	2.5 / 5 / 10
019																																	2.5 / 5 / 10
020																																	2.5 / 5 / 10

10/10/17 [initials]

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	DG9A	40 mL amber ascorbic	JGFU	4 oz amber jar unpres
AG1H	1 liter amber glass HCL	BP2N	500 mL plastic HNO3	DG9T	40 mL amber Na Thio	WGFU	4 oz clear jar unpres
AG4S	125 mL amber glass H2SO4	BP2Z	500 mL plastic NaOH, Znact	VG9U	40 mL clear vial unpres	WPFU	4 oz plastic jar unpres
AG4U	120 mL amber glass unpres	BP3U	250 mL plastic unpres	VG9H	40 mL clear vial HCL		
AG5U	100 mL amber glass unpres	BP3B	250 mL plastic NaOH	VG9M	40 mL clear vial MeOH	SP5T	120 mL plastic Na Thiosulfate
AG2S	500 mL amber glass H2SO4	BP3N	250 mL plastic HNO3	VG9D	40 mL clear vial DI	ZPLC	ziploc bag
BG3U	250 mL clear glass unpres	BP3S	250 mL plastic H2SO4			GN:	

Pace Analytical 1241 Bellevue Street, Green Bay, WI 54302	Document Name: **Sample Condition Upon Receipt (SCUR)**	Document Revised: 25Apr2018
	Document No.: **F-GB-C-031-Rev.07**	Issuing Authority: Pace Green Bay Quality Office

Sample Condition Upon Receipt Form (SCUR)

Project #: **WO#:40196971**

40196971

Client Name: SCS Engineers

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

Tracking #: 2120.100919

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 plastic bag

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

Cooler Temperature Uncorr: ROI /Corr: –

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.

Person examining contents:
Date: 10/10/19
Initials: JW

Chain of Custody Present:	☒Yes ☐No ☐N/A	1.
Chain of Custody Filled Out:	☒Yes ☐No ☐N/A	2.
Chain of Custody Relinquished:	☒Yes ☐No ☐N/A	3.
Sampler Name & Signature on COC:	☒Yes ☐No ☐N/A	4.
Samples Arrived within Hold Time: - 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: ____

Project Manager Review: [signature] DM **Date:** 10-10-19

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

November 01, 2019

Meghan Blodgett
SCS ENGINEERS
2830 Dairy Drive
Madison, WI 53718

RE: Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196970

Dear Meghan Blodgett:

Enclosed are the analytical results for sample(s) received by the laboratory on October 10, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

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

Sincerely,

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

Enclosures

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

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CERTIFICATIONS

Project:	25219067.00 COLUMBIA CCR
Pace Project No.:	40196970

Pennsylvania Certification IDs

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

Green Bay Certification IDs

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

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SAMPLE SUMMARY

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196970

Lab ID	Sample ID	Matrix	Date Collected	Date Received
40196970001	**MW-301**	Water	10/09/19 12:00	10/10/19 09:15
40196970002	**MW-84A**	Water	10/09/19 13:10	10/10/19 09:15

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SAMPLE ANALYTE COUNT

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196970

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
40196970001	**MW-301**	EPA 6020	DS1	14	PASI-G
		EPA 7470	AJT	1	PASI-G
			HMG	7	PASI-G
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
		Total Radium Calculation	CMC	1	PASI-PA
		SM 2540C	TMK	1	PASI-G
		EPA 9040	ALY	1	PASI-G
		EPA 300.0	HMB	3	PASI-G
40196970002	**MW-84A**	EPA 6020	DS1	14	PASI-G
		EPA 7470	AJT	1	PASI-G
			HMG	7	PASI-G
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
		Total Radium Calculation	CMC	1	PASI-PA
		SM 2540C	TMK	1	PASI-G
		EPA 9040	ALY	1	PASI-G
		EPA 300.0	HMB	3	PASI-G

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ANALYTICAL RESULTS

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196970

Sample: MW-301 **Lab ID: 40196970001** Collected: 10/09/19 12:00 Received: 10/10/19 09:15 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Antimony	**<0.15**	ug/L	1.0	0.15	1	10/14/19 07:07	10/14/19 23:25	7440-36-0	
Arsenic	**0.42J**	ug/L	1.0	0.28	1	10/14/19 07:07	10/15/19 12:57	7440-38-2	
Barium	**10**	ug/L	2.3	0.70	1	10/14/19 07:07	10/14/19 23:25	7440-39-3	
Beryllium	**<0.25**	ug/L	1.0	0.25	1	10/14/19 07:07	10/15/19 12:57	7440-41-7	
Boron	**35.9**	ug/L	10.0	3.0	1	10/14/19 07:07	10/15/19 12:57	7440-42-8	
Cadmium	**<0.15**	ug/L	1.0	0.15	1	10/14/19 07:07	10/14/19 23:25	7440-43-9	
Calcium	**114000**	ug/L	254	76.2	1	10/14/19 07:07	10/15/19 12:57	7440-70-2	
Chromium	**<1.0**	ug/L	3.4	1.0	1	10/14/19 07:07	10/15/19 12:57	7440-47-3	
Cobalt	**<0.12**	ug/L	1.0	0.12	1	10/14/19 07:07	10/15/19 12:57	7440-48-4	
Lead	**<0.24**	ug/L	1.0	0.24	1	10/14/19 07:07	10/14/19 23:25	7439-92-1	
Lithium	**0.61J**	ug/L	1.0	0.22	1	10/14/19 07:07	10/15/19 12:57	7439-93-2	
Molybdenum	**<0.44**	ug/L	1.5	0.44	1	10/14/19 07:07	10/14/19 23:25	7439-98-7	
Selenium	**<0.32**	ug/L	1.1	0.32	1	10/14/19 07:07	10/15/19 12:57	7782-49-2	
Thallium	**<0.14**	ug/L	1.0	0.14	1	10/14/19 07:07	10/14/19 23:25	7440-28-0	
7470 Mercury	Analytical Method: EPA 7470 Preparation Method: EPA 7470								
Mercury	**<0.084**	ug/L	0.28	0.084	1	10/22/19 14:50	10/23/19 09:18	7439-97-6	
Field Data	Analytical Method:								
Field pH	**6.67**	Std. Units			1		10/09/19 12:00		
Field Specific Conductance	**801**	umhos/cm			1		10/09/19 12:00		
Oxygen, Dissolved	**1.67**	mg/L			1		10/09/19 12:00	7782-44-7	
REDOX	**173.0**	mV			1		10/09/19 12:00		
Turbidity	**2.12**	NTU			1		10/09/19 12:00		
Static Water Level	**788.47**	feet			1		10/09/19 12:00		
Temperature, Water (C)	**11.3**	deg C			1		10/09/19 12:00		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**418**	mg/L	20.0	8.7	1		10/15/19 16:41		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**7.0**	Std. Units	0.10	0.010	1		10/18/19 09:42		H6
300.0 IC Anions	Analytical Method: EPA 300.0								
Chloride	**1.7J**	mg/L	2.0	0.50	1		10/21/19 18:26	16887-00-6	
Fluoride	**<0.10**	mg/L	0.30	0.10	1		10/21/19 18:26	16984-48-8	
Sulfate	**8.4**	mg/L	3.0	1.0	1		10/21/19 18:26	14808-79-8	

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ANALYTICAL RESULTS

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196970

Sample: MW-84A **Lab ID: 40196970002** Collected: 10/09/19 13:10 Received: 10/10/19 09:15 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Antimony	**<0.15**	ug/L	1.0	0.15	1	10/14/19 07:07	10/14/19 23:46	7440-36-0	
Arsenic	**0.46J**	ug/L	1.0	0.28	1	10/14/19 07:07	10/15/19 13:34	7440-38-2	
Barium	**13.2**	ug/L	2.3	0.70	1	10/14/19 07:07	10/14/19 23:46	7440-39-3	
Beryllium	**<0.25**	ug/L	1.0	0.25	1	10/14/19 07:07	10/15/19 13:34	7440-41-7	
Boron	**12.0**	ug/L	10.0	3.0	1	10/14/19 07:07	10/15/19 13:34	7440-42-8	
Cadmium	**<0.15**	ug/L	1.0	0.15	1	10/14/19 07:07	10/15/19 13:34	7440-43-9	
Calcium	**73500**	ug/L	254	76.2	1	10/14/19 07:07	10/15/19 13:34	7440-70-2	
Chromium	**1.6J**	ug/L	3.4	1.0	1	10/14/19 07:07	10/15/19 13:34	7440-47-3	
Cobalt	**<0.12**	ug/L	1.0	0.12	1	10/14/19 07:07	10/15/19 13:34	7440-48-4	
Lead	**<0.24**	ug/L	1.0	0.24	1	10/14/19 07:07	10/14/19 23:46	7439-92-1	
Lithium	**0.52J**	ug/L	1.0	0.22	1	10/14/19 07:07	10/15/19 13:34	7439-93-2	
Molybdenum	**<0.44**	ug/L	1.5	0.44	1	10/14/19 07:07	10/15/19 13:34	7439-98-7	
Selenium	**<0.32**	ug/L	1.1	0.32	1	10/14/19 07:07	10/15/19 13:34	7782-49-2	
Thallium	**<0.14**	ug/L	1.0	0.14	1	10/14/19 07:07	10/14/19 23:46	7440-28-0	
7470 Mercury	Analytical Method: EPA 7470 Preparation Method: EPA 7470								
Mercury	**<0.084**	ug/L	0.28	0.084	1	10/22/19 14:50	10/23/19 09:25	7439-97-6	
Field Data	Analytical Method:								
Field pH	**7.23**	Std. Units			1		10/09/19 13:10		
Field Specific Conductance	**614.1**	umhos/cm			1		10/09/19 13:10		
Oxygen, Dissolved	**11.36**	mg/L			1		10/09/19 13:10	7782-44-7	
REDOX	**181.7**	mV			1		10/09/19 13:10		
Turbidity	**2.41**	NTU			1		10/09/19 13:10		
Static Water Level	**787.79**	feet			1		10/09/19 13:10		
Temperature, Water (C)	**11.8**	deg C			1		10/09/19 13:10		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**310**	mg/L	20.0	8.7	1		10/15/19 16:41		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**7.5**	Std. Units	0.10	0.010	1		10/18/19 09:44		H6
300.0 IC Anions	Analytical Method: EPA 300.0								
Chloride	**3.9**	mg/L	2.0	0.50	1		10/21/19 19:19	16887-00-6	
Fluoride	**<0.10**	mg/L	0.30	0.10	1		10/21/19 19:19	16984-48-8	
Sulfate	**1.3J**	mg/L	3.0	1.0	1		10/21/19 19:19	14808-79-8	

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QUALITY CONTROL DATA

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196970

QC Batch: 338359 Analysis Method: EPA 7470
QC Batch Method: EPA 7470 Analysis Description: 7470 Mercury
Associated Lab Samples: 40196970001, 40196970002

METHOD BLANK: 1964880 Matrix: Water
Associated Lab Samples: 40196970001, 40196970002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mercury	ug/L	<0.084	0.28	10/23/19 09:14	

LABORATORY CONTROL SAMPLE: 1964881

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury	ug/L	5	5.3	105	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1964882 1964883

Parameter	Units	40196970001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mercury	ug/L	<0.084	5	5	5.1	5.0	101	100	85-115	1	20	

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QUALITY CONTROL DATA

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196970

QC Batch: 337277 Analysis Method: EPA 6020
QC Batch Method: EPA 3010 Analysis Description: 6020 MET
Associated Lab Samples: 40196970001, 40196970002

METHOD BLANK: 1959950 Matrix: Water
Associated Lab Samples: 40196970001, 40196970002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Antimony	ug/L	<0.15	1.0	10/14/19 18:40	
Arsenic	ug/L	<0.28	1.0	10/14/19 18:40	
Barium	ug/L	<0.70	2.3	10/14/19 18:40	
Beryllium	ug/L	<0.25	1.0	10/14/19 18:40	
Boron	ug/L	<3.0	10.0	10/14/19 18:40	
Cadmium	ug/L	<0.15	1.0	10/14/19 18:40	
Calcium	ug/L	<76.2	254	10/14/19 18:40	
Chromium	ug/L	<1.0	3.4	10/14/19 18:40	
Cobalt	ug/L	<0.12	1.0	10/14/19 18:40	
Lead	ug/L	<0.24	1.0	10/14/19 18:40	
Lithium	ug/L	<0.22	1.0	10/14/19 18:40	
Molybdenum	ug/L	<0.44	1.5	10/14/19 18:40	
Selenium	ug/L	<0.32	1.1	10/14/19 18:40	
Thallium	ug/L	<0.14	1.0	10/14/19 18:40	

LABORATORY CONTROL SAMPLE: 1959951

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Antimony	ug/L	500	497	99	80-120	
Arsenic	ug/L	500	478	96	80-120	
Barium	ug/L	500	477	95	80-120	
Beryllium	ug/L	500	488	98	80-120	
Boron	ug/L	500	464	93	80-120	
Cadmium	ug/L	500	501	100	80-120	
Calcium	ug/L	5000	5080	102	80-120	
Chromium	ug/L	500	478	96	80-120	
Cobalt	ug/L	500	467	93	80-120	
Lead	ug/L	500	470	94	80-120	
Lithium	ug/L	500	477	95	80-120	
Molybdenum	ug/L	500	452	90	80-120	
Selenium	ug/L	500	494	99	80-120	
Thallium	ug/L	500	476	95	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1959952 1959953

Parameter	Units	40196861005 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Antimony	ug/L	<0.15	500	500	513	510	103	102	75-125	1	20	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196970

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1959952 1959953

Parameter	Units	40196861005 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Arsenic	ug/L	2.4	500	500	512	504	102	100	75-125	2	20	
Barium	ug/L	169	500	500	671	672	100	101	75-125	0	20	
Beryllium	ug/L	<0.25	500	500	513	469	103	94	75-125	9	20	
Boron	ug/L	73.0	500	500	582	529	102	91	75-125	10	20	
Cadmium	ug/L	<0.15	500	500	514	512	103	102	75-125	0	20	
Calcium	ug/L	90300	5000	5000	96800	99900	130	192	75-125	3	20	P6
Chromium	ug/L	<1.0	500	500	492	486	98	97	75-125	1	20	
Cobalt	ug/L	<0.12	500	500	488	484	98	97	75-125	1	20	
Lead	ug/L	<0.24	500	500	489	489	98	98	75-125	0	20	
Lithium	ug/L	12.4	500	500	518	476	101	93	75-125	8	20	
Molybdenum	ug/L	2.6	500	500	477	476	95	95	75-125	0	20	
Selenium	ug/L	<0.32	500	500	524	521	105	104	75-125	1	20	
Thallium	ug/L	<0.14	500	500	502	502	100	100	75-125	0	20	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196970

QC Batch: 337571 | Analysis Method: SM 2540C
QC Batch Method: SM 2540C | Analysis Description: 2540C Total Dissolved Solids
Associated Lab Samples: 40196970001, 40196970002

METHOD BLANK: 1960873 | Matrix: Water
Associated Lab Samples: 40196970001, 40196970002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	<8.7	20.0	10/15/19 16:39	

LABORATORY CONTROL SAMPLE: 1960874

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Dissolved Solids	mg/L	547	558	102	80-120	

SAMPLE DUPLICATE: 1960875

Parameter	Units	40196939001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	354	368	4	10	

SAMPLE DUPLICATE: 1960876

Parameter	Units	40196970001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	418	406	3	10	

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QUALITY CONTROL DATA

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196970

QC Batch:	337952	Analysis Method:	EPA 9040
QC Batch Method:	EPA 9040	Analysis Description:	9040 pH

Associated Lab Samples: 40196970001, 40196970002

SAMPLE DUPLICATE: 1962801

Parameter	Units	40196967002 Result	Dup Result	RPD	Max RPD	Qualifiers
pH at 25 Degrees C	Std. Units	7.3	7.3	0	20	H6

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QUALITY CONTROL DATA

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196970

QC Batch: 337822 | Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 | Analysis Description: 300.0 IC Anions
Associated Lab Samples: 40196970001, 40196970002

METHOD BLANK: 1962191 | Matrix: Water
Associated Lab Samples: 40196970001, 40196970002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chloride	mg/L	<0.50	2.0	10/21/19 11:34	
Fluoride	mg/L	<0.10	0.30	10/21/19 11:34	
Sulfate	mg/L	<1.0	3.0	10/21/19 11:34	

LABORATORY CONTROL SAMPLE: 1962192

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	20	20.1	101	90-110	
Fluoride	mg/L	2	2.0	102	90-110	
Sulfate	mg/L	20	20.1	100	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1962193 1962194

Parameter	Units	40196954007 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	14.1	20	20	33.8	33.6	99	98	90-110	1	15	
Fluoride	mg/L	<0.10	2	2	2.1	2.1	102	102	90-110	0	15	
Sulfate	mg/L	7.2	20	20	27.0	26.9	99	98	90-110	0	15	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1962195 1962196

Parameter	Units	40196971011 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	1.6J	20	20	20.9	21.3	97	99	90-110	2	15	
Fluoride	mg/L	<0.10	2	2	2.1	2.1	102	102	90-110	0	15	
Sulfate	mg/L	<1.0	20	20	20.6	20.4	102	101	90-110	1	15	

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

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Green Bay, WI 54302
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ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196970

Sample: MW-301 **Lab ID: 40196970001** Collected: 10/09/19 12:00 Received: 10/10/19 09:15 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	**0.252 ± 0.351 (0.585) C:NA T:83%**	pCi/L	10/31/19 12:20	13982-63-3	
Radium-228	EPA 904.0	**0.449 ± 0.363 (0.723) C:77% T:95%**	pCi/L	10/30/19 14:23	15262-20-1	
Total Radium	Total Radium Calculation	**0.701 ± 0.714 (1.31)**	pCi/L	11/01/19 15:00	7440-14-4	

Sample: MW-84A **Lab ID: 40196970002** Collected: 10/09/19 13:10 Received: 10/10/19 09:15 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	**0.247 ± 0.292 (0.459) C:NA T:101%**	pCi/L	10/31/19 12:20	13982-63-3	
Radium-228	EPA 904.0	**-0.0240 ± 0.355 (0.827) C:78% T:89%**	pCi/L	10/30/19 14:24	15262-20-1	
Total Radium	Total Radium Calculation	**0.247 ± 0.647 (1.29)**	pCi/L	11/01/19 15:00	7440-14-4	

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QUALITY CONTROL - RADIOCHEMISTRY

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196970

QC Batch: 366494 | Analysis Method: EPA 903.1
QC Batch Method: EPA 903.1 | Analysis Description: 903.1 Radium-226
Associated Lab Samples: 40196970001, 40196970002

METHOD BLANK: 1777728 | Matrix: Water
Associated Lab Samples: 40196970001, 40196970002

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-226	0.0468 ± 0.331 (0.660) C:NA T:87%	pCi/L	10/31/19 12:20	

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.

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QUALITY CONTROL - RADIOCHEMISTRY

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196970

QC Batch: 366493 Analysis Method: EPA 904.0
QC Batch Method: EPA 904.0 Analysis Description: 904.0 Radium 228
Associated Lab Samples: 40196970001, 40196970002

METHOD BLANK: 1777725 Matrix: Water
Associated Lab Samples: 40196970001, 40196970002

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-228	-0.00340 ± 0.362 (0.843) C:80% T:79%	pCi/L	10/30/19 14:21	

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

REPORT OF LABORATORY ANALYSIS

QUALIFIERS

Project:	25219067.00 COLUMBIA CCR
Pace Project No.:	40196970

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.

LABORATORIES

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

ANALYTE QUALIFIERS

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

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196970

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
40196970001	**MW-301**	EPA 3010	337277	EPA 6020	337400
40196970002	**MW-84A**	EPA 3010	337277	EPA 6020	337400
40196970001	**MW-301**	EPA 7470	338359	EPA 7470	338406
40196970002	**MW-84A**	EPA 7470	338359	EPA 7470	338406
40196970001	**MW-301**				
40196970002	**MW-84A**				
40196970001	**MW-301**	EPA 903.1	366494		
40196970002	**MW-84A**	EPA 903.1	366494		
40196970001	**MW-301**	EPA 904.0	366493		
40196970002	**MW-84A**	EPA 904.0	366493		
40196970001	**MW-301**	Total Radium Calculation	369027		
40196970002	**MW-84A**	Total Radium Calculation	369027		
40196970001	**MW-301**	SM 2540C	337571		
40196970002	**MW-84A**	SM 2540C	337571		
40196970001	**MW-301**	EPA 9040	337952		
40196970002	**MW-84A**	EPA 9040	337952		
40196970001	**MW-301**	EPA 300.0	337822		
40196970002	**MW-84A**	EPA 300.0	337822		

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

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CHAIN OF CUSTODY

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

(Please Print Clearly)

Company Name:	SCS Engineers
Branch/Location:	Madison, WI
Project Contact:	Tom Karwoski
Phone:	608-224-2830
Project Number:	25219067.00
Project Name:	Columbia
Project State:	Wisconsin
Sampled By (Print):	Adam Watson
Sampled By (Sign):	[signature]
PO #:	
Regulatory Program:	

Quote #:	
Mail To Contact:	Tom Karwoski
Mail To Company:	SCS Engineers
Mail To Address:	2830 Dairy Dr. Madison, WI 53718
Invoice To Contact:	
Invoice To Company:	
Invoice To Address:	
Invoice To Phone:	

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

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

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

				FILTERED? (YES/NO) Y/N	N	N	N	N	
				PRESERVATION (CODE)* Pick Letter	D	D	A	A	
PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX	Radium 226 & 228	Metals See attached table	pH	TDS, Cl, F, SO4	CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)	Profile #
001	MW-301	10/9/19	1200	W	X	X	X	X		001	
002	MW-84A	10/9/19	1316	W	X	X	X	X		002	

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

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

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

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

Relinquished By:	Date/Time:	Received By:	Date/Time:
[signature]	10/9/19 1600		
CS Logistics	10/10/19 0915	[signature] PACE	10/10/19 0915

PACE Project No. 40196970

Receipt Temp = ROI °C

Sample Receipt pH
OK / Adjusted

Cooler Custody Seal
Present / Not Present
Intact / Not Intact

Version 6.0 06/14/06

C019a(27Jun2006)

ORIGINAL

40196970

Table 2. Sampling Points and Parameters - CCR Rule Sampling Program
Groundwater Monitoring - Columbia Energy Center / SCS Engineers Project #25219067

	Parameter	MW-301	MW-84A	MW-302	MW-33AR	MW-34A	FIELD BLANK - MOD1-3LF	MW-309	MW-310	MW-311	FIELD BLANK-MOD4	MW-303	MW-304	MW-305	MW-4R	FIELD BLANK - PPOND	MW-306	MW-307	MW-308	FIELD BLANK - SCPOND
		COC #1 - Background Wells		COC #2 - Landfill Modules 1-3				COC #3 - Landfill Module 4				COC #4 - Primary Pond					COC #5 - Secondary Pond			
Appendix III Parameters (Detection Monitoring)	Boron	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Calcium	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Chloride	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Fluoride	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	pH	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Sulfate	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	TDS	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Appendix IV Parameters (Assessment Monitoring)	Antimony	x	x									x	x	x	x	x				
	Arsenic	x	x									x	x	x	x	x				
	Barium	x	x									x	x	x	x	x				
	Beryllium	x	x									x	x	x	x	x				
	Cadmium	x	x									x	x	x	x	x				
	Chromium	x	x									x	x	x	x	x				
	Cobalt	x	x									x	x	x	x	x				
	Fluoride	x	x									x	x	x	x	x				
	Lead	x	x									x	x	x	x	x				
	Lithium	x	x									x	x	x	x	x				
	Mercury	x	x									x	x	x	x	x				
	Molybdenum	x	x									x	x	x	x	x				
	Selenium	x	x									x	x	x	x	x				
	Thallium	x	x									x	x	x	x	x				
	Radium 226+228	x	x									x	x	x	x	x				
CCR Rule Field Parameters	Groundwater Elevation	x	x	x	x	x		x	x	x		x	x	x	x		x	x	x	
	pH	x	x	x	x	x		x	x	x		x	x	x	x		x	x	x	
Low-Flow Sampling Field Parameters	Well Depth	x	x	x	x	x		x	x	x		x	x	x	x		x	x	x	
	Specific Conductance	x	x	x	x	x		x	x	x		x	x	x	x		x	x	x	
	Dissolved Oxygen	x	x	x	x	x		x	x	x		x	x	x	x		x	x	x	
	ORP	x	x	x	x	x		x	x	x		x	x	x	x		x	x	x	
	Temperature	x	x	x	x	x		x	x	x		x	x	x	x		x	x	x	
	Turbidity	x	x	x	x	x		x	x	x		x	x	x	x		x	x	x	
	Color	x	x	x	x	x		x	x	x		x	x	x	x		x	x	x	
	Odor	x	x	x	x	x		x	x	x		x	x	x	x		x	x	x	

Notes: All samples are unfiltered (total).

I:\25219067.00\Data and Calculations\Tables\Lab Bottle Orders\[2019 April_COL CCR.xls]Sheet1

Pace Analytical Services, LLC
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Green Bay, WI 54302

Sample Preservation Receipt Form

Client Name: SC Engineers   Project # 40196920

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

Lab Lot# of pH paper: 1AU5089   Lab Std #ID of preservation (if pH adjusted):

Initial when completed: JW   Date/Time:

	Glass							Plastic							Vials						Jars			General									
Pace Lab #	AG1U	AG1H	AG4S	AG4U	AG5U	AG2S	BG3U	BP1U	BP2N	BP2Z	BP3U	BP3B	BP3N	BP3S	DG9A	DG9T	VG9U	VG9H	VG9M	VG9D	JGFU	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

10/10/17
JW

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	DG9A	40 mL amber ascorbic	JGFU	4 oz amber jar unpres
AG1H	1 liter amber glass HCL	BP2N	500 mL plastic HNO3	DG9T	40 mL amber Na Thio	WGFU	4 oz clear jar unpres
AG4S	125 mL amber glass H2SO4	BP2Z	500 mL plastic NaOH, Znact	VG9U	40 mL clear vial unpres	WPFU	4 oz plastic jar unpres
AG4U	120 mL amber glass unpres	BP3U	250 mL plastic unpres	VG9H	40 mL clear vial HCL		
AG5U	100 mL amber glass unpres	BP3B	250 mL plastic NaOH	VG9M	40 mL clear vial MeOH	SP5T	120 mL plastic Na Thiosulfate
AG2S	500 mL amber glass H2SO4	BP3N	250 mL plastic HNO3	VG9D	40 mL clear vial DI	ZPLC	ziploc bag
BG3U	250 mL clear glass unpres	BP3S	250 mL plastic H2SO4			GN:	1 liter plastic HNO3 pres

Pace Analytical™ 1241 Bellevue Street, Green Bay, WI 54302	Document Name: **Sample Condition Upon Receipt (SCUR)**	Document Revised: 25Apr2018
	Document No.: **F-GB-C-031-Rev.07**	Issuing Authority: Pace Green Bay Quality Office

Sample Condition Upon Receipt Form (SCUR)

Project #:

WO# : 40196970

40196970

Client Name: SCS Engineers

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

Tracking #: 2120.100919

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 zip lock/plastic bag

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

Cooler Temperature Uncorr: ROI /Corr: —

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.

Person examining contents:
Date: 10/10/19
Initials: JW

Chain of Custody Present:	☒Yes ☐No ☐N/A	1.
Chain of Custody Filled Out:	☐Yes ☒No ☐N/A	2. invoice details not documented w/bottle &
Chain of Custody Relinquished:	☒Yes ☐No ☐N/A	3.
Sampler Name & Signature on COC:	☒Yes ☐No ☐N/A	4.
Samples Arrived within Hold Time:	☒Yes ☐No	5.
- VOA Samples frozen upon receipt	☐Yes ☐No	Date/Time:
Short Hold Time Analysis (<72hr):	☐Yes ☒No	6.
Rush Turn Around Time Requested:	☐Yes ☒No	7.
Sufficient Volume: For Analysis: ☒Yes ☐No MS/MSD:	☐Yes ☒No ☐N/A	8.
Correct Containers Used:	☒Yes ☐No	9.
-Pace Containers Used:	☒Yes ☐No ☐N/A	
-Pace IR Containers Used:	☐Yes ☐No ☒N/A	
Containers Intact:	☒Yes ☐No	10.
Filtered volume received for Dissolved tests	☐Yes ☐No ☒N/A	11.
Sample Labels match COC:	☒Yes ☐No ☐N/A	12.
-Includes date/time/ID/Analysis Matrix: W		
Trip Blank Present:	☐Yes ☐No ☒N/A	13.
Trip Blank Custody Seals Present	☐Yes ☐No ☒N/A	
Pace Trip Blank Lot # (if purchased):		

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

Person Contacted: Date/Time:

Comments/ Resolution:

Project Manager Review: JJ for DM **Date:** 10-10-19

Appendix B

Alternative Source Demonstrations

B1 Alternative Source Demonstration, October 2018 Detection Monitoring

Alternative Source Demonstration
October 2018 Detection Monitoring

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

Prepared for:

Alliant Energy

SCS ENGINEERS

25216067.18 | April 15, 2019

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

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Appendices

I:\25216067.00\Deliverables\2019 ASD LF 1-3 1810\190415_ASD_COLLF1-3_1810_FINAL.docx

PE CERTIFICATION

WISCONSIN
Sherren C. Clark
E-29863
Madison, Wis.
PROFESSIONAL ENGINEER

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

(signature) 4-12-19 (date)

Sherren Clark
(printed or typed name)

License number E-29863

My license renewal date is July 31, 2020.

Pages or sheets covered by this seal:
Alternative Source Demonstration, all pages.

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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 (USEPA) in the *Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule*, dated April 17, 2015 (USEPA, 2015), and subsequent amendments. Specifically, this report was prepared to fulfill the requirements of 40 CFR 257.94(e)(2). The applicable sections of the Rule are provided below in *italics*.

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 2018 detection monitoring event at the Columbia Energy Center (COL) Dry Ash Disposal Facility, Modules 1-3 CCR Units. Previous ASDs were prepared for this facility evaluating the SSIs observed in the statistical evaluation of the October 2017 and the April 2018 detection monitoring events (SCS Engineers [SCS], 2018b and 2018c). The October 2017 ASD (dated April 2018) and the April 2018 ASD (dated December 2018) concluded that several lines of evidence demonstrated that SSIs reported for boron, chloride, sulfate, and total dissolved solids (TDS) 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 2018 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 Dry Ash Disposal Facility (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 for the COL ADF Modules 1-3 is a multi-unit system, monitoring three existing CCR Units:

- COL Dry ADF – Module 1 (existing CCR Landfill)
- COL Dry ADF – Module 2 (existing CCR Landfill)
- COL Dry ADF – Module 3 (existing CCR Landfill)

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.** A separate monitoring system has been established for Module 4 of the COL ADF and for the primary ash pond and secondary ash pond.

1.3 STATISTICALLY SIGNIFICANT INCREASES IDENTIFIED

SSIs were identified for boron, chloride, and sulfate at one or more wells based on the October 2018 detection monitoring event.

A summary of the October 2018 constituent concentrations and the established benchmark concentrations is provided in **Table 1.** The constituent concentrations with SSIs above the background concentration are highlighted in the table. Concentration trends for the parameters with SSIs are shown in **Appendix A.**

1.4 OVERVIEW OF ASD

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.** Complete laboratory reports for the background monitoring events and the October 2017 detection monitoring event were included in the 2017 Annual Groundwater Monitoring and Corrective Action Report (SCS, 2018a). The laboratory reports for the 2018 events were included in the 2018 Annual Report (SCS, 2019).

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, 2018b).

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, 2018b).

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, 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 northwest across the existing landfill area, then generally flows west toward the Wisconsin River. A groundwater flow map for October 2018 is shown on **Figure 3**. The groundwater elevation data for the CCR monitoring 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 40 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 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 field pH 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 2018 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.

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**.

3.3 STATISTICAL EVALUATION REVIEW

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

- Input analytical data vs. laboratory analytical reports
- Review statistical method and outlier concentration lists for each monitoring well/CCR Unit

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 2018 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 2018 monitoring event based on the methodology and analysis review, and 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 MW-33AR, MW-34A, and MW-302; 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 2018 detection monitoring results to the upper prediction limits (UPLs) calculated based on 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.

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 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 and MW34A.

Based on the higher chloride concentrations previously detected at MW-33AR from 2016 through April 2018, a non-CCR alternative source may also contribute to the chloride SSIs.

4.2 LINES OF EVIDENCE

The lines of evidence indicating that the SSIs for boron, chloride, and/or 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/or 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.

4. The increase in chloride results for well B-33AR in the last 2 years has not correlated with an increase in boron, 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 are much lower, but remain above background. The October 2018 sulfate result for MW-33AR (installed to replace MW-33A) was 112 mg/L and at MW-34A were 123 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 historic monitoring data show that concentrations of boron and sulfate were significantly higher 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, chloride, and sulfate concentrations are consistent with generally decreasing or stable historical concentrations at MW-33AR and MW-34A (**Appendix A** and **Appendix C**).

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 west 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 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 significantly in October 2016 through April 2018 and decreased between April and October 2018 to concentrations similar to those detected prior to October 2016. Corresponding changes in boron concentrations were not detected during 2016 through 2018, indicating that the source of the increasing chloride was not likely the CCR landfill. Sampling of the landfill leachate pond and the lysimeters indicates that boron and chloride concentrations are generally both elevated in leachate (**Table 4**). An alternative man-made source, such as salt, is a more likely source of chloride than the CCR Units.

5.0 ASD 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 landfill site may continue with detection monitoring based on this ASD. The ASD report will be included in the 2019 Annual Report due January 31, 2019.

7.0 REFERENCES

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Tables

Table 1. Groundwater Analytical Results - Detection Monitoring
Columbia Landfill MOD 1-3 / SCS Engineers Project #25218067.18

Parameter Name	Interwell Upper Prediction Limit (UPL)	Background Wells						Compliance Wells											
		MW-84A			MW-301			MW-33AR				MW-34A				MW-302			
		Oct-17	Apr-18	Oct-18	Oct-17	Apr-18	Oct-18	Oct-17	Apr-18		Oct-18	Oct-17	Apr-18		Oct-18	Oct-17	Apr-18		Oct-18
		10/24/2017	4/25/2018	10/22/2018	10/23/2017	4/25/2018	10/22/2018	10/24/2017	Original 4/24/2018	Retest 9/21/2018	10/22/2018	10/24/2017	Original 4/24/2018	Retest 9/21/2018	10/22/2018	10/24/2017	Original 4/24/2018	Retest 9/21/2018	10/22/2018
Boron, ug/L	37.4	13.8	25.0	10.1 J	34.3	24.3	27.8	678	601	683	682	208	209	241	233	691	1,950	203	296
Calcium, ug/L	138,400	77,500	76,600	74000	87,200	112,000	101,000	98,200	99,800	NA	66,900	69,600	69,600	NA	70,100	94,400	110,000	NA	56,900
Chloride, mg/L	6.52	5.1	4.8	4.2	4.0	2.3	3.2	119	188	32.6	14.4	7.6	8.2	17.1	19.9	6.9	15.0	1.7 J	1.8 J
Fluoride, mg/L	0.3	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	NA	<0.10	<0.10	<0.10	NA	<0.10	<0.10	<0.10	NA	<0.10
Field pH, Std. Units	7.93	7.68	7.45	7.24	7.37	6.76	6.79	7.81	7.74	8.16	7.69	7.67	7.80	8.12	7.64	8.23	7.21	7.74	7.22
Sulfate, mg/L	37.1	2.2 J	2.8 J	1.6 J	27.5	8.6	19.2	175	163	124	112	98	144	141	123	78.4	109	30.0	26.9
Total Dissolved Solids, mg/L	514	314	328	330	362	464	424	606	692	466	388	340	412	460	392	446	598	280	288

Highlighted cell indicates the compliance well result is an SSI. UPLs are based on a 1-of-2 retesting approach; therefore, for the April 2018 semiannual event an SSI is indicated only if both the original result and the September 2018 retest are above the UPL and the LOQ.

Abbreviations:
UPL = Upper Prediction Limit NA = Not Analyzed LOQ = Limit of Quantification LOD = Limit of Detection SSI = Statistically Significant Increase
J = Estimated concentration at or above the LOD and below the LOQ.

Notes:
1. Interwell UPL based on parametric prediction limit based on 1-of-2 retesting methodology for all parameters except fluoride and total dissolved solids. Parametric UPL for sulfate calculated using natural logarithm transformed data.
2. Interwell UPL for fluoride is non-parametric based on quantitation limit. UPL for total dissolved solids based on non-parametric prediction limit (highest background value). Non-parametric UPLs are based on 1-of-2 retesting methodology.
3. Interwell UPLs calculated from background well results for December 2015 through October 2017.

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Checked by: NAS Date: 3/6/2019

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Table 2. Analytical Results - Appendix III Constituents with SSIs
CCR Landfills, Columbia Generation Station
Pardeeville, Wisconsin

Well Group	Well	Collection Date	Boron (µg/L)	Chloride (mg/L)	Sulfate (mg/L)
Background	MW-301	12/22/2015	26.5	3.7 J	9.3
		4/5/2016	25.2	4	15.3
		7/8/2016	23.6	3.5 J	15
		10/13/2016	30.6	2.2	13.9
		12/29/2016	32.8	2 J	12.3 J
		1/25/2017	32.6	1.5 J	6.5
		4/11/2017	28.8	2	10.3
		6/6/2017	21.3	3.5	17.1
		8/8/2017	30.6	5.5	31.6
		10/23/2017	34.3	4	27.5
		4/25/2018	24.3	2.3	8.6
		10/22/2018	27.8	3.2	19.2
	MW-84A	12/22/2015	11.9	4.9	4.9
		4/5/2016	14	4.7	4.3
		7/8/2016	14.7	5.1	3.7 J
		10/13/2016	11.1	4.3	2.6 J
		12/29/2016	14.7	4.7	2.7 J
		1/25/2017	16.1	4.6	3
		4/11/2017	12.9	4.9	2.8 J
		6/6/2017	14.8	5.5	2.7 J
		8/8/2017	22.9	5.5	2 J
		10/24/2017	13.8	5.1	2.2 J
		4/25/2018	25	4.8	2.8 J
		10/22/2018	10.1 J	4.2	1.6 J
Compliance	MW-302	12/22/2015	80	4.2	37.4
		4/5/2016	78.8	4.1	55.6
		7/7/2016	134	3.1 J	35.4
		10/13/2016	132	1.1 J	64.7
		12/29/2016	106	1.2 J	56.4
		1/25/2017	149	1.6 J	61.6
		4/11/2017	322	1.6 J	81.3
		6/6/2017	671	3.5	84.6
		8/8/2017	833	4.5	79
		10/24/2017	691	6.9	78.4
		4/24/2018	1,950	15	109
		9/21/2018	203	1.7 J	30
		10/22/2018	296	1.8 J	26.9
	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

Table 2. Analytical Results - Appendix III Constituents with SSIs
CCR Landfills, Columbia Generation Station
Pardeeville, Wisconsin

Well Group	Well	Collection Date	Boron (µg/L)	Chloride (mg/L)	Sulfate (mg/L)
Compliance	MW-34A	12/21/2015	230	4.9	69.9
		4/5/2016	220	5.1	71.6
		7/7/2016	216	5.6	63.4
		10/13/2016	212	6.8	54.8
		12/29/2016	224	7.1	63.9
		1/25/2017	214	7.2	71.2
		4/11/2017	214	6.2	87.6
		6/6/2017	201	7.8	106
		8/7/2017	205	7.4	105
		10/24/2017	208	7.6	98
		4/24/2018	209	8.2	144
		9/21/2018	241	17.1	141
		10/22/2018	233	19.9	123

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

Notes:
(1) Analytical laboratory reports provided in the 2017 Annual Groundwater Monitoring and Corrective Action Report.

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I:\25216067.00\Deliverables\2019 ASD LF 1-3 1810\Tables\1810_tables\[2 and 3_COL LF ASD.xlsx]Table 2. Analy. Rslts- CCR

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

CCR Landfill Modules 1-3, Columbia Generating Station

Pardeeville, Wisconsin

	Well Number	MW-1AR	MW-5R	MW-33AR	MW-33BR	MW-34A	MW-34B	MW-37A	MW-83	MW-84A	MW-84B	MW-86	MW-91AR	MW-91B	MW-92A	MW-92B
	Top of Casing Elevation (feet amsl)	822.55	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	25.97	31.08	57.50	35.43	56.95	31.80	25.42	40.21	52.02	45.43	32.90	52.38	28.94	51.75
	Top of Well Screen Elevation (ft)	778.15	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
Dry Ash Facility	**Measurement Date**															
	April 4-6, 2016	785.82	787.02	785.29	785.07	785.63	785.67	784.76	785.43	786.37	786.26	785.89	786.05	785.95	786.61	786.21
	October 3-5, 2017	785.48	786.66	784.51	784.22	784.67	784.63	784.86	784.29	--	786.49	785.58	786.08	785.83	786.47	786.02
	October 9-10, 2017	--	--	--	--	--	--	--	--	785.56 [2]	--	--	--	--	--	--
	April 23-25, 2018	783.99	785.36	783.09	786.36	781.77	780.79	783.28	783.32	785.88	784.91	782.54	784.71	784.53	785.23	784.81
	October 23-25, 2018	788.25	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
	Bottom of Well Elevation (ft)	778.15	779.47	777.21	750.89	770.52	749.10	781.24	782.54	774.07	762.24	779.36	776.13	756.07	779.53	756.66

	Well Number	M-3	M-4R	MW-39A	MW-39B	MW-48A	MW-48B	MW-57	MW-59	MW-216R	MW-217	MW-220RR
	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
	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
Ash Pond Facility	**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											
	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
	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
	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
	October 22-24, 2018	782.95	788.47	787.12	786.88	787.12	786.99	783.48	787.73	787.49	784.90	784.52
	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

	Well Number	MW-301	MW-302	MW-33AR	MW-34A	MW-84A
	Top of Casing Elevation (feet amsl)	806.89	813.00	808.29	805.95	814.28
	Screen Length (ft)	10	10	10	10	10
	Total Depth (ft from top of casing)	29.40	33.6	31.08	35.43	40.21
	Top of Well Screen Elevation (ft)	787.49	789.40	787.21	780.52	784.07
	Measurement Date					
	April 4-5, 2016	786.78	785.81	785.29	785.63	786.37
	July 7-8, 2016	786.31	786.28	785.19	785.05	785.89
	July 28, 2016	NM	NM	NM	784.86	785.61
CCR Rule Wells	October 11-13, 2016	787.64	787.76	787.36	786.45	787.22
	December 29, 2016	787.37	787.05	785.66	785.72	786.63
	January 25-26, 2017	787.27	786.89	785.88	785.98	786.70
	April 10 & 11, 2017	787.89	787.55	786.39	786.30	787.16
	June 6, 2017	788.25	788.37	787.27	786.66	787.63
	August 7-9, 2017	787.34	787.55	786.11	785.81	786.68
	October 23-24, 2017	785.89	785.94	784.13	784.50	785.32
	April 23-25, 2018	785.29	784.37	783.09	781.77	785.88
	September 21, 2018	NM	788.37	787.90	787.01	NM
	October 22-24, 2018	788.98	789.16	788.77	787.88	788.32
	Bottom of Well Elevation (ft)	771.33	780.55	771.89	776.98	776.36

Notes:
NM = not measured

Created by: MDB Date: 5/6/2013
Last revision by: NAS Date: 3/6/2019
Checked by: MDB Date: 3/27/2019

(1) Water Levels collected during sample collection.
(2) The depth to water at MW-84A was not measured prior to purging for sampling during the October 3-5, 2017 sampling event. The level was allowed to return to static and was measured on 10/10/2017.

I:\25216067.00\Deliverables\2019 ASD LF 1-3 1810\Tables\1810_tables\[2 and 3_COL LF ASD.xlsx]Table 3. GW Elevations

Table 4. Analytical Results - Lysimeters and Leachate Pond
Wisconsin Power and Light - Columbia Dry Ash Disposal Facility
SCS Engineers Project #25216067

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 J	856
	2018-Oct	DRY	--	--	
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
LP-1	2015-Apr	--	4060	27.8	734
	2015-Oct	--	4300	37.1	820
	2016-Apr	--	1830	26.8	416
	2016-Oct	--	4610	71.5	835
	2017-Apr	--	2690	66.3	587
	2017-Oct	--	4970	91.7	739
	2018-Apr	--	2060	63.2	634
	2018-Oct	--	2630	151	907

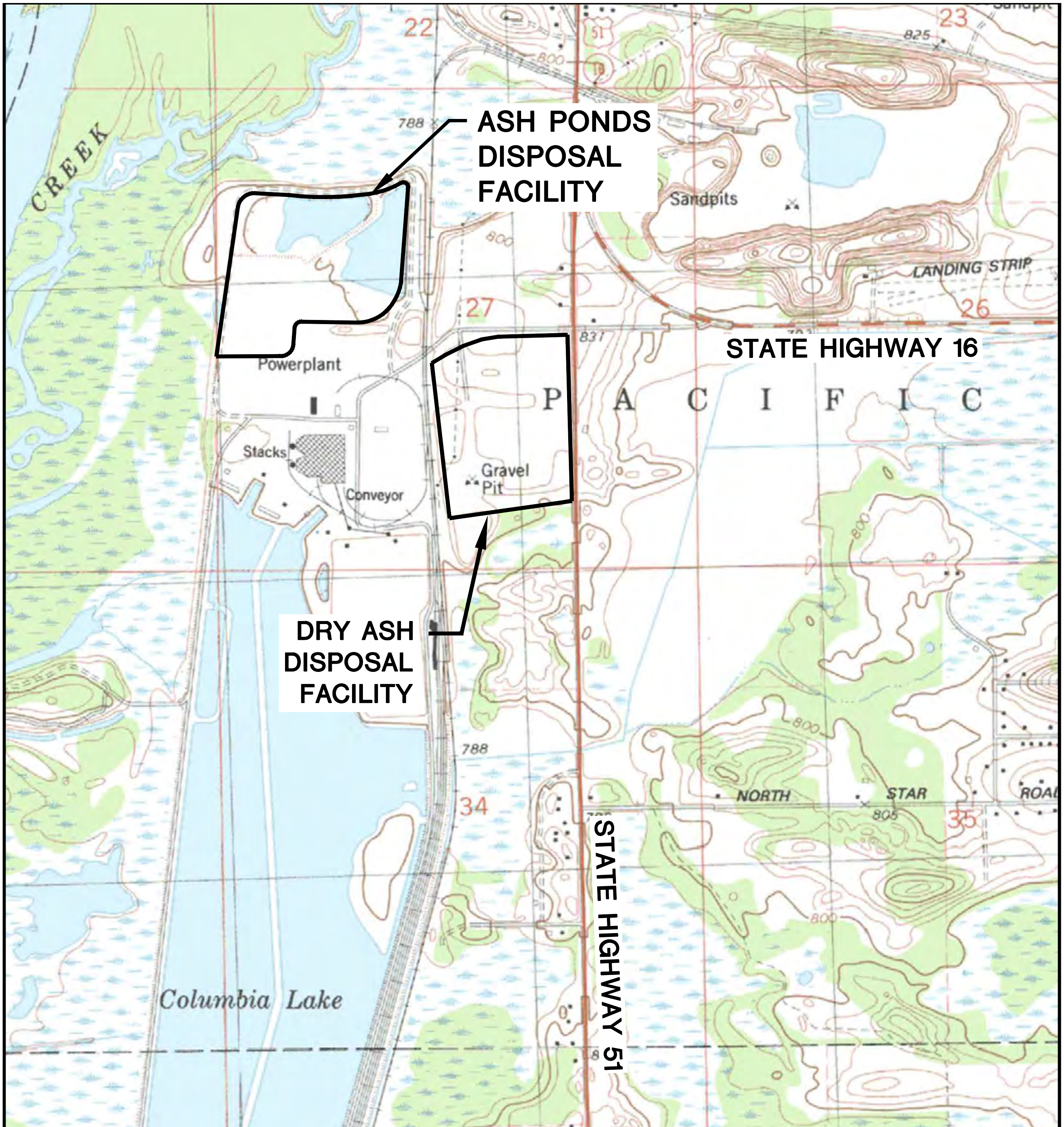
Abbreviations:
µg/L = micrograms per liter
mg/L = milligrams per liter
-- = not analyzed
µmhos/cm = micromhos/centimeter

Notes:
J = Estimated concentration at or above the LOD and below the LOQ.

Created by: TLC Date 12/1/2014
Last revision by: NDK Date 3/17/2019
Checked by: MDB Date 3/27/2019

I:\25216067.00\Deliverables\2019 ASD LF 1-3 1810\Tables\1810_tables\[4_Leachate_2015_2016_2018.xlsx]Lys LP1 App

Figures



N

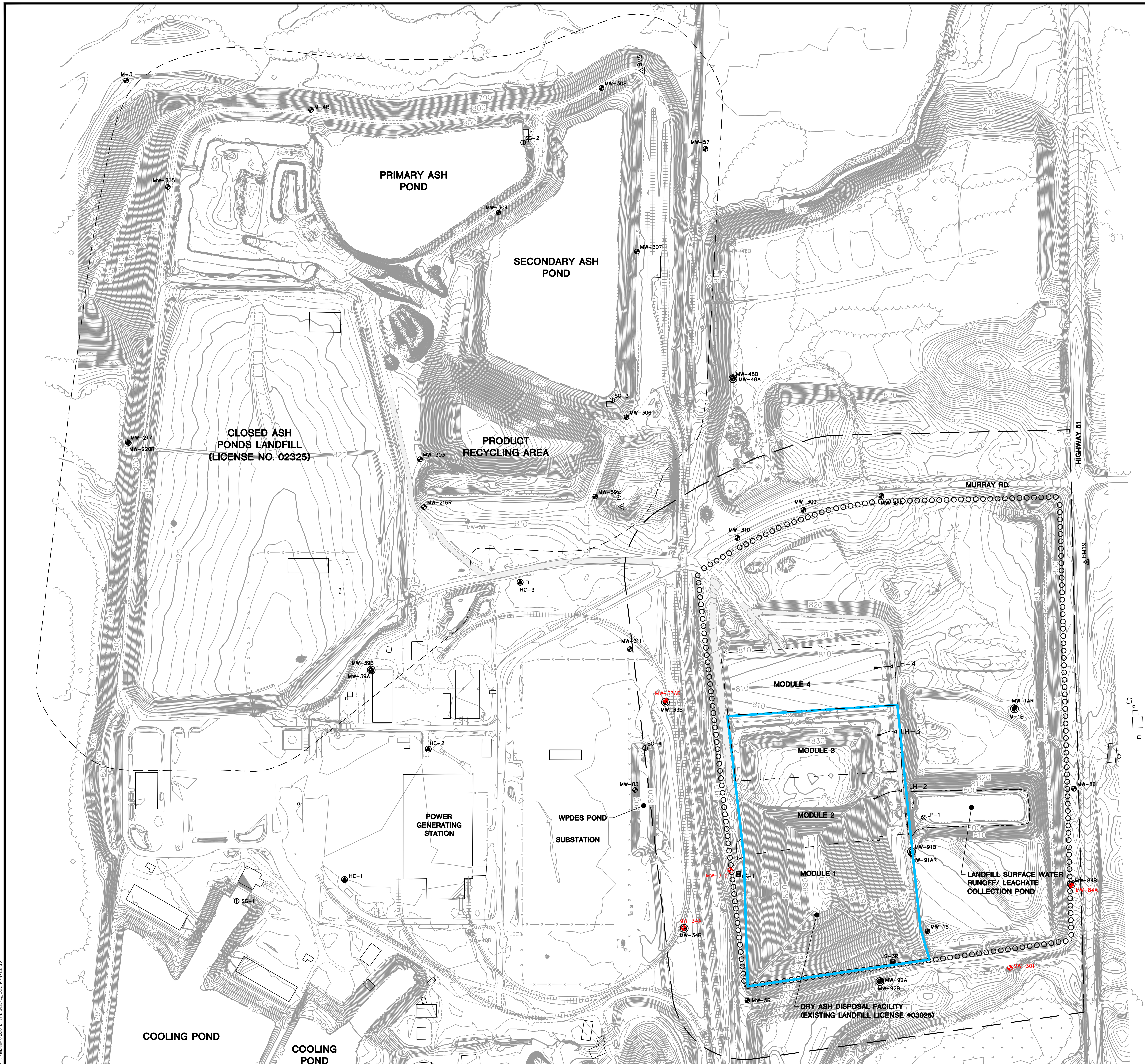
POYNETTE QUADRANGLE
WISCONSIN–COLUMBIA CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)
NW/4 POYNETTE 15' QUADRANGLE
1984
SCALE: 1" = 2,000'

CLIENT	ALLIANT ENERGY ALLIANT ENERGY 4902 NORTH BILTMORE LN. #1000 MADISON, WI 53718	SITE	COLUMBIA ASH PONDS AND DRY ASH DISPOSAL FACILITIES

SITE LOCATION MAP

PROJECT NO.	25216067.00	DRAWN BY:	KP	ENGINEER	SCS ENGINEERS 2830 DAIRY DRIVE MADISON, WI 53718-6751 PHONE: (608) 224-2830	FIGURE
DRAWN:	08/10/09	CHECKED BY:	MDB			1
REVISED:	04/16/18	APPROVED BY:	SC 04/16/18			

I:\25216067.00\Drawings\Site Loc.dwg, 4/16/2018 11:31:14 AM



LEGEND

810	EXISTING MAJOR CONTOUR (10' INTERVAL)
	EXISTING MINOR CONTOUR (2' CONTOUR)
	EXISTING FENCELINE
	EXISTING TRACKS
	EXISTING PAVED ROAD
	EXISTING UNPAVED ROAD
	EDGE OF WATER
	DESIGN MANAGEMENT ZONE
	APPROVED LIMITS OF WASTE
	CONSTRUCTED LIMITS OF WASTE
	WATER SUPPLY WELL
	STAFF GAUGE
	WATER TABLE WELL
	PIEZOMETER
	SURFACE WATER SAMPLE LOCATION
	LYSIMETER
	ABANDONED WATER TABLE WELL
	ABANDONED PIEZOMETER
	LEACHATE HEADWELL
	MOD 1-3 CCR UNIT
	CCR 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, AND AUGUST 2018.
2. MONITORING WELL LOCATIONS AND ELEVATIONS SURVEYED BY WISCONSIN POWER AND LIGHT, INC. IN DECEMBER 1994, NOVEMBER 1996, APRIL 2003, AND AUGUST 2012.
3. SUPPLY WELL LOCATIONS ARE APPROXIMATE AND ASSUMED BASED ON JANUARY 2013 DRAWINGS BY TRC.
4. THE LOCATIONS OF THE ASH PONDS FACILITY DESIGN MANAGEMENT ZONE DEMARCATION LINES ARE APPROXIMATE AND BASED ON THE WATER TABLE MAP (OCTOBER 2012) FIGURE BY RMT.
5. THE LOCATION OF THE ACTIVE DRY ASH LANDFILL DESIGN MANAGEMENT ZONE DEMARCATION LINE IS BASED ON A 300 FOOT OFFSET FROM THE DESIGN LIMITS OF ASH EXCEPT WHERE OFFSET WOULD EXTEND LINE BEYOND PROPERTY LINE.

N

200 0 200

SCALE: 1" = 200'

PROJECT NO.	25216067.00
DRAWN:	01/06/19
REVISED:	01/09/19
DRAWN BY:	KP
CHECKED BY:	NK
APPROVED BY:	TK 04/09/19

ENGINEER

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

CLIENT

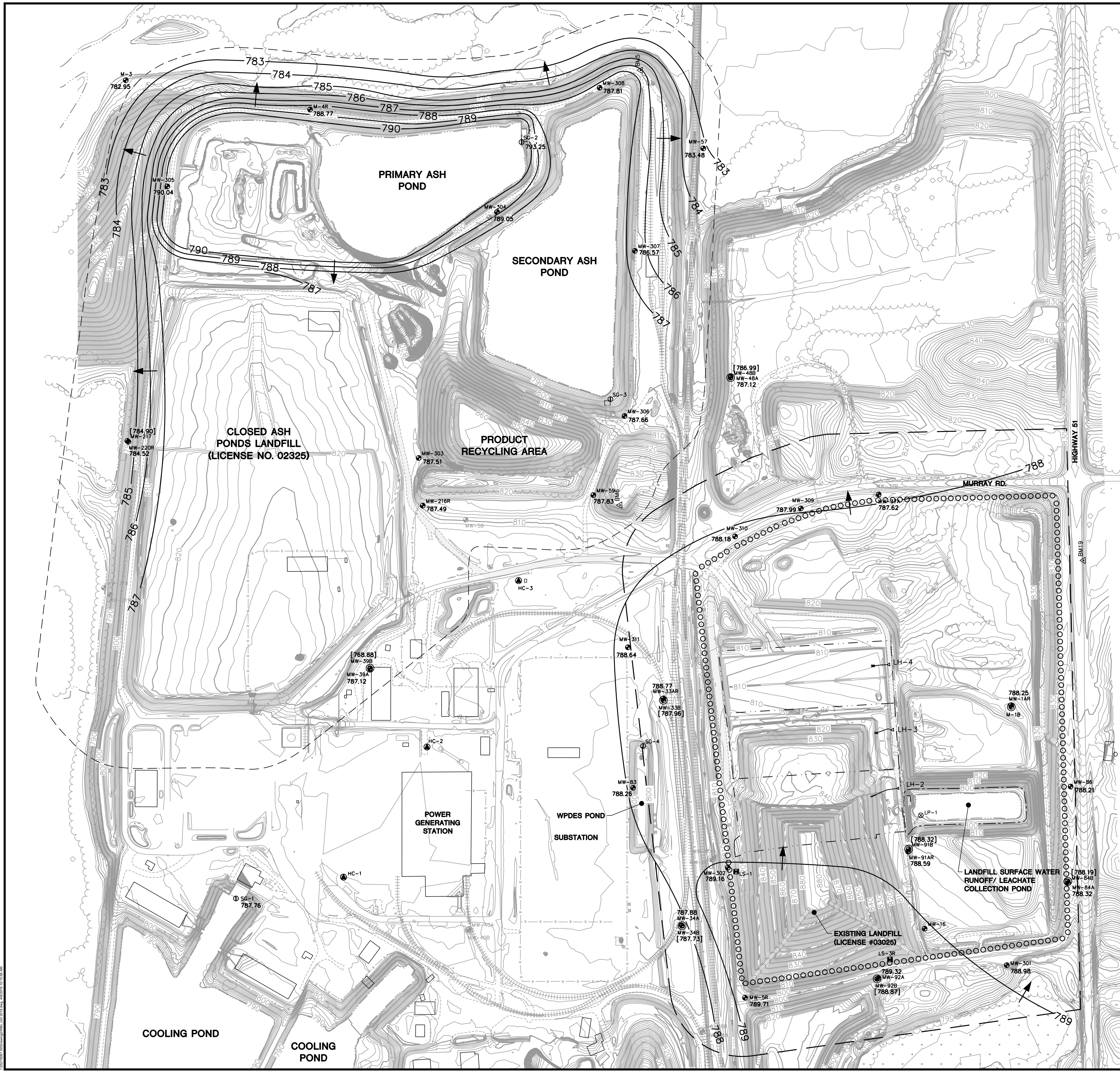
ALLIANT ENERGY
4902 NORTH BILTMORE LN. #1000
MADISON, WI 53718

SITE

COLUMBIA ASH PONDS AND DRY ASH DISPOSAL FACILITIES

SITE PLAN AND WELL LOCATION MAP

FIGURE 2



LEGEND

- 810 EXISTING MAJOR CONTOUR (10' INTERVAL)
- EXISTING MINOR CONTOUR (2' CONTOUR)
- EXISTING FENCELINE
- EXISTING TRACKS
- EXISTING PAVED ROAD
- EXISTING UNPAVED ROAD
- EDGE OF WATER
- DESIGN MANAGEMENT ZONE
- APPROVED LIMITS OF WASTE
- CONSTRUCTED LIMITS OF WASTE
- WATER SUPPLY WELL
- STAFF GAUGE
- WATER TABLE WELL
- PIEZOMETER
- SURFACE WATER SAMPLE LOCATION
- LYSIMETER
- ABANDONED WATER TABLE WELL
- ABANDONED PIEZOMETER
- LEACHATE HEADWELL
- 787.62 WATER TABLE ELEVATION MEASURED OCTOBER 2018
- [788.87] POTIENTIOMETRIC SURFACE ELEVATION MEASURED OCOTBER 2018 (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, AND AUGUST 2018.
2. MONITORING WELL LOCATIONS AND ELEVATIONS SURVEYED BY WISCONSIN POWER AND LIGHT, INC. IN DECEMBER 1994, NOVEMBER 1996, APRIL 2003, AND AUGUST 2012.
3. SUPPLY WELL LOCATIONS ARE APPROXIMATE AND ASSUMED BASED ON JANUARY 2013 DRAWINGS BY TRC.
4. THE LOCATIONS OF THE ASH PONDS FACILITY DESIGN MANAGEMENT ZONE DEMARCATION LINES ARE APPROXIMATE AND BASED ON THE WATER TABLE MAP (OCTOBER 2012) FIGURE BY RMT.
5. THE LOCATION OF THE ACTIVE DRY ASH LANDFILL DESIGN MANAGEMENT ZONE DEMARCATION LINE IS BASED ON A 300 FOOT OFFSET FROM THE DESIGN LIMITS OF ASH EXCEPT WHERE OFFSET WOULD EXTEND LINE BEYOND PROPERTY LINE.

FIGURE 3

WATER TABLE MAP OCTOBER 2018

SITE: COLUMBIA ASH PONDS AND DRY ASH DISPOSAL FACILITIES

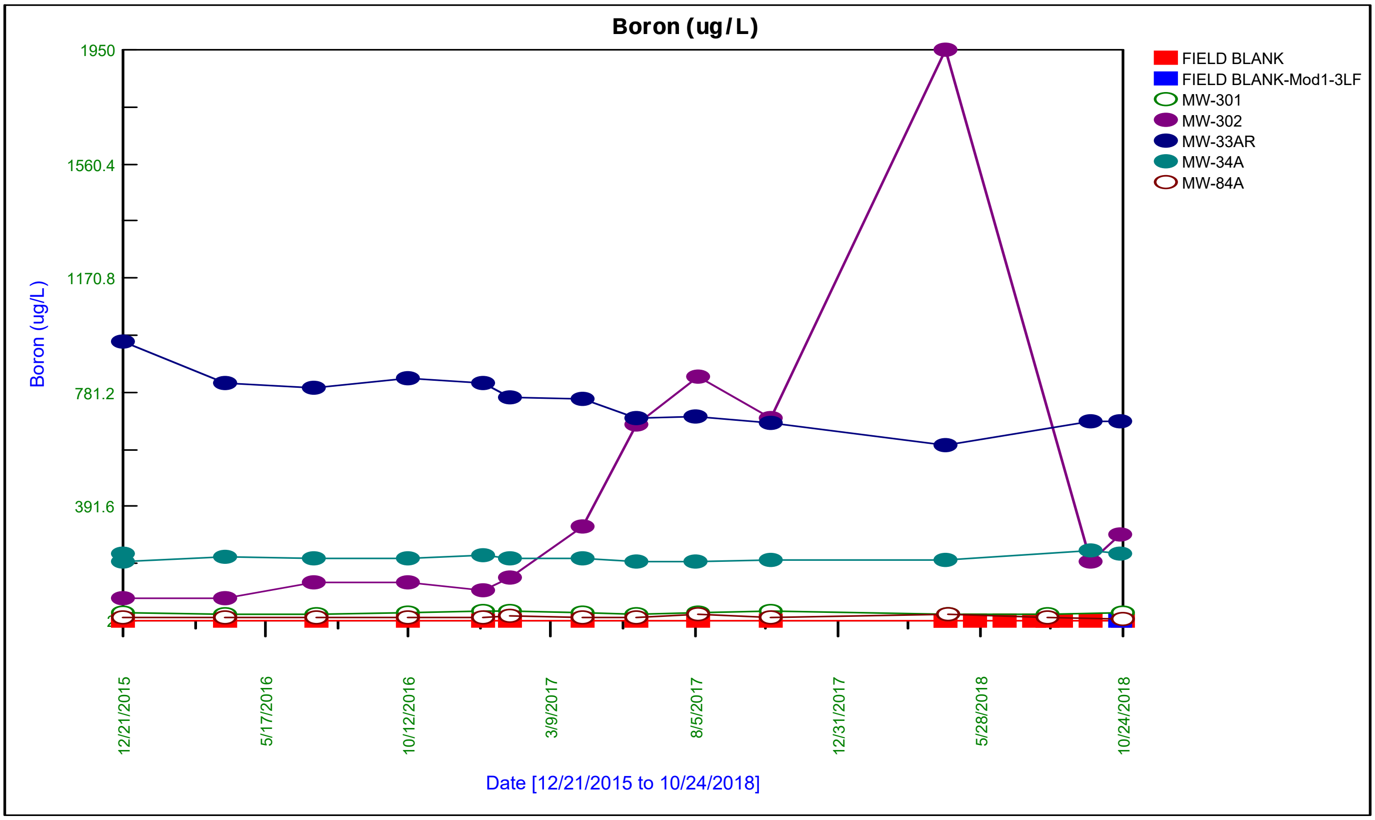
CLIENT: ALLIANT ENERGY 4902 NORTH BILTMORE LN. #1000 MADISON, WI 53718

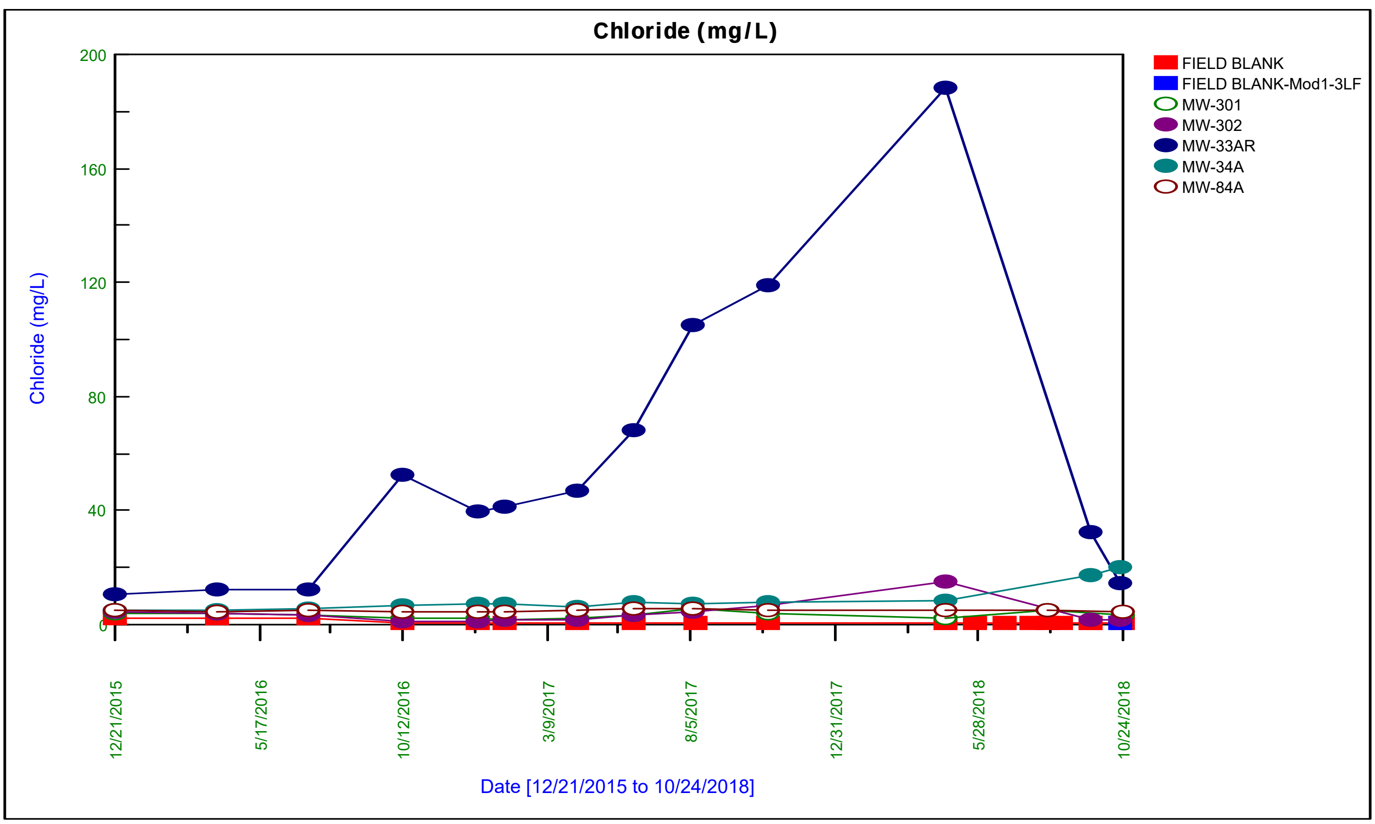
ENGINEER: SCS ENGINEERS 2830 DAIRY DRIVE MADISON, WI 53718-6751 PHONE: (608) 224-2830

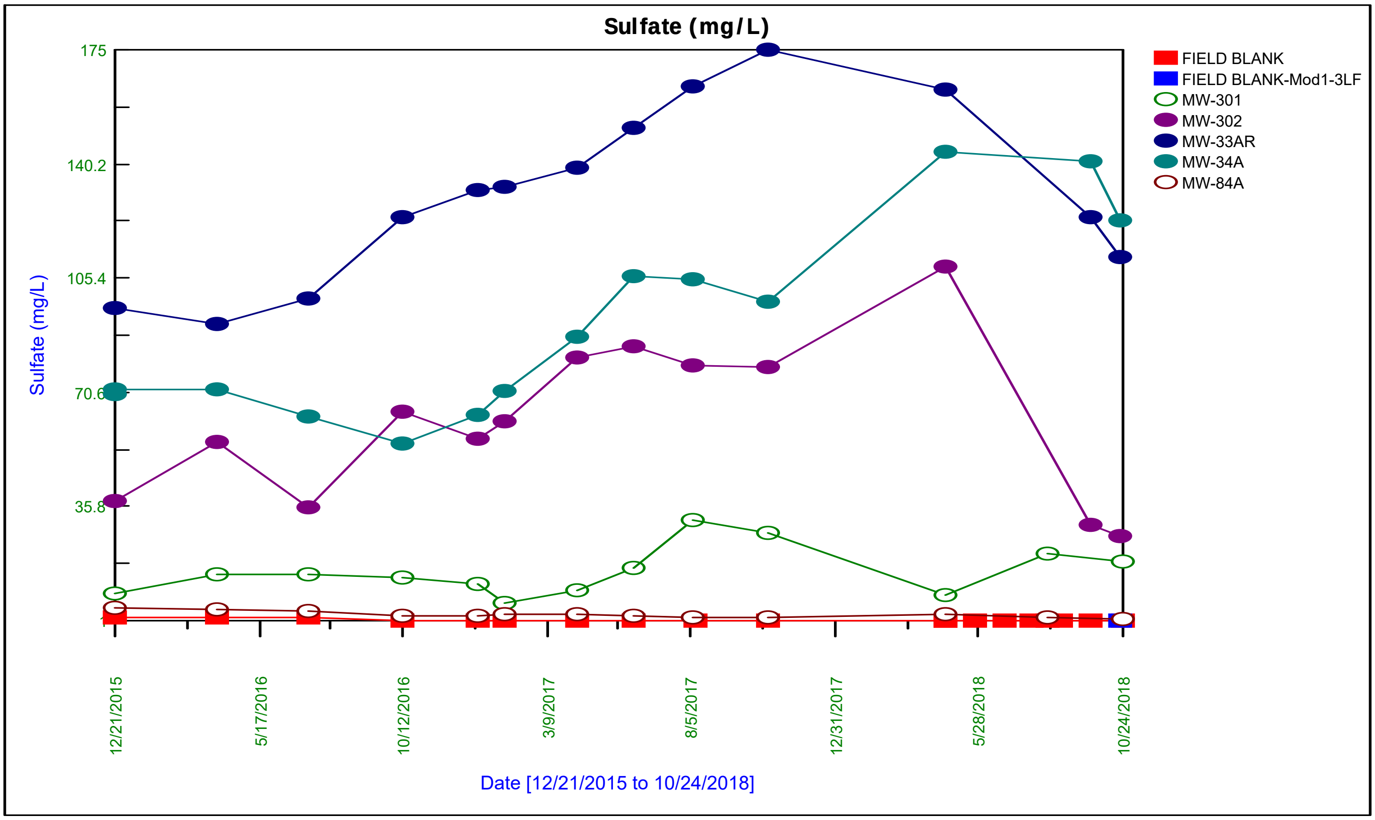
PROJECT NO.	25216067.00	DRAWN BY:	KP
DRAWN:	01/03/19	CHECKED BY:	MDB
REVISED:	01/09/19	APPROVED BY:	TK 04/09/19

Appendix A

Trend Plots for CCR Wells


Boron (ug/L)
1950
1560.4
1170.8
781.2
391.6
Boron (ug/L)
FIELD BLANK
FIELD BLANK-Mod1-3LF
MW-301
MW-302
MW-33AR
MW-34A
MW-84A
12/21/2015
5/17/2016
10/12/2016
3/9/2017
8/5/2017
12/31/2017
5/28/2018
10/24/2018
Date [12/21/2015 to 10/24/2018]


Chloride (mg/L)
200
160
120
80
40
0
Chloride (mg/L)
FIELD BLANK
FIELD BLANK-Mod1-3LF
MW-301
MW-302
MW-33AR
MW-34A
MW-84A
12/21/2015
5/17/2016
10/12/2016
3/9/2017
8/5/2017
12/31/2017
5/28/2018
10/24/2018
Date [12/21/2015 to 10/24/2018]



Sulfate (mg/L)
175
140.2
105.4
70.6
35.8
Sulfate (mg/L)
12/21/2015
5/17/2016
10/12/2016
3/9/2017
8/5/2017
12/31/2017
5/28/2018
10/24/2018
Date [12/21/2015 to 10/24/2018]
FIELD BLANK
FIELD BLANK-Mod1-3LF
MW-301
MW-302
MW-33AR
MW-34A
MW-84A

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

APPENDICES TO

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

WARZYN
ENGINEERING INC

APPENDIX I

WATER QUALITY DATA - DECEMBER 1978

WARZYN
ENGINEERING INC

12/78

C 7134

WATER QUALITY DATA

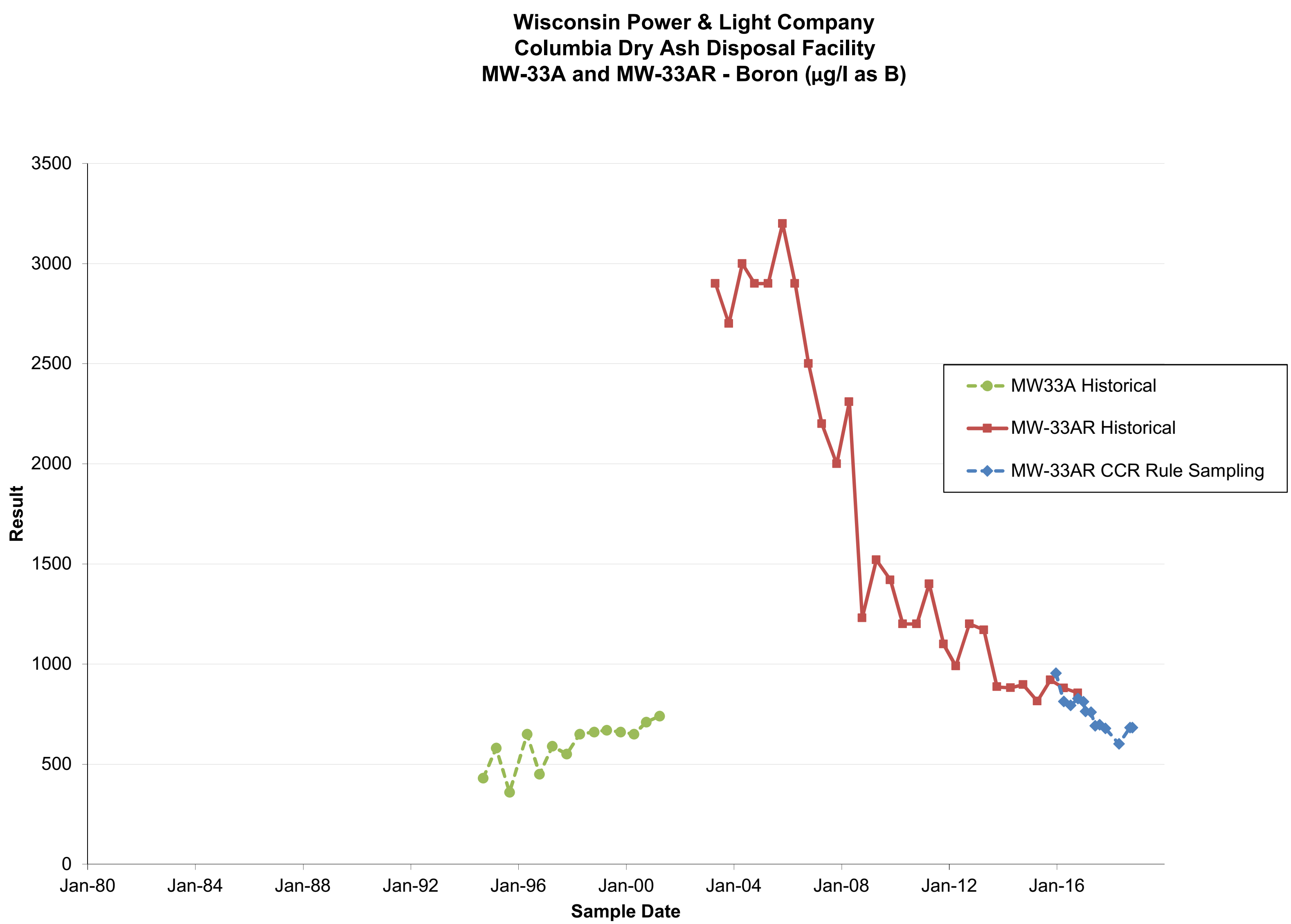
WELL NO.	pH	SPECIFIC CONDUCTANCE (umhos/cm @ 25°C)	SULFATE (mg/l)	CHLORIDE (mg/l)	CALCIUM (mg/l)	MAGNESIUM (mg/l)	IRON (mg/l)	BORON (mg/l)
1A	7.3	530	30	3.1	54	35	<0.1	-
1B	7.0	470	67	6.1	49	30	<0.1	-
2	7.25	458	91	<.5	48	24	<0.1	-
3A	7.0	560	36	<.5	61	31	<0.1	-
3B	7.15	530	52	35.7	37	33	<0.1	-
4	7.2	750	69	5.8	49	30	<0.1	-
5	6.35	1,650	670	14.1	14	13	1.7	-
16	6.9	390	69	1.0	49	23	<0.1	-
17	5.55	295	57	16.3	14	8.6	0.2	-
18	5.9	430	10	4.2	47	21	1.1	-
19	7.4	765	75	4.2	51	28	<0.1	-
20	7.4	380	26	1.6	39	26	<0.1	-
21	5.7	250	54	10.4	15	8.3	0.2	-
24A	7.2	730	36	1.6	65	42	<0.1	-
24B	7.2	470	10	7.3	42	28	<0.1	-
25	7.0	335	29	7.8	39	21	0.2	-
26A	7.4	2,250	650	12.6	32	8.6	<0.1	-
26B	6.8	2,530	840	20.8	49	18	<0.1	-
27	6.9	410	24	4.2	40	24	0.4	-
28A	7.2	500	61	0.5	45	28	<0.1	-
28B	7.0	465	6	2.1	39	26	0.1	-
29A	7.1	410	24	3.6	31	22	0.1	-
30A	5.8	1,140	15	<0.5	97	56	38	-
30B	6.65	835	160	14.6	37	20	<0.1	-
33A	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	1.0	-
36	6.4	515	5.0	2.6	43	24	4.8	-
37A	7.05	438	30	3.7	50	28	<0.1	-
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	7.15	2,050	910	15.6	23	7.5	0.1	-
44	6.15	710	6	0.5	56	27	3.5	-
45	7.2	420	32	1.0	44	26	<0.1	-
46A	7.0	560	93	<0.5	130	75	<0.1	<0.05
46B	6.5	1,290	170	20.8	46	30	<0.1	<0.05
47	7.3	958	120	<0.5	110	48	<0.1	-
48A	6.15	640	59	<0.5	42	51	<0.1	<0.05
48B	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	7.0	1,170	57	135	66	31	<0.1	-
51B	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	6.55	1,265	140	<0.5	110	65	0.1	-
59	6.8	925	40	<0.5	86	60	<0.1	-
60	7.2	1,510	54	4.7	130	85	<0.1	-
61A	6.85	590	39	30.2	58	31	<0.1	-
61B	7.2	505	6	13.5	48	29	<0.1	-
62	6.7	1,517	72	178	120	53	<0.1	-
64	6.9	670	100	26.8	63	36	0.8	-
65	7.2	830	57	17.8	78	50	<0.1	-
66	6.5	680	55	40	66	24	3.6	-

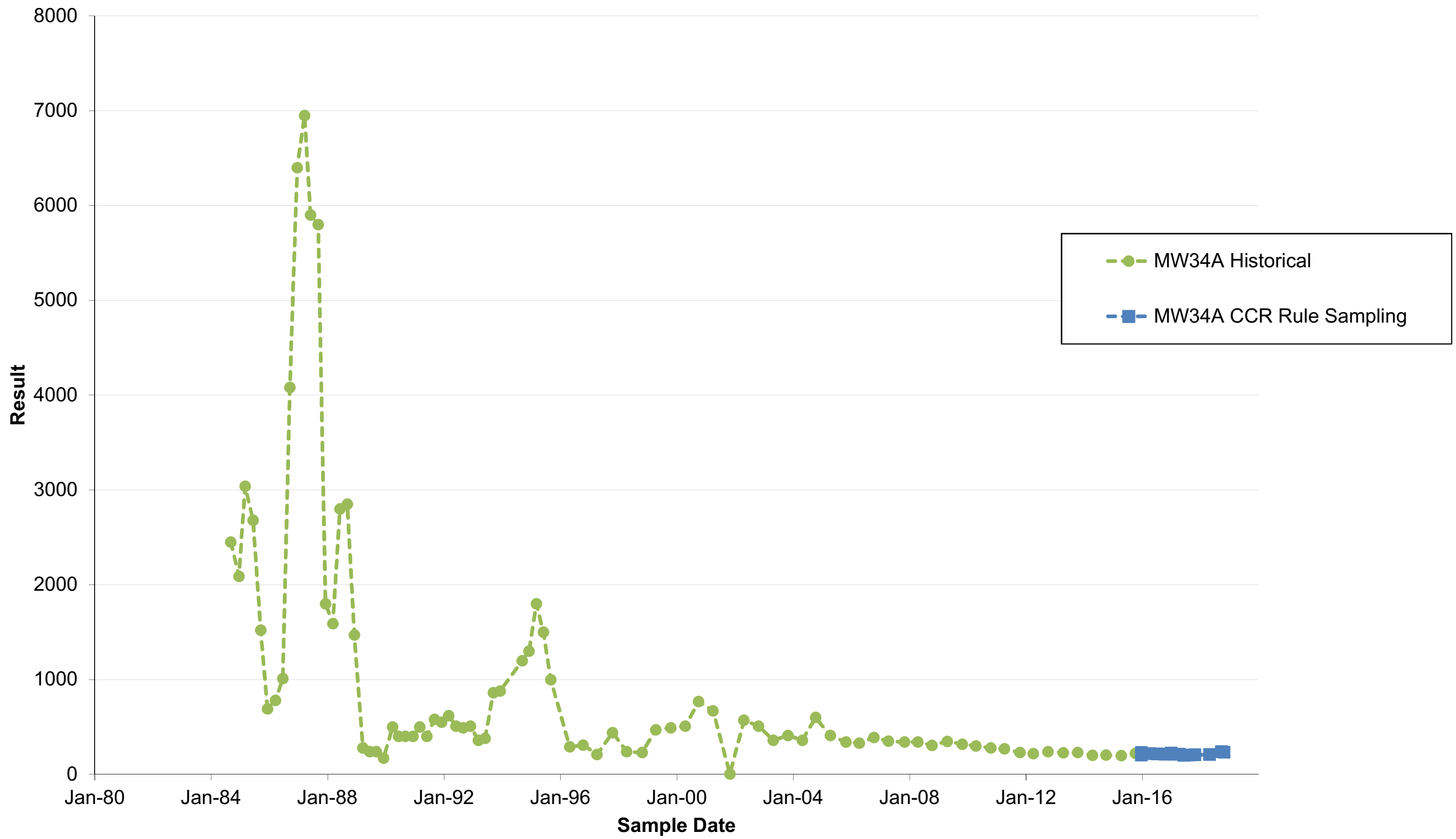
WELL NO.	pH	SPECIFIC CONDUCTANCE (umhos/cm @ 25°C)	SULFATE (mg/l)	CHLORIDE (mg/l)	CALCIUM (mg/l)	MAGNESIUM (mg/l)	IRON (mg/l)	BORON (mg/l)
67	7.0	560	100	1.0	57	32	1.0	-
68A	7.6	440	32	2.1	40	27	<0.1	-
68B	7.2	400	36	1.0	42	25	<0.1	-
70A	7.5	440	20	<0.5	27	37	<0.1	-
70B	7.3	520	25	5.2	51	34	<0.1	-
72A 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

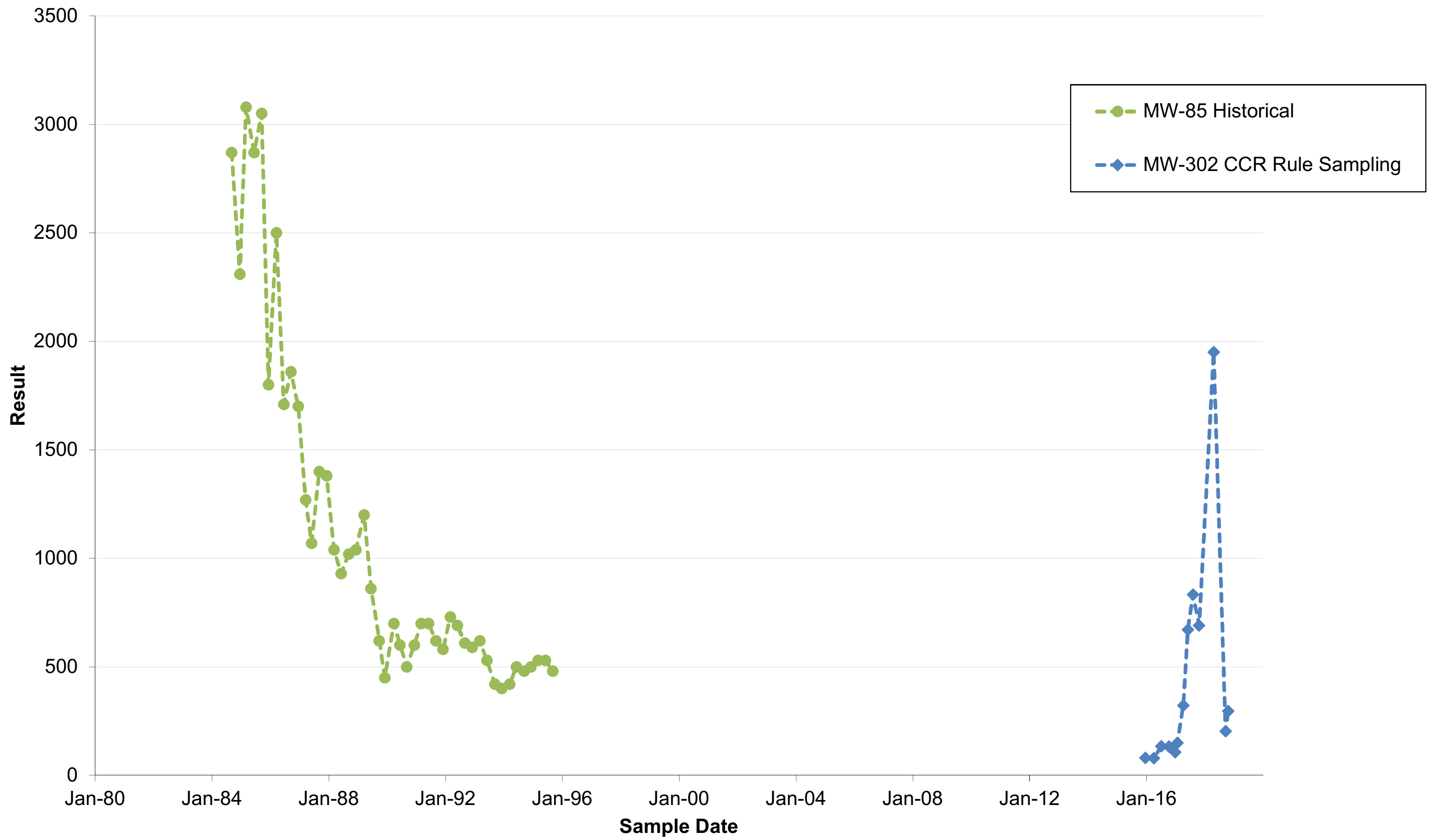
Long-Term Concentration Trend Plots

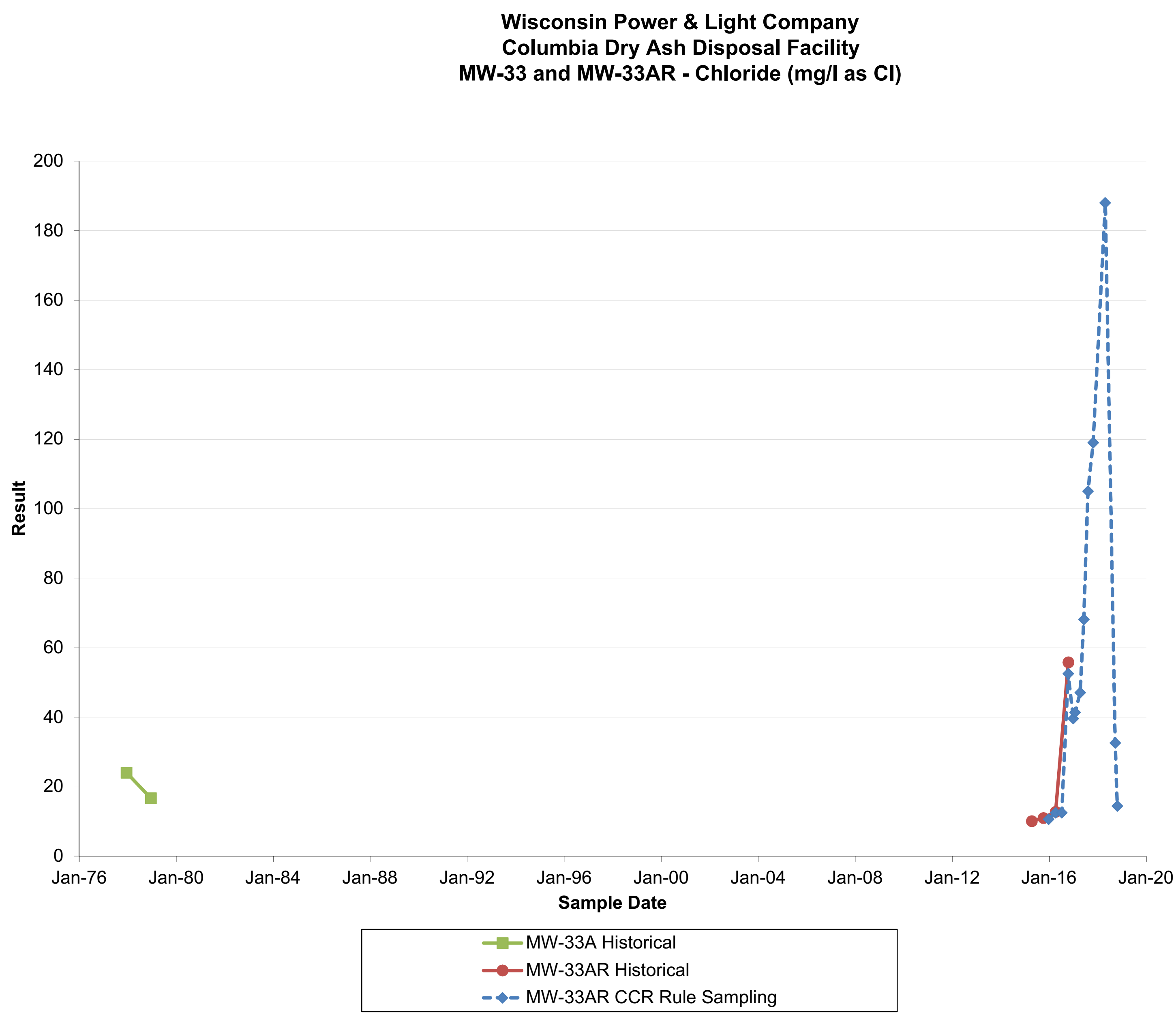

Wisconsin Power & Light Company
Columbia Dry Ash Disposal Facility
MW-33A and MW-33AR - Boron (µg/l as B)
3500
3000
2500
2000
1500
1000
500
0
Result
Jan-80
Jan-84
Jan-88
Jan-92
Jan-96
Jan-00
Jan-04
Jan-08
Jan-12
Jan-16
Sample Date
MW33A Historical
MW-33AR Historical
MW-33AR CCR Rule Sampling

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

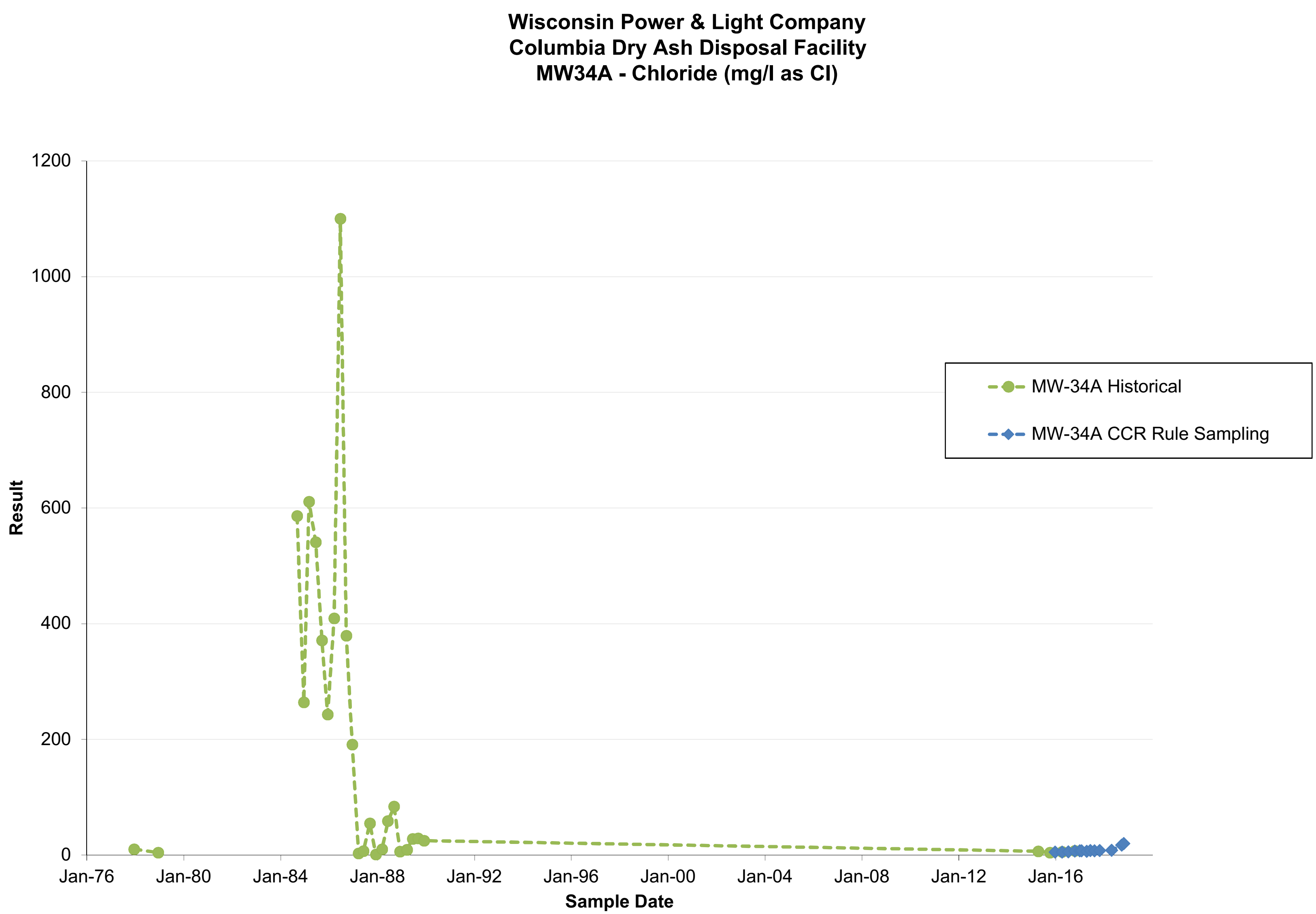


Wisconsin Power & Light Company
Columbia Dry Ash Disposal Facility
MW-302 and MW-85 - Boron (µg/l as B)

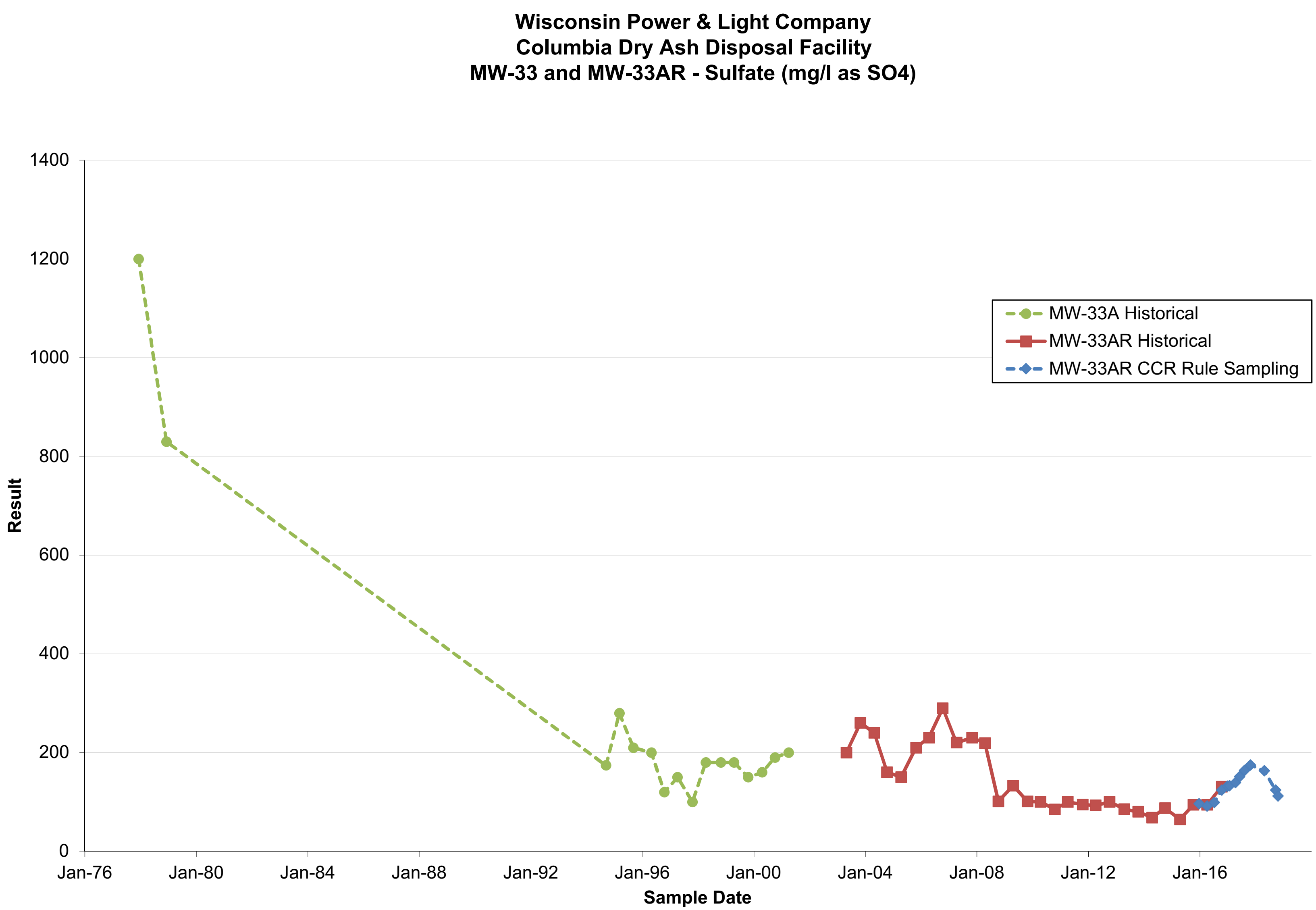




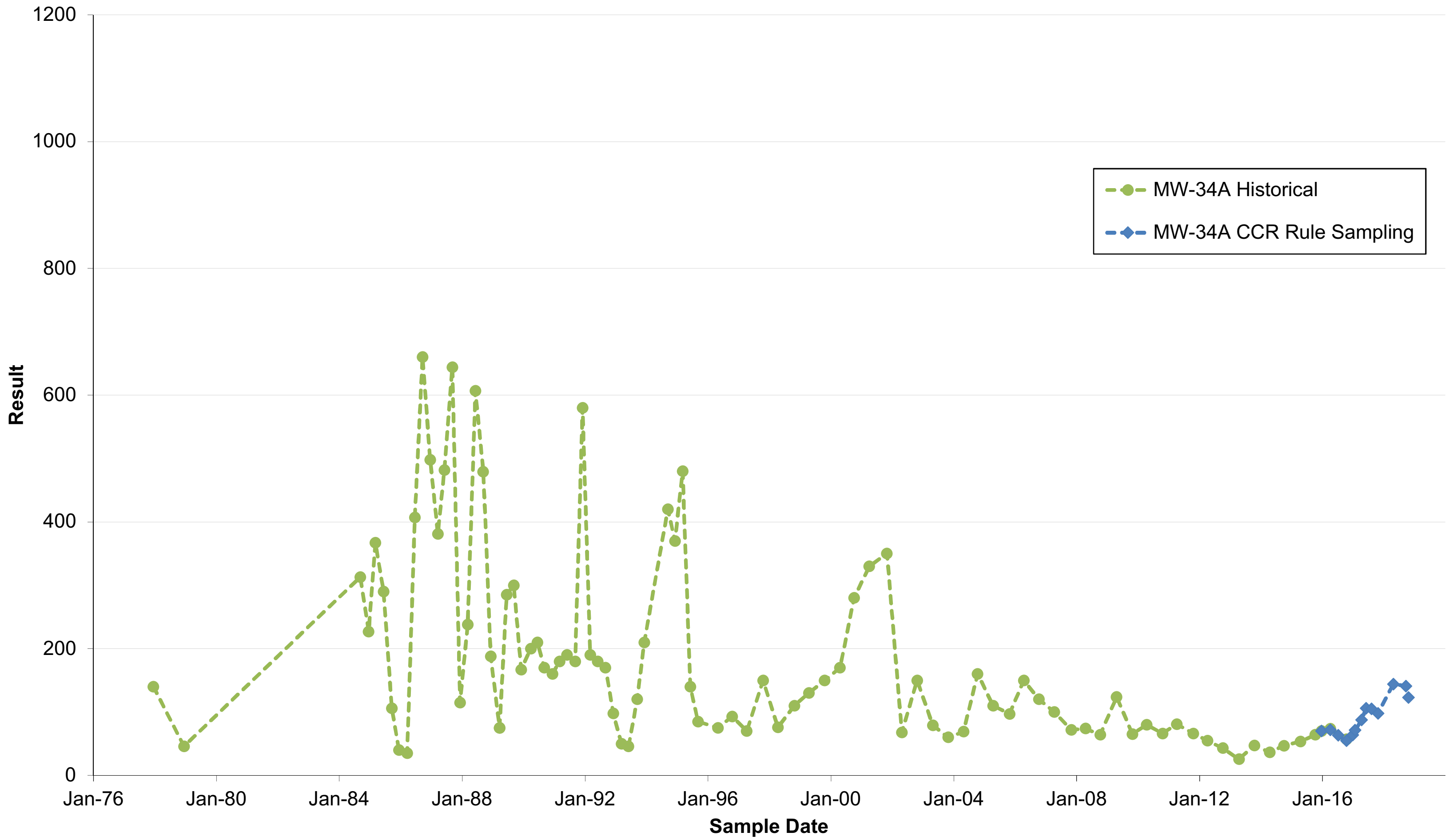
Wisconsin Power & Light Company
Columbia Dry Ash Disposal Facility
MW-33 and MW-33AR - Chloride (mg/l as Cl)
Result
0
20
40
60
80
100
120
140
160
180
200
Jan-76
Jan-80
Jan-84
Jan-88
Jan-92
Jan-96
Jan-00
Jan-04
Jan-08
Jan-12
Jan-16
Jan-20
Sample Date
MW-33A Historical
MW-33AR Historical
MW-33AR CCR Rule Sampling



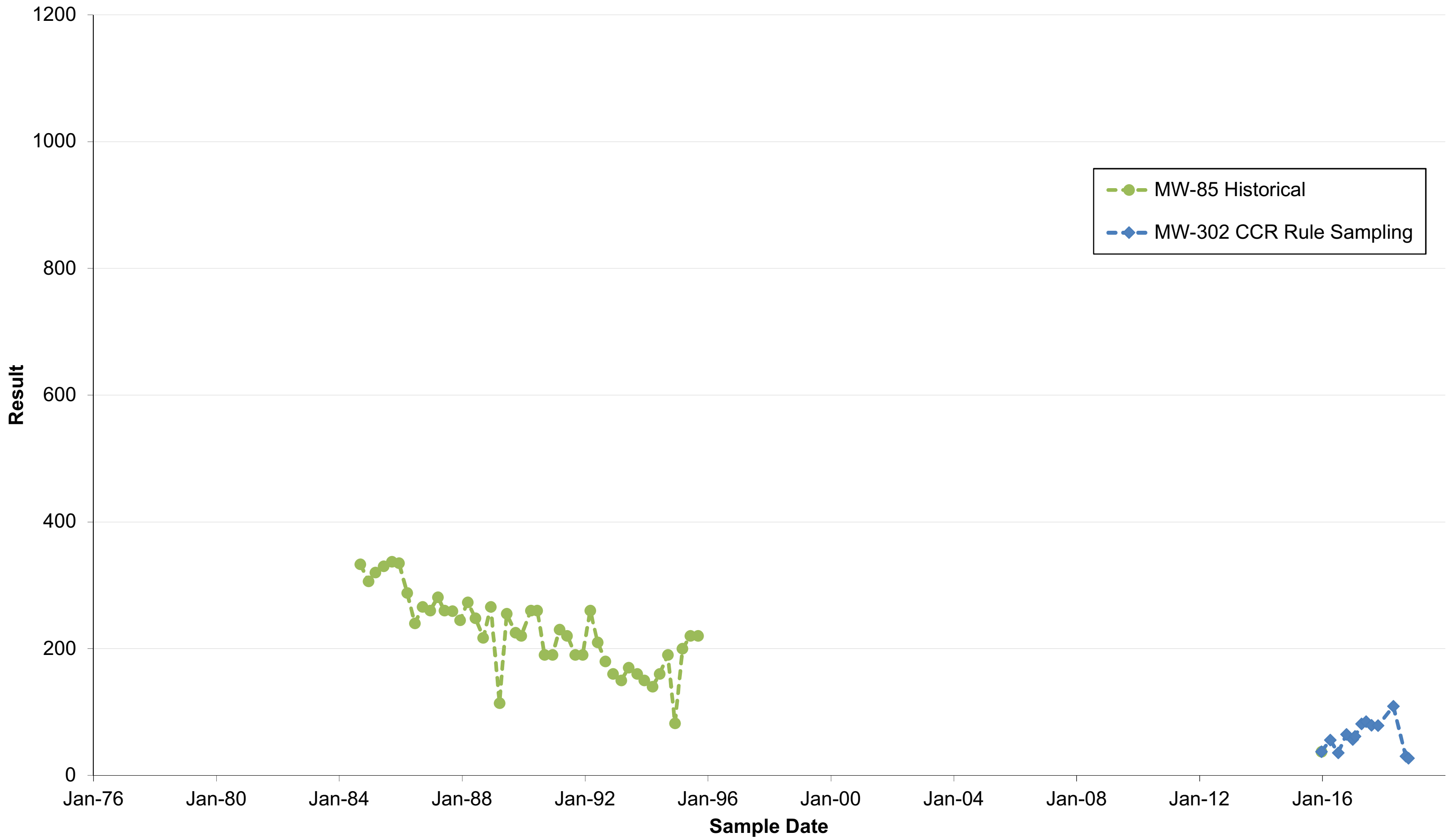
Wisconsin Power & Light Company
Columbia Dry Ash Disposal Facility
MW34A - Chloride (mg/l as Cl)
Result
1200
1000
800
600
400
200
0
Jan-76
Jan-80
Jan-84
Jan-88
Jan-92
Jan-96
Jan-00
Jan-04
Jan-08
Jan-12
Jan-16
Sample Date
MW-34A Historical
MW-34A CCR Rule Sampling


Wisconsin Power & Light Company
Columbia Dry Ash Disposal Facility
MW-33 and MW-33AR - Sulfate (mg/l as SO4)
Result
1400
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
Sample Date
MW-33A Historical
MW-33AR Historical
MW-33AR CCR Rule Sampling

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

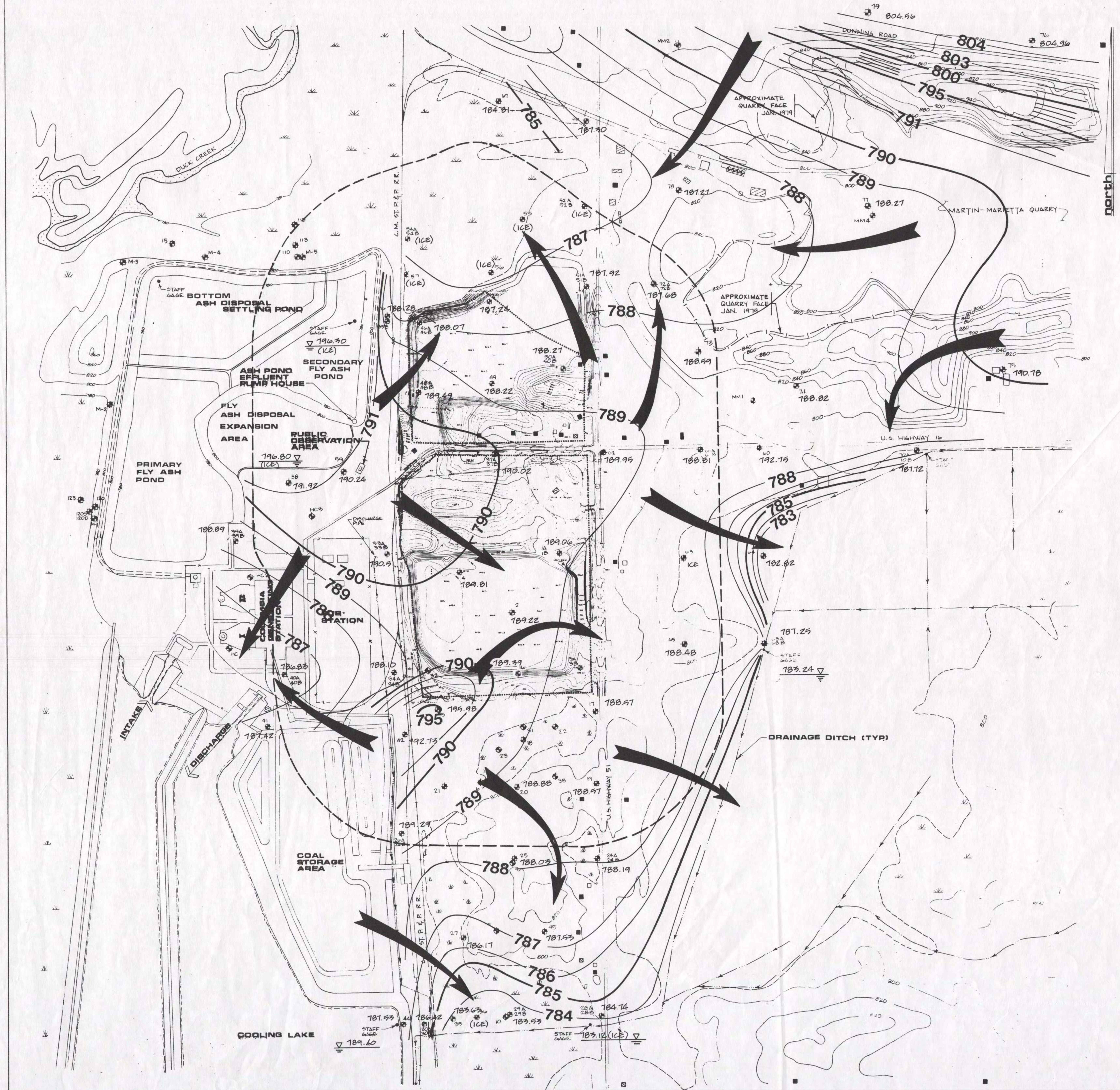


Wisconsin Power & Light Company
Columbia Dry Ash Disposal Facility
MW-85 and MW-302 - Sulfate (mg/l as SO4)



Appendix D

Historical Groundwater Flow Maps



LEGEND

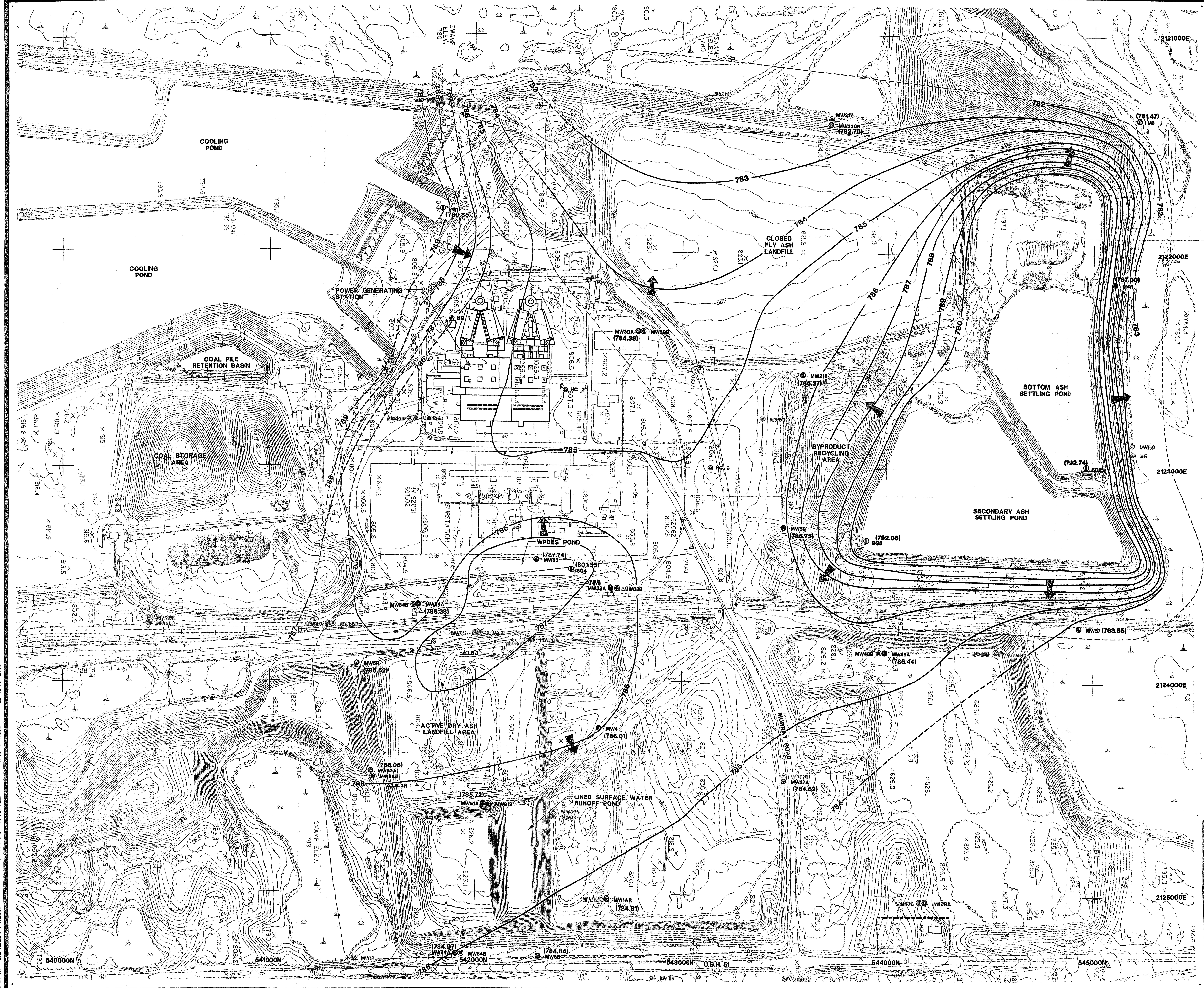
....	PROPOSED PROJECT AREA
43 / 720.29	OBSERVATION WELL LOCATION, NUMBER, AND WATER TABLE ELEVATION
	BORING LOCATION AND NUMBER
	WETLANDS
	TOPOGRAPHIC CONTOURS (CONTOUR INTERVAL: 20 FT.)
	PRIVATE RESIDENCES (ASSUMED LOCATIONS OF PRIVATE WATER SUPPLY WELLS)
	COMMERCIAL BUILDINGS (ASSUMED LOCATIONS OF POSSIBLE PUBLIC WATER SUPPLY WELLS)
	SURFACE WATERS (STREAMS OR DRAINAGE DITCHES) ARROWS INDICATE DIRECTION OF FLOW
	OTHER BUILDINGS (GARAGES, BARNS, ETC.)
	HIGH CAPICITY WELLS
—790—	WATER TABLE CONTOURS (CONTOUR INTERVAL: 1 FT.)
	DIRECTION OF GROUNDWATER FLOW

NO	BY	DATE	REVISION	APP'D

WATER TABLE CONTOUR MAP 2/4/81

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

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



LEGEND

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

NOTES

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

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

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

SHEET TITLE: WATER TABLE MAP (OCTOBER 2002)

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

RMT®

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

B2 Alternative Source Demonstration, April 2019 Detection Monitoring

Alternative Source Demonstration
April 2019 Detection Monitoring

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

Prepared for:

Alliant Energy

SCS ENGINEERS

25219067.00 | October 14, 2019

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

Table of Contents

Tables

Figures

Appendices

I:\25219067.00\Deliverables\2019 April ASD COL MOD 1-3 LF\191014_COL_1-3 LF_April ASD_DRAFT.docx

PE CERTIFICATION

WISCONSIN
Sherren C. Clark
E-29863
Madison,
Wis.
10-11-19
PROFESSIONAL ENGINEER

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

SC Clark　　　　　　10-11-19
(signature)　　　　　　(date)

Sherren Clark
(printed or typed name)

License number E-29863

My license renewal date is July 31, 2020.

Pages or sheets covered by this seal:
Alternative Source Demonstration, April 2019 Detection
Monitoring – Dry Ash Disposal Facility, Modules 1-3
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 (USEPA) in the *Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule*, dated April 17, 2015 (USEPA, 2015), and subsequent amendments. Specifically, this report was prepared to fulfill the requirements of 40 CFR 257.94(e)(2). The applicable sections of the Rule are provided below in *italics*.

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

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

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

This ASD report is evaluating the SSIs observed in the statistical evaluation of the April 2019 detection monitoring event at the Columbia Energy Center (COL) Dry Ash Disposal Facility, 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, sulfate, and total dissolved solids (TDS) 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 2019 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 Dry Ash Disposal Facility (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 for the COL ADF Modules 1-3 (MOD 1-3) is a multi-unit system, monitoring three existing CCR Units:

- COL Dry ADF – Module 1 (existing CCR Landfill)
- COL Dry ADF – Module 2 (existing CCR Landfill)
- COL Dry ADF – Module 3 (existing CCR Landfill)

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 Module 4 of the COL ADF, for the primary ash pond and for the secondary ash pond.

1.3 STATISTICALLY SIGNIFICANT INCREASES IDENTIFIED

SSIs were identified for boron, chloride, sulfate, and TDS at one or more wells based on the April 2019 detection monitoring event.

A summary of the April 2019 constituent concentrations and the established benchmark concentrations is provided in **Table 1.** The constituent concentrations with SSIs above the background concentration are highlighted in the table. 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 report for the April 2019 detection monitoring event will be included in the 2019 Annual Groundwater Monitoring and Corrective Action Report submitted in January 2020. 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, 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 northwest across the existing landfill area, then generally flows west toward the Wisconsin River. A groundwater flow map for April 2019 is shown on Figure 3. The groundwater elevation data for the CCR monitoring 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 40 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 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 field analysis based on review of the data and field notes. Because boron, chloride, sulfate, and TDS 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 2019 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, sulfate, or TDS. 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.

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 with the exception of MW-33AR which has recent concentration increases of chloride, sulfate, and TDS. The boron concentration at MW-33AR is consistent with previously observed concentrations at this monitoring well (Appendix A).

3.3 STATISTICAL EVALUATION REVIEW

The review of the statistical results and methods include 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 2019 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 2019 monitoring event based on the methodology and analysis review, and 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, sulfate, and TDS 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 2019 detection monitoring results to the upper prediction limits (UPLs) calculated based on 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.

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, sulfate, and TDS SSIs.

4.1.2 Man-Made Alternative Sources

Man-made alternative sources that could potentially contribute to the boron, chloride, sulfate, and TDS SSIs could include the closed ash pond landfill, the active 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 and MW34A.

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

4.2 LINES OF EVIDENCE

The lines of evidence indicating that the SSIs for boron, chloride, sulfate, and TDS 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, sulfate, and TDS 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 increase in chloride and TDS results for well B-33AR in the last 2 years has not correlated with an increase in boron, 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, sulfate, and TDS 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. TDS was not monitored, but is generally correlated with 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 are much lower, but remain above background. The October 2018 sulfate result for MW-33AR (installed to replace MW-33A) was 112 mg/L and at MW-34A were 123 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 historic monitoring data show that concentrations of boron and sulfate were significantly higher 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**).

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 west 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 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 and TDS results for well MW-33AR increased significantly without a corresponding increase in boron, indicating the source of the increasing chloride and TDS is not likely the CCR landfill. Sampling of the landfill leachate pond and the lysimeters indicates that boron and chloride concentrations are generally both elevated in leachate (**Table 4**). Furthermore, the chloride concentration in the April 2019 sample from MW-33AR was significantly higher than the chloride concentrations measured in the leachate, indicating the leachate is not the source (**Tables 2** and **4**). An alternative man-made source, such as road salt, is a more likely source of chloride than the CCR Units. The TDS increase correlated closely with the chloride increase and likely has the same alternative source.

5.0 ALTERNATIVE SOURCE DEMONSTRATION CONCLUSIONS

The lines of evidence discussed above regarding the SSIs reported for boron, chloride, sulfate, and TDS 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 and TDS 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 MOD 1-3 CCR Units may continue with detection monitoring based on this ASD. The ASD report will be included in the 2019 Annual Report due January 31, 2020.

7.0 REFERENCES

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

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

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

Warzyn Engineering, Inc., 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 - Detection Monitoring
Columbia Dry ADF, Modules 1-3 / SCS Engineers Project #25219067.00

Parameter Name	Interwell Upper Prediction Limit (UPL)	Background Wells							
		MW-84A				MW-301			
		Oct-17	Apr-18	Oct-18	Apr-19	Oct-17	Apr-18	Oct-18	Apr-19
		10/24/2017	4/25/2018	10/22/2018	4/3/2019	10/23/2017	4/25/2018	10/22/2018	4/3/2019
Boron, ug/L	37.4	13.8	25.0	10.1 J	13.6	34.3	24.3	27.8	26.9
Calcium, ug/L	138,400	77,500	76,600	74000	80,100	87,200	112,000	101,000	126,000 P6
Chloride, mg/L	6.52	5.1	4.8	4.2	3.6 B	4.0	2.3	3.2	2.9 J,B
Fluoride, mg/L	DQ	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.50 D3
Field pH, Std. Units	7.93	7.68	7.45	7.24	7.03	7.37	6.76	6.79	6.62
Sulfate, mg/L	37.1	2.2 J	2.8 J	1.6 J	1.4 J	27.5	8.6	19.2	5.3 J
Total Dissolved Solids, mg/L	514	314	328	330	318	362	464	424	462

Parameter Name	Compliance Wells														
	MW-33AR					MW-34A					MW-302				
	Oct-17	Apr-18		Oct-18	Apr-19	Oct-17	Apr-18		Oct-18	Apr-19	Oct-17	Apr-18		Oct-18	Apr-19
	10/24/2017	4/24/2018	Resample 9/21/2018	10/22/2018	4/2/2019	10/24/2017	4/24/2018	Resample 9/21/2018	10/22/2018	4/4/2019	10/24/2017	4/24/2018	Resample 9/21/2018	10/22/2018	4/2/2019
Boron, ug/L	678	601	683	682	568	208	209	241	233	204	691	1,950	203	296	254
Calcium, ug/L	98,200	99,800	NA	66,900	131,000	69,600	69,600	NA	70,100	67,500	94,400	110,000	NA	56,900	62,400
Chloride, mg/L	119	188	32.6	14.4	229	7.6	8.2	17.1	19.9	18.7	6.9	15.0	1.7 J	1.8 J	1.5 J
Fluoride, mg/L	<0.10	<0.10	NA	<0.10	<0.10	<0.10	<0.10	NA	<0.10	<0.10	<0.10	<0.10	NA	<0.10	<0.10
Field pH, Std. Units	7.81	7.74	8.16	7.69	7.72	7.67	7.80	8.12	7.64	7.73	8.23	7.21	7.74	7.22	7.32
Sulfate, mg/L	175	163	124	112	201	98	144	141	123	70.4	78.4	109	30.0	26.9	25.2
Total Dissolved Solids, mg/L	606	692	466	388	784	340	412	460	392	310	446	598	280	288	290

Highlighted cell indicates the compliance well result is an SSI. UPLs are based on a 1-of-2 retesting approach; therefore, for the April 2018 semiannual event an SSI is indicated only if both the original result and the September 2018 retest are above the UPL and the LOQ.

Abbreviations:
UPL = Upper Prediction Limit
NA = Not Analyzed
LOQ = Limit of Quantification
LOD = Limit of Detection
SSI = Statistically Significant Increase
DQ = Double Qualification
B = Analyte was detected in the associated Method Blank.
J = Estimated concentration at or above the LOD and below the LOQ.
D3 = Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.
P6 = Matrix Spike Recovery was outside laboratory control limits due to a parent sample concentrations notably higher than the spike level.

Notes:
1. Interwell UPL is based on the parametric prediction limit with 1-of-2 retesting methodology for all parameters except fluoride. and total dissolved solids. Parametric UPL for sulfate calculated using natural logarithm transformed data.
2. Interwell UPL for fluoride is based on the double quantification rule, because fluoride was not detected above the LOQ in the background samples.
3. Interwell UPL for total dissolved solids is nonparametric limit.
4. Interwell UPLs calculated from background well results for December 2015 through October 2017.

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Checked by: AJR Date: 9/24/2019

I:\25219067.00\Deliverables\2019 April ASD COL MOD 1-3 LF\Tables\[1_CCR GW Screening Summary_COL LF Mod 1_3 updated.xlsx]Table

Table 2. Analytical Results - Appendix III Constituents with SSIs
Columbia Dry ADF, Modules 1-3

Well Group	Well	Collection Date	Boron (µg/L)	Chloride (mg/L)	Sulfate (mg/L)	Total Dissolved Solids (mg/L)
Background	MW-301	12/22/2015	26.5	3.7 J	9.3	478
		4/5/2016	25.2	4	15.3	486
		7/8/2016	23.6	3.5 J	15	464
		10/13/2016	30.6	2.2	13.9	490
		12/29/2016	32.8	2 J	12.3 J	444
		1/25/2017	32.6	1.5 J	6.5	514
		4/11/2017	28.8	2	10.3	502
		6/6/2017	21.3	3.5	17.1	458
		8/8/2017	30.6	5.5	31.6	462
		10/23/2017	34.3	4	27.5	362
		4/25/2018	24.3	2.3	8.6	464
		10/22/2018	27.8	3.2	19.2	424
		4/3/2019	26.9	2.9 J, B	5.3 J	462
	MW-84A	12/22/2015	11.9	4.9	4.9	316
		4/5/2016	14	4.7	4.3	322
		7/8/2016	14.7	5.1	3.7 J	316
		10/13/2016	11.1	4.3	2.6 J	324
		12/29/2016	14.7	4.7	2.7 J	316
		1/25/2017	16.1	4.6	3	328
		4/11/2017	12.9	4.9	2.8 J	342
		6/6/2017	14.8	5.5	2.7 J	344
		8/8/2017	22.9	5.5	2 J	342
		10/24/2017	13.8	5.1	2.2 J	314
		4/25/2018	25	4.8	2.8 J	328
		10/22/2018	10.1 J	4.2	1.6 J	330
		4/3/2019	13.6	3.6 B	1.4 J	318
Compliance	MW-302	12/22/2015	80	4.2	37.4	312
		4/5/2016	78.8	4.1	55.6	312
		7/7/2016	134	3.1 J	35.4	344
		10/13/2016	132	1.1 J	64.7	360
		12/29/2016	106	1.2 J	56.4	330
		1/25/2017	149	1.6 J	61.6	384
		4/11/2017	322	1.6 J	81.3	436
		6/6/2017	671	3.5	84.6	466
		8/8/2017	833	4.5	79	470
		10/24/2017	691	6.9	78.4	446
		4/24/2018	1,950	15	109	598
		9/21/2018	203	1.7 J	30	280
		10/22/2018	296	1.8 J	26.9	288
		4/2/2019	254	1.5 J	25.2	290

Table 2. Analytical Results - Appendix III Constituents with SSIs
Columbia Dry ADF, Modules 1-3

Well Group	Well	Collection Date	Boron (µg/L)	Chloride (mg/L)	Sulfate (mg/L)	Total Dissolved Solids (mg/L)
Compliance	MW-33AR	12/21/2015	954	10.6	96.2	356
		4/5/2016	813	12.5	91.5	354
		7/7/2016	794	12.5	99.2	364
		10/13/2016	827	52.5	124	456
		12/29/2016	812	39.6	132	440
		1/25/2017	763	41.4	133	426
		4/11/2017	760	47.1	139	446
		6/6/2017	692	68.1	151	492
		8/7/2017	697	105	164	598
		10/24/2017	678	119	175	606
		4/24/2018	601	188	163	692
		9/21/2018	683	32.6	124	466
		10/22/2018	682	14.4	112	388
		4/2/2019	568	229	201	784
	MW-34A	12/21/2015	230	4.9	69.9	324
		4/5/2016	220	5.1	71.6	298
		7/7/2016	216	5.6	63.4	304
		10/13/2016	212	6.8	54.8	288
		12/29/2016	224	7.1	63.9	242
		1/25/2017	214	7.2	71.2	310
		4/11/2017	214	6.2	87.6	330
		6/6/2017	201	7.8	106	366
		8/7/2017	205	7.4	105	358
		10/24/2017	208	7.6	98	340
		4/24/2018	209	8.2	144	412
		9/21/2018	241	17.1	141	460
		10/22/2018	233	19.9	123	392
		4/4/2019	204	18.7	70.4	310

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.

Notes:
(1) Analytical laboratory reports provided in the 2017 Annual Groundwater Monitoring and Corrective Action Report.

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Last revision by:	NDK	Date:	9/30/2019
Checked by:	LMH	Date:	9/30/2019

I:\25219067.00\Deliverables\2019 April ASD COL MOD 1-3 LF\Tables\[2 and 3_COL LF ASD.xlsx]Table 2. Analy. Rslts- CCR

Table 3. Groundwater Elevations - State Monitoring Program and CCR Well Network
Columbia Generating Station

	Well Number	MW-1AR	MW-5R	MW-33AR	MW-33BR	MW-34A	MW-34B	MW-37A	MW-83	MW-84A	MW-84B	MW-86	MW-91AR	MW-91B	MW-92A	MW-92B
Dry Ash Facility	**Top of Casing Elevation (feet amsl)**	822.55	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	25.97	31.08	57.50	35.43	56.95	31.80	25.42	40.21	52.02	45.43	32.90	52.38	28.94	51.75
	Top of Well Screen Elevation (ft)	778.15	779.47	777.21	750.89	770.52	749.10	781.24	782.54	774.07	762.24	779.36	776.13	756.07	779.53	756.66
	Measurement Date															
	April 4-6, 2016	785.82	787.02	785.29	785.07	785.63	785.67	784.76	785.43	786.37	786.26	785.89	786.05	785.95	786.61	786.21
	October 3-5, 2017	785.48	786.66	784.51	784.22	784.67	784.63	784.86	784.29	--	786.49	785.58	786.08	785.83	786.47	786.02
	October 9-10, 2017	--	--	--	--	--	--	--	--	785.56 (2)	--	--	--	--	--	--
	April 23-25, 2018	783.99	785.36	783.09	786.36	781.77	780.79	783.28	783.32	785.88	784.91	782.54	784.71	784.53	785.23	784.81
	October 23-25, 2018	788.25	789.71	788.77	787.96	787.88	787.73	787.62	788.26	788.32	788.19	788.21	788.59	788.31	789.32	788.87
	April 1-4, 2019	787.05	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
	Bottom of Well Elevation (ft)	778.15	779.47	777.21	750.89	770.52	749.10	781.24	782.54	774.07	762.24	779.36	776.13	756.07	779.53	756.66

	Well Number	M-3	M-4R	MW-39A	MW-39B	MW-48A	MW-48B	MW-57	MW-59	MW-216R	MW-217	MW-220RR
Ash Pond Facility	**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
	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											
	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
	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
	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
	October 22-24, 2018	782.95	788.47	787.12	786.88	787.12	786.99	783.48	787.73	787.49	784.90	784.52
	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
	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

		Background Wells		Mod 1- 3 LF			Primary Pond				Secondary Pond			Mod 4 Landfill		
	Well Number	MW-301	MW-84A	MW-302	MW-33AR	MW-34A	MW-303	MW-304	MW-305	M-4R	MW-306	MW-307	MW-308	MW-309	MW-310	MW-311
CCR Rule Wells	**Top of Casing Elevation (feet amsl)**	806.89	814.28	813.00	808.29	805.95	811.52	805.42	806.32	806.1	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	40.21	33.6	31.08	35.43	35.8	25.7	25.6	39.58	27	26.5	28	37.67	38.41	36.19
	Top of Well Screen Elevation (ft)	787.49	784.07	789.40	787.21	780.52	785.72	789.72	790.72	776.52	790.63	790.39	788.90	785.60	785.21	783.55
	Measurement Date															
	April 4-5, 2016	786.78	786.37	785.81	785.29	785.63	785.48	788.08	789.61	789.09	--	--	--	--	--	--
	July 7-8, 2016	786.31	785.89	786.28	785.19	785.05	784.60	787.36	789.26	787.43	--	--	--	--	--	--
	July 28, 2016	NM	785.61	NM	NM	784.86	784.35	NM	NM	NM	--	--	--	--	--	--
	October 11-13, 2016	787.64	787.22	787.76	787.36	786.45	786.18	788.18	789.78	787.88	--	--	--	--	--	--
	December 29, 2016	787.37	786.63	787.05	785.66	785.72	NM	NM	NM	NM	--	--	--	--	--	--
	January 25-26, 2017	787.27	786.70	786.89	785.88	785.98	785.28	789.34	789.36	789.64	785.50	785.36	785.73	--	--	--
	April 10 & 11, 2017	787.89	787.16	787.55	786.39	786.30	786.00	788.22	789.57	787.95	786.22	785.64	786.51	--	--	--
	June 6, 2017	788.25	787.63	788.37	787.27	786.66	786.49	788.58	789.79	787.83	786.85	786.07	786.46	--	--	--
	August 7-9, 2017	787.34	786.68	787.55	786.11	785.81	785.42	789.52	789.30	788.54	785.69	785.19	785.37	--	--	--
	October 23-24, 2017	785.89	785.32	785.94	784.13	784.50	783.92	788.97	788.14	788.00	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	785.88	784.37	783.09	781.77	783.27	789.69	787.67	790.43	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	786.55	NM	NM	NM	785.20	788.25	788.56	787.63	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	NM	788.37	787.90	787.01	786.50	NM	NM	NM	NM	NM	NM	787.08	787.24	787.66
	October 22-24, 2018	788.98	788.32	789.16	788.77	787.88	787.51	789.05	790.04	788.47	787.66	786.57	787.81	787.99	788.18	788.64
	April 1-4, 2019	787.04	787.35	787.56	786.63	786.82	786.52	789.72	790.07	789.44	786.72	786.71	787.53	786.30	786.38	786.38
	Bottom of Well Elevation (ft)	771.33	776.36	780.55	771.89	776.98	774.82	733.43	776.98	753.04	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: 8/1/2019
Checked by: AJR Date: 8/21/2019

(1) Water Levels collected during sample collection.
(2) The depth to water at MW-84A was not measured prior to purging for sampling during the October 3-5, 2017 sampling event. The level was allowed to return to static and was measured on 10/10/2017.

I:\25219067.00\Deliverables\2019 April ASD COL MOD 1-3 LF\Tables\[2 and 3_COL LF ASD.xlsx]Table 3. GW Elevations

Table 4. Analytical Results - Lysimeters and Leachate Pond
Columbia Dry Ash Disposal Facility
SCS Engineers Project #25219067.00

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 J	856
	2018-Oct	DRY	--	--	
	2019-Apr	--	5,640	22 J	911
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	--	--	--
LP-1	2015-Apr	--	4060	27.8	734
	2015-Oct	--	4300	37.1	820
	2016-Apr	--	1830	26.8	416
	2016-Oct	--	4610	71.5	835
	2017-Apr	--	2690	66.3	587
	2017-Oct	--	4970	91.7	739
	2018-Apr	--	2060	63.2	634
	2018-Oct	--	2630	151	907
	2019-Apr	--	570	35.1	249

Table 4. Analytical Results - Lysimeters and Leachate Pond
Columbia Dry Ash Disposal Facility
SCS Engineers Project #25219067.00

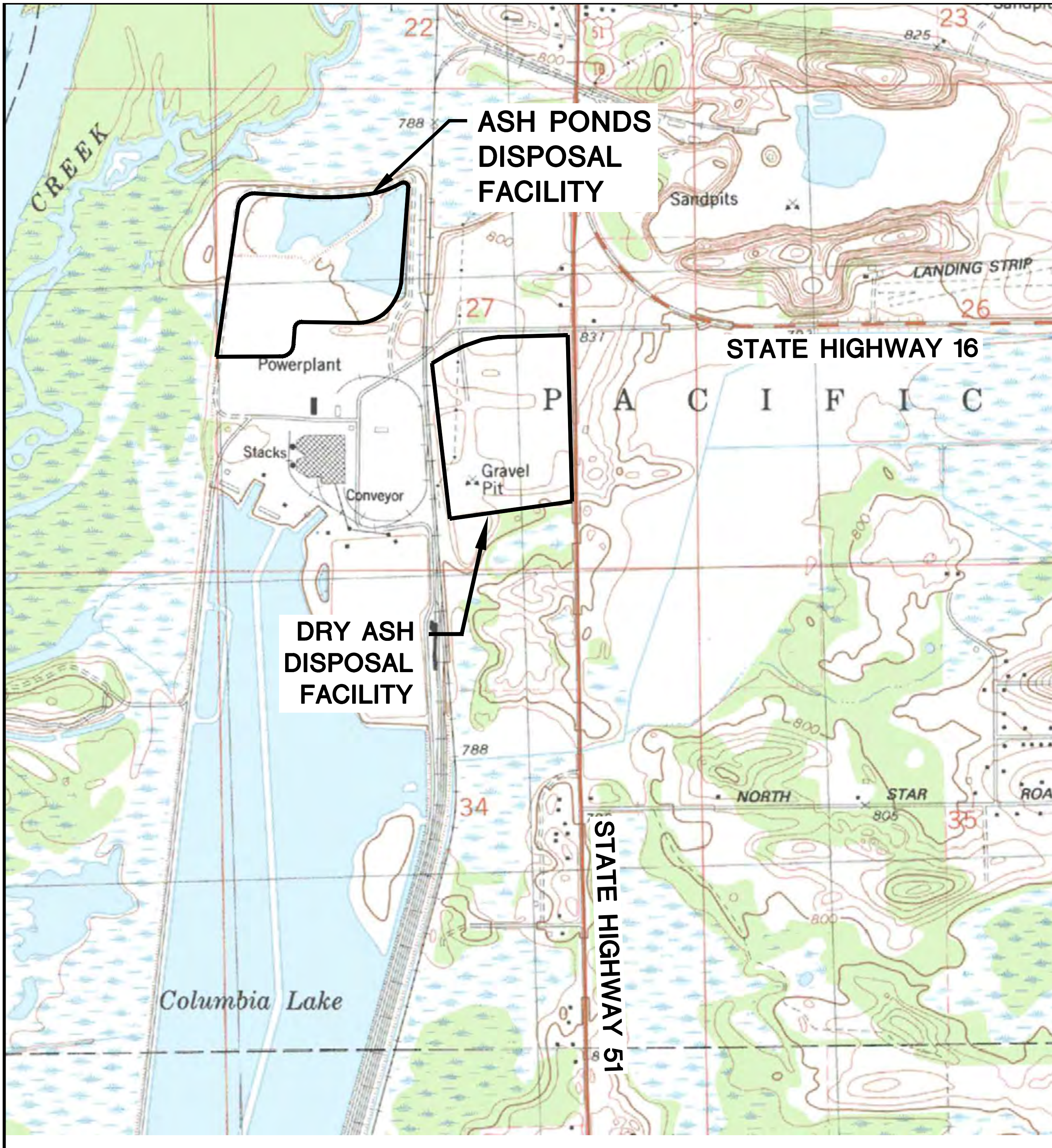
Abbreviations:
μg/L = micrograms per liter
mg/L = milligrams per liter
-- = not analyzed
μmhos/cm = micromhos/centimeter

Notes:
J = Estimated concentration at or above the LOD and below the LOQ.

Created by:	TLC	Date:	12/1/2014
Last revision by:	NDK	Date:	8/20/2019
Checked by:	AJR	Date:	8/21/2019

I:\25219067.00\Deliverables\2019 April ASD COL MOD 1-3 LF\Tables\[4_Leachate_2015-2019.xlsx]Lys LP1 App III

Figures



N

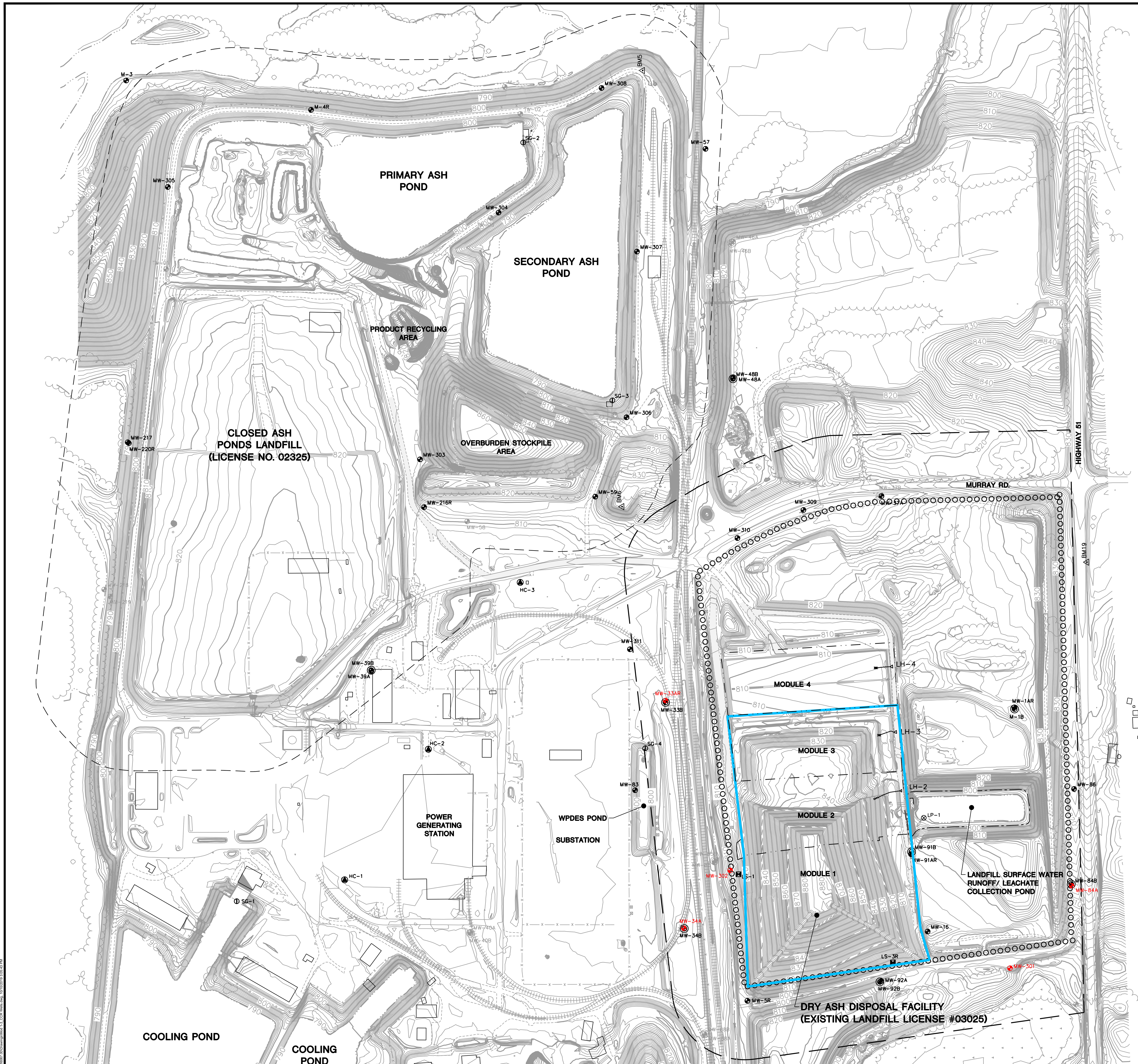
POYNETTE QUADRANGLE
WISCONSIN–COLUMBIA CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)
NW/4 POYNETTE 15' QUADRANGLE
1984
SCALE: 1" = 2,000'

WISCONSIN

CLIENT	ALLIANT ENERGY 4902 NORTH BILTMORE LN. #1000 MADISON, WI 53718	SITE	COLUMBIA ASH PONDS AND DRY ASH DISPOSAL FACILITIES	SITE LOCATION MAP

PROJECT NO.	25216067.00	DRAWN BY:	KP	ENGINEER	SCS ENGINEERS 2830 DAIRY DRIVE MADISON, WI 53718-6751 PHONE: (608) 224-2830	FIGURE
DRAWN:	08/10/09	CHECKED BY:	MDB			1
REVISED:	04/16/18	APPROVED BY:	SC 04/16/18			

I:\25216067.00\Drawings\Site Loc.dwg, 4/16/2018 11:31:14 AM



LEGEND

- 810 EXISTING MAJOR CONTOUR (10' INTERVAL)
- EXISTING MINOR CONTOUR (2' CONTOUR)
- EXISTING FENCELINE
- EXISTING TRACKS
- EXISTING PAVED ROAD
- EXISTING UNPAVED ROAD
- EDGE OF WATER
- DESIGN MANAGEMENT ZONE
- APPROVED LIMITS OF WASTE
- CONSTRUCTED LIMITS OF WASTE
- WATER SUPPLY WELL
- STAFF GAUGE
- WATER TABLE WELL
- PIEZOMETER
- SURFACE WATER SAMPLE LOCATION
- LYSIMETER
- ABANDONED WATER TABLE WELL
- ABANDONED PIEZOMETER
- LEACHATE HEADWELL
- MOD 1-3 CCR UNIT
- CCR 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, AND AUGUST 2018.
2. MONITORING WELL LOCATIONS AND ELEVATIONS SURVEYED BY WISCONSIN POWER AND LIGHT, INC. IN DECEMBER 1994, NOVEMBER 1996, APRIL 2003, AND AUGUST 2012.
3. SUPPLY WELL LOCATIONS ARE APPROXIMATE AND ASSUMED BASED ON JANUARY 2013 DRAWINGS BY TRC.
4. THE LOCATIONS OF THE ASH PONDS FACILITY DESIGN MANAGEMENT ZONE DEMARCATION LINES ARE APPROXIMATE AND BASED ON THE WATER TABLE MAP (OCTOBER 2012) FIGURE BY RMT.
5. THE LOCATION OF THE ACTIVE DRY ASH LANDFILL DESIGN MANAGEMENT ZONE DEMARCATION LINE IS BASED ON A 300 FOOT OFFSET FROM THE DESIGN LIMITS OF ASH EXCEPT WHERE OFFSET WOULD EXTEND LINE BEYOND PROPERTY LINE.

PROJECT NO.	25216067.00	DRAWN BY:	KP/JMO
DRAWN:	01/06/19	CHECKED BY:	NK
REVISED:	10/10/19	APPROVED BY:	SC 10/10/19

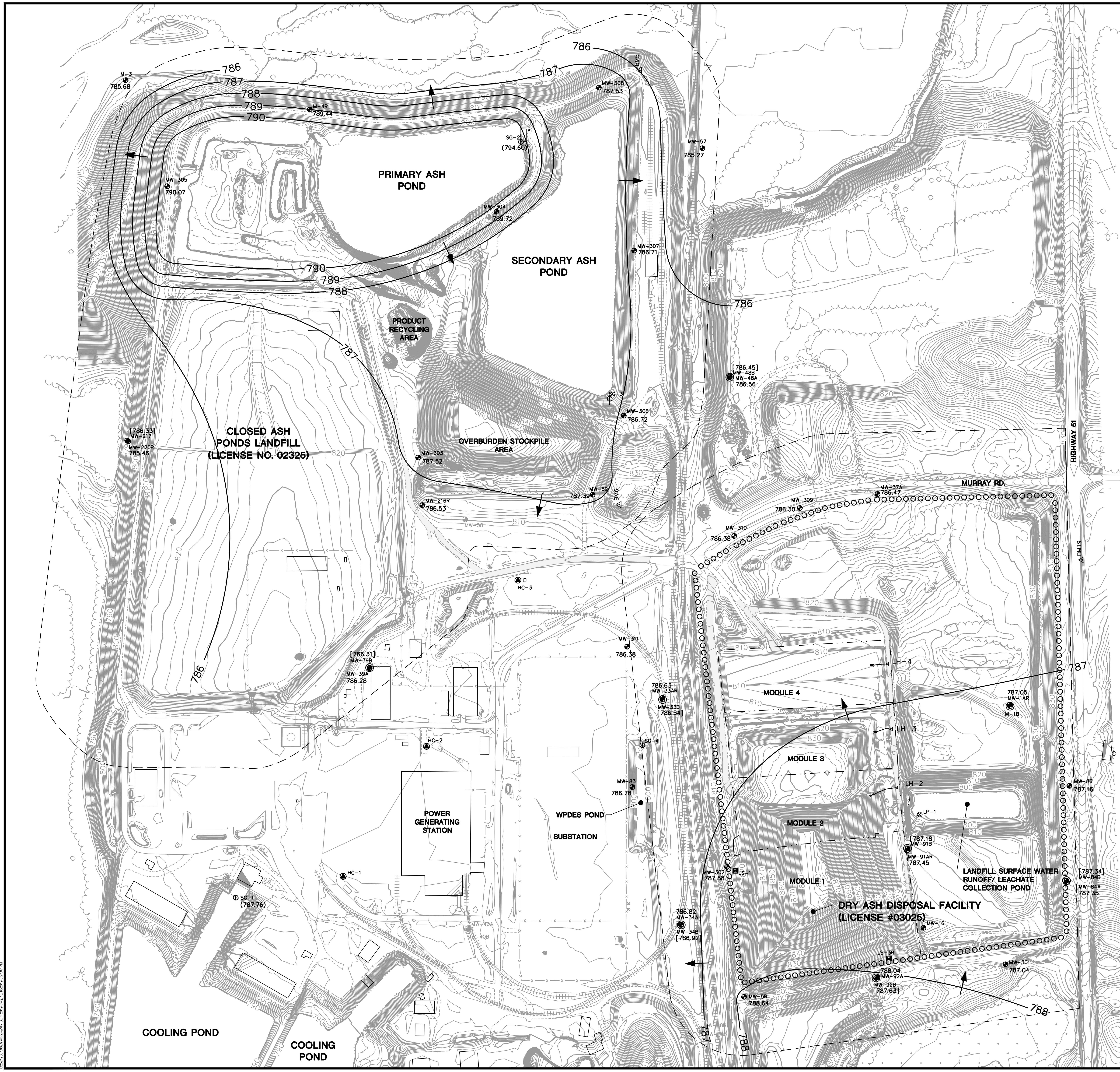
ENGINEER: SCS ENGINEERS
2830 DAIRY DRIVE MADISON, WI 53718-6751
PHONE: (608) 224-2830

CLIENT: ALLIANT ENERGY
4902 NORTH BILTMORE LN. #1000
MADISON, WI 53718

SITE: COLUMBIA ASH PONDS AND DRY ASH DISPOSAL FACILITIES

SITE PLAN AND WELL LOCATION MAP

FIGURE 2



LEGEND

810	EXISTING MAJOR CONTOUR (10' INTERVAL)
	EXISTING MINOR CONTOUR (2' CONTOUR)
	EXISTING FENCELINE
	EXISTING TRACKS
	EXISTING PAVED ROAD
	EXISTING UNPAVED ROAD
	EDGE OF WATER
	DESIGN MANAGEMENT ZONE
	APPROVED LANDFILL LIMITS
	CONSTRUCTED LANDFILL LIMITS/MODULE LIMITS
	WATER SUPPLY WELL
	STAFF GAUGE
	WATER TABLE WELL
	PIEZOMETER
	SURFACE WATER SAMPLE LOCATION
	LYSIMETER
	ABANDONED WATER TABLE WELL
	ABANDONED PIEZOMETER
	LEACHATE HEADWELL
787.62	WATER TABLE ELEVATION MEASURED APRIL 2019
[788.87]	POTIENTIOMETRIC SURFACE ELEVATION MEASURED APRIL 2019 (NOT CONTOURED)
(794.60)	SURFACE WATER ELEVATION MEASURED APRIL 2019 (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, AND AUGUST 2018.
2. MONITORING WELL LOCATIONS AND ELEVATIONS SURVEYED BY WISCONSIN POWER AND LIGHT, INC. IN DECEMBER 1994, NOVEMBER 1996, APRIL 2003, JANUARY 6, 2016 AND BY SCS ENGINEERS IN FEBRUARY 2018.
3. SUPPLY WELL LOCATIONS ARE APPROXIMATE AND ASSUMED BASED ON JANUARY 2013 DRAWINGS BY TRC.
4. THE LOCATIONS OF THE ASH PONDS FACILITY DESIGN MANAGEMENT ZONE DEMARCATION LINES ARE APPROXIMATE AND BASED ON THE WATER TABLE MAP (OCTOBER 2012) FIGURE BY RMT.
5. THE LOCATION OF THE ACTIVE DRY ASH LANDFILL DESIGN MANAGEMENT ZONE DEMARCATION LINE IS BASED ON A 300 FOOT OFFSET FROM THE DESIGN LIMITS OF ASH EXCEPT WHERE OFFSET WOULD EXTEND LINE BEYOND PROPERTY LINE.

N

200 0 200

SCALE: 1" = 200'

PROJECT NO.	25219067.00	DRAWN BY:	KP/JMO
DRAWN:	08/23/19	CHECKED BY:	NDK
REVISED:	10/10/19	APPROVED BY:	SC 10/10/19

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

CLIENT: ALLIANT ENERGY
ALLIANT ENERGY
4902 NORTH BILTMORE LN. #1000
MADISON, WI 53718

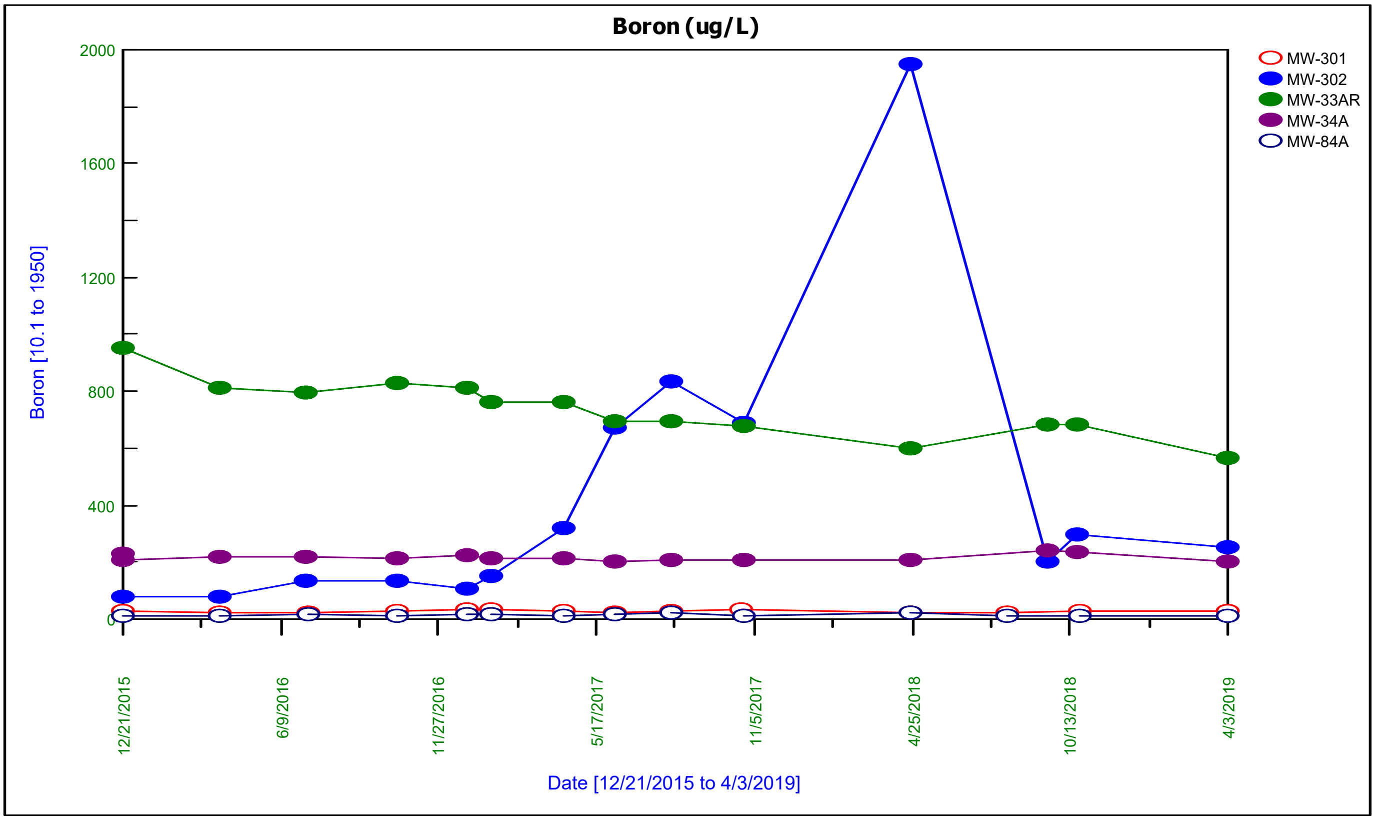
SITE: COLUMBIA ASH PONDS AND DRY ASH DISPOSAL FACILITIES

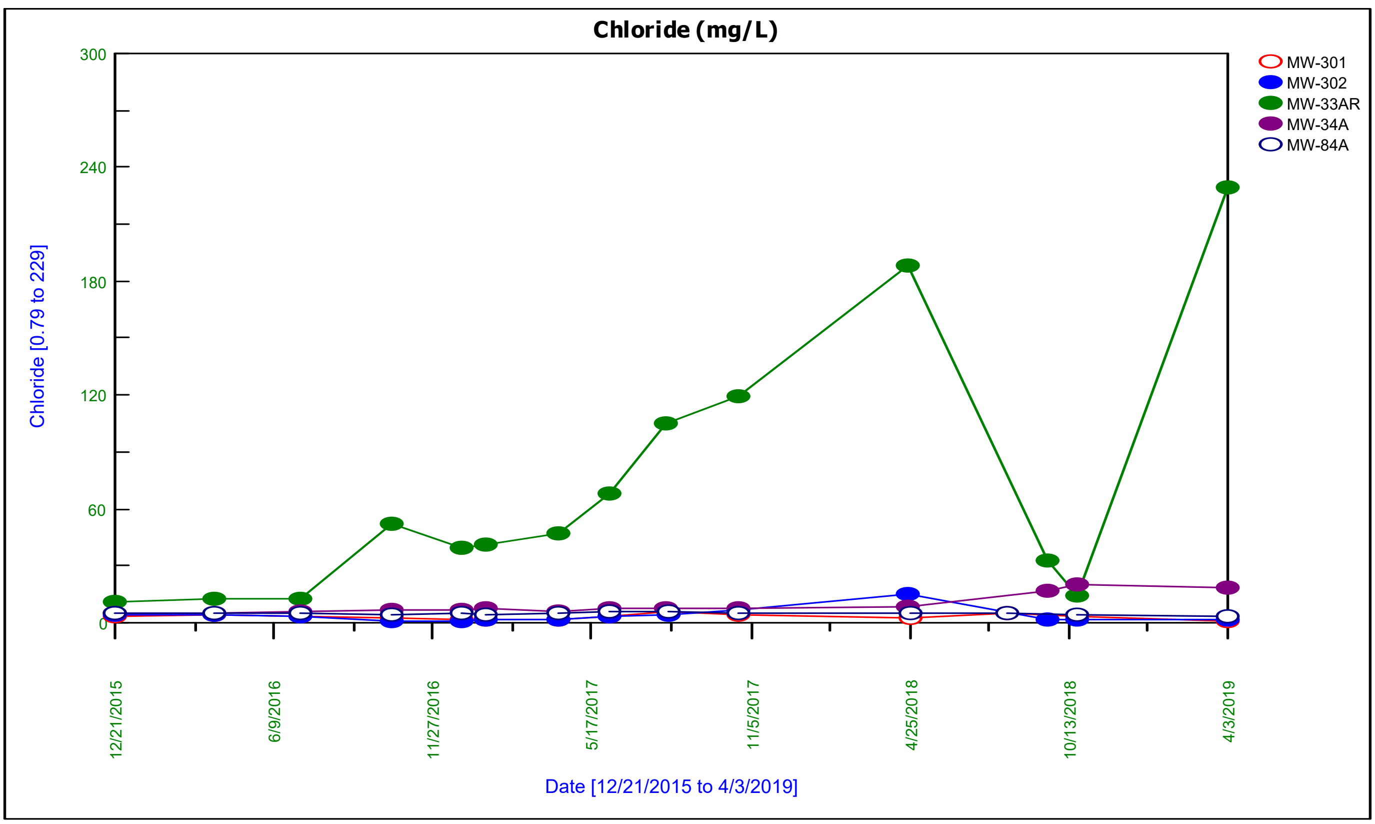
WATER TABLE MAP
APRIL 2019

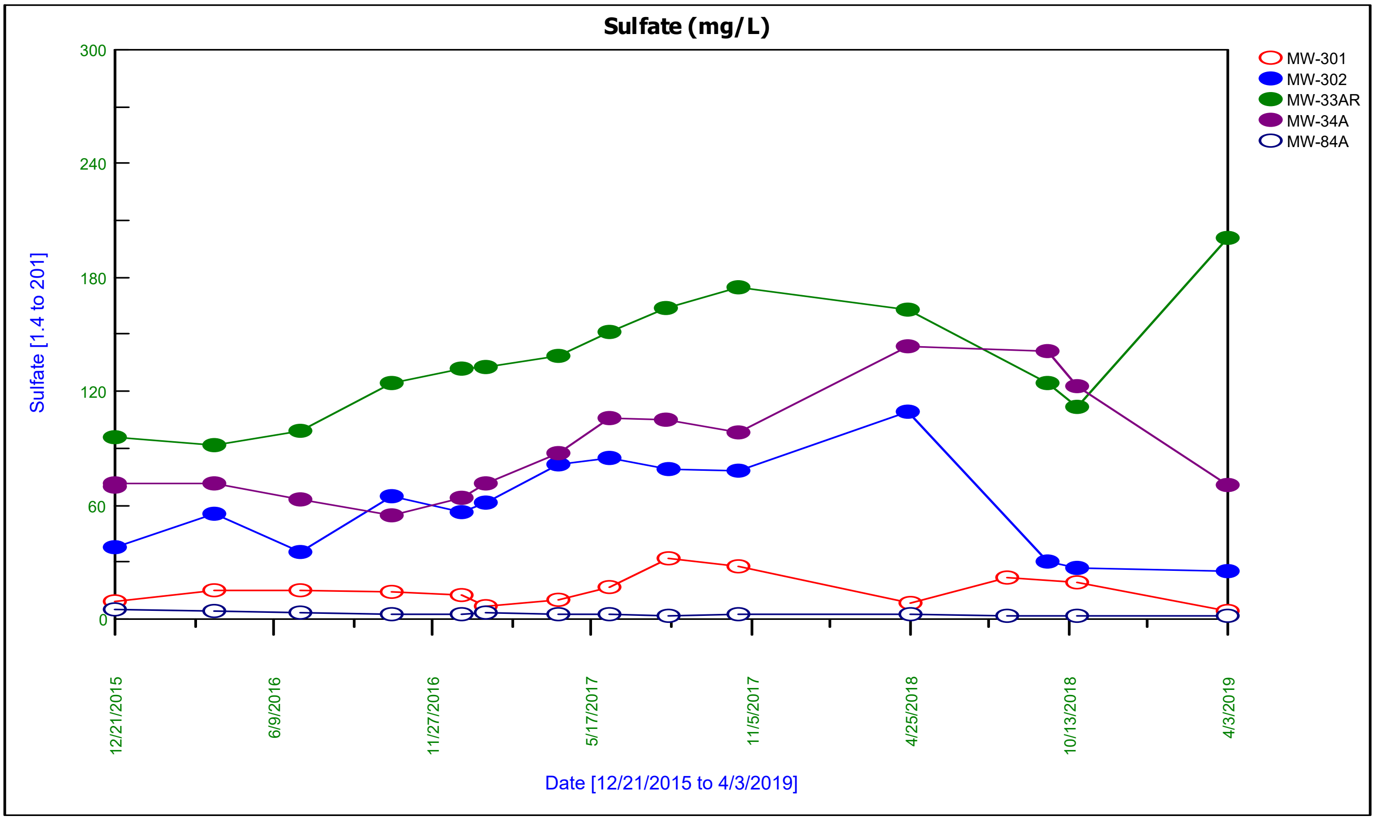
FIGURE 3

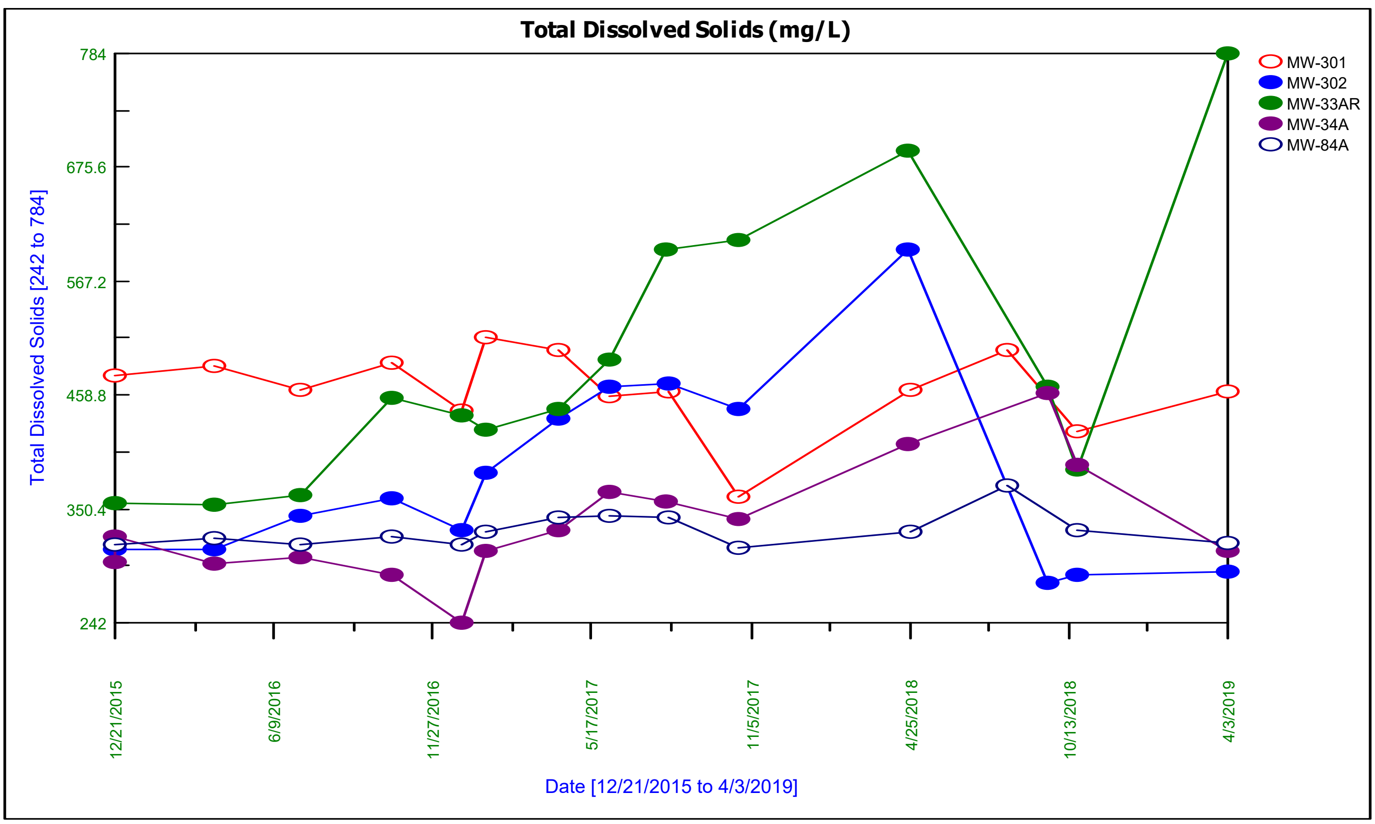
Appendix A

Trend Plots for CCR Wells


Boron (ug/L)
MW-301
MW-302
MW-33AR
MW-34A
MW-84A
2000
1600
1200
800
400
0
Boron [10.1 to 1950]
12/21/2015
6/9/2016
11/27/2016
5/17/2017
11/5/2017
4/25/2018
10/13/2018
4/3/2019
Date [12/21/2015 to 4/3/2019]


Chloride (mg/L)
MW-301
MW-302
MW-33AR
MW-34A
MW-84A
300
240
180
120
60
0
Chloride [0.79 to 229]
12/21/2015
6/9/2016
11/27/2016
5/17/2017
11/5/2017
4/25/2018
10/13/2018
4/3/2019
Date [12/21/2015 to 4/3/2019]


Sulfate (mg/L)
300
240
180
120
60
0
Sulfate [1.4 to 201]
MW-301
MW-302
MW-33AR
MW-34A
MW-84A
12/21/2015
6/9/2016
11/27/2016
5/17/2017
11/5/2017
4/25/2018
10/13/2018
4/3/2019
Date [12/21/2015 to 4/3/2019]


Total Dissolved Solids (mg/L)
784
675.6
567.2
458.8
350.4
242
Total Dissolved Solids [242 to 784]
MW-301
MW-302
MW-33AR
MW-34A
MW-84A
12/21/2015
6/9/2016
11/27/2016
5/17/2017
11/5/2017
4/25/2018
10/13/2018
4/3/2019
Date [12/21/2015 to 4/3/2019]

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

APPENDICES TO

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

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	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	5.8	1,140	15	<0.5	97	56	0.1	-
30B	6.65	835	160	14.6	37	20	38	-
33A	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	-

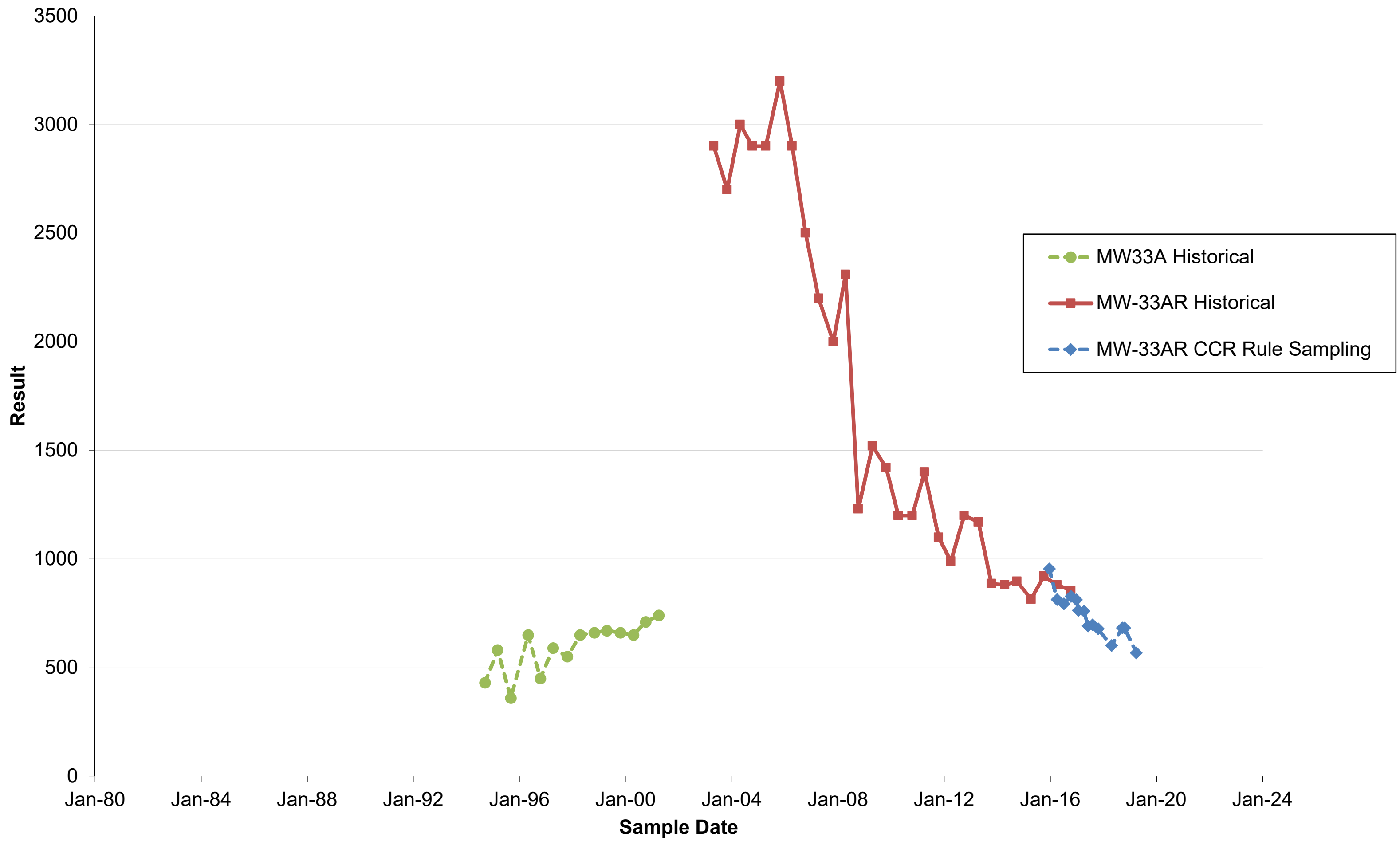
WELL NO.	pH	SPECIFIC CONDUCTANCE (umhos/cm @ 25°C)	SULFATE (mg/l)	CHLORIDE (mg/l)	CALCIUM (mg/l)	MAGNESIUM (mg/l)	IRON (mg/l)	BORON (mg/l)
42	7.15	2,050	910	15.6	23	7.5	0.1	-
44	6.15	710	6	0.5	56	27	3.5	-
45	7.2	420	32	1.0	44	26	<0.1	-
46A	7.0	560	93	<0.5	130	75	<0.1	<0.05
46B	6.5	1,290	170	20.8	46	30	<0.1	<0.05
47	7.3	958	120	<0.5	110	48	<0.1	-
48A	6.15	640	59	<0.5	42	51	<0.1	<0.05
48B	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	7.0	1,170	57	135	66	31	<0.1	-
51B	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	6.55	1,265	140	<0.5	110	65	0.1	-
59	6.8	925	40	<0.5	86	60	<0.1	-
60	7.2	1,510	54	4.7	130	85	<0.1	-
61A	6.85	590	39	30.2	58	31	<0.1	-
61B	7.2	505	6	13.5	48	29	<0.1	-
62	6.7	1,517	72	178	120	53	<0.1	-
64	6.9	670	100	26.8	63	36	0.8	-
65	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	7.5	440	20	<0.5	27	37	<0.1	-
70B	7.3	520	25	5.2	51	34	<0.1	-
72A	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	-

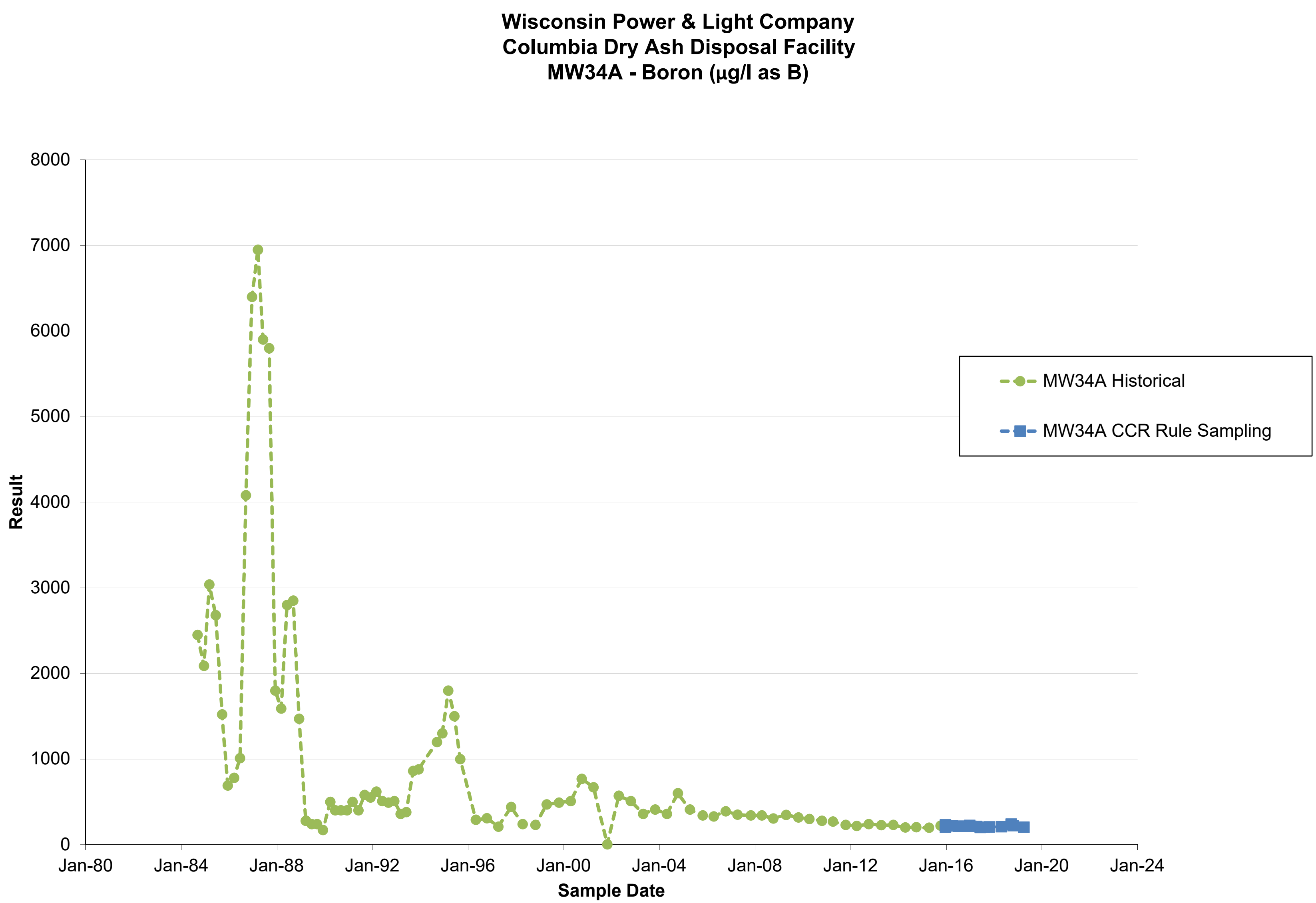
Appendix C

Long-Term Concentration Trend Plots

Wisconsin Power & Light Company
Columbia Dry Ash Disposal Facility
MW-33A and MW-33AR - Boron (µg/l as B)

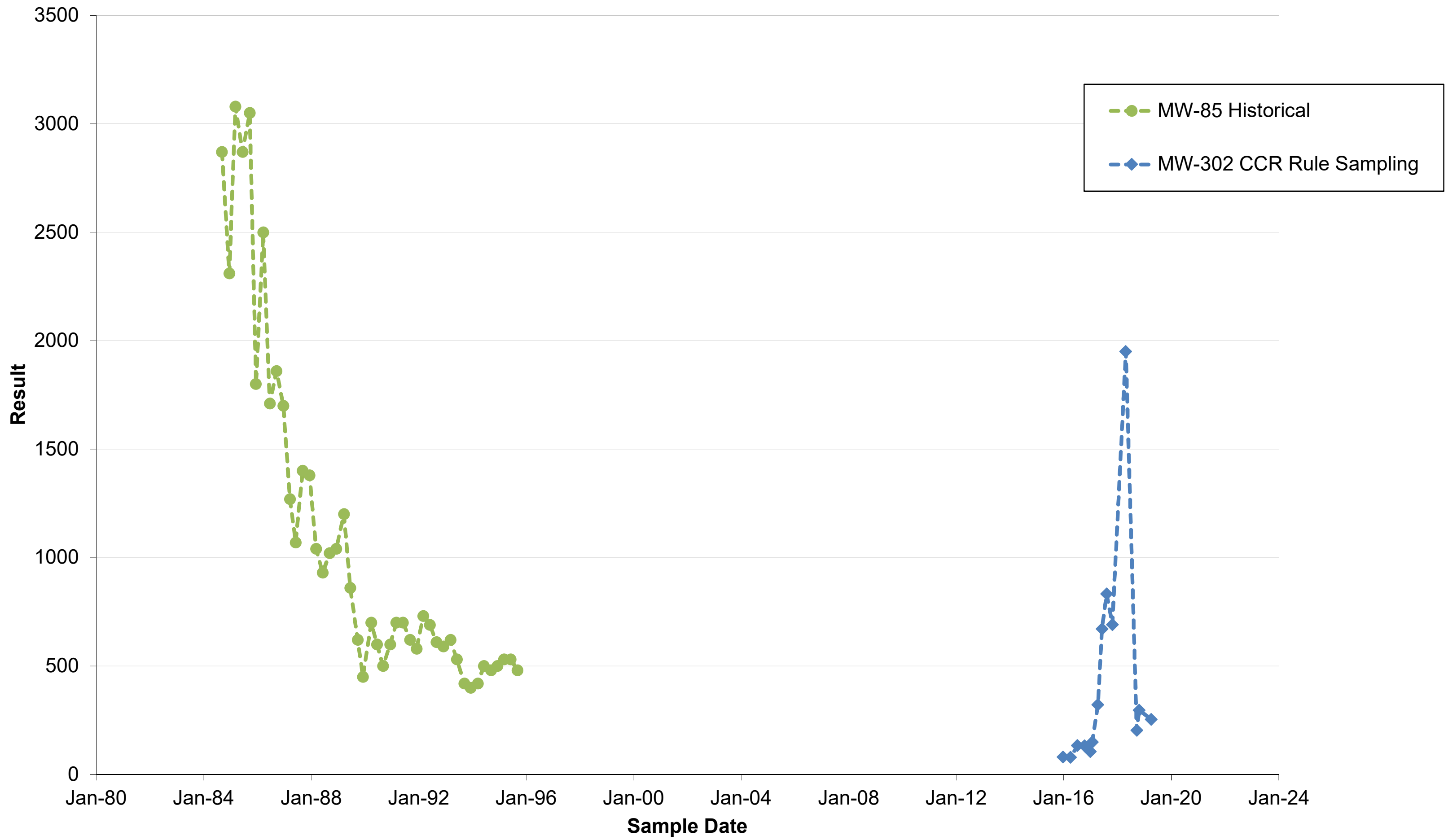


I:\25219067.00\Deliverables\2019 April ASD COL MOD 1-3 LF\Graphs\[Bo_COL Dry.xlsx]MW-33AR



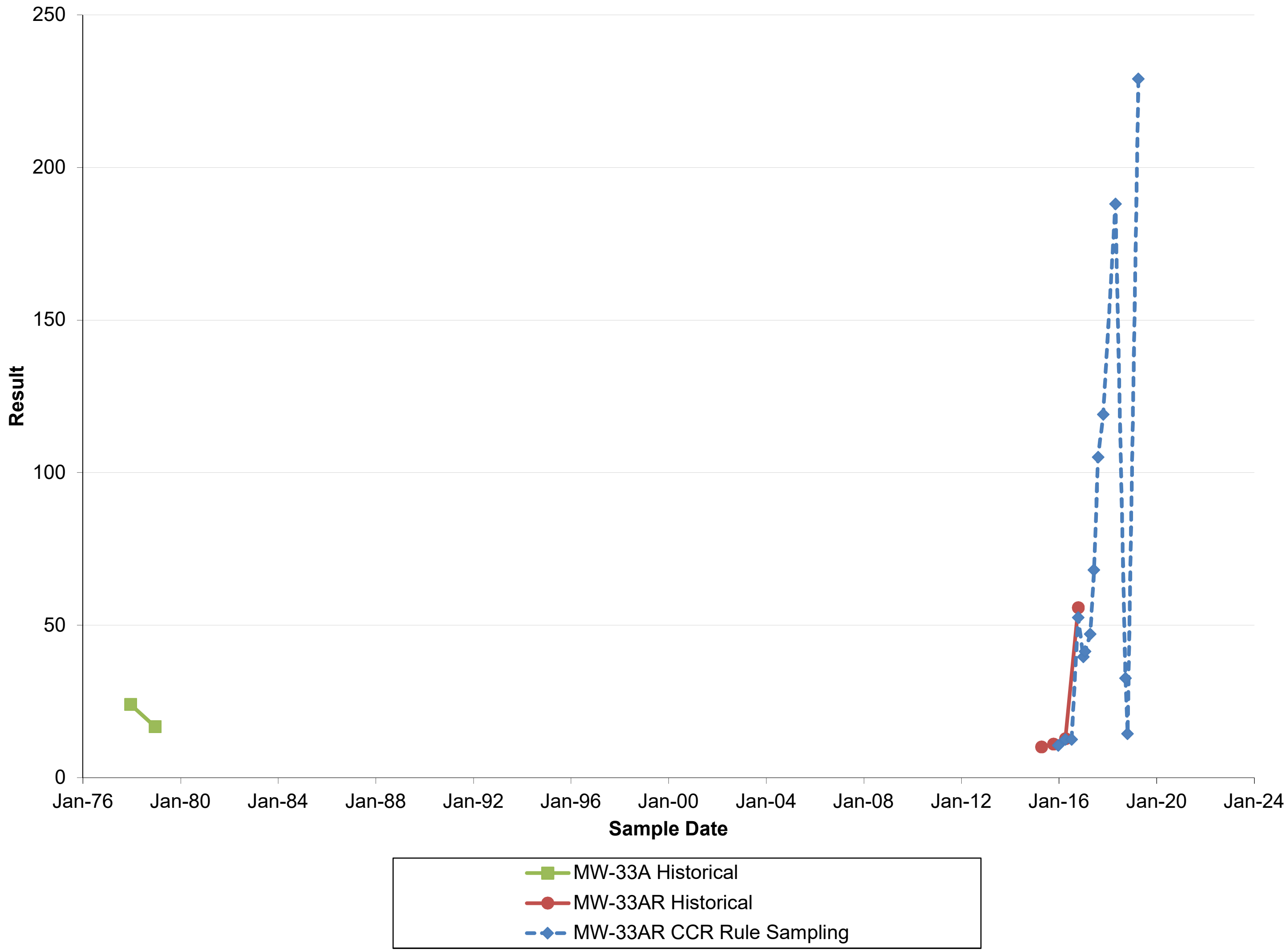
I:\25219067.00\Deliverables\2019 April ASD COL MOD 1-3 LF\Graphs\[Bo_COL Dry.xlsx]MW-34A

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



I:\25219067.00\Deliverables\2019 April ASD COL 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)



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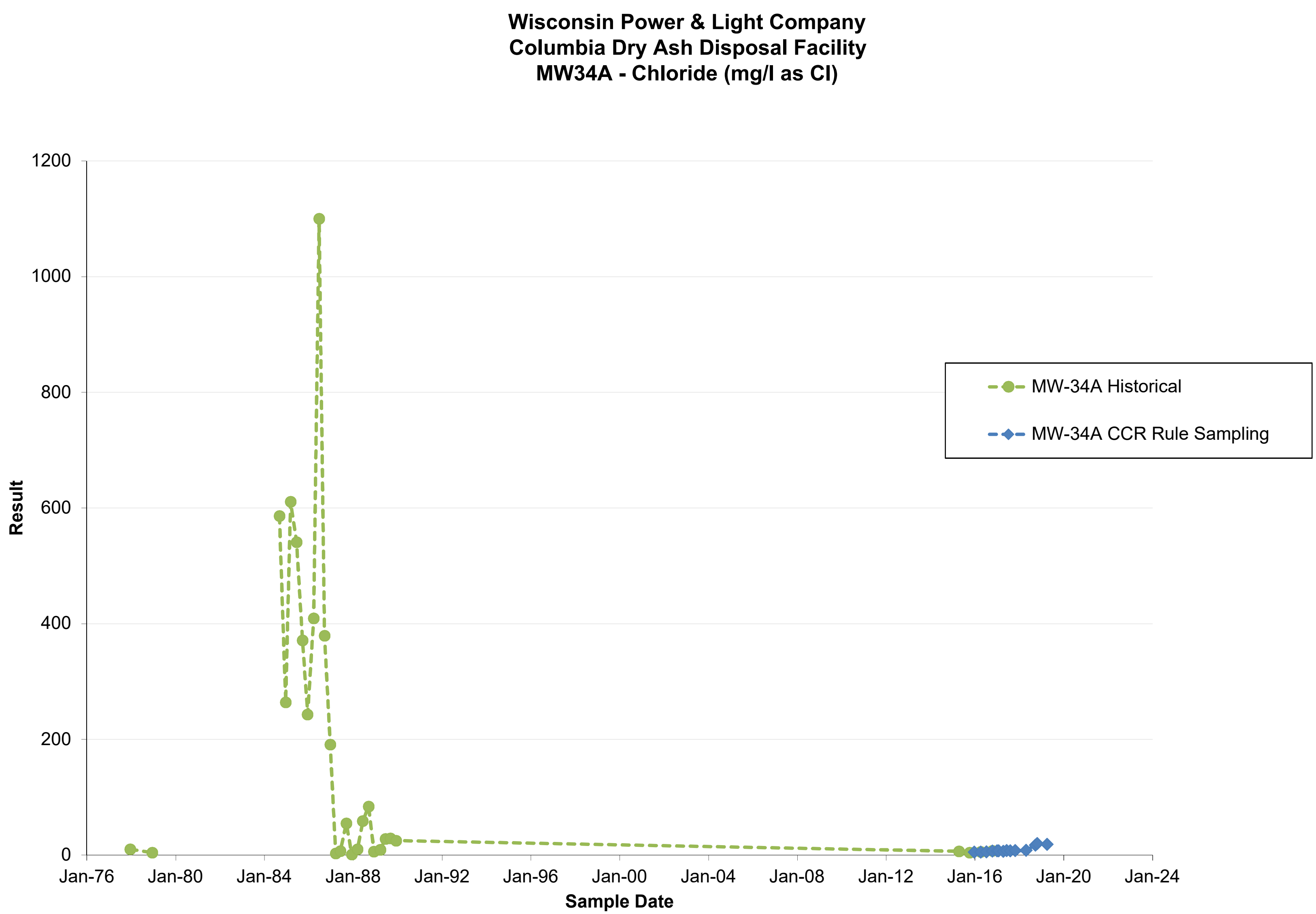
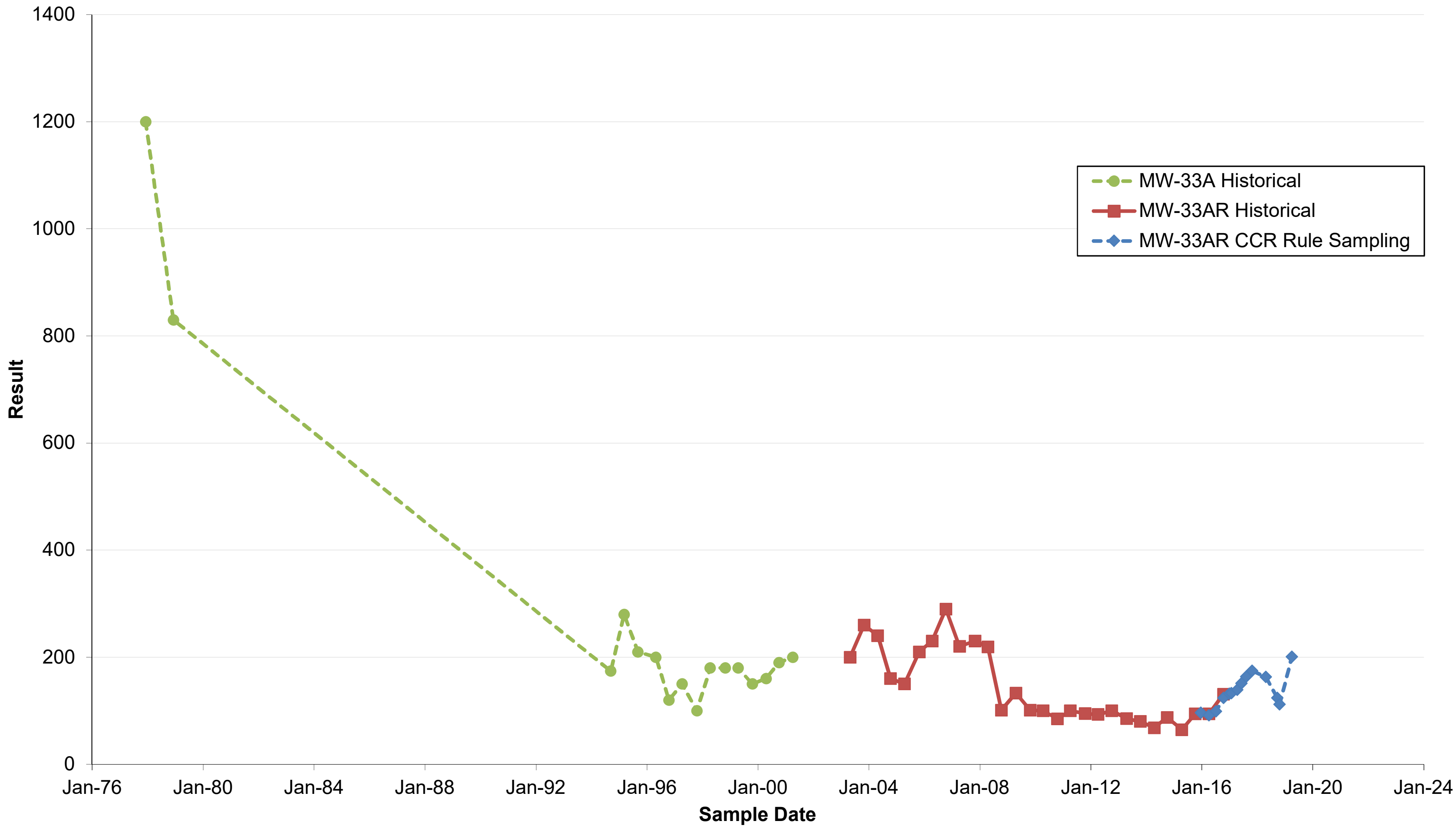
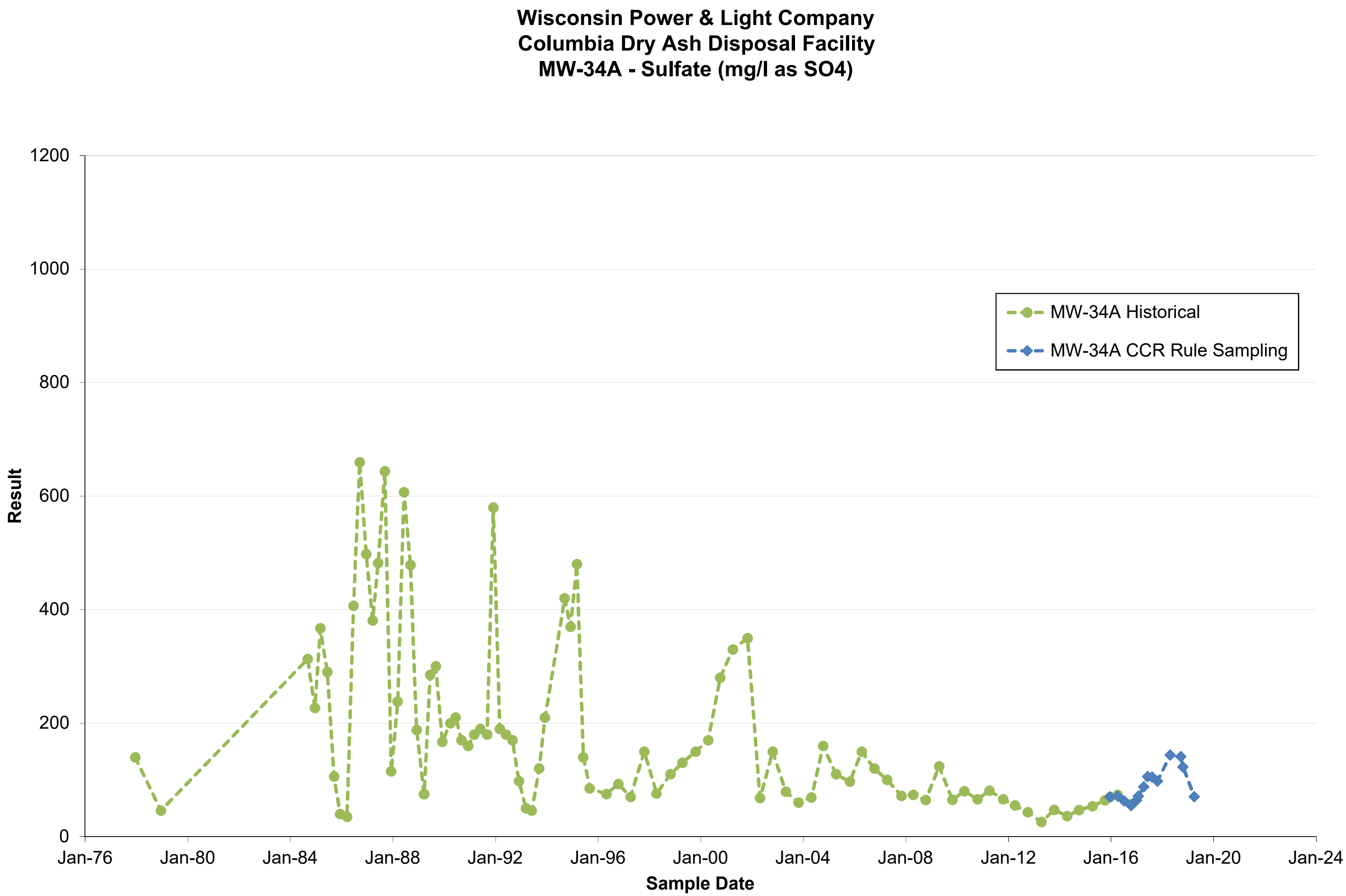


I:\25219067.00\Deliverables\2019 April ASD COL MOD 1-3 LF\Graphs\[Cl_COL Dry.xlsx]MW-34A

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



I:\25219067.00\Deliverables\2019 April ASD COL MOD 1-3 LF\Graphs\[SO4_COL Dry.xlsx]MW-33AR CCR



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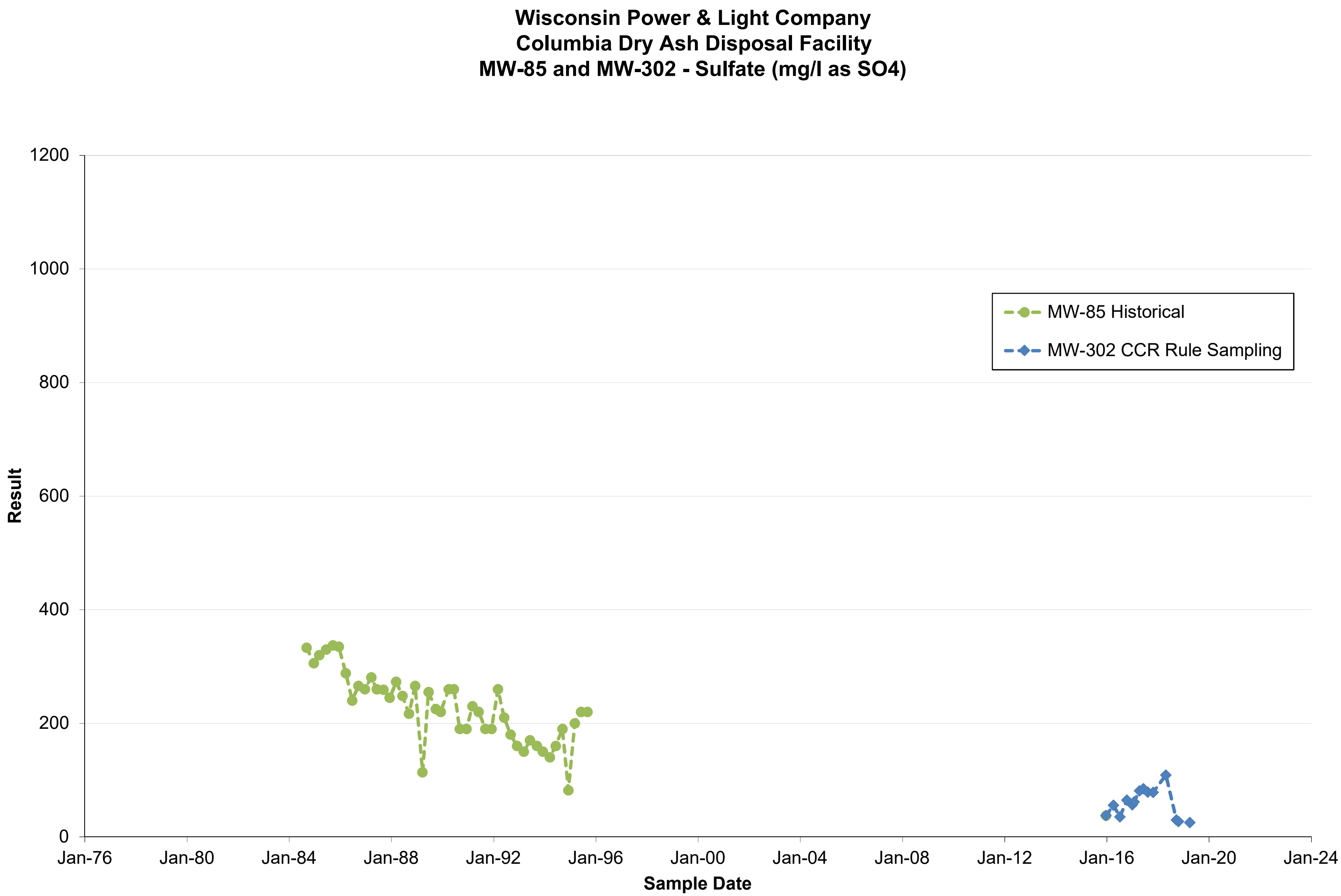

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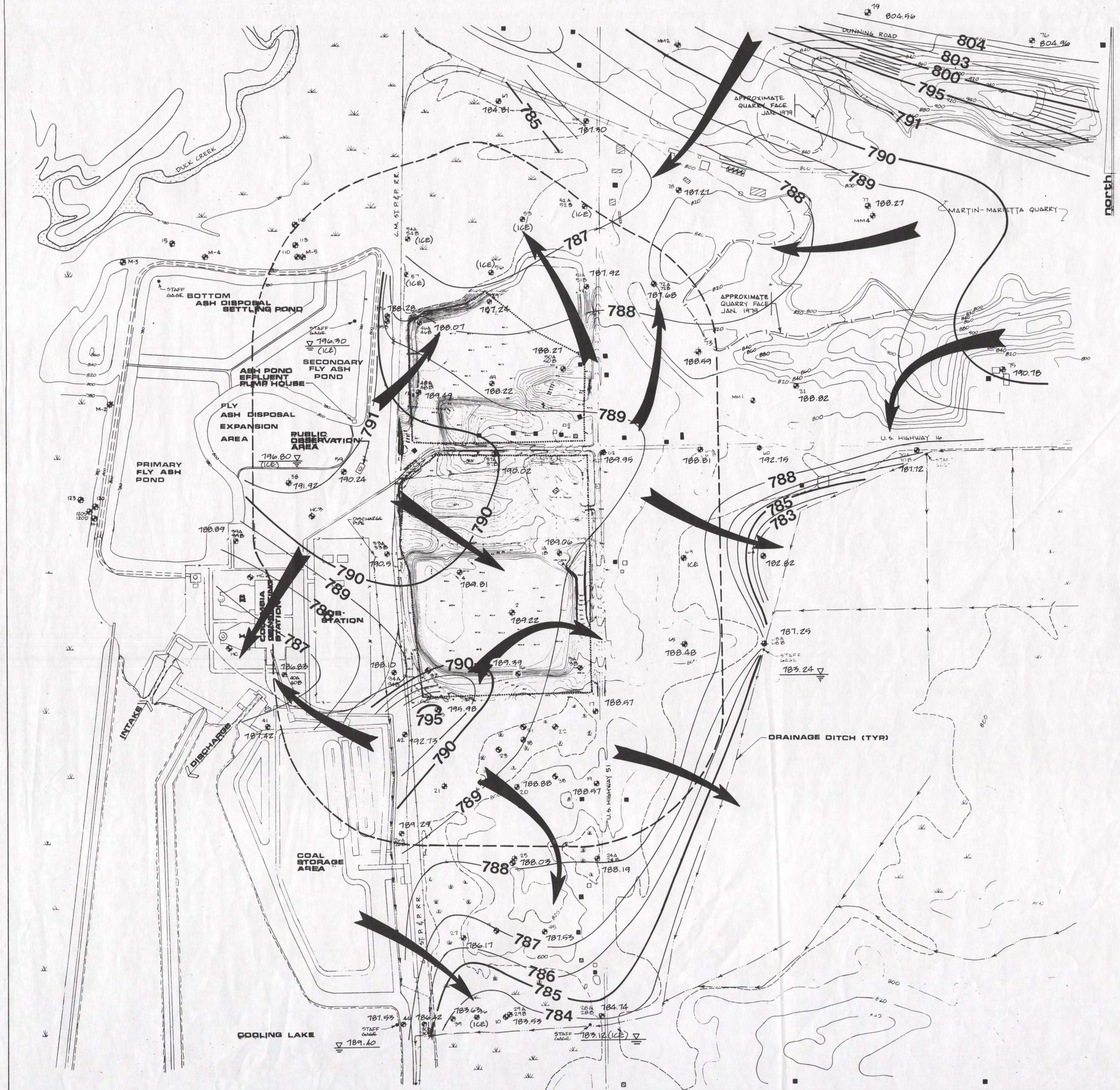
Appendix D

Historical Groundwater Flow Maps



LEGEND

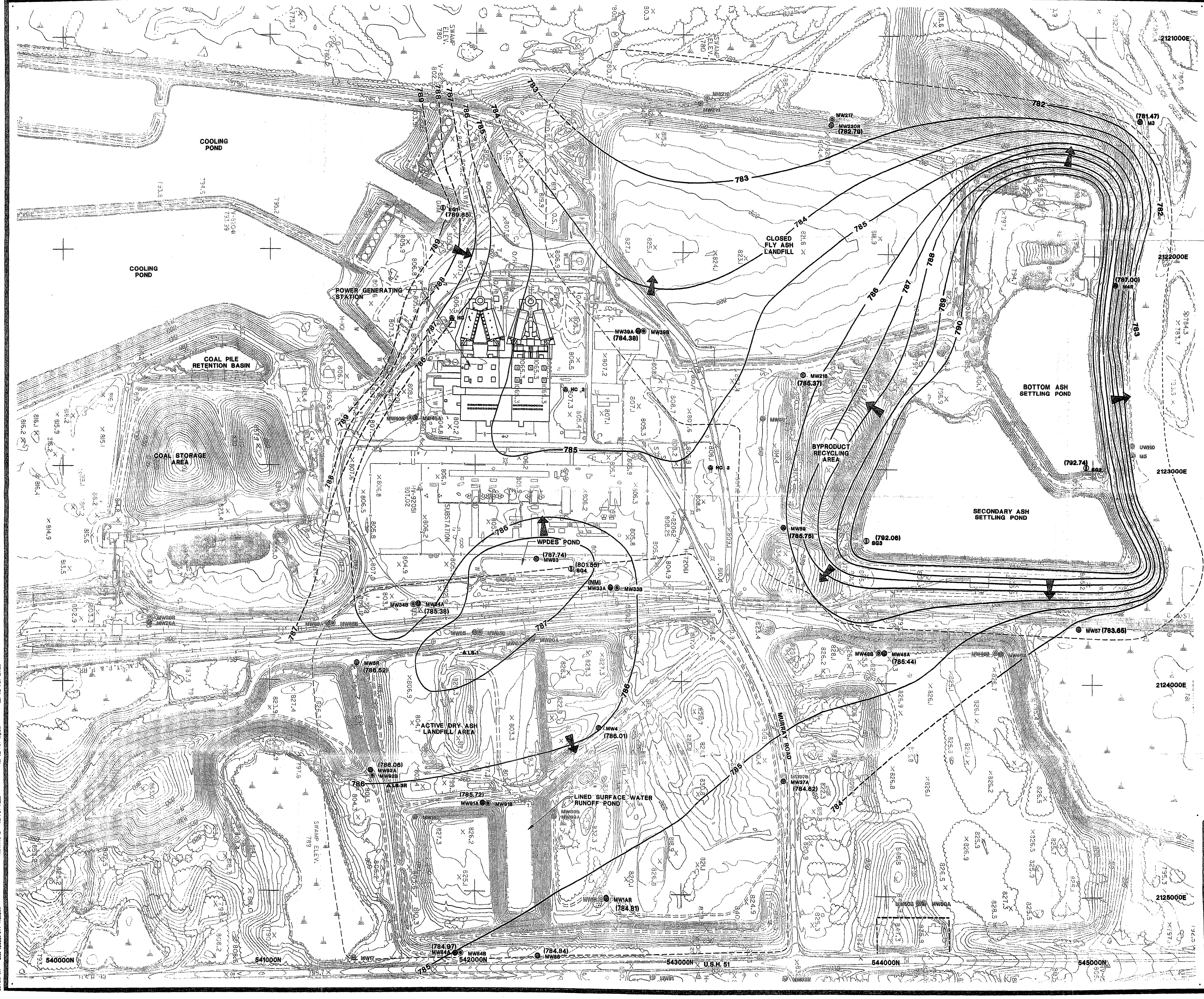
- PROPOSED PROJECT AREA
- OBSERVATION WELL LOCATION, NUMBER, AND WATER TABLE ELEVATION
- BORING LOCATION AND NUMBER
- WETLANDS
- TOPOGRAPHIC CONTOURS (CONTOUR INTERVAL: 20 FT.)
- PRIVATE RESIDENCES (ASSUMED LOCATIONS OF PRIVATE WATER SUPPLY WELLS)
- COMMERCIAL BUILDINGS (ASSUMED LOCATIONS OF POSSIBLE PUBLIC WATER SUPPLY WELLS)
- SURFACE WATERS (STREAMS OR DRAINAGE DITCHES) ARROWS INDICATE DIRECTION OF FLOW
- OTHER BUILDINGS (GARAGES, BARNS, ETC.)
- HIGH CAPICITY WELLS
- 790 WATER TABLE CONTOURS (CONTOUR INTERVAL: 1 FT.)
- DIRECTION OF GROUNDWATER FLOW

NO	BY	DATE	REVISION	APP'D

WATER TABLE CONTOUR MAP 2/4/81

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

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



LEGEND

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

NOTES

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

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

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

SHEET TITLE: WATER TABLE MAP (OCTOBER 2002)

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

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

2019 Annual Groundwater Monitoring and Corrective Action Report

Columbia Energy Center
Dry Ash Disposal Facility, Module 4
Pardeeville, Wisconsin

Prepared for:

Alliant Energy

SCS ENGINEERS

25219067.00 | January 31, 2020

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

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Appendices

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1.0 INTRODUCTION

This 2019 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 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 2019 Annual Groundwater Monitoring and Corrective Action Report for the CCR Unit.

This report covers the period of groundwater monitoring from January 1, 2019, through December 31, 2019.

The Columbia Energy Center (COL) Dry Disposal Ash Facility is an active CCR landfill and includes three existing CCR units and one new CCR landfill unit, which became operational in 2018. The groundwater monitoring system addressed in this report is evaluating conditions at:

- COL Dry Ash Disposal Facility – Module 4

The system is designed to detect monitored constituents at the waste boundary of Module 4 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.

A separate multiunit groundwater monitoring system evaluates conditions for Modules 1 through 3 of the Dry Ash Disposal Facility. The two background (upgradient) monitoring wells are shared by both systems.

2.0 § 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:*

2.1 § 257.90(e)(1) SITE MAP

A map, aerial image, or diagram showing the CCR unit and all background (or upgradient) and downgradient monitoring wells, to include the well identification numbers, that are part of the groundwater monitoring program for the CCR unit;

A map of the site location is provided on **Figure 1**. A map showing the Dry Ash Disposal Facility Module 4 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**.

2.2 § 257.90(e)(2) MONITORING SYSTEM CHANGES

Identification of any monitoring wells that were installed or decommissioned during the preceding year, along with a narrative description of why those actions were taken;

No new monitoring wells were installed and no wells were decommissioned as part of the groundwater monitoring program for Module 4 of the Dry Ash Disposal Facility in 2019.

2.3 § 257.90(e)(3) SUMMARY OF SAMPLING EVENTS

In addition to all the monitoring data obtained under §§ 257.90 through 257.98, a summary including the number of groundwater samples that were collected for analysis for each background and downgradient well, the dates the samples were collected, and whether the sample was required by the detection monitoring or assessment monitoring programs;

Groundwater sampling events were completed in April and October 2019 at COL Dry Ash Disposal Module 4 as part of ongoing detection monitoring. As part of the April 2019 semiannual event, a retest sample was collected at one monitoring well in June 2019. As part of the October 2019 sampling event, a retest sample was collected at one monitoring well in December 2019.

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 is included in **Table 1**. The results of the analytical laboratory analyses are provided in the laboratory reports in **Appendix A1** through **Appendix A3**. The June sampling event was for field pH only; therefore, there is no laboratory report.

2.4 § 257.90(e)(4) MONITORING TRANSITION NARRATIVE

A narrative discussion of any transition between monitoring programs (e.g., the date and circumstances for transitioning from detection monitoring to assessment monitoring in addition to identifying the constituent(s) detected at a statistically significant increase over background levels);

Detection monitoring was initiated in late October 2018, and the first semiannual detection monitoring compliance sampling event was completed in April 2019. There were no transitions between monitoring programs during 2019. The COL Dry Ash Disposal Facility, Module 4, remained in the detection monitoring program.

In 2019, the monitoring results for the April 2019 monitoring events were evaluated for statistically significant increases (SSIs) in detection monitoring parameters relative to background. For the April 2019 event, an SSI for pH at MW-310 was identified; however, an alternative source demonstration (ASD) was completed, demonstrating that the SSI was determined to be due to a field data collection error that occurred during the sampling event, and not reflective of true groundwater quality. The ASD report is provided in **Appendix B**.

2.5 § 257.90(e)(5) OTHER REQUIREMENTS

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

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 2019 Annual Groundwater Monitoring and Corrective Action Report for the CCR Unit.

2.5.1 § 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 2019.

Summary of Key Actions Completed.

- Statistical evaluation and determination of SSIs for the April 2019 monitoring event.
- ASD report for the SSI identified from the April 2019 monitoring event.
- Two semiannual groundwater sampling and analysis events (April and October 2019).

Description of Any Problems Encountered: No problems were encountered in 2019.

Discussion of Actions to Resolve the Problems. Not applicable.

Projection of Key Activities for the Upcoming Year (2020):

- Statistical evaluation and determination of any SSIs for the October 2019 and April 2020 monitoring events.
- If an SSI is determined, then within 90 days either:
  - Complete alternative source demonstration (if applicable), or
  - Establish an assessment monitoring program.
- Two semi-annual groundwater sampling and analysis events (April and October 2020).

2.5.2 § 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.

2.5.3 § 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 report prepared to address the SSI observed for the April 2019 sampling event is provided in **Appendix B**. The ASD report is certified by a qualified professional engineer.

2.5.4 § 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.

2.5.5 § 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.

2.5.6 § 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.

2.5.7 § 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.

Table 1

CCR Rule Groundwater Samples Summary

Table 1. CCR Rule Groundwater Samples Summary
Columbia Energy Center-Dry Ash Disposal Facility MOD 4 / SCS Engineers Project #25219067.00

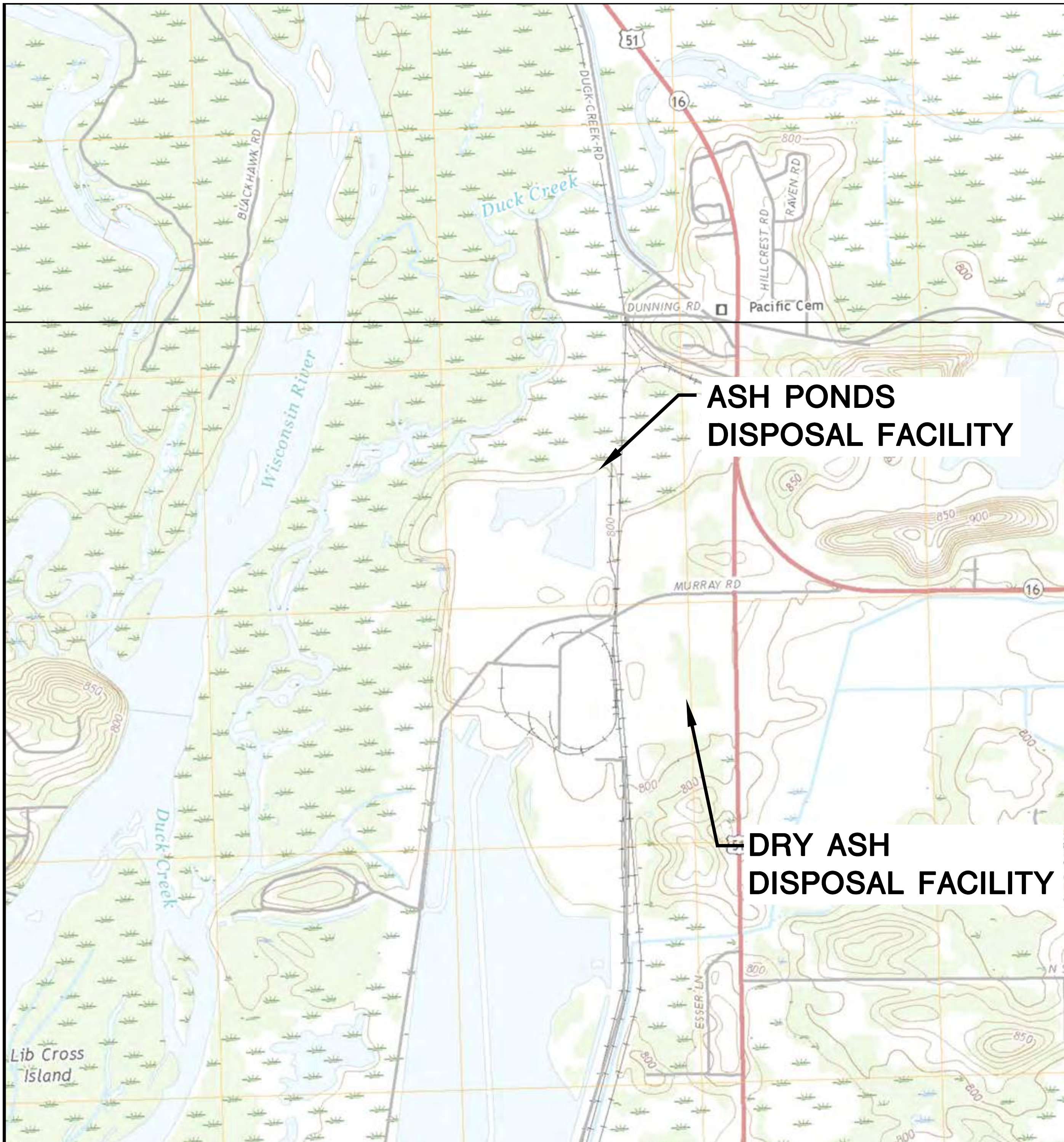
Sample Dates	Downgradient Wells			Background Wells	
	MW-309	MW-310	MW-311	MW-84A	MW-301
April 2-3, 2019	D	D	D	D	D
June 12, 2019	--	D-R	--	--	--
October 8-9, 2019	D	D	D	D	D
December 23, 2019	--	D-R	--	--	--
Total Samples	2	4	2	2	2

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

Created by:	NDK	Date:	1/3/2019
Last revision by:	MDB	Date:	1/8/2020
Checked by:	JR	Date:	1/8/2020

I:\25219067.00\Deliverables\2019 Federal Annual Report - MOD 4 LF\Tables\[GW_Samples_Summary_Table_COL MOD 4.xlsx]GW Summary

Figures

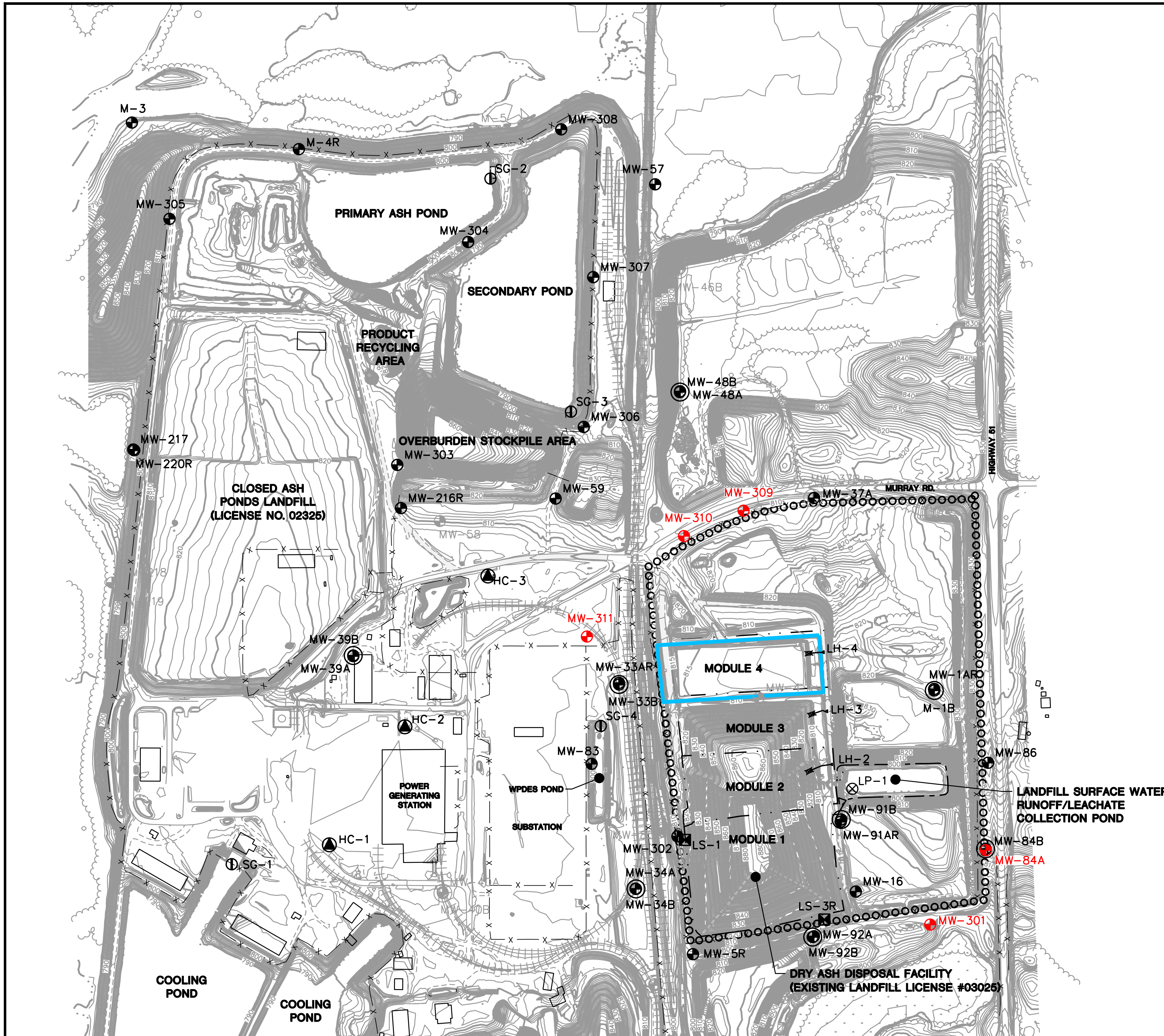


POYNETTE QUADRANGLE
WISCONSIN–COLUMBIA CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)
2018
SCALE: 1" = 2,000'

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

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

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



LEGEND

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

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.

N

500 0 500

SCALE: 1" = 500'

PROJECT NO.	25219067.00	DRAWN BY:	BSS
DRAWN:	12/02/2019	CHECKED BY:	MDB
REVISED:	01/13/2020	APPROVED BY:	TK 01/30/2020

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

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

SITE: ALLIANT ENERGY
COLUMBIA ENERGY CENTER
MODULE 4 DRY ASH DISPOSAL FACILITY
PARDEEVILLE, WI

SITE PLAN AND MONITORING WELL LOCATIONS

FIGURE 2

I:\25219067.00\Drawings\CCR 2019 Annual Report\Mod 4 LF\Site Plan and Monitoring Well Locations.dwg, 1/30/2020 3:40:32 PM

Appendix A

Laboratory Reports

A1 April 2019 Detection Monitoring

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

April 22, 2019

Meghan Blodgett
SCS ENGINEERS
2830 Dairy Drive
Madison, WI 53718

RE: Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185521

Dear Meghan Blodgett:

Enclosed are the analytical results for sample(s) received by the laboratory on April 04, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

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

Sincerely,

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

Enclosures

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

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CERTIFICATIONS

Project:	25219067 ALLIANT-COLUMBIA CCR
Pace Project No.:	40185521

Green Bay Certification IDs

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

Pace Analytical Services, LLC
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Green Bay, WI 54302
(920)469-2436

SAMPLE SUMMARY

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185521

Lab ID	Sample ID	Matrix	Date Collected	Date Received
40185260005	**MW-309**	Water	04/02/19 09:10	04/04/19 09:30
40185260006	**MW-310**	Water	04/02/19 09:55	04/04/19 09:30
40185260007	**MW-311**	Water	04/02/19 10:50	04/04/19 09:30
40185260008	**FIELD BLANK MOD4**	Water	04/02/19 09:55	04/04/19 09:30

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SAMPLE ANALYTE COUNT

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185521

Lab ID	Sample ID	Method	Analysts	Analytes Reported
40185260005	**MW-309**	EPA 6020	KXS	2
			AXL	7
		SM 2540C	TMK	1
		EPA 9040	ALY	1
		EPA 300.0	HMB	3
40185260006	**MW-310**	EPA 6020	KXS	2
			AXL	7
		SM 2540C	TMK	1
		EPA 9040	ALY	1
		EPA 300.0	HMB	3
40185260007	**MW-311**	EPA 6020	KXS	2
			AXL	7
		SM 2540C	TMK	1
		EPA 9040	ALY	1
		EPA 300.0	HMB	3
40185260008	**FIELD BLANK MOD4**	EPA 6020	KXS	2
		SM 2540C	TMK	1
		EPA 9040	ALY	1
		EPA 300.0	HMB	3

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(920)469-2436

ANALYTICAL RESULTS

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185521

Sample: MW-309 | **Lab ID: 40185260005** | Collected: 04/02/19 09:10 | Received: 04/04/19 09:30 | Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Boron	**37.4**	ug/L	11.0	3.3	1	04/05/19 08:40	04/09/19 07:57	7440-42-8	
Calcium	**45300**	ug/L	250	69.8	1	04/05/19 08:40	04/09/19 07:57	7440-70-2	
Field Data	Analytical Method:								
Field pH	**7.49**	Std. Units			1		04/02/19 09:10		
Field Specific Conductance	**1041**	umhos/cm			1		04/02/19 09:10		
Oxygen, Dissolved	**9.79**	mg/L			1		04/02/19 09:10	7782-44-7	
REDOX	**120.1**	mV			1		04/02/19 09:10		
Turbidity	**1.25**	NTU			1		04/02/19 09:10		
Static Water Level	**786.30**	feet			1		04/02/19 09:10		
Temperature, Water (C)	**10.1**	deg C			1		04/02/19 09:10		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**548**	mg/L	20.0	8.7	1		04/09/19 12:36		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**7.7**	Std. Units	0.10	0.010	1		04/09/19 11:07		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**145**	mg/L	10.0	2.5	5		04/15/19 18:12	16887-00-6	
Fluoride	**<0.10**	mg/L	0.30	0.10	1		04/15/19 12:36	16984-48-8	
Sulfate	**35.2**	mg/L	3.0	1.0	1		04/15/19 12:36	14808-79-8	

Sample: MW-310 | **Lab ID: 40185260006** | Collected: 04/02/19 09:55 | Received: 04/04/19 09:30 | Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Boron	**73.0**	ug/L	11.0	3.3	1	04/05/19 08:40	04/09/19 08:04	7440-42-8	
Calcium	**38800**	ug/L	250	69.8	1	04/05/19 08:40	04/09/19 08:04	7440-70-2	
Field Data	Analytical Method:								
Field pH	**9.79**	Std. Units			1		04/02/19 09:55		
Field Specific Conductance	**924**	umhos/cm			1		04/02/19 09:55		
Oxygen, Dissolved	**7.86**	mg/L			1		04/02/19 09:55	7782-44-7	
REDOX	**119.0**	mV			1		04/02/19 09:55		
Turbidity	**1.13**	NTU			1		04/02/19 09:55		
Static Water Level	**786.38**	feet			1		04/02/19 09:55		
Temperature, Water (C)	**10.5**	deg C			1		04/02/19 09:55		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**470**	mg/L	20.0	8.7	1		04/09/19 12:36		

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(920)469-2436

ANALYTICAL RESULTS

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185521

Sample: MW-310 **Lab ID: 40185260006** Collected: 04/02/19 09:55 Received: 04/04/19 09:30 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**7.8**	Std. Units	0.10	0.010	1		04/09/19 11:09		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**76.0**	mg/L	10.0	2.5	5		04/15/19 18:24	16887-00-6	
Fluoride	**<0.10**	mg/L	0.30	0.10	1		04/15/19 12:48	16984-48-8	
Sulfate	**58.4**	mg/L	3.0	1.0	1		04/15/19 12:48	14808-79-8	

Sample: MW-311 **Lab ID: 40185260007** Collected: 04/02/19 10:50 Received: 04/04/19 09:30 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Boron	**35.7**	ug/L	11.0	3.3	1	04/05/19 08:40	04/09/19 08:24	7440-42-8	
Calcium	**65600**	ug/L	250	69.8	1	04/05/19 08:40	04/09/19 08:24	7440-70-2	
Field Data	Analytical Method:								
Field pH	**7.51**	Std. Units			1		04/02/19 10:50		
Field Specific Conductance	**337.8**	umhos/cm			1		04/02/19 10:50		
Oxygen, Dissolved	**9.77**	mg/L			1		04/02/19 10:50	7782-44-7	
REDOX	**116.3**	mV			1		04/02/19 10:50		
Turbidity	**2.91**	NTU			1		04/02/19 10:50		
Static Water Level	**786.38**	feet			1		04/02/19 10:50		
Temperature, Water (C)	**9.7**	deg C			1		04/02/19 10:50		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**276**	mg/L	20.0	8.7	1		04/09/19 12:36		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**7.6**	Std. Units	0.10	0.010	1		04/09/19 11:10		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**1.9J**	mg/L	2.0	0.50	1		04/15/19 17:47	16887-00-6	
Fluoride	**<0.10**	mg/L	0.30	0.10	1		04/15/19 17:47	16984-48-8	
Sulfate	**23.1**	mg/L	3.0	1.0	1		04/15/19 17:47	14808-79-8	

Sample: FIELD BLANK MOD4 **Lab ID: 40185260008** Collected: 04/02/19 09:55 Received: 04/04/19 09:30 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Boron	**<3.3**	ug/L	11.0	3.3	1	04/05/19 08:40	04/09/19 05:07	7440-42-8	
Calcium	**<69.8**	ug/L	250	69.8	1	04/05/19 08:40	04/09/19 05:07	7440-70-2	

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ANALYTICAL RESULTS

Project: 25219067 ALLIANT-COLUMBIA CCR

Pace Project No.: 40185521

Sample: FIELD BLANK MOD4 **Lab ID: 40185260008** Collected: 04/02/19 09:55 Received: 04/04/19 09:30 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**<8.7**	mg/L	20.0	8.7	1		04/09/19 12:36		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**7.1**	Std. Units	0.10	0.010	1		04/09/19 11:14		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**<0.50**	mg/L	2.0	0.50	1		04/15/19 13:49	16887-00-6	
Fluoride	**<0.10**	mg/L	0.30	0.10	1		04/15/19 13:49	16984-48-8	
Sulfate	**<1.0**	mg/L	3.0	1.0	1		04/15/19 13:49	14808-79-8	

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QUALITY CONTROL DATA

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185521

QC Batch: 317485 — Analysis Method: EPA 6020
QC Batch Method: EPA 3010 — Analysis Description: 6020 MET
Associated Lab Samples: 40185260005, 40185260006, 40185260007, 40185260008

METHOD BLANK: 1846066 — Matrix: Water
Associated Lab Samples: 40185260005, 40185260006, 40185260007, 40185260008

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Boron	ug/L	<3.3	11.0	04/09/19 04:47	
Calcium	ug/L	<69.8	250	04/09/19 04:47	

LABORATORY CONTROL SAMPLE: 1846067

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Boron	ug/L	500	486	97	80-120	
Calcium	ug/L	5000	4990	100	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1846068 1846069

Parameter	Units	40185256001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Boron	ug/L	26.9	500	500	492	498	93	94	75-125	1	20	
Calcium	ug/L	126000	5000	5000	126000	123000	12	-46	75-125	2	20	P6

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

REPORT OF LABORATORY ANALYSIS

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

QUALITY CONTROL DATA

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185521

QC Batch: 317813 — Analysis Method: SM 2540C
QC Batch Method: SM 2540C — Analysis Description: 2540C Total Dissolved Solids
Associated Lab Samples: 40185260005, 40185260006, 40185260007, 40185260008

METHOD BLANK: 1847582 — Matrix: Water
Associated Lab Samples: 40185260005, 40185260006, 40185260007, 40185260008

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	<8.7	20.0	04/09/19 12:32	

LABORATORY CONTROL SAMPLE: 1847583

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Dissolved Solids	mg/L	577	552	96	80-120	

SAMPLE DUPLICATE: 1847584

Parameter	Units	40185256001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	462	462	0	5	

SAMPLE DUPLICATE: 1847585

Parameter	Units	40185260001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	290	284	2	5	

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.

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QUALITY CONTROL DATA

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185521

QC Batch: 317736 | Analysis Method: EPA 9040
QC Batch Method: EPA 9040 | Analysis Description: 9040 pH
Associated Lab Samples: 40185260005, 40185260006, 40185260007, 40185260008

SAMPLE DUPLICATE: 1847351

Parameter	Units	40185260001 Result	Dup Result	RPD	Max RPD	Qualifiers
pH at 25 Degrees C	Std. Units	7.4	7.4	0	20	H6

SAMPLE DUPLICATE: 1847381

Parameter	Units	40185339014 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.

REPORT OF LABORATORY ANALYSIS

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Green Bay, WI 54302
(920)469-2436

QUALITY CONTROL DATA

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185521

QC Batch: 318035 | Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 | Analysis Description: 300.0 IC Anions
Associated Lab Samples: 40185260005, 40185260006, 40185260007, 40185260008

METHOD BLANK: 1848956 | Matrix: Water
Associated Lab Samples: 40185260005, 40185260006, 40185260007, 40185260008

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chloride	mg/L	<0.50	2.0	04/15/19 11:11	
Fluoride	mg/L	<0.10	0.30	04/15/19 11:11	
Sulfate	mg/L	<1.0	3.0	04/15/19 11:11	

LABORATORY CONTROL SAMPLE: 1848957

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	20	21.2	106	90-110	
Fluoride	mg/L	2	2.1	104	90-110	
Sulfate	mg/L	20	21.4	107	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1848958 1848959

Parameter	Units	40185548003 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	261	200	200	438	463	88	101	90-110	6	15	M0
Fluoride	mg/L	<1.0	20	20	18.0	19.8	90	99	90-110	9	15	
Sulfate	mg/L	54.2	200	200	232	252	89	99	90-110	8	15	M0

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1848960 1848961

Parameter	Units	40185308003 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	106	200	200	313	318	104	106	90-110	1	15	
Fluoride	mg/L	<1.0	20	20	20.6	21.5	103	108	90-110	4	15	
Sulfate	mg/L	94.8	200	200	298	309	102	107	90-110	3	15	

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

REPORT OF LABORATORY ANALYSIS

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QUALIFIERS

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185521

DEFINITIONS

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

ND - Not Detected at or above LOD.

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

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

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

S - Surrogate

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

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

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

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

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

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

TNI - The NELAC Institute.

ANALYTE QUALIFIERS

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

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185521

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
40185260005	**MW-309**	EPA 3010	317485	EPA 6020	317570
40185260006	**MW-310**	EPA 3010	317485	EPA 6020	317570
40185260007	**MW-311**	EPA 3010	317485	EPA 6020	317570
40185260008	**FIELD BLANK MOD4**	EPA 3010	317485	EPA 6020	317570
40185260005	**MW-309**				
40185260006	**MW-310**				
40185260007	**MW-311**				
40185260005	**MW-309**	SM 2540C	317813		
40185260006	**MW-310**	SM 2540C	317813		
40185260007	**MW-311**	SM 2540C	317813		
40185260008	**FIELD BLANK MOD4**	SM 2540C	317813		
40185260005	**MW-309**	EPA 9040	317736		
40185260006	**MW-310**	EPA 9040	317736		
40185260007	**MW-311**	EPA 9040	317736		
40185260008	**FIELD BLANK MOD4**	EPA 9040	317736		
40185260005	**MW-309**	EPA 300.0	318035		
40185260006	**MW-310**	EPA 300.0	318035		
40185260007	**MW-311**	EPA 300.0	318035		
40185260008	**FIELD BLANK MOD4**	EPA 300.0	318035		

(Please Print Clearly)

Company Name:	SCS
Branch/Location:	Madison, WI
Project Contact:	Meg Blodgett
Phone:	608-216-7362
Project Number:	25219067
Project Name:	Alliant - Columbia
Project State:	WI
Sampled By (Print):	Adam Watson
Sampled By (Sign):	Paul A. Groom for Adam Watson
PO #:	
Regulatory Program:	

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CHAIN OF CUSTODY

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

Page 1 of

MN

40185260

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

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

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

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

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

				FILTERED? (YES/NO) Y/N	No	No	No	
				PRESERVATION (CODE)* Pick Letter	A	A	D	
PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX	Analyses Requested: TDS, SO4, Ph	Floride, CL	Ca, B	CLIENT COMMENTS / LAB COMMENTS (Lab Use Only) / Profile #
001	MW 302	4-2-19	16:25	GW	X	X	X	
002	MW 33AR	4-2-19	15:30	↓				
003	MW 34A	4-2-19	14:30	↓				
004	Field Blank Mod 1	4-2-19	16:25	DI				
005	MW 309	4-2-19	9:10	GW				
006	MW 310	4-2-19	9:55	↓				
007	MW 311	4-2-19	10:50	↓				
008	Field Blank Mod 4	4-2-19	9:55	DI				
009	MW 306	4-1-19	18:15	GW				
010	MW 307	4-1-19	17:25	↓				
011	MW 308	4-1-19	16:50	↓				
012	Field Blank SC Pond	4-1-19	16:50	DI	↓	↓	↓	
~~013~~	4/4/19 SW							

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

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

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

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

Relinquished By:	Date/Time:	Received By:	Date/Time:
Paul A. Groom	4-3-19 18:30		
Fed Ex	4-4-19 0930	Susan Mu...	4-4-19 0930

PACE Project No. 40185260

Receipt Temp = ROI °C

Sample Receipt pH
OK / Adjusted

Cooler Custody Seal
Present / Not Present
Intact / Not Intact

C019a(27Jun2006)

Version 6.0 06/14/06

ORIGINAL

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

Sample Preservation Receipt Form

Client Name: SCS

Project # 40185260

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

Lab Lot# of pH paper: 10053581 Lab Std #ID of preservation (if pH adjusted):

Initial when completed: SKW

Date/ Time:

	Glass							Plastic							Vials						Jars			General									
Pace Lab #	AG1U	AG1H	AG4S	AG4U	AG5U	AG2S	BG3U	BP1U	BP2N	BP2Z	BP3U	BP3C	BP3N	BP3S	DG9A	DG9T	VG9U	VG9H	VG9M	VG9D	JGFU	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		1																		X		2.5 / 5 / 10
006											2		1																		X		2.5 / 5 / 10
007											2		1																		X		2.5 / 5 / 10
008											2		1																		X		2.5 / 5 / 10
009											2		1																		X		2.5 / 5 / 10
010											2		1																		X		2.5 / 5 / 10
011											2		1																		X		2.5 / 5 / 10
012											2		1																		X		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

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	DG9A	40 mL amber ascorbic	JGFU	4 oz amber jar unpres
AG1H	1 liter amber glass HCL	BP2N	500 mL plastic HNO3	DG9T	40 mL amber Na Thio	WGFU	4 oz clear jar unpres
AG4S	125 mL amber glass H2SO4	BP2Z	500 mL plastic NaOH, Znact	VG9U	40 mL clear vial unpres	WPFU	4 oz plastic jar unpres
AG4U	120 mL amber glass unpres	BP3U	250 mL plastic unpres	VG9H	40 mL clear vial HCL		
AG5U	100 mL amber glass unpres	BP3C	250 mL plastic NaOH	VG9M	40 mL clear vial MeOH	SP5T	120 mL plastic Na Thiosulfate
AG2S	500 mL amber glass H2SO4	BP3N	250 mL plastic HNO3	VG9D	40 mL clear vial DI	ZPLC	ziploc bag
BG3U	250 mL clear glass unpres	BP3S	250 mL plastic H2SO4			GN:	

F-GB-C-046-Rev.02 (29Mar2018) Sample Preservation Receipt Form

1610

Pace Analytical 1241 Bellevue Street, Green Bay, WI 54302	Document Name: **Sample Condition Upon Receipt (SCUR)**	Document Revised: 25Apr2018
	Document No.: **F-GB-C-031-Rev.07**	Issuing Authority: Pace Green Bay Quality Office

Sample Condition Upon Receipt Form (SCUR)

Project #:

WO# : 40185260

40185260

Client Name: SCS

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

Tracking #: 7864 3720 0524

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 - N/A **Type of Ice:** Wet Blue Dry None ☑ Samples on ice, cooling process has begun

Cooler Temperature Uncorr: ROI /Corr:

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.

Person examining contents:
Date: 4-4-19
Initials: SW

Chain of Custody Present:	☑Yes	☐No	☐N/A	1.
Chain of Custody Filled Out:	☐Yes	☑No	☐N/A	2. No pg#, Mail, Invoice 4-4-19 SW
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. 004-ID is ~~Field Blank MOD1 3LF~~ 009-No date + time on 250mL 4-4-19 SW
-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:

Project Manager Review: AL for DM **Date:** 4/4/19

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

May 03, 2019

Meghan Blodgett
SCS ENGINEERS
2830 Dairy Drive
Madison, WI 53718

RE: Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185256

Dear Meghan Blodgett:

Enclosed are the analytical results for sample(s) received by the laboratory on April 04, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

Revised Report: Anions for MW-301 were reanalyzed at a lesser dilution.

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

Sincerely,

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

Enclosures

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

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

CERTIFICATIONS

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185256

Pennsylvania Certification IDs

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

Green Bay Certification IDs

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

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SAMPLE SUMMARY

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185256

Lab ID	Sample ID	Matrix	Date Collected	Date Received
40185256001	**MW-301**	Water	04/02/19 17:20	04/04/19 09:30
40185256002	**MW-84A**	Water	04/03/19 09:40	04/04/19 09:30

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SAMPLE ANALYTE COUNT

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185256

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
40185256001	**MW-301**	EPA 6020	KXS	14	PASI-G
		EPA 7470	AJT	1	PASI-G
			AXL	7	PASI-G
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	JLW	1	PASI-PA
		Total Radium Calculation	CMC	1	PASI-PA
		SM 2540C	TMK	1	PASI-G
		EPA 9040	ALY	1	PASI-G
		EPA 300.0	HMB	3	PASI-G
40185256002	**MW-84A**	EPA 6020	KXS	14	PASI-G
		EPA 7470	AJT	1	PASI-G
			AXL	7	PASI-G
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	JLW	1	PASI-PA
		Total Radium Calculation	CMC	1	PASI-PA
		SM 2540C	TMK	1	PASI-G
		EPA 9040	ALY	1	PASI-G
		EPA 300.0	HMB	3	PASI-G

Pace Analytical Services, LLC
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ANALYTICAL RESULTS

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185256

Sample: MW-301 **Lab ID: 40185256001** Collected: 04/02/19 17:20 Received: 04/04/19 09:30 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Antimony	**0.32J**	ug/L	1.0	0.15	1	04/05/19 08:40	04/09/19 06:15	7440-36-0	
Arsenic	**0.40J**	ug/L	1.0	0.28	1	04/05/19 08:40	04/09/19 06:15	7440-38-2	
Barium	**11.8**	ug/L	4.9	1.5	1	04/05/19 08:40	04/09/19 06:15	7440-39-3	
Beryllium	**0.28J**	ug/L	1.0	0.18	1	04/05/19 08:40	04/09/19 06:15	7440-41-7	
Boron	**26.9**	ug/L	11.0	3.3	1	04/05/19 08:40	04/09/19 06:15	7440-42-8	
Cadmium	**0.21J**	ug/L	1.0	0.15	1	04/05/19 08:40	04/09/19 06:15	7440-43-9	
Calcium	**126000**	ug/L	2500	698	10	04/05/19 08:40	04/09/19 05:48	7440-70-2	P6
Chromium	**<1.0**	ug/L	3.4	1.0	1	04/05/19 08:40	04/09/19 06:15	7440-47-3	
Cobalt	**0.35J**	ug/L	1.0	0.12	1	04/05/19 08:40	04/09/19 06:15	7440-48-4	
Lead	**0.30J**	ug/L	1.0	0.24	1	04/05/19 08:40	04/09/19 06:15	7439-92-1	
Lithium	**0.90J**	ug/L	1.0	0.19	1	04/05/19 08:40	04/09/19 06:15	7439-93-2	
Molybdenum	**<0.44**	ug/L	1.5	0.44	1	04/05/19 08:40	04/09/19 06:15	7439-98-7	
Selenium	**0.49J**	ug/L	1.1	0.32	1	04/05/19 08:40	04/09/19 06:15	7782-49-2	
Thallium	**0.48J**	ug/L	1.0	0.14	1	04/05/19 08:40	04/09/19 06:15	7440-28-0	
7470 Mercury	Analytical Method: EPA 7470 Preparation Method: EPA 7470								
Mercury	**<0.084**	ug/L	0.28	0.084	1	04/12/19 09:55	04/15/19 10:05	7439-97-6	
Field Data	Analytical Method:								
Field pH	**6.62**	Std. Units			1		04/02/19 17:20		
Field Specific Conductance	**883**	umhos/cm			1		04/02/19 17:20		
Oxygen, Dissolved	**2.20**	mg/L			1		04/02/19 17:20	7782-44-7	
REDOX	**152.1**	mV			1		04/02/19 17:20		
Turbidity	**2.02**	NTU			1		04/02/19 17:20		
Static Water Level	**787.04**	feet			1		04/02/19 17:20		
Temperature, Water (C)	**7.5**	deg C			1		04/02/19 17:20		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**462**	mg/L	20.0	8.7	1		04/09/19 12:34		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**6.8**	Std. Units	0.10	0.010	1		04/08/19 11:21		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**0.79J**	mg/L	2.0	0.50	1		04/30/19 11:06	16887-00-6	
Fluoride	**<0.10**	mg/L	0.30	0.10	1		04/30/19 11:06	16984-48-8	
Sulfate	**4.4**	mg/L	3.0	1.0	1		04/30/19 11:06	14808-79-8	

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ANALYTICAL RESULTS

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185256

Sample: MW-84A **Lab ID: 40185256002** Collected: 04/03/19 09:40 Received: 04/04/19 09:30 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Antimony	**<0.15**	ug/L	1.0	0.15	1	04/05/19 08:40	04/09/19 06:42	7440-36-0	
Arsenic	**<0.28**	ug/L	1.0	0.28	1	04/05/19 08:40	04/09/19 06:42	7440-38-2	
Barium	**14.7**	ug/L	4.9	1.5	1	04/05/19 08:40	04/09/19 06:42	7440-39-3	
Beryllium	**<0.18**	ug/L	1.0	0.18	1	04/05/19 08:40	04/09/19 06:42	7440-41-7	
Boron	**13.6**	ug/L	11.0	3.3	1	04/05/19 08:40	04/09/19 06:42	7440-42-8	
Cadmium	**<0.15**	ug/L	1.0	0.15	1	04/05/19 08:40	04/09/19 06:42	7440-43-9	
Calcium	**80100**	ug/L	250	69.8	1	04/05/19 08:40	04/09/19 06:42	7440-70-2	
Chromium	**1.8J**	ug/L	3.4	1.0	1	04/05/19 08:40	04/09/19 06:42	7440-47-3	
Cobalt	**<0.12**	ug/L	1.0	0.12	1	04/05/19 08:40	04/09/19 06:42	7440-48-4	
Lead	**<0.24**	ug/L	1.0	0.24	1	04/05/19 08:40	04/09/19 06:42	7439-92-1	
Lithium	**0.56J**	ug/L	1.0	0.19	1	04/05/19 08:40	04/09/19 06:42	7439-93-2	
Molybdenum	**<0.44**	ug/L	1.5	0.44	1	04/05/19 08:40	04/09/19 06:42	7439-98-7	
Selenium	**<0.32**	ug/L	1.1	0.32	1	04/05/19 08:40	04/09/19 06:42	7782-49-2	
Thallium	**<0.14**	ug/L	1.0	0.14	1	04/05/19 08:40	04/09/19 06:42	7440-28-0	
7470 Mercury	Analytical Method: EPA 7470 Preparation Method: EPA 7470								
Mercury	**<0.084**	ug/L	0.28	0.084	1	04/12/19 09:55	04/15/19 10:07	7439-97-6	
Field Data	Analytical Method:								
Field pH	**7.03**	Std. Units			1		04/03/19 09:40		
Field Specific Conductance	**637.2**	umhos/cm			1		04/03/19 09:40		
Oxygen, Dissolved	**9.49**	mg/L			1		04/03/19 09:40	7782-44-7	
REDOX	**103.4**	mV			1		04/03/19 09:40		
Turbidity	**1.90**	NTU			1		04/03/19 09:40		
Static Water Level	**787.35**	feet			1		04/03/19 09:40		
Temperature, Water (C)	**10.2**	deg C			1		04/03/19 09:40		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**318**	mg/L	20.0	8.7	1		04/09/19 12:34		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**7.4**	Std. Units	0.10	0.010	1		04/08/19 11:24		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**3.6**	mg/L	2.0	0.50	1		04/16/19 20:03	16887-00-6	B
Fluoride	**<0.10**	mg/L	0.30	0.10	1		04/16/19 20:03	16984-48-8	
Sulfate	**1.4J**	mg/L	3.0	1.0	1		04/16/19 20:03	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185256

QC Batch: 318138 | Analysis Method: EPA 7470
QC Batch Method: EPA 7470 | Analysis Description: 7470 Mercury
Associated Lab Samples: 40185256001, 40185256002

METHOD BLANK: 1849587 | Matrix: Water
Associated Lab Samples: 40185256001, 40185256002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mercury	ug/L	<0.084	0.28	04/15/19 09:25	

LABORATORY CONTROL SAMPLE: 1849588

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury	ug/L	5	5.3	105	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1849589 1849590

Parameter	Units	40185483005 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mercury	ug/L	0.00016J mg/L	5	5	5.4	5.2	105	101	85-115	4	20	

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QUALITY CONTROL DATA

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185256

QC Batch: 317485 Analysis Method: EPA 6020
QC Batch Method: EPA 3010 Analysis Description: 6020 MET
Associated Lab Samples: 40185256001, 40185256002

METHOD BLANK: 1846066 Matrix: Water
Associated Lab Samples: 40185256001, 40185256002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Antimony	ug/L	<0.15	1.0	04/09/19 04:47	
Arsenic	ug/L	<0.28	1.0	04/09/19 04:47	
Barium	ug/L	<1.5	4.9	04/09/19 04:47	
Beryllium	ug/L	<0.18	1.0	04/09/19 04:47	
Boron	ug/L	<3.3	11.0	04/09/19 04:47	
Cadmium	ug/L	<0.15	1.0	04/09/19 04:47	
Calcium	ug/L	<69.8	250	04/09/19 04:47	
Chromium	ug/L	<1.0	3.4	04/09/19 04:47	
Cobalt	ug/L	<0.12	1.0	04/09/19 04:47	
Lead	ug/L	<0.24	1.0	04/09/19 04:47	
Lithium	ug/L	<0.19	1.0	04/09/19 04:47	
Molybdenum	ug/L	<0.44	1.5	04/09/19 04:47	
Selenium	ug/L	<0.32	1.1	04/09/19 04:47	
Thallium	ug/L	<0.14	1.0	04/09/19 04:47	

LABORATORY CONTROL SAMPLE: 1846067

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Antimony	ug/L	500	500	100	80-120	
Arsenic	ug/L	500	474	95	80-120	
Barium	ug/L	500	487	97	80-120	
Beryllium	ug/L	500	492	98	80-120	
Boron	ug/L	500	486	97	80-120	
Cadmium	ug/L	500	500	100	80-120	
Calcium	ug/L	5000	4990	100	80-120	
Chromium	ug/L	500	492	98	80-120	
Cobalt	ug/L	500	485	97	80-120	
Lead	ug/L	500	463	93	80-120	
Lithium	ug/L	500	467	93	80-120	
Molybdenum	ug/L	500	465	93	80-120	
Selenium	ug/L	500	508	102	80-120	
Thallium	ug/L	500	464	93	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1846068 1846069

Parameter	Units	40185256001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Antimony	ug/L	0.32J	500	500	496	496	99	99	75-125	0	20	

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QUALITY CONTROL DATA

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185256

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1846068 1846069

Parameter	Units	40185256001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Arsenic	ug/L	0.40J	500	500	480	478	96	95	75-125	0	20	
Barium	ug/L	11.8	500	500	496	498	97	97	75-125	0	20	
Beryllium	ug/L	0.28J	500	500	481	480	96	96	75-125	0	20	
Boron	ug/L	26.9	500	500	492	498	93	94	75-125	1	20	
Cadmium	ug/L	0.21J	500	500	491	490	98	98	75-125	0	20	
Calcium	ug/L	126000	5000	5000	126000	123000	12	-46	75-125	2	20	P6
Chromium	ug/L	<1.0	500	500	484	483	97	96	75-125	0	20	
Cobalt	ug/L	0.35J	500	500	476	473	95	95	75-125	1	20	
Lead	ug/L	0.30J	500	500	467	468	93	94	75-125	0	20	
Lithium	ug/L	0.90J	500	500	463	463	92	92	75-125	0	20	
Molybdenum	ug/L	<0.44	500	500	465	464	93	93	75-125	0	20	
Selenium	ug/L	0.49J	500	500	512	513	102	103	75-125	0	20	
Thallium	ug/L	0.48J	500	500	474	476	95	95	75-125	0	20	

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QUALITY CONTROL DATA

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185256

QC Batch: 317813 | Analysis Method: SM 2540C
QC Batch Method: SM 2540C | Analysis Description: 2540C Total Dissolved Solids
Associated Lab Samples: 40185256001, 40185256002

METHOD BLANK: 1847582 | Matrix: Water
Associated Lab Samples: 40185256001, 40185256002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	<8.7	20.0	04/09/19 12:32	

LABORATORY CONTROL SAMPLE: 1847583

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Dissolved Solids	mg/L	577	552	96	80-120	

SAMPLE DUPLICATE: 1847584

Parameter	Units	40185256001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	462	462	0	5	

SAMPLE DUPLICATE: 1847585

Parameter	Units	40185260001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	290	284	2	5	

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QUALITY CONTROL DATA

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185256

QC Batch: 317619 | Analysis Method: EPA 9040
QC Batch Method: EPA 9040 | Analysis Description: 9040 pH
Associated Lab Samples: 40185256001, 40185256002

SAMPLE DUPLICATE: 1846956

Parameter	Units	40185113001 Result	Dup Result	RPD	Max RPD	Qualifiers
pH at 25 Degrees C	Std. Units	1.1	1.1	7	20	H6

SAMPLE DUPLICATE: 1846957

Parameter	Units	40185204001 Result	Dup Result	RPD	Max RPD	Qualifiers
pH at 25 Degrees C	Std. Units	7.2	7.2	0	20	H6

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QUALITY CONTROL DATA

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185256

QC Batch: 317955 — Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 — Analysis Description: 300.0 IC Anions
Associated Lab Samples: 40185256001, 40185256002

METHOD BLANK: 1848305 — Matrix: Water
Associated Lab Samples: 40185256001, 40185256002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chloride	mg/L	0.52J	2.0	04/16/19 10:22	
Fluoride	mg/L	<0.10	0.30	04/16/19 10:22	
Sulfate	mg/L	<1.0	3.0	04/16/19 10:22	

LABORATORY CONTROL SAMPLE: 1848306

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	20	21.6	108	90-110	
Fluoride	mg/L	2	2.0	98	90-110	
Sulfate	mg/L	20	21.7	109	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1848307 1848308

Parameter	Units	40185204004 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	43.0	100	100	149	148	106	105	90-110	1	15	
Fluoride	mg/L	<0.50	10	10	10.3	10.4	103	104	90-110	1	15	
Sulfate	mg/L	<5.0	100	100	109	109	105	105	90-110	0	15	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1848309 1848310

Parameter	Units	40185260002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	229	200	200	439	425	105	98	90-110	3	15	
Fluoride	mg/L	<0.10	2	2	1.9	2.0	97	99	90-110	2	15	
Sulfate	mg/L	201	200	200	411	397	105	98	90-110	3	15	

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ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185256

Sample: MW-301 **Lab ID: 40185256001** Collected: 04/02/19 17:20 Received: 04/04/19 09:30 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	**0.000 ± 0.278 (0.565) C:NA T:94%**	pCi/L	04/22/19 23:16	13982-63-3	
Radium-228	EPA 904.0	**0.552 ± 0.391 (0.759) C:75% T:91%**	pCi/L	04/19/19 12:45	15262-20-1	
Total Radium	Total Radium Calculation	**0.552 ± 0.669 (1.32)**	pCi/L	04/25/19 11:01	7440-14-4	

Sample: MW-84A **Lab ID: 40185256002** Collected: 04/03/19 09:40 Received: 04/04/19 09:30 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	**0.199 ± 0.391 (0.715) C:NA T:93%**	pCi/L	04/22/19 23:16	13982-63-3	
Radium-228	EPA 904.0	**0.482 ± 0.511 (1.07) C:72% T:80%**	pCi/L	04/19/19 12:45	15262-20-1	
Total Radium	Total Radium Calculation	**0.681 ± 0.902 (1.79)**	pCi/L	04/25/19 11:01	7440-14-4	

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QUALITY CONTROL - RADIOCHEMISTRY

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185256

QC Batch: 338211 | Analysis Method: EPA 904.0
QC Batch Method: EPA 904.0 | Analysis Description: 904.0 Radium 228
Associated Lab Samples: 40185256001, 40185256002

METHOD BLANK: 1646527 | Matrix: Water
Associated Lab Samples: 40185256001, 40185256002

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-228	-0.0681 ± 0.343 (0.816) C:74% T:84%	pCi/L	04/19/19 12:45	

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QUALITY CONTROL - RADIOCHEMISTRY

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185256

QC Batch: 338210 | Analysis Method: EPA 903.1
QC Batch Method: EPA 903.1 | Analysis Description: 903.1 Radium-226
Associated Lab Samples: 40185256001, 40185256002

METHOD BLANK: 1646526 | Matrix: Water
Associated Lab Samples: 40185256001, 40185256002

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-226	0.212 ± 0.323 (0.520) C:NA T:90%	pCi/L	04/22/19 22:44	

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QUALIFIERS

Project:	25219067 ALLIANT-COLUMBIA CCR
Pace Project No.:	40185256

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.

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TNI - The NELAC Institute.

LABORATORIES

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

ANALYTE QUALIFIERS

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

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185256

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
40185256001	**MW-301**	EPA 3010	317485	EPA 6020	317570
40185256002	**MW-84A**	EPA 3010	317485	EPA 6020	317570
40185256001	**MW-301**	EPA 7470	318138	EPA 7470	318191
40185256002	**MW-84A**	EPA 7470	318138	EPA 7470	318191
40185256001	**MW-301**				
40185256002	**MW-84A**				
40185256001	**MW-301**	EPA 903.1	338210		
40185256002	**MW-84A**	EPA 903.1	338210		
40185256001	**MW-301**	EPA 904.0	338211		
40185256002	**MW-84A**	EPA 904.0	338211		
40185256001	**MW-301**	Total Radium Calculation	339896		
40185256002	**MW-84A**	Total Radium Calculation	339897		
40185256001	**MW-301**	SM 2540C	317813		
40185256002	**MW-84A**	SM 2540C	317813		
40185256001	**MW-301**	EPA 9040	317619		
40185256002	**MW-84A**	EPA 9040	317619		
40185256001	**MW-301**	EPA 300.0	317955		
40185256002	**MW-84A**	EPA 300.0	317955		

(Please Print Clearly)

Company Name:	SCS
Branch/Location:	Madison WI
Project Contact:	Meg Blodgett
Phone:	608 216 7362
Project Number:	25219067
Project Name:	Alliant - Columbia
Project State:	WI
Sampled By (Print):	Adam Watson
Sampled By (Sign):	Paul A. Grover for Adam Watson
PO #:	
Regulatory Program:	

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MY

CHAIN OF CUSTODY

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

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40185256

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

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

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

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

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

				FILTERED? (YES/NO)	Y/N	No	No	No	No	
				PRESERVATION (CODE)*	Pick Letter	A	C	C	C	
PACE LAB #	CLIENT FIELD ID	COLLECTION ① DATE	TIME	MATRIX	Analyses Requested	CL, Floride, Ph, SO4, TDS	Metals	Radium 226	Radium 228	CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)	Profile #
001	MW 301	4/3/19	1720	W		X	X	X	X			
002	MW 84A	4/3/19	0940			X	X	X	X			
003	MW 303	4/1/19	1800			X	X	X	X			
004	MW 304	4/2/19	1230									
005	MW 305	4/1/19	1410									
006	M-4R	4/1/19	1515									
007	Field Blank P Pond	4/2/19	1230									

① Filled in by Lab from labels 4/4/19 SKW

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

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

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

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

Relinquished By:	Date/Time:	Received By:	Date/Time:
Paul A. Grover	4-3-19 19:00		
FedEx	4/4/19 0930	Susan Kluge	4/4/19 0930
		Pace	

PACE Project No. 40185256

Receipt Temp = ROI °C

Sample Receipt pH
OK / Adjusted

Cooler Custody Seal
Present / Not Present
Intact / Not Intact

Version 6.0 06/14/06

C019a(27Jun2006)

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Page 1 of

40185256

(Please Print Clearly)

Company Name:	SCS
Branch/Location:	Madison WI
Project Contact:	Meg Blodgett
Phone:	608 216 7362
Project Number:	25219067
Project Name:	Alliant - Columbia
Project State:	WI
Sampled By (Print):	Adam Watson
Sampled By (Sign):	Paul A. Grover for Adam Watson
PO #:	
Regulatory Program:	

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

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

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

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

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

FILTERED? (YES/NO) — Y/N: No | No | No | No
PRESERVATION (CODE)* — Pick Letter: A | C | C | C

PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX	CL, Floride, Ph, SO4, TDS	Metals	Radium 226	Radium 228	CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)	Profile #
	MW 301	4-2-19	17:20	GW	X	X	X	X			
	MW 84A	4-3-19	9:40	GW	X	X	X	X			
	MW 303	4-1-19	18:00	GW	X	X	X	X			
	MW 304	4-2-19	12:30								
	MW 305	4-1-19	14:10								
	M-4R	4-1-19	15:15								
	Field Blank PPond	4-2-19	12:30	DI							

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

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

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

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

Relinquished By:	Date/Time:	Received By:	Date/Time:
Paul A. Grover	4-3-19 19:00		
Fed X	4/4/19 0930	[illegible] Pace	4/4/19 0930

PACE Project No. 40185256

Receipt Temp = °C

Sample Receipt pH
OK / Adjusted

Cooler Custody Seal
Present / Not Present
Intact / Not Intact

Version 6.0 06/14/06

ORIGINAL

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

Sample Preservation Receipt Form

Client Name: SCS

Project # 40185256

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

Lab Lot# of pH paper: 10053581 Lab Std #ID of preservation (if pH adjusted):

Initial when completed: SKW Date/ Time:

Pace Lab #	AG1U	AG1H	AG4S	AG4U	AG5U	AG2S	BG3U	BP1U	BP2N	BP2Z	BP3U	BP3C	BP3N	BP3S	DG9A	DG9T	VG9U	VG9H	VG9M	VG9D	JGFU	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)
	Glass							Plastic							Vials						Jars			General									
001									4		2		1																		X		2.5 / 5 / 10
002									4		2		1																		X		2.5 / 5 / 10
003									4		2		1																		X		2.5 / 5 / 10
004									4		2		1																		X		2.5 / 5 / 10
005									4		2		1																		X		2.5 / 5 / 10
006									4		2		1																		X		2.5 / 5 / 10
007									4		2		1																		X		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

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	DG9A	40 mL amber ascorbic	JGFU	4 oz amber jar unpres
AG1H	1 liter amber glass HCL	BP2N	500 mL plastic HNO3	DG9T	40 mL amber Na Thio	WGFU	4 oz clear jar unpres
AG4S	125 mL amber glass H2SO4	BP2Z	500 mL plastic NaOH, Znact	VG9U	40 mL clear vial unpres	WPFU	4 oz plastic jar unpres
AG4U	120 mL amber glass unpres	BP3U	250 mL plastic unpres	VG9H	40 mL clear vial HCL		
AG5U	100 mL amber glass unpres	BP3C	250 mL plastic NaOH	VG9M	40 mL clear vial MeOH	SP5T	120 mL plastic Na Thiosulfate
AG2S	500 mL amber glass H2SO4	BP3N	250 mL plastic HNO3	VG9D	40 mL clear vial DI	ZPLC	ziploc bag
BG3U	250 mL clear glass unpres	BP3S	250 mL plastic H2SO4			GN:	

Sample Condition Upon Receipt Form (SCUR)

Project #:

WO# : 40185256

40185256

Client Name: SCS

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

Tracking #: 7864 3720 0524

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 - N/A **Type of Ice:** Wet Blue Dry None ☑ Samples on ice, cooling process has begun

Cooler Temperature Uncorr: ROI /Corr:

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.

Person examining contents:
Date: 4-4-19
Initials: SEW

Chain of Custody Present:	☑Yes ☐No ☐N/A	1.
Chain of Custody Filled Out:	☐Yes ☑No ☐N/A	2. No po# Mail Invoice Collect 4-4-19 SW
Chain of Custody Relinquished:	☑Yes ☐No ☐N/A	3. date & time + Lab added to coc SW
Sampler Name & Signature on COC:	☑Yes ☐No ☐N/A	4. ~~Recieved updated COC via email from client~~ 4-4-19 SW
Samples Arrived within Hold Time:	☑Yes ☐No	5.
- VOA Samples frozen upon receipt	☐Yes ☐No	Date/Time:
Short Hold Time Analysis (<72hr):	☑Yes ☐No	6.
Rush Turn Around Time Requested:	☐Yes ☑No	7.
Sufficient Volume: For Analysis: ☑Yes ☐No	MS/MSD: ☐Yes ☑No ☐N/A	8.
Correct Containers Used:	☑Yes ☐No	9.
-Pace Containers Used:	☑Yes ☐No ☐N/A	
-Pace IR Containers Used:	☐Yes ☐No ☑N/A	
Containers Intact:	☑Yes ☐No	10.
Filtered volume received for Dissolved tests	☐Yes ☐No ☑N/A	11.
Sample Labels match COC:	☑Yes ☐No ☐N/A	12.
-Includes date/time/ID/Analysis Matrix: W		
Trip Blank Present:	☐Yes ☐No ☑N/A	13.
Trip Blank Custody Seals Present	☐Yes ☐No ☑N/A	
Pace Trip Blank Lot # (if purchased):		

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

Person Contacted: Date/Time:

Comments/ Resolution:

Project Manager Review: AR for DM **Date:** 4/4/19

A2 October 2019 Detection Monitoring

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

October 28, 2019

Meghan Blodgett
SCS ENGINEERS
2830 Dairy Drive
Madison, WI 53718

RE: Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40197016

Dear Meghan Blodgett:

Enclosed are the analytical results for sample(s) received by the laboratory on October 10, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

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

Sincerely,

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

Enclosures

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

CERTIFICATIONS

Project:	25219067.00 COLUMBIA CCR
Pace Project No.:	40197016

Green Bay Certification IDs

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

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

SAMPLE SUMMARY

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40197016

Lab ID	Sample ID	Matrix	Date Collected	Date Received
40196971005	**MW-309**	Water	10/08/19 11:50	10/10/19 09:15
40196971006	**MW-310**	Water	10/08/19 12:50	10/10/19 09:15
40196971007	**MW-311**	Water	10/08/19 13:40	10/10/19 09:15
40196971008	**FIELD BLANK MOD 4**	Water	10/08/19 11:50	10/10/19 09:15

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SAMPLE ANALYTE COUNT

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40197016

Lab ID	Sample ID	Method	Analysts	Analytes Reported
40196971005	**MW-309**	EPA 6020	DS1	2
			HMG	7
		SM 2540C	TMK	1
		EPA 9040	ALY	1
		EPA 300.0	HMB	3
40196971006	**MW-310**	EPA 6020	DS1	2
			HMG	7
		SM 2540C	TMK	1
		EPA 9040	ALY	1
		EPA 300.0	HMB	3
40196971007	**MW-311**	EPA 6020	DS1	2
			HMG	7
		SM 2540C	TMK	1
		EPA 9040	ALY	1
		EPA 300.0	HMB	3
40196971008	**FIELD BLANK MOD 4**	EPA 6020	DS1	2
		SM 2540C	TMK	1
		EPA 9040	ALY	1
		EPA 300.0	HMB	3

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ANALYTICAL RESULTS

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40197016

Sample: MW-309 **Lab ID: 40196971005** Collected: 10/08/19 11:50 Received: 10/10/19 09:15 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Boron	**33.4**	ug/L	10.0	3.0	1	10/11/19 07:55	10/15/19 10:59	7440-42-8	
Calcium	**46900**	ug/L	254	76.2	1	10/11/19 07:55	10/15/19 10:59	7440-70-2	
Field Data	Analytical Method:								
Field pH	**7.75**	Std. Units			1		10/08/19 11:50		
Field Specific Conductance	**687**	umhos/cm			1		10/08/19 11:50		
Oxygen, Dissolved	**11.52**	mg/L			1		10/08/19 11:50	7782-44-7	
REDOX	**125.2**	mV			1		10/08/19 11:50		
Turbidity	**4.89**	NTU			1		10/08/19 11:50		
Static Water Level	**787.26**	feet			1		10/08/19 11:50		
Temperature, Water (C)	**13.0**	deg C			1		10/08/19 11:50		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**370**	mg/L	20.0	8.7	1		10/11/19 18:21		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**7.7**	Std. Units	0.10	0.010	1		10/18/19 09:58		H6
300.0 IC Anions	Analytical Method: EPA 300.0								
Chloride	**43.2**	mg/L	2.0	0.50	1		10/21/19 20:25	16887-00-6	
Fluoride	**<0.10**	mg/L	0.30	0.10	1		10/21/19 20:25	16984-48-8	
Sulfate	**21.9**	mg/L	3.0	1.0	1		10/21/19 20:25	14808-79-8	

Sample: MW-310 **Lab ID: 40196971006** Collected: 10/08/19 12:50 Received: 10/10/19 09:15 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Boron	**81.8**	ug/L	10.0	3.0	1	10/11/19 07:55	10/15/19 11:06	7440-42-8	
Calcium	**57600**	ug/L	254	76.2	1	10/11/19 07:55	10/15/19 11:06	7440-70-2	
Field Data	Analytical Method:								
Field pH	**7.82**	Std. Units			1		10/08/19 12:50		
Field Specific Conductance	**1226**	umhos/cm			1		10/08/19 12:50		
Oxygen, Dissolved	**11.57**	mg/L			1		10/08/19 12:50	7782-44-7	
REDOX	**139.4**	mV			1		10/08/19 12:50		
Turbidity	**2.66**	NTU			1		10/08/19 12:50		
Static Water Level	**787.94**	feet			1		10/08/19 12:50		
Temperature, Water (C)	**13.4**	deg C			1		10/08/19 12:50		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**650**	mg/L	20.0	8.7	1		10/11/19 18:21		

REPORT OF LABORATORY ANALYSIS

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

ANALYTICAL RESULTS

Project: 25219067.00 COLUMBIA CCR

Pace Project No.: 40197016

Sample: MW-310 **Lab ID: 40196971006** Collected: 10/08/19 12:50 Received: 10/10/19 09:15 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**7.8**	Std. Units	0.10	0.010	1		10/18/19 09:59		H6
300.0 IC Anions	Analytical Method: EPA 300.0								
Chloride	**190**	mg/L	20.0	5.0	10		10/22/19 14:42	16887-00-6	
Fluoride	**<0.10**	mg/L	0.30	0.10	1		10/21/19 20:38	16984-48-8	
Sulfate	**85.9**	mg/L	30.0	10.0	10		10/22/19 14:42	14808-79-8	

Sample: MW-311 **Lab ID: 40196971007** Collected: 10/08/19 13:40 Received: 10/10/19 09:15 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Boron	**33.5**	ug/L	10.0	3.0	1	10/11/19 07:55	10/15/19 11:13	7440-42-8	
Calcium	**63900**	ug/L	254	76.2	1	10/11/19 07:55	10/15/19 11:13	7440-70-2	
Field Data	Analytical Method:								
Field pH	**7.69**	Std. Units			1		10/08/19 13:40		
Field Specific Conductance	**495.6**	umhos/cm			1		10/08/19 13:40		
Oxygen, Dissolved	**11.68**	mg/L			1		10/08/19 13:40	7782-44-7	
REDOX	**144.3**	mV			1		10/08/19 13:40		
Turbidity	**8.56**	NTU			1		10/08/19 13:40		
Static Water Level	**787.64**	feet			1		10/08/19 13:40		
Temperature, Water (C)	**12.9**	deg C			1		10/08/19 13:40		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**272**	mg/L	20.0	8.7	1		10/11/19 18:21		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**7.6**	Std. Units	0.10	0.010	1		10/18/19 10:01		H6
300.0 IC Anions	Analytical Method: EPA 300.0								
Chloride	**1.5J**	mg/L	2.0	0.50	1		10/21/19 20:51	16887-00-6	
Fluoride	**<0.10**	mg/L	0.30	0.10	1		10/21/19 20:51	16984-48-8	
Sulfate	**21.2**	mg/L	3.0	1.0	1		10/21/19 20:51	14808-79-8	

Sample: FIELD BLANK MOD 4 **Lab ID: 40196971008** Collected: 10/08/19 11:50 Received: 10/10/19 09:15 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Boron	**<3.0**	ug/L	10.0	3.0	1	10/11/19 07:55	10/15/19 08:13	7440-42-8	
Calcium	**<76.2**	ug/L	254	76.2	1	10/11/19 07:55	10/15/19 08:13	7440-70-2	

REPORT OF LABORATORY ANALYSIS

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

ANALYTICAL RESULTS

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40197016

Sample: FIELD BLANK MOD 4 **Lab ID: 40196971008** Collected: 10/08/19 11:50 Received: 10/10/19 09:15 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**<8.7**	mg/L	20.0	8.7	1		10/11/19 18:21		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**5.7**	Std. Units	0.10	0.010	1		10/18/19 10:08		H6
300.0 IC Anions	Analytical Method: EPA 300.0								
Chloride	**<0.50**	mg/L	2.0	0.50	1		10/21/19 21:04	16887-00-6	
Fluoride	**<0.10**	mg/L	0.30	0.10	1		10/21/19 21:04	16984-48-8	
Sulfate	**<1.0**	mg/L	3.0	1.0	1		10/21/19 21:04	14808-79-8	

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

QUALITY CONTROL DATA

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40197016

QC Batch: 337095 Analysis Method: EPA 6020
QC Batch Method: EPA 3010 Analysis Description: 6020 MET
Associated Lab Samples: 40196971005, 40196971006, 40196971007, 40196971008

METHOD BLANK: 1957892 Matrix: Water
Associated Lab Samples: 40196971005, 40196971006, 40196971007, 40196971008

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Boron	ug/L	<3.0	10.0	10/15/19 07:53	
Calcium	ug/L	<76.2	254	10/15/19 07:53	

LABORATORY CONTROL SAMPLE: 1957893

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Boron	ug/L	500	474	95	80-120	
Calcium	ug/L	5000	5060	101	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1957894 1957895

Parameter	Units	40196734001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Boron	ug/L	7220	500	500	7950	8800	146	316	75-125	10	20	P6
Calcium	ug/L	87600	5000	5000	95700	98200	161	210	75-125	3	20	P6

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

REPORT OF LABORATORY ANALYSIS

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Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
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QUALITY CONTROL DATA

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40197016

QC Batch: 337218 Analysis Method: SM 2540C
QC Batch Method: SM 2540C Analysis Description: 2540C Total Dissolved Solids
Associated Lab Samples: 40196971005, 40196971006, 40196971007, 40196971008

METHOD BLANK: 1959158 Matrix: Water
Associated Lab Samples: 40196971005, 40196971006, 40196971007, 40196971008

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	<8.7	20.0	10/11/19 18:18	

LABORATORY CONTROL SAMPLE: 1959159

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Dissolved Solids	mg/L	547	560	102	80-120	

SAMPLE DUPLICATE: 1959160

Parameter	Units	40196967001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	574	564	2	10	

SAMPLE DUPLICATE: 1959161

Parameter	Units	40196971001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	274	278	1	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.

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QUALITY CONTROL DATA

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40197016

QC Batch: 337952 Analysis Method: EPA 9040
QC Batch Method: EPA 9040 Analysis Description: 9040 pH
Associated Lab Samples: 40196971005, 40196971006, 40196971007, 40196971008

SAMPLE DUPLICATE: 1962801

Parameter	Units	40196967002 Result	Dup Result	RPD	Max RPD	Qualifiers
pH at 25 Degrees C	Std. Units	7.3	7.3	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.

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QUALITY CONTROL DATA

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40197016

QC Batch: 337822 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 40196971005, 40196971006, 40196971007, 40196971008

METHOD BLANK: 1962191 Matrix: Water
Associated Lab Samples: 40196971005, 40196971006, 40196971007, 40196971008

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chloride	mg/L	<0.50	2.0	10/21/19 11:34	
Fluoride	mg/L	<0.10	0.30	10/21/19 11:34	
Sulfate	mg/L	<1.0	3.0	10/21/19 11:34	

LABORATORY CONTROL SAMPLE: 1962192

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	20	20.1	101	90-110	
Fluoride	mg/L	2	2.0	102	90-110	
Sulfate	mg/L	20	20.1	100	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1962193 1962194

Parameter	Units	40196954007 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	14.1	20	20	33.8	33.6	99	98	90-110	1	15	
Fluoride	mg/L	<0.10	2	2	2.1	2.1	102	102	90-110	0	15	
Sulfate	mg/L	7.2	20	20	27.0	26.9	99	98	90-110	0	15	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1962195 1962196

Parameter	Units	40196971011 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	1.6J	20	20	20.9	21.3	97	99	90-110	2	15	
Fluoride	mg/L	<0.10	2	2	2.1	2.1	102	102	90-110	0	15	
Sulfate	mg/L	<1.0	20	20	20.6	20.4	102	101	90-110	1	15	

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

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QUALIFIERS

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40197016

DEFINITIONS

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

ND - Not Detected at or above LOD.

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

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

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

S - Surrogate

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

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

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

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

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

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

TNI - The NELAC Institute.

ANALYTE QUALIFIERS

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

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40197016

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
40196971005	**MW-309**	EPA 3010	337095	EPA 6020	337193
40196971006	**MW-310**	EPA 3010	337095	EPA 6020	337193
40196971007	**MW-311**	EPA 3010	337095	EPA 6020	337193
40196971008	**FIELD BLANK MOD 4**	EPA 3010	337095	EPA 6020	337193
40196971005	**MW-309**				
40196971006	**MW-310**				
40196971007	**MW-311**				
40196971005	**MW-309**	SM 2540C	337218		
40196971006	**MW-310**	SM 2540C	337218		
40196971007	**MW-311**	SM 2540C	337218		
40196971008	**FIELD BLANK MOD 4**	SM 2540C	337218		
40196971005	**MW-309**	EPA 9040	337952		
40196971006	**MW-310**	EPA 9040	337952		
40196971007	**MW-311**	EPA 9040	337952		
40196971008	**FIELD BLANK MOD 4**	EPA 9040	337952		
40196971005	**MW-309**	EPA 300.0	337822		
40196971006	**MW-310**	EPA 300.0	337822		
40196971007	**MW-311**	EPA 300.0	337822		
40196971008	**FIELD BLANK MOD 4**	EPA 300.0	337822		

Page 1 of

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

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CHAIN OF CUSTODY

(Please Print Clearly)

Company Name:	SCS Engineers
Branch/Location:	Madison, WI.
Project Contact:	Tom Karwoski
Phone:	608-224-2830
Project Number:	25219067.00
Project Name:	Columbia
Project State:	Wisconsin
Sampled By (Print):	Adam Watson
Sampled By (Sign):	
PO #:	
Regulatory Program:	

Quote #:	
Mail To Contact:	Tom Karwoski
Mail To Company:	SCS Engineers
Mail To Address:	2830 Dairy Dr Madison, WI 53718
Invoice To Contact:	Same
Invoice To Company:	
Invoice To Address:	
Invoice To Phone:	

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

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

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

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

					Analyses Requested										
			FILTERED? (YES/NO)	Y/N	N	N	N								
			PRESERVATION (CODE)*	Pick Letter	D	A	A								
PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX	Boron/Calcium	pH	TDS, Cl, F, SO4						CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)	Profile #
	MW-302	10/9/19	1100	W	X	X	X							001	
	MW-33AR	10/8/19	1540	W	X	X	X							002	
	MW-34A	10/8/19	1435	W	X	X	X							003	
	Field blank Mod 1-3LF	10/8/19	1435	W	X	X	X							004	
	MW-309	10/8/19	1150	W	X	X	X							005	
	MW-310	10/8/19	1250	W	X	X	X							006	
	MW-311	10/8/19	1340	W	X	X	X							007	
	Field blank Mod 4	10/8/19	1150	W	X	X	X							008	
	MW-306	10/8/19	1055	W	X	X	X							009	
	MW-307	10/7/19	1005	W	X	X	X							010	
	MW-308	10/7/19	1355	W	X	X	X							011	
	Field blank SCPOND	10/8/19	1055	W	X	X	X							012	

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

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

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

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

Relinquished By:	Date/Time:	Received By:	Date/Time:
	10/9/19 1600		
CS Logistics	10/10/19 0915		10/10/19 0915

PACE Project No. 4019697I

Receipt Temp = ROI °C

Sample Receipt pH
OK / Adjusted

Cooler Custody Seal
Present / Not Present
Intact / Not Intact

Version 6.0 06/14/06

C019a(27Jun2006)

ORIGINAL

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

Sample Preservation Receipt Form

Client Name: SCS Engineers Project # 40196971

All containers needing preservation have been checked and noted below: ☒Yes ☐No ☐N/A Initial when completed: [initials] Date/Time:

Lab Lot# of pH paper: 10US0891 Lab Std #ID of preservation (if pH adjusted):

	Glass							Plastic							Vials						Jars			General									
Pace Lab #	AG1U	AG1H	AG4S	AG4U	AG5U	AG2S	BG3U	BP1U	BP2N	BP2Z	BP3U	BP3B	BP3N	BP3S	DG9A	DG9T	VG9U	VG9H	VG9M	VG9D	JGFU	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		1																		X		2.5 / 5 / 10
006											2		1																		X		2.5 / 5 / 10
007											2		1																		X		2.5 / 5 / 10
008											2		1																		X		2.5 / 5 / 10
009											2		1																		X		2.5 / 5 / 10
010											2		1																		X		2.5 / 5 / 10
011											2		1																		X		2.5 / 5 / 10
012											2		1																		X		2.5 / 5 / 10
013																																	2.5 / 5 / 10
014																																	2.5 / 5 / 10
015																																	2.5 / 5 / 10
016																																	2.5 / 5 / 10
017																																	2.5 / 5 / 10
018																																	2.5 / 5 / 10
019																																	2.5 / 5 / 10
020																																	2.5 / 5 / 10

10/10/17

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	DG9A	40 mL amber ascorbic	JGFU	4 oz amber jar unpres
AG1H	1 liter amber glass HCL	BP2N	500 mL plastic HNO3	DG9T	40 mL amber Na Thio	WGFU	4 oz clear jar unpres
AG4S	125 mL amber glass H2SO4	BP2Z	500 mL plastic NaOH, Znact	VG9U	40 mL clear vial unpres	WPFU	4 oz plastic jar unpres
AG4U	120 mL amber glass unpres	BP3U	250 mL plastic unpres	VG9H	40 mL clear vial HCL		
AG5U	100 mL amber glass unpres	BP3B	250 mL plastic NaOH	VG9M	40 mL clear vial MeOH	SP5T	120 mL plastic Na Thiosulfate
AG2S	500 mL amber glass H2SO4	BP3N	250 mL plastic HNO3	VG9D	40 mL clear vial DI	ZPLC	ziploc bag
BG3U	250 mL clear glass unpres	BP3S	250 mL plastic H2SO4			GN:	

Pace Analytical 1241 Bellevue Street, Green Bay, WI 54302	Document Name: **Sample Condition Upon Receipt (SCUR)**	Document Revised: 25Apr2018
	Document No.: **F-GB-C-031-Rev.07**	Issuing Authority: Pace Green Bay Quality Office

Sample Condition Upon Receipt Form (SCUR)

Project #: WO#: 40196971

40196971

Client Name: SCS Engineers

Courier: [x] CS Logistics [ ] Fed Ex [ ] Speedee [ ] UPS [ ] Waltco [ ] Client [ ] Pace Other: ______

Tracking #: Z120. 100919

Custody Seal on Cooler/Box Present: [ ] yes [x] no Seals intact: [ ] yes [ ] no

Custody Seal on Samples Present: [ ] yes [x] no Seals intact: [ ] yes [ ] no

Packing Material: [ ] Bubble Wrap [ ] Bubble Bags [ ] None [x] Other plastic bag

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

Cooler Temperature Uncorr: ROI /Corr: —

Temp Blank Present: [ ] yes [x] no **Biological Tissue is Frozen:** [ ] yes [ ] no

Temp should be above freezing to 6°C.
Biota Samples may be received at ≤ 0°C.

Person examining contents:
Date: 10/10/19
Initials: JW

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

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

Person Contacted: ______ Date/Time: ______

Comments/ Resolution: ______

Project Manager Review: [signature] for DM **Date:** 10-10-19

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

November 01, 2019

Meghan Blodgett
SCS ENGINEERS
2830 Dairy Drive
Madison, WI 53718

RE: Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196970

Dear Meghan Blodgett:

Enclosed are the analytical results for sample(s) received by the laboratory on October 10, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

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

Sincerely,

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

Enclosures

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

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

CERTIFICATIONS

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196970

Pennsylvania Certification IDs

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

Green Bay Certification IDs

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

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(920)469-2436

SAMPLE SUMMARY

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196970

Lab ID	Sample ID	Matrix	Date Collected	Date Received
40196970001	**MW-301**	Water	10/09/19 12:00	10/10/19 09:15
40196970002	**MW-84A**	Water	10/09/19 13:10	10/10/19 09:15

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
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SAMPLE ANALYTE COUNT

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196970

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
40196970001	**MW-301**	EPA 6020	DS1	14	PASI-G
		EPA 7470	AJT	1	PASI-G
			HMG	7	PASI-G
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
		Total Radium Calculation	CMC	1	PASI-PA
		SM 2540C	TMK	1	PASI-G
		EPA 9040	ALY	1	PASI-G
		EPA 300.0	HMB	3	PASI-G
40196970002	**MW-84A**	EPA 6020	DS1	14	PASI-G
		EPA 7470	AJT	1	PASI-G
			HMG	7	PASI-G
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
		Total Radium Calculation	CMC	1	PASI-PA
		SM 2540C	TMK	1	PASI-G
		EPA 9040	ALY	1	PASI-G
		EPA 300.0	HMB	3	PASI-G

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Green Bay, WI 54302
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ANALYTICAL RESULTS

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196970

Sample: MW-301 **Lab ID: 40196970001** Collected: 10/09/19 12:00 Received: 10/10/19 09:15 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Antimony	**<0.15**	ug/L	1.0	0.15	1	10/14/19 07:07	10/14/19 23:25	7440-36-0	
Arsenic	**0.42J**	ug/L	1.0	0.28	1	10/14/19 07:07	10/15/19 12:57	7440-38-2	
Barium	**10**	ug/L	2.3	0.70	1	10/14/19 07:07	10/14/19 23:25	7440-39-3	
Beryllium	**<0.25**	ug/L	1.0	0.25	1	10/14/19 07:07	10/15/19 12:57	7440-41-7	
Boron	**35.9**	ug/L	10.0	3.0	1	10/14/19 07:07	10/15/19 12:57	7440-42-8	
Cadmium	**<0.15**	ug/L	1.0	0.15	1	10/14/19 07:07	10/14/19 23:25	7440-43-9	
Calcium	**114000**	ug/L	254	76.2	1	10/14/19 07:07	10/15/19 12:57	7440-70-2	
Chromium	**<1.0**	ug/L	3.4	1.0	1	10/14/19 07:07	10/15/19 12:57	7440-47-3	
Cobalt	**<0.12**	ug/L	1.0	0.12	1	10/14/19 07:07	10/15/19 12:57	7440-48-4	
Lead	**<0.24**	ug/L	1.0	0.24	1	10/14/19 07:07	10/14/19 23:25	7439-92-1	
Lithium	**0.61J**	ug/L	1.0	0.22	1	10/14/19 07:07	10/15/19 12:57	7439-93-2	
Molybdenum	**<0.44**	ug/L	1.5	0.44	1	10/14/19 07:07	10/14/19 23:25	7439-98-7	
Selenium	**<0.32**	ug/L	1.1	0.32	1	10/14/19 07:07	10/15/19 12:57	7782-49-2	
Thallium	**<0.14**	ug/L	1.0	0.14	1	10/14/19 07:07	10/14/19 23:25	7440-28-0	
7470 Mercury	Analytical Method: EPA 7470 Preparation Method: EPA 7470								
Mercury	**<0.084**	ug/L	0.28	0.084	1	10/22/19 14:50	10/23/19 09:18	7439-97-6	
Field Data	Analytical Method:								
Field pH	**6.67**	Std. Units			1		10/09/19 12:00		
Field Specific Conductance	**801**	umhos/cm			1		10/09/19 12:00		
Oxygen, Dissolved	**1.67**	mg/L			1		10/09/19 12:00	7782-44-7	
REDOX	**173.0**	mV			1		10/09/19 12:00		
Turbidity	**2.12**	NTU			1		10/09/19 12:00		
Static Water Level	**788.47**	feet			1		10/09/19 12:00		
Temperature, Water (C)	**11.3**	deg C			1		10/09/19 12:00		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**418**	mg/L	20.0	8.7	1		10/15/19 16:41		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**7.0**	Std. Units	0.10	0.010	1		10/18/19 09:42		H6
300.0 IC Anions	Analytical Method: EPA 300.0								
Chloride	**1.7J**	mg/L	2.0	0.50	1		10/21/19 18:26	16887-00-6	
Fluoride	**<0.10**	mg/L	0.30	0.10	1		10/21/19 18:26	16984-48-8	
Sulfate	**8.4**	mg/L	3.0	1.0	1		10/21/19 18:26	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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

ANALYTICAL RESULTS

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196970

Sample: MW-84A **Lab ID: 40196970002** Collected: 10/09/19 13:10 Received: 10/10/19 09:15 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Antimony	**<0.15**	ug/L	1.0	0.15	1	10/14/19 07:07	10/14/19 23:46	7440-36-0	
Arsenic	**0.46J**	ug/L	1.0	0.28	1	10/14/19 07:07	10/15/19 13:34	7440-38-2	
Barium	**13.2**	ug/L	2.3	0.70	1	10/14/19 07:07	10/14/19 23:46	7440-39-3	
Beryllium	**<0.25**	ug/L	1.0	0.25	1	10/14/19 07:07	10/15/19 13:34	7440-41-7	
Boron	**12.0**	ug/L	10.0	3.0	1	10/14/19 07:07	10/15/19 13:34	7440-42-8	
Cadmium	**<0.15**	ug/L	1.0	0.15	1	10/14/19 07:07	10/15/19 13:34	7440-43-9	
Calcium	**73500**	ug/L	254	76.2	1	10/14/19 07:07	10/15/19 13:34	7440-70-2	
Chromium	**1.6J**	ug/L	3.4	1.0	1	10/14/19 07:07	10/15/19 13:34	7440-47-3	
Cobalt	**<0.12**	ug/L	1.0	0.12	1	10/14/19 07:07	10/15/19 13:34	7440-48-4	
Lead	**<0.24**	ug/L	1.0	0.24	1	10/14/19 07:07	10/14/19 23:46	7439-92-1	
Lithium	**0.52J**	ug/L	1.0	0.22	1	10/14/19 07:07	10/15/19 13:34	7439-93-2	
Molybdenum	**<0.44**	ug/L	1.5	0.44	1	10/14/19 07:07	10/15/19 13:34	7439-98-7	
Selenium	**<0.32**	ug/L	1.1	0.32	1	10/14/19 07:07	10/15/19 13:34	7782-49-2	
Thallium	**<0.14**	ug/L	1.0	0.14	1	10/14/19 07:07	10/14/19 23:46	7440-28-0	
7470 Mercury	Analytical Method: EPA 7470 Preparation Method: EPA 7470								
Mercury	**<0.084**	ug/L	0.28	0.084	1	10/22/19 14:50	10/23/19 09:25	7439-97-6	
Field Data	Analytical Method:								
Field pH	**7.23**	Std. Units			1		10/09/19 13:10		
Field Specific Conductance	**614.1**	umhos/cm			1		10/09/19 13:10		
Oxygen, Dissolved	**11.36**	mg/L			1		10/09/19 13:10	7782-44-7	
REDOX	**181.7**	mV			1		10/09/19 13:10		
Turbidity	**2.41**	NTU			1		10/09/19 13:10		
Static Water Level	**787.79**	feet			1		10/09/19 13:10		
Temperature, Water (C)	**11.8**	deg C			1		10/09/19 13:10		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**310**	mg/L	20.0	8.7	1		10/15/19 16:41		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**7.5**	Std. Units	0.10	0.010	1		10/18/19 09:44		H6
300.0 IC Anions	Analytical Method: EPA 300.0								
Chloride	**3.9**	mg/L	2.0	0.50	1		10/21/19 19:19	16887-00-6	
Fluoride	**<0.10**	mg/L	0.30	0.10	1		10/21/19 19:19	16984-48-8	
Sulfate	**1.3J**	mg/L	3.0	1.0	1		10/21/19 19:19	14808-79-8	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
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(920)469-2436

QUALITY CONTROL DATA

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196970

QC Batch: 338359
QC Batch Method: EPA 7470
Analysis Method: EPA 7470
Analysis Description: 7470 Mercury
Associated Lab Samples: 40196970001, 40196970002

METHOD BLANK: 1964880 Matrix: Water
Associated Lab Samples: 40196970001, 40196970002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mercury	ug/L	<0.084	0.28	10/23/19 09:14	

LABORATORY CONTROL SAMPLE: 1964881

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury	ug/L	5	5.3	105	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1964882 1964883

Parameter	Units	40196970001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mercury	ug/L	<0.084	5	5	5.1	5.0	101	100	85-115	1	20	

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QUALITY CONTROL DATA

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196970

QC Batch: 337277 Analysis Method: EPA 6020
QC Batch Method: EPA 3010 Analysis Description: 6020 MET
Associated Lab Samples: 40196970001, 40196970002

METHOD BLANK: 1959950 Matrix: Water
Associated Lab Samples: 40196970001, 40196970002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Antimony	ug/L	<0.15	1.0	10/14/19 18:40	
Arsenic	ug/L	<0.28	1.0	10/14/19 18:40	
Barium	ug/L	<0.70	2.3	10/14/19 18:40	
Beryllium	ug/L	<0.25	1.0	10/14/19 18:40	
Boron	ug/L	<3.0	10.0	10/14/19 18:40	
Cadmium	ug/L	<0.15	1.0	10/14/19 18:40	
Calcium	ug/L	<76.2	254	10/14/19 18:40	
Chromium	ug/L	<1.0	3.4	10/14/19 18:40	
Cobalt	ug/L	<0.12	1.0	10/14/19 18:40	
Lead	ug/L	<0.24	1.0	10/14/19 18:40	
Lithium	ug/L	<0.22	1.0	10/14/19 18:40	
Molybdenum	ug/L	<0.44	1.5	10/14/19 18:40	
Selenium	ug/L	<0.32	1.1	10/14/19 18:40	
Thallium	ug/L	<0.14	1.0	10/14/19 18:40	

LABORATORY CONTROL SAMPLE: 1959951

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Antimony	ug/L	500	497	99	80-120	
Arsenic	ug/L	500	478	96	80-120	
Barium	ug/L	500	477	95	80-120	
Beryllium	ug/L	500	488	98	80-120	
Boron	ug/L	500	464	93	80-120	
Cadmium	ug/L	500	501	100	80-120	
Calcium	ug/L	5000	5080	102	80-120	
Chromium	ug/L	500	478	96	80-120	
Cobalt	ug/L	500	467	93	80-120	
Lead	ug/L	500	470	94	80-120	
Lithium	ug/L	500	477	95	80-120	
Molybdenum	ug/L	500	452	90	80-120	
Selenium	ug/L	500	494	99	80-120	
Thallium	ug/L	500	476	95	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1959952 1959953

Parameter	Units	40196861005 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Antimony	ug/L	<0.15	500	500	513	510	103	102	75-125	1	20	

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QUALITY CONTROL DATA

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196970

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1959952 1959953

Parameter	Units	40196861005 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Arsenic	ug/L	2.4	500	500	512	504	102	100	75-125	2	20	
Barium	ug/L	169	500	500	671	672	100	101	75-125	0	20	
Beryllium	ug/L	<0.25	500	500	513	469	103	94	75-125	9	20	
Boron	ug/L	73.0	500	500	582	529	102	91	75-125	10	20	
Cadmium	ug/L	<0.15	500	500	514	512	103	102	75-125	0	20	
Calcium	ug/L	90300	5000	5000	96800	99900	130	192	75-125	3	20	P6
Chromium	ug/L	<1.0	500	500	492	486	98	97	75-125	1	20	
Cobalt	ug/L	<0.12	500	500	488	484	98	97	75-125	1	20	
Lead	ug/L	<0.24	500	500	489	489	98	98	75-125	0	20	
Lithium	ug/L	12.4	500	500	518	476	101	93	75-125	8	20	
Molybdenum	ug/L	2.6	500	500	477	476	95	95	75-125	0	20	
Selenium	ug/L	<0.32	500	500	524	521	105	104	75-125	1	20	
Thallium	ug/L	<0.14	500	500	502	502	100	100	75-125	0	20	

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QUALITY CONTROL DATA

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196970

QC Batch: 337571 Analysis Method: SM 2540C
QC Batch Method: SM 2540C Analysis Description: 2540C Total Dissolved Solids
Associated Lab Samples: 40196970001, 40196970002

METHOD BLANK: 1960873 Matrix: Water
Associated Lab Samples: 40196970001, 40196970002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	<8.7	20.0	10/15/19 16:39	

LABORATORY CONTROL SAMPLE: 1960874

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Dissolved Solids	mg/L	547	558	102	80-120	

SAMPLE DUPLICATE: 1960875

Parameter	Units	40196939001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	354	368	4	10	

SAMPLE DUPLICATE: 1960876

Parameter	Units	40196970001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	418	406	3	10	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196970

QC Batch: 337952 | Analysis Method: EPA 9040
QC Batch Method: EPA 9040 | Analysis Description: 9040 pH
Associated Lab Samples: 40196970001, 40196970002

SAMPLE DUPLICATE: 1962801

Parameter	Units	40196967002 Result	Dup Result	RPD	Max RPD	Qualifiers
pH at 25 Degrees C	Std. Units	7.3	7.3	0	20	H6

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QUALITY CONTROL DATA

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196970

QC Batch: 337822 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 40196970001, 40196970002

METHOD BLANK: 1962191 Matrix: Water
Associated Lab Samples: 40196970001, 40196970002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chloride	mg/L	<0.50	2.0	10/21/19 11:34	
Fluoride	mg/L	<0.10	0.30	10/21/19 11:34	
Sulfate	mg/L	<1.0	3.0	10/21/19 11:34	

LABORATORY CONTROL SAMPLE: 1962192

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	20	20.1	101	90-110	
Fluoride	mg/L	2	2.0	102	90-110	
Sulfate	mg/L	20	20.1	100	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1962193 1962194

Parameter	Units	40196954007 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	14.1	20	20	33.8	33.6	99	98	90-110	1	15	
Fluoride	mg/L	<0.10	2	2	2.1	2.1	102	102	90-110	0	15	
Sulfate	mg/L	7.2	20	20	27.0	26.9	99	98	90-110	0	15	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1962195 1962196

Parameter	Units	40196971011 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	1.6J	20	20	20.9	21.3	97	99	90-110	2	15	
Fluoride	mg/L	<0.10	2	2	2.1	2.1	102	102	90-110	0	15	
Sulfate	mg/L	<1.0	20	20	20.6	20.4	102	101	90-110	1	15	

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REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
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ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196970

Sample: MW-301 **Lab ID: 40196970001** Collected: 10/09/19 12:00 Received: 10/10/19 09:15 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	**0.252 ± 0.351 (0.585) C:NA T:83%**	pCi/L	10/31/19 12:20	13982-63-3	
Radium-228	EPA 904.0	**0.449 ± 0.363 (0.723) C:77% T:95%**	pCi/L	10/30/19 14:23	15262-20-1	
Total Radium	Total Radium Calculation	**0.701 ± 0.714 (1.31)**	pCi/L	11/01/19 15:00	7440-14-4	

Sample: MW-84A **Lab ID: 40196970002** Collected: 10/09/19 13:10 Received: 10/10/19 09:15 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	**0.247 ± 0.292 (0.459) C:NA T:101%**	pCi/L	10/31/19 12:20	13982-63-3	
Radium-228	EPA 904.0	**-0.0240 ± 0.355 (0.827) C:78% T:89%**	pCi/L	10/30/19 14:24	15262-20-1	
Total Radium	Total Radium Calculation	**0.247 ± 0.647 (1.29)**	pCi/L	11/01/19 15:00	7440-14-4	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
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QUALITY CONTROL - RADIOCHEMISTRY

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196970

QC Batch: 366494 Analysis Method: EPA 903.1
QC Batch Method: EPA 903.1 Analysis Description: 903.1 Radium-226
Associated Lab Samples: 40196970001, 40196970002

METHOD BLANK: 1777728 Matrix: Water
Associated Lab Samples: 40196970001, 40196970002

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-226	0.0468 ± 0.331 (0.660) C:NA T:87%	pCi/L	10/31/19 12:20	

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QUALITY CONTROL - RADIOCHEMISTRY

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196970

QC Batch: 366493 Analysis Method: EPA 904.0
QC Batch Method: EPA 904.0 Analysis Description: 904.0 Radium 228
Associated Lab Samples: 40196970001, 40196970002

METHOD BLANK: 1777725 Matrix: Water
Associated Lab Samples: 40196970001, 40196970002

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-228	-0.00340 ± 0.362 (0.843) C:80% T:79%	pCi/L	10/30/19 14:21	

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REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
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QUALIFIERS

Project:	25219067.00 COLUMBIA CCR
Pace Project No.:	40196970

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.

LABORATORIES

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

ANALYTE QUALIFIERS

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

Pace Analytical Services, LLC
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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196970

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
40196970001	**MW-301**	EPA 3010	337277	EPA 6020	337400
40196970002	**MW-84A**	EPA 3010	337277	EPA 6020	337400
40196970001	**MW-301**	EPA 7470	338359	EPA 7470	338406
40196970002	**MW-84A**	EPA 7470	338359	EPA 7470	338406
40196970001	**MW-301**				
40196970002	**MW-84A**				
40196970001	**MW-301**	EPA 903.1	366494		
40196970002	**MW-84A**	EPA 903.1	366494		
40196970001	**MW-301**	EPA 904.0	366493		
40196970002	**MW-84A**	EPA 904.0	366493		
40196970001	**MW-301**	Total Radium Calculation	369027		
40196970002	**MW-84A**	Total Radium Calculation	369027		
40196970001	**MW-301**	SM 2540C	337571		
40196970002	**MW-84A**	SM 2540C	337571		
40196970001	**MW-301**	EPA 9040	337952		
40196970002	**MW-84A**	EPA 9040	337952		
40196970001	**MW-301**	EPA 300.0	337822		
40196970002	**MW-84A**	EPA 300.0	337822		

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

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CHAIN OF CUSTODY

(Please Print Clearly)

Company Name:	SCS Engineers
Branch/Location:	Madison, WI
Project Contact:	Tom Karwoski
Phone:	608-224-2830
Project Number:	25219067.00
Project Name:	Columbia
Project State:	Wisconsin
Sampled By (Print):	Adam Watson
Sampled By (Sign):	
PO #:	
Regulatory Program:	

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

Quote #:	
Mail To Contact:	Tom Karwoski
Mail To Company:	SCS Engineers
Mail To Address:	2830 Dairy Dr. Madison, WI 53718
Invoice To Contact:	
Invoice To Company:	
Invoice To Address:	
Invoice To Phone:	

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

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

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

					Analyses Requested												
				FILTERED? (YES/NO)	Y/N	N	N	N	N								
				PRESERVATION (CODE)*	Pick Letter	D	D	A	A								
PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX		Radium 226 & 228	Metals See attached table	pH	TDS, Cl, F, SO4						CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)	Profile #
001	MW-301	10/9/19	1200	W		X	X	X	X							001	
002	MW-84A	10/9/19	1316	W		X	X	X	X							002	

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

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

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

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

Relinquished By:	Date/Time:	Received By:	Date/Time:
	10/9/19 1600		
CS Logistics	10/10/19 0915	PACE	10/10/19 0915

PACE Project No. 40196970

Receipt Temp = ROI °C

Sample Receipt pH
OK / Adjusted

Cooler Custody Seal
Present / Not Present
Intact / Not Intact

Version 6.0 06/14/06

ORIGINAL

40196970

Table 2. Sampling Points and Parameters - CCR Rule Sampling Program
Groundwater Monitoring - Columbia Energy Center / SCS Engineers Project #25219067

		COC #1 - Background Wells		COC #2 - Landfill Modules 1-3				COC #3 - Landfill Module 4				COC #4 - Primary Pond					COC #5 - Secondary Pond			
	Parameter	MW-301	MW-84A	MW-302	MW-33AR	MW-34A	FIELD BLANK - MOD1-3LF	MW-309	MW-310	MW-311	FIELD BLANK-MOD4	MW-303	MW-304	MW-305	MW-4R	FIELD BLANK - PPOND	MW-306	MW-307	MW-308	FIELD BLANK - SCPOND
Appendix III Parameters (Detection Monitoring)	Boron	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Calcium	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Chloride	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Fluoride	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	pH	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Sulfate	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	TDS	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Appendix IV Parameters (Assessment Monitoring)	Antimony	x	x									x	x	x	x	x				
	Arsenic	x	x									x	x	x	x	x				
	Barium	x	x									x	x	x	x	x				
	Beryllium	x	x									x	x	x	x	x				
	Cadmium	x	x									x	x	x	x	x				
	Chromium	x	x									x	x	x	x	x				
	Cobalt	x	x									x	x	x	x	x				
	Fluoride	x	x									x	x	x	x	x				
	Lead	x	x									x	x	x	x	x				
	Lithium	x	x									x	x	x	x	x				
	Mercury	x	x									x	x	x	x	x				
	Molybdenum	x	x									x	x	x	x	x				
	Selenium	x	x									x	x	x	x	x				
	Thallium	x	x									x	x	x	x	x				
	Radium 226+228	x	x									x	x	x	x	x				
CCR Rule Field Parameters	Groundwater Elevation	x	x	x	x	x		x	x	x		x	x	x	x		x	x	x	
	pH	x	x	x	x	x		x	x	x		x	x	x	x		x	x	x	
Low-Flow Sampling Field Parameters	Well Depth	x	x	x	x	x		x	x	x		x	x	x	x		x	x	x	
	Specific Conductance	x	x	x	x	x		x	x	x		x	x	x	x		x	x	x	
	Dissolved Oxygen	x	x	x	x	x		x	x	x		x	x	x	x		x	x	x	
	ORP	x	x	x	x	x		x	x	x		x	x	x	x		x	x	x	
	Temperature	x	x	x	x	x		x	x	x		x	x	x	x		x	x	x	
	Turbidity	x	x	x	x	x		x	x	x		x	x	x	x		x	x	x	
	Color	x	x	x	x	x		x	x	x		x	x	x	x		x	x	x	
	Odor	x	x	x	x	x		x	x	x		x	x	x	x		x	x	x	

Notes: All samples are unfiltered (total).

I:\25219067.00\Data and Calculations\Tables\Lab Bottle Orders\[2019 April_COL CCR.xls]Sheet1

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

Sample Preservation Receipt Form

Client Name: SC Engineers   Project # 40196920

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

Lab Lot# of pH paper: 1GUS089   Lab Std #ID of preservation (if pH adjusted):

Initial when completed: JW   Date/ Time:

Pace Lab #	Glass AG1U	AG1H	AG4S	AG4U	AG5U	AG2S	BG3U	Plastic BP1U	BP2N	BP2Z	BP3U	BP3B	BP3N	BP3S	Vials DG9A	DG9T	VG9U	VG9H	VG9M	VG9D	Jars JGFU	WGFU	WPFU	General SP5T	ZPLC	GN	VOA Vials (>6mm) *	H2SO4 pH ≤2	NaOH+Zn Act pH ≥9	NaOH pH ≥12	HNO3 pH ≤2	pH after adjusted	Volume (mL)
001											2		1													2					X		2.5 / 5 / 10
002											2		1													2					X		2.5 / 5 / 10
003																																	2.5 / 5 / 10
004																																	2.5 / 5 / 10
005																																	2.5 / 5 / 10
006																																	2.5 / 5 / 10
007																																	2.5 / 5 / 10
008																																	2.5 / 5 / 10
009																																	2.5 / 5 / 10
010																																	2.5 / 5 / 10
011																																	2.5 / 5 / 10
012																																	2.5 / 5 / 10
013																																	2.5 / 5 / 10
014																																	2.5 / 5 / 10
015																																	2.5 / 5 / 10
016																																	2.5 / 5 / 10
017																																	2.5 / 5 / 10
018																																	2.5 / 5 / 10
019																																	2.5 / 5 / 10
020																																	2.5 / 5 / 10

10/10/17 JW

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	DG9A	40 mL amber ascorbic	JGFU	4 oz amber jar unpres
AG1H	1 liter amber glass HCL	BP2N	500 mL plastic HNO3	DG9T	40 mL amber Na Thio	WGFU	4 oz clear jar unpres
AG4S	125 mL amber glass H2SO4	BP2Z	500 mL plastic NaOH, Znact	VG9U	40 mL clear vial unpres	WPFU	4 oz plastic jar unpres
AG4U	120 mL amber glass unpres	BP3U	250 mL plastic unpres	VG9H	40 mL clear vial HCL		
AG5U	100 mL amber glass unpres	BP3B	250 mL plastic NaOH	VG9M	40 mL clear vial MeOH	SP5T	120 mL plastic Na Thiosulfate
AG2S	500 mL amber glass H2SO4	BP3N	250 mL plastic HNO3	VG9D	40 mL clear vial DI	ZPLC	ziploc bag
BG3U	250 mL clear glass unpres	BP3S	250 mL plastic H2SO4			GN:	1 liter plastic HNO3 pres

Pace Analytical 1241 Bellevue Street, Green Bay, WI 54302	Document Name: **Sample Condition Upon Receipt (SCUR)** Document No.: **F-GB-C-031-Rev.07**	Document Revised: 25Apr2018 Issuing Authority: Pace Green Bay Quality Office

Sample Condition Upon Receipt Form (SCUR)

Project #:

WO# : 40196970

40196970

Client Name: SCS Engineers

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

Tracking #: 2120.100919

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 zip lock/plastic bag

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

Cooler Temperature Uncorr: ROI /Corr: —

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.

Person examining contents:
Date: 10/10/19
Initials: JW

Chain of Custody Present:	☒Yes	☐No	☐N/A	1.
Chain of Custody Filled Out:	☐Yes	☒No	☐N/A	2. invoice details not documented 10/10/19 JW
Chain of Custody Relinquished:	☒Yes	☐No	☐N/A	3.
Sampler Name & Signature on COC:	☒Yes	☐No	☐N/A	4.
Samples Arrived within Hold Time:	☒Yes	☐No		5.
- VOA Samples frozen upon receipt	☐Yes	☐No		Date/Time:
Short Hold Time Analysis (<72hr):	☐Yes	☒No		6.
Rush Turn Around Time Requested:	☐Yes	☒No		7.
Sufficient Volume: For Analysis: ☒Yes ☐No MS/MSD:	☐Yes	☒No	☐N/A	8.
Correct Containers Used:	☒Yes	☐No		9.
-Pace Containers Used:	☒Yes	☐No	☐N/A	
-Pace IR Containers Used:	☐Yes	☐No	☒N/A	
Containers Intact:	☒Yes	☐No		10.
Filtered volume received for Dissolved tests	☐Yes	☐No	☒N/A	11.
Sample Labels match COC:	☒Yes	☐No	☐N/A	12.
-Includes date/time/ID/Analysis Matrix: W				
Trip Blank Present:	☐Yes	☐No	☒N/A	13.
Trip Blank Custody Seals Present	☐Yes	☐No	☒N/A	
Pace Trip Blank Lot # (if purchased):				

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

Person Contacted: Date/Time:

Comments/ Resolution:

Project Manager Review: [signature] for DM **Date:** 10-10-19

A3 December 2019 Retesting Event

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

January 07, 2020

Meghan Blodgett
SCS ENGINEERS
2830 Dairy Drive
Madison, WI 53718

RE: Project: 25219067 ALLIANT-COLUMBIA
Pace Project No.: 40201277

Dear Meghan Blodgett:

Enclosed are the analytical results for sample(s) received by the laboratory on December 24, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

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

Sincerely,

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

Enclosures

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

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

CERTIFICATIONS

Project:	25219067 ALLIANT-COLUMBIA
Pace Project No.:	40201277

Pace Analytical Services Green Bay

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

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

SAMPLE SUMMARY

Project: 25219067 ALLIANT-COLUMBIA
Pace Project No.: 40201277

Lab ID	Sample ID	Matrix	Date Collected	Date Received
40201277001	**MW-310**	Water	12/23/19 12:37	12/24/19 09:05

Pace Analytical Services, LLC
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Green Bay, WI 54302
(920)469-2436

SAMPLE ANALYTE COUNT

Project: 25219067 ALLIANT-COLUMBIA
Pace Project No.: 40201277

Lab ID	Sample ID	Method	Analysts	Analytes Reported
40201277001	**MW-310**	EPA 6020	KXS	1
			AXL	7

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Green Bay, WI 54302
(920)469-2436

ANALYTICAL RESULTS

Project: 25219067 ALLIANT-COLUMBIA
Pace Project No.: 40201277

Sample: MW-310 **Lab ID: 40201277001** Collected: 12/23/19 12:37 Received: 12/24/19 09:05 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Calcium	**55400**	ug/L	2540	762	10	01/02/20 05:43	01/03/20 04:34	7440-70-2	P6
Field Data	Analytical Method:								
Field pH	**7.70**	Std. Units			1		12/23/19 12:37		
Field Specific Conductance	**1416**	umhos/cm			1		12/23/19 12:37		
Oxygen, Dissolved	**9.65**	mg/L			1		12/23/19 12:37	7782-44-7	
REDOX	**40.0**	mV			1		12/23/19 12:37		
Turbidity	**2.06**	NTU			1		12/23/19 12:37		
Static Water Level	**775.22**	feet			1		12/23/19 12:37		
Temperature, Water (C)	**12.4**	deg C			1		12/23/19 12:37		

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Green Bay, WI 54302
(920)469-2436

QUALITY CONTROL DATA

Project: 25219067 ALLIANT-COLUMBIA
Pace Project No.: 40201277

QC Batch: 344644 — Analysis Method: EPA 6020
QC Batch Method: EPA 3010 — Analysis Description: 6020 MET
Associated Lab Samples: 40201277001

METHOD BLANK: 1999854 — Matrix: Water
Associated Lab Samples: 40201277001

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Calcium	ug/L	<76.2	254	01/03/20 04:20	

LABORATORY CONTROL SAMPLE: 1999855

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Calcium	ug/L	5000	5020	100	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1999856 1999857

Parameter	Units	40201277001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Calcium	ug/L	55400	5000	5000	61300	65500	117	202	75-125	7	20	P6

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

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

QUALIFIERS

Project: 25219067 ALLIANT-COLUMBIA

Pace Project No.: 40201277

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

P6 Matrix spike recovery was outside laboratory control limits due to a parent sample concentration notably higher than the spike level.

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

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 25219067 ALLIANT-COLUMBIA
Pace Project No.: 40201277

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
40201277001	**MW-310**	EPA 3010	344644	EPA 6020	344747
40201277001	**MW-310**				

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

4001277

CHAIN OF COSTODY

(Please Print Clearly)

Company Name:	SCS
Branch/Location:	Madison
Project Contact:	Meg Blodgett
Phone:	608 216-7362
Project Number:	25219067
Project Name:	Alliant - Columbia
Project State:	WI
Sampled By (Print):	Paul A. Grover
Sampled By (Sign):	Paul A. Grover
PO #:	
Regulatory Program:	

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

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

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

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

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

FILTERED? (YES/NO): Y/N — No
PRESERVATION (CODE)*: Pick Letter — D

Analyses Requested: Calcium

PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX	Calcium	CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)	Profile #
001	MW-310	12/23/19	12:37	GW	X			

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

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

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

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

Relinquished By	Date/Time	Received By	Date/Time
Paul A. Grover	12/23/19 13:45		
CS Logistics	12/24/19 0905	[signature]	12/24/19 0905

PACE Project No. 4001277
Receipt Temp = NA °C
Sample Receipt pH: OK / Adjusted
Cooler Custody Seal: Present / Not Present; Intact / Not Intact

Version 6.0 06/14/06
ORIGINAL

C019a(27Jun2006)

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

Sample Preservation Receipt Form

Client Name: SCS   Project # 40201277

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

Lab Lot# of pH paper: 10U53581   Lab Std #ID of preservation (if pH adjusted):

Initial when completed: Date/Time:

Pace Lab #	Glass AG1U	AG1H	AG4S	AG4U	AG5U	AG2S	BG3U	Plastic BP1U	BP2N	BP2Z	BP3U	BP3B	BP3N	BP3S	Vials DG9A	DG9T	VG9U	VG9H	VG9M	VG9D	Jars JGFU	WGFU	WPFU	General SP5T	ZPLC	GN	VOA Vials (>6mm) *	H2SO4 pH ≤2	NaOH+Zn Act pH ≥9	NaOH pH ≥12	HNO3 pH ≤2	pH after adjusted	Volume (mL)
001													1																		✓		2.5 / 5 / 10
002																																	2.5 / 5 / 10
003																																	2.5 / 5 / 10
004																																	2.5 / 5 / 10
005																																	2.5 / 5 / 10
006																																	2.5 / 5 / 10
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018																																	2.5 / 5 / 10
019																																	2.5 / 5 / 10
020																																	2.5 / 5 / 10

12/24/19

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	DG9A	40 mL amber ascorbic	JGFU	4 oz amber jar unpres
AG1H	1 liter amber glass HCL	BP2N	500 mL plastic HNO3	DG9T	40 mL amber Na Thio	WGFU	4 oz clear jar unpres
AG4S	125 mL amber glass H2SO4	BP2Z	500 mL plastic NaOH, Znact	VG9U	40 mL clear vial unpres	WPFU	4 oz plastic jar unpres
AG4U	120 mL amber glass unpres	BP3U	250 mL plastic unpres	VG9H	40 mL clear vial HCL		
AG5U	100 mL amber glass unpres	BP3B	250 mL plastic NaOH	VG9M	40 mL clear vial MeOH	SP5T	120 mL plastic Na Thiosulfate
AG2S	500 mL amber glass H2SO4	BP3N	250 mL plastic HNO3	VG9D	40 mL clear vial DI	ZPLC	ziploc bag
BG3U	250 mL clear glass unpres	BP3S	250 mL plastic H2SO4			GN:	

Pace Analytical™ 1241 Bellevue Street, Green Bay, WI 54302	Document Name: **Sample Condition Upon Receipt (SCUR)**	Document Revised: 25Apr2018
	Document No.: **F-GB-C-031-Rev.07**	Issuing Authority: Pace Green Bay Quality Office

Sample Condition Upon Receipt Form (SCUR)

Project #: WO# : 40201277

40201277

Client Name: SCS

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

Tracking #: ______

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

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

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

Thermometer Used SR - N/A **Type of Ice:** Wet Blue Dry None ☐ Samples on ice, cooling process has begun

Cooler Temperature Uncorr: N/A /Corr:

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.

Person examining contents:
Date: 12/24/19
Initials: [initials]

Chain of Custody Present:	☑Yes ☐No ☐N/A	1.
Chain of Custody Filled Out:	☐Yes ☑No ☐N/A	2. pg#, mail, invoice 12/24/19 [initials]
Chain of Custody Relinquished:	☑Yes ☐No ☐N/A	3.
Sampler Name & Signature on COC:	☑Yes ☐No ☐N/A	4.
Samples Arrived within Hold Time:	☑Yes ☐No	5.
- VOA Samples frozen upon receipt	☐Yes ☐No	Date/Time:
Short Hold Time Analysis (<72hr):	☐Yes ☑No	6.
Rush Turn Around Time Requested:	☐Yes ☑No	7.
Sufficient Volume: For Analysis: ☑Yes ☐No	MS/MSD: ☐Yes ☑No ☐N/A	8.
Correct Containers Used:	☑Yes ☐No	9.
-Pace Containers Used:	☐Yes ☑No ☐N/A	
-Pace IR Containers Used:	☐Yes ☐No ☑N/A	
Containers Intact:	☑Yes ☐No	10.
Filtered volume received for Dissolved tests	☐Yes ☐No ☑N/A	11.
Sample Labels match COC:	☑Yes ☐No ☐N/A	12.
-Includes date/time/ID/Analysis Matrix: W		
Trip Blank Present:	☐Yes ☐No ☑N/A	13.
Trip Blank Custody Seals Present	☐Yes ☐No ☑N/A	
Pace Trip Blank Lot # (if purchased): ______		

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

Person Contacted: ______ Date/Time: ______

Comments/ Resolution: ______

Project Manager Review: HMB per DM **Date:** 12/24/19

Appendix B

Alternative Source Demonstration, April 2019 Detection Monitoring

Alternative Source Demonstration
April 2019 Detection Monitoring

Dry Ash Disposal Facility – Module 4
Columbia Energy Center
Pardeeville, Wisconsin

Prepared for:

Alliant Energy

SCS ENGINEERS

25217156.01 | October 14, 2019

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

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PE CERTIFICATION

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

10-11-19

(signature) (date)

Sherren Clark

(printed or typed name)

License number E-29863

My license renewal date is July 31, 2020.

Pages or sheets covered by this seal:
Alternative Source Demonstration, April 2019
Detection Monitoring, Columbia Energy Center
Dry Ash Disposal Facility – Module 4
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 (USEPA) in the *Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule*, dated April 17, 2015 (USEPA, 2015), and subsequent amendments. Specifically, this report was prepared to fulfill the requirements of 40 CFR 257.94(e)(2). The applicable sections of the Rule are provided below in *italics*.

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 SSI observed in the statistical evaluation of the April 2019 detection monitoring event at the Columbia Energy Center (COL) Dry Ash Disposal Facility, Module 4 CCR Unit (MOD 4).

1.2 SITE INFORMATION AND MAP

The COL site is located at W8375 Murray Road, Pardeeville, Columbia County, Wisconsin (**Figure 1**). The COL site is an active coal-burning generating station which has been burning coal and disposing of CCR on site since the mid-1970s. The layout of the site is shown on **Figure 2**. The COL property includes two areas of CCR storage and disposal. These are the Dry Ash Disposal Facility (ADF) and the Ash Ponds Facility. This ASD will evaluate the conditions at the site for MOD 4 of the ADF only. The ADF is operated under the Wisconsin Department of Natural Resources (WDNR) License No. 3025.

The groundwater monitoring system for the COL ADF MOD 4, is monitoring a single existing CCR Unit.

A map showing the CCR Unit and all background and compliance 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 Modules 1-3 of the COL ADF, for the primary ash pond and for the secondary ash pond.

1.3 STATISTICALLY SIGNIFICANT INCREASES IDENTIFIED

An SSI was identified for field pH at monitoring well MW-310, based on the April 2019 detection monitoring event.

A summary of the April 2019 monitoring results and the established benchmarks is provided in **Table 1**. The result with an SSI above background is highlighted in the table. A time series graph for pH shown is in **Appendix A**.

The April 2019 field pH result for MW-310 was above the upper prediction limit (UPL); however, a second sample collected in June 2019 was below the UPL.

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**)
- Site groundwater monitoring recommendations (**Section 4.0**)

The results from background and compliance sampling for parameters with SSIs are provided in **Table 2**. Complete laboratory reports for the background monitoring events were included in the 2018 annual groundwater monitoring and corrective action report. The laboratory report for the April 2019 detection monitoring event will be included in the 2019 annual groundwater monitoring and corrective action report.

2.0 BACKGROUND

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

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

2.1 GEOLOGY AND HYDROGEOLOGY

2.1.1 Regional Information

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

A summary of the regional hydrogeologic stratigraphy is presented in **Appendix B**. 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 B**.

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 B**.

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 well MW-301, the unconsolidated materials were identified as consisting primarily of silty sand. The boring log for previously installed monitoring well MW-84A 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 northwest across the existing landfill area, then generally flows west toward the Wisconsin River. A groundwater flow map for April 2019 is shown on **Figure 3**. The groundwater elevation data for the state and CCR monitoring 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 compliance monitoring wells. The background wells include MW-301 and MW-84A. The compliance wells include MW-309, MW-310, and MW-311. The CCR Rule wells are installed within the sand and gravel aquifer. Well depths range from approximately 24 to 36 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 if necessary.

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 a review of the field notes, it appears that in the original sampling the dissolved oxygen data and pH data for MW-310 were accidentally entered in the wrong columns on the field data sheet (switched), causing the apparent SSI. On June 12, 2019, SCS Engineers (SCS) collected field parameters again from the MW-310 monitoring well. The field pH measurement was similar to background monitoring results for this well, and was below the UPL (**Table 1**).

3.2 LABORATORY ANALYSIS REVIEW

The laboratory report for the April 2019 detection monitoring event was reviewed to evaluate whether there were any laboratory analysis errors and/or issues.

Because field pH is a field parameter, the laboratory's role is only to enter the field data into their reporting system. No laboratory error was identified.

3.3 STATISTICAL EVALUATION REVIEW

The review of the statistical results and methods include 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 an intrawell SSI for pH for the April 2019 detection monitoring event.

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).

On review, the parametric UPL calculations were revised from a 95% one-sided comparison to a 99% one-sided comparison, consistent with the CCR Rule and Unified Guidance, but this did not change the SSI evaluation outcome for any parameters. The UPLs are shown in **Table 1**.

The time series plots are provided in **Appendix A**. As discussed in **Section 3.1**, the time series plot shows the field pH value recorded incorrectly in April 2019 and the June 2019 result consistent with previous results.

3.4 SUMMARY OF METHODOLOGY AND ANALYSIS REVIEW FINDINGS & ALTERNATIVE SOURCE DEMONSTRATION CONCLUSIONS

In summary, the SSI identified for pH for MW-310 for the April 2019 monitoring event was determined to be due to a field data collection error that occurred during the sampling event, and not reflective of true groundwater quality.

4.0 SITE GROUNDWATER MONITORING RECOMMENDATIONS

In accordance with section 257.94(e)(2) of the CCR Rule, the COL MOD 4 CCR Unit site may continue with detection monitoring based on this ASD. The ASD report will be included in the 2019 Annual Report due January 31, 2020.

5.0 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 (USEPA), 2009, Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance, EPA 530-R-09-007, March 2009.

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

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

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Tables

Table 1. Detection Monitoring Results Summary - April and June 2019
Columbia Dry Ash Disposal Facility - Module 4 / SCS Engineers Project #25219067.00

	Background Wells		Compliance Wells						
	MW-84A	MW-301	MW-309		MW-310			MW-311	
Parameter Name	4/3/2019	4/2/2019	Intrawell UPL	4/2/2019	Intrawell UPL	4/2/2019	6/12/2019	Intrawell UPL	4/2/2019
Boron, µg/L	13.6	26.9	45.73	37.4	87.41	73.0	NA	54.62	35.7
Calcium, µg/L	80,100	126,000 P6	114,236	45,300	64,861	38,800	NA	90,368	65,600
Chloride, mg/L	3.6 B	0.79 J	1097	145	249	76.0	NA	4.93	1.9
Fluoride, mg/L	<0.10	<0.10	DQ	<0.10	DQ	<0.10	NA	DQ	<0.10
Field pH, Std. Units	7.03	6.62	8.28	7.49	8.19	9.79	7.82	8.17	7.51
Sulfate, mg/L	1.4 J	4.4 J,D3	62.94	35.2	118	58.4	NA	159	23.1
Total Dissolved Solids, mg/L	318	462	2,049	548	850	470	NA	509	276

Highlighted cell indicates the compliance well result is an SSI.

Abbreviations:
UPL = Upper Prediction Limit
µg/L = micrograms per liter
NA = Not Analyzed
mg/L = milligrams per liter
LOQ = Limit of Quantification
SSI = Statistically Significant Increase
DQ = Double Quantification rule applies (not detected in background samples)
B = Analyte was detected in the associated Method Blank.
J = Estimated concentration at or above the LOD and below the LOQ.
D3 = Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.
P6 = Matrix spike recovery was outside laboratory control limits due to a parent sample concentration notably higher than the spike level.

Notes:
1. Intrawell UPLs based on parametric prediction interval analysis for all parameters except fluoride and sulfate at MW-310. Natural log transformation used for parametric prediction interval analysis for calcium at MW-310.
2. Intrawell UPL for sulfate at MW-310 based on non-parametric interval analysis.
3. Intrawell UPLs calculated from background well results for February 2018 through September 2018.

Created by: NDK Date: 5/16/2019
Last revision by: NDK Date: 9/23/2019
Checked by: LMH Date: 9/23/2019

I:\25219067.00\Deliverables\2019 April ASD COL MOD 4 LF\Tables\[1_CCR GW Screening Summary_COL LF Mod 4-Intrawell option.xlsx]Table

Table 2. Analytical Results - Appendix III Constituents with SSIs
CCR Landfill MOD 4, Columbia Generation Station
Pardeeville, Wisconsin

Well Group	Well	Collection Date	Field pH (std units)
Background	MW-301	12/22/2015	6.85
		4/5/2016	7.01
		7/8/2016	6.87
		10/13/2016	7.28
		12/29/2016	6.63
		1/25/2017	7.10
		4/11/2017	7.11
		6/6/2017	6.70
		8/8/2017	6.75
		10/23/2017	7.37
		4/25/2018	6.76
		8/8/2018	6.91
		10/24/2018	6.79
		4/2/2019	6.62
	MW-84A	12/22/2015	7.60
		4/5/2016	7.61
		7/8/2016	7.45
		7/28/2016	7.34
		10/13/2016	7.91
		12/29/2016	7.25
		1/25/2017	6.99
		4/11/2017	7.80
		6/6/2017	7.28
		8/8/2017	7.23
		10/24/2017	7.68
		4/25/2018	7.45
		8/8/2019	7.38
		10/24/2018	7.24
		4/3/2019	7.03
Compliance	MW-309	2/21/2018	7.84
		3/23/2018	8.08
		4/23/2018	7.71
		5/24/2018	7.59
		6/23/2018	7.50
		7/23/2018	7.55
		8/22/2018	7.53
		9/21/2018	7.83
		10/22/2018	7.56
		4/2/2019	7.49
	MW-310	2/21/2018	7.85
		3/23/2018	8.06
		4/23/2018	7.75
		5/24/2018	7.74
		6/23/2018	7.82
		7/23/2018	7.81
		8/22/2018	7.77
		9/21/2018	7.98
		10/22/2018	7.70
		4/2/2019	9.79
		6/12/2019	7.82

Table 2. Analytical Results - Appendix III Constituents with SSIs
CCR Landfill MOD 4, Columbia Generation Station
Pardeeville, Wisconsin

Well Group	Well	Collection Date	Field pH (std units)
Compliance	MW-311	2/21/2018	7.72
		3/23/2018	7.93
		4/23/2018	7.62
		5/24/2018	7.54
		6/23/2018	7.65
		7/23/2018	7.59
		8/22/2018	7.60
		9/21/2018	7.95
		10/22/2018	7.50
		4/2/2019	7.51

Notes:

(1) Analytical laboratory reports provided in the 2018 Annual Groundwater Monitoring and Corrective Action Report.

Created by: NDK Date: 9/10/2019
Last revision by: NDK Date: 9/10/2019
Checked by: AJR Date: 9/10/2019

I:\25219067.00\Deliverables\2019 April ASD COL MOD 4 LF\Tables\[2_MOD 4 LF ASD.xlsx]Table 2. Analy. Rslts- CCR

Table 3. Groundwater Elevations - State Monitoring Program and CCR Well Network
CCR Landfill Module 4, Columbia Generating Station
Pardeeville, Wisconsin

	Well Number	MW-1AR	MW-5R	MW-33AR	MW-33BR	MW-34A	MW-34B	MW-37A	MW-83	MW-84A	MW-84B	MW-86	MW-91AR	MW-91B	MW-92A	MW-92B
Dry Ash Facility	**Top of Casing Elevation (feet amsl)**	822.55	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	25.97	31.08	57.50	35.43	56.95	31.80	25.42	40.21	52.02	45.43	32.90	52.38	28.94	51.75
	Top of Well Screen Elevation (ft)	778.15	779.47	777.21	750.89	770.52	749.10	781.24	782.54	774.07	762.24	779.36	776.13	756.07	779.53	756.66
	Measurement Date															
	April 4-6, 2016	785.82	787.02	785.29	785.07	785.63	785.67	784.76	785.43	786.37	786.26	785.89	786.05	785.95	786.61	786.21
	October 3-5, 2017	785.48	786.66	784.51	784.22	784.67	784.63	784.86	784.29	--	786.49	785.58	786.08	785.83	786.47	786.02
	October 9-10, 2017	--	--	--	--	--	--	--	--	785.56 (2)	--	--	--	--	--	--
	April 23-25, 2018	783.99	785.36	783.09	786.36	781.77	780.79	783.28	783.32	785.88	784.91	782.54	784.71	784.53	785.23	784.81
	October 23-25, 2018	788.25	789.71	788.77	787.96	787.88	787.73	787.62	788.26	788.32	788.19	788.21	788.59	788.31	789.32	788.87
	April 1-4, 2019	787.05	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
	Bottom of Well Elevation (ft)	778.15	779.47	777.21	750.89	770.52	749.10	781.24	782.54	774.07	762.24	779.36	776.13	756.07	779.53	756.66

	Well Number	M-3	M-4R	MW-39A	MW-39B	MW-48A	MW-48B	MW-57	MW-59	MW-216R	MW-217	MW-220RR
Ash Pond Facility	**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
	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											
	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
	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
	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
	October 22-24, 2018	782.95	788.47	787.12	786.88	787.12	786.99	783.48	787.73	787.49	784.90	784.52
	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
	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

		Background Wells		Mod 1- 3 LF			Primary Pond				Secondary Pond			Mod 4 Landfill		
	Well Number	MW-301	MW-84A	MW-302	MW-33AR	MW-34A	MW-303	MW-304	MW-305	M-4R	MW-306	MW-307	MW-308	MW-309	MW-310	MW-311
CCR Rule Wells	**Top of Casing Elevation (feet amsl)**	806.89	814.28	813.00	808.29	805.95	811.52	805.42	806.32	806.1	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	40.21	33.6	31.08	35.43	35.8	25.7	25.6	39.58	27	26.5	28	37.67	38.41	36.19
	Top of Well Screen Elevation (ft)	787.49	784.07	789.40	787.21	780.52	785.72	789.72	790.72	776.52	790.63	790.39	788.90	785.60	785.21	783.55
	Measurement Date															
	April 4-5, 2016	786.78	786.37	785.81	785.29	785.63	785.48	788.08	789.61	789.09	--	--	--	--	--	--
	July 7-8, 2016	786.31	785.89	786.28	785.19	785.05	784.60	787.36	789.26	787.43	--	--	--	--	--	--
	July 28, 2016	NM	785.61	NM	NM	784.86	784.35	NM	NM	NM	--	--	--	--	--	--
	October 11-13, 2016	787.64	787.22	787.76	787.36	786.45	786.18	788.18	789.78	787.88	--	--	--	--	--	--
	December 29, 2016	787.37	786.63	787.05	785.66	785.72	NM	NM	NM	NM	--	--	--	--	--	--
	January 25-26, 2017	787.27	786.70	786.89	785.88	785.98	785.28	789.34	789.36	789.64	785.50	785.36	785.73	--	--	--
	April 10 & 11, 2017	787.89	787.16	787.55	786.39	786.30	786.00	788.22	789.57	787.95	786.22	785.64	786.51	--	--	--
	June 6, 2017	788.25	787.63	788.37	787.27	786.66	786.49	788.58	789.79	787.83	786.85	786.07	786.46	--	--	--
	August 7-9, 2017	787.34	786.68	787.55	786.11	785.81	785.42	789.52	789.30	788.54	785.69	785.19	785.37	--	--	--
	October 23-24, 2017	785.89	785.32	785.94	784.13	784.50	783.92	788.97	788.14	788.00	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	785.88	784.37	783.09	781.77	783.27	789.69	787.67	790.43	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	786.55	NM	NM	NM	785.20	788.25	788.56	787.63	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	NM	788.37	787.90	787.01	786.50	NM	NM	NM	NM	NM	NM	787.08	787.24	787.66
	October 22-24, 2018	788.98	788.32	789.16	788.77	787.88	787.51	789.05	790.04	788.47	787.66	786.57	787.81	787.99	788.18	788.64
	April 1-4, 2019	787.04	787.35	787.56	786.63	786.82	786.52	789.72	790.07	789.44	786.72	786.71	787.53	786.30	786.38	786.38
	Bottom of Well Elevation (ft)	771.33	776.36	780.55	771.89	776.98	774.82	733.43	776.98	753.04	780.63	780.39	778.90	775.60	775.21	773.55

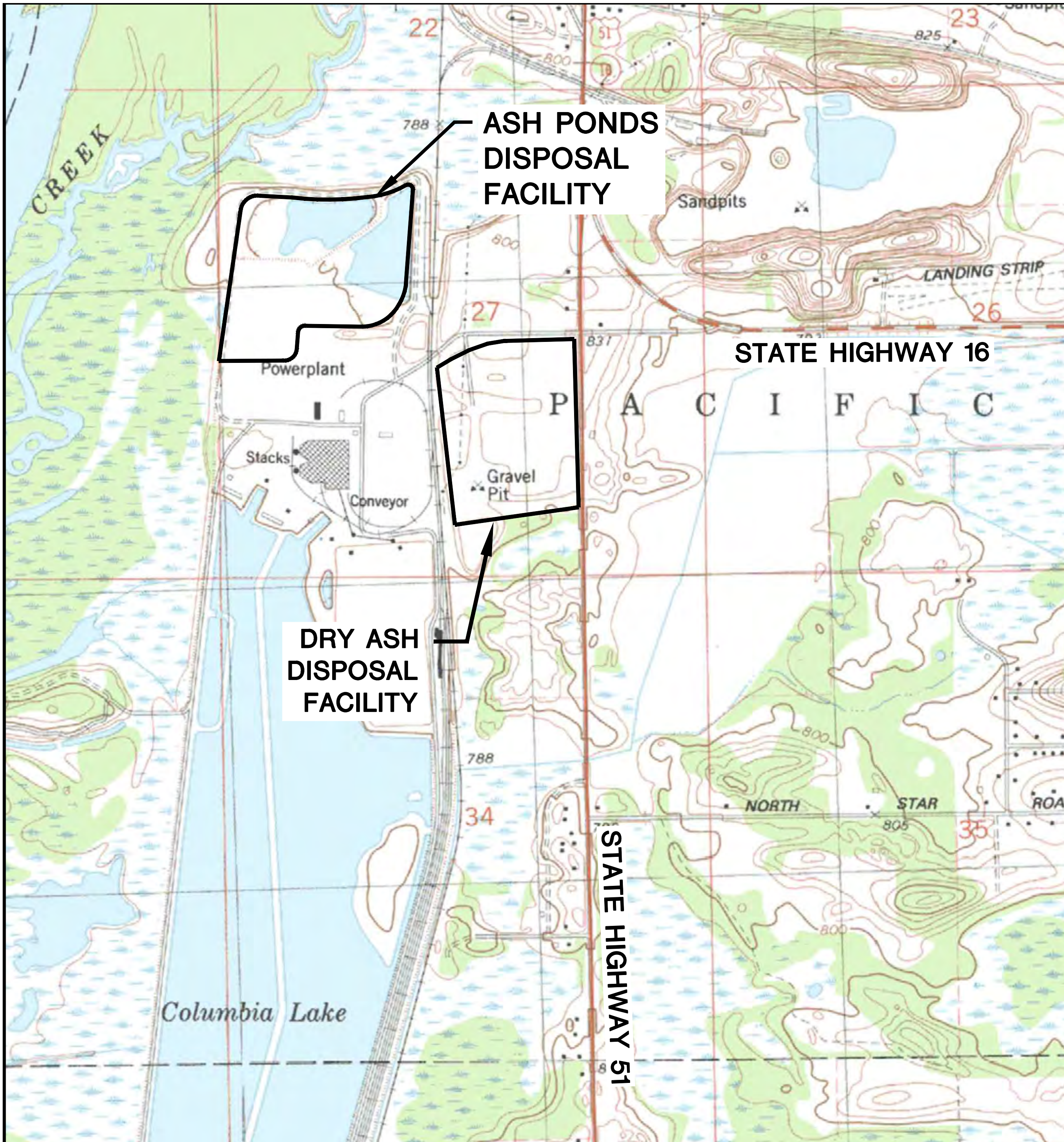
Notes:
NM = not measured

Created by: MDB Date: 5/6/2013
Last revision by: NDK Date: 8/1/2019
Checked by: AJR Date: 8/21/2019

(1) Water Levels collected during sample collection.
(2) The depth to water at MW-84A was not measured prior to purging for sampling during the October 3-5, 2017 sampling event. The level was allowed to return to static and was measured on 10/10/2017.

I:\25219067.00\Deliverables\2019 April ASD COL MOD 4 LF\Tables\[3_COL MOD LF 4 ASD - only.xlsx]Table 3. GW Elevations

Figures



N

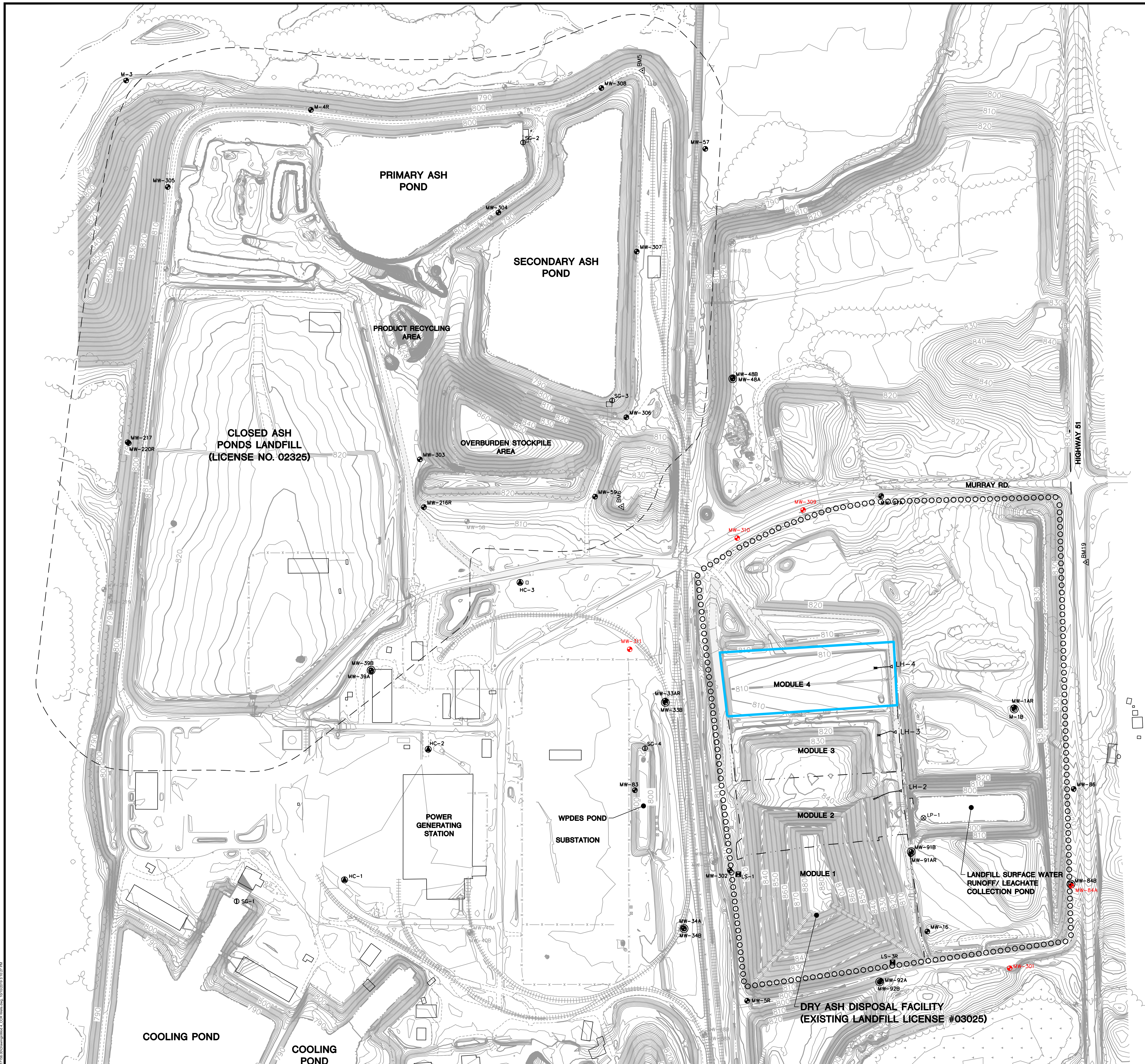
POYNETTE QUADRANGLE
WISCONSIN–COLUMBIA CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)
NW/4 POYNETTE 15' QUADRANGLE
1984
SCALE: 1" = 2,000'

WISCONSIN

CLIENT	ALLIANT ENERGY 4902 NORTH BILTMORE LN. #1000 MADISON, WI 53718	SITE: COLUMBIA ASH PONDS AND DRY ASH DISPOSAL FACILITIES	SITE LOCATION MAP

PROJECT NO.	25216067.00	DRAWN BY:	KP	ENGINEER: SCS ENGINEERS 2830 DAIRY DRIVE MADISON, WI 53718-6751 PHONE: (608) 224-2830	FIGURE
DRAWN:	08/10/09	CHECKED BY:	MDB		1
REVISED:	04/16/18	APPROVED BY:	SC 04/16/18		

I:\25216067.00\Drawings\Site Loc.dwg, 4/16/2018 11:31:14 AM



LEGEND

810	EXISTING MAJOR CONTOUR (10' INTERVAL)
	EXISTING MINOR CONTOUR (2' CONTOUR)
	EXISTING FENCELINE
	EXISTING TRACKS
	EXISTING PAVED ROAD
	EXISTING UNPAVED ROAD
	EDGE OF WATER
	DESIGN MANAGEMENT ZONE
	APPROVED LIMITS OF WASTE
	CONSTRUCTED LIMITS OF WASTE
	WATER SUPPLY WELL
	STAFF GAUGE
	WATER TABLE WELL
	PIEZOMETER
	SURFACE WATER SAMPLE LOCATION
	LYSIMETER
	ABANDONED WATER TABLE WELL
	ABANDONED PIEZOMETER
	LEACHATE HEADWELL
	MOD 4 CCR UNIT
	CCR 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, AND AUGUST 2018.
2. MONITORING WELL LOCATIONS AND ELEVATIONS SURVEYED BY WISCONSIN POWER AND LIGHT, INC. IN DECEMBER 1994, NOVEMBER 1996, APRIL 2003, AND AUGUST 2012.
3. SUPPLY WELL LOCATIONS ARE APPROXIMATE AND ASSUMED BASED ON JANUARY 2013 DRAWINGS BY TRC.
4. THE LOCATIONS OF THE ASH PONDS FACILITY DESIGN MANAGEMENT ZONE DEMARCATION LINES ARE APPROXIMATE AND BASED ON THE WATER TABLE MAP (OCTOBER 2012) FIGURE BY RMT.
5. THE LOCATION OF THE ACTIVE DRY ASH LANDFILL DESIGN MANAGEMENT ZONE DEMARCATION LINE IS BASED ON A 300 FOOT OFFSET FROM THE DESIGN LIMITS OF ASH EXCEPT WHERE OFFSET WOULD EXTEND LINE BEYOND PROPERTY LINE.

FIGURE 2

SITE PLAN AND WELL LOCATION MAP

COLUMBIA ASH PONDS AND DRY ASH DISPOSAL FACILITIES

SITE

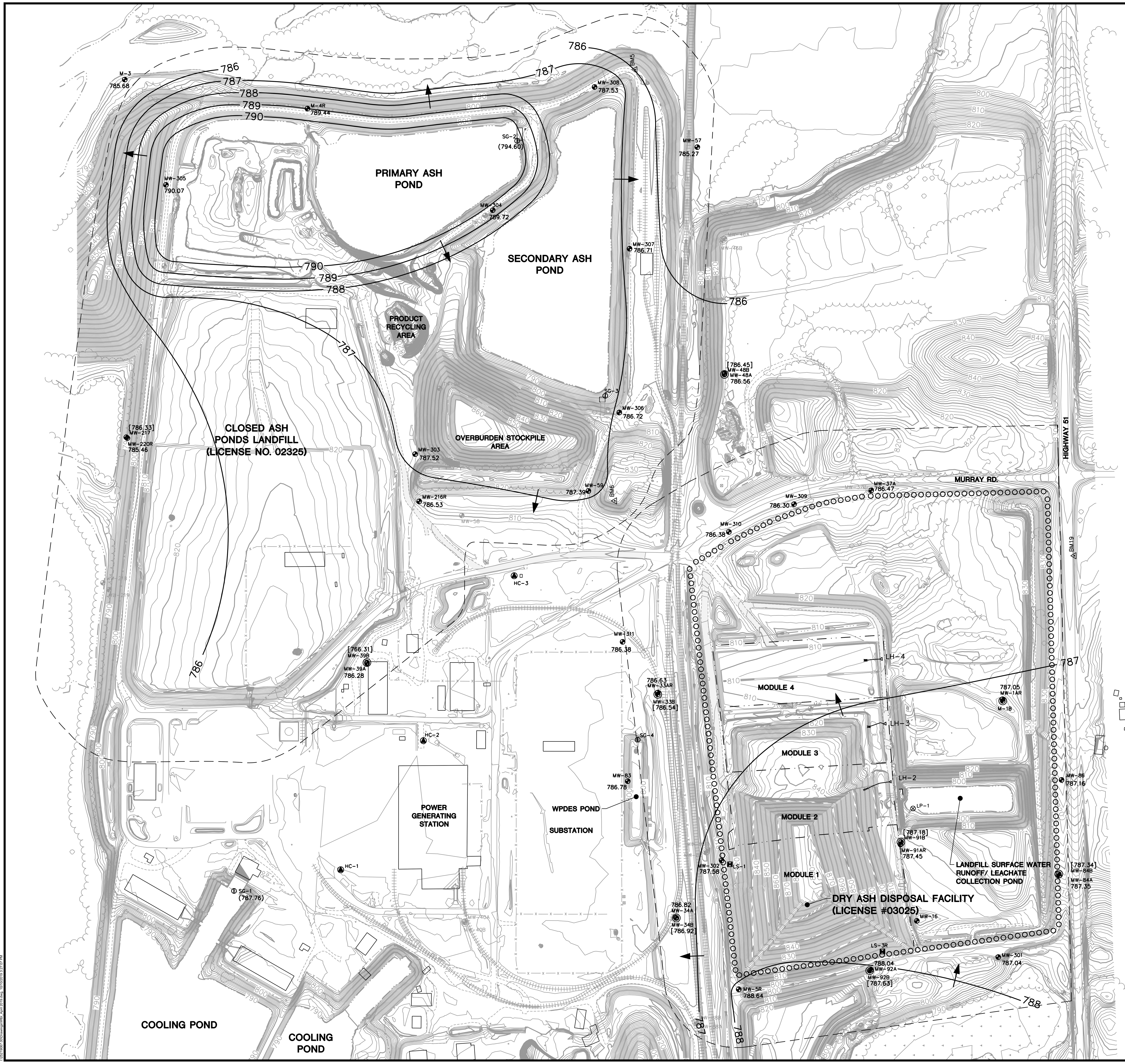
ALLIANT ENERGY
4902 NORTH BILTMORE LN. #1000
MADISON, WI 53718

CLIENT

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

ENGINEER

PROJECT NO.	25217156.00	DRAWN BY:	KP/JMO
DRAWN:	07/06/19	CHECKED BY:	NK
REVISED:	10/10/19	APPROVED BY:	SC 10/10/19



LEGEND

810	EXISTING MAJOR CONTOUR (10' INTERVAL)
	EXISTING MINOR CONTOUR (2' CONTOUR)
	EXISTING FENCELINE
	EXISTING TRACKS
	EXISTING PAVED ROAD
	EXISTING UNPAVED ROAD
	EDGE OF WATER
	DESIGN MANAGEMENT ZONE
	APPROVED LANDFILL LIMITS
	CONSTRUCTED LANDFILL LIMITS/MODULE LIMITS
	WATER SUPPLY WELL
	STAFF GAUGE
	WATER TABLE WELL
	PIEZOMETER
	SURFACE WATER SAMPLE LOCATION
	LYSIMETER
	ABANDONED WATER TABLE WELL
	ABANDONED PIEZOMETER
	LEACHATE HEADWELL
787.62	WATER TABLE ELEVATION MEASURED APRIL 2019
[788.87]	POTIENTIOMETRIC SURFACE ELEVATION MEASURED APRIL 2019 (NOT CONTOURED)
(794.60)	SURFACE WATER ELEVATION MEASURED APRIL 2019 (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, AND AUGUST 2018.
2. MONITORING WELL LOCATIONS AND ELEVATIONS SURVEYED BY WISCONSIN POWER AND LIGHT, INC. IN DECEMBER 1994, NOVEMBER 1996, APRIL 2003, JANUARY 6, 2016 AND BY SCS ENGINEERS IN FEBRUARY 2018.
3. SUPPLY WELL LOCATIONS ARE APPROXIMATE AND ASSUMED BASED ON JANUARY 2013 DRAWINGS BY TRC.
4. THE LOCATIONS OF THE ASH PONDS FACILITY DESIGN MANAGEMENT ZONE DEMARCATION LINES ARE APPROXIMATE AND BASED ON THE WATER TABLE MAP (OCTOBER 2012) FIGURE BY RMT.
5. THE LOCATION OF THE ACTIVE DRY ASH LANDFILL DESIGN MANAGEMENT ZONE DEMARCATION LINE IS BASED ON A 300 FOOT OFFSET FROM THE DESIGN LIMITS OF ASH EXCEPT WHERE OFFSET WOULD EXTEND LINE BEYOND PROPERTY LINE.

N

200 0 200

SCALE: 1" = 200'

FIGURE 3

WATER TABLE MAP
APRIL 2019

SITE
COLUMBIA ASH PONDS AND DRY ASH DISPOSAL FACILITIES

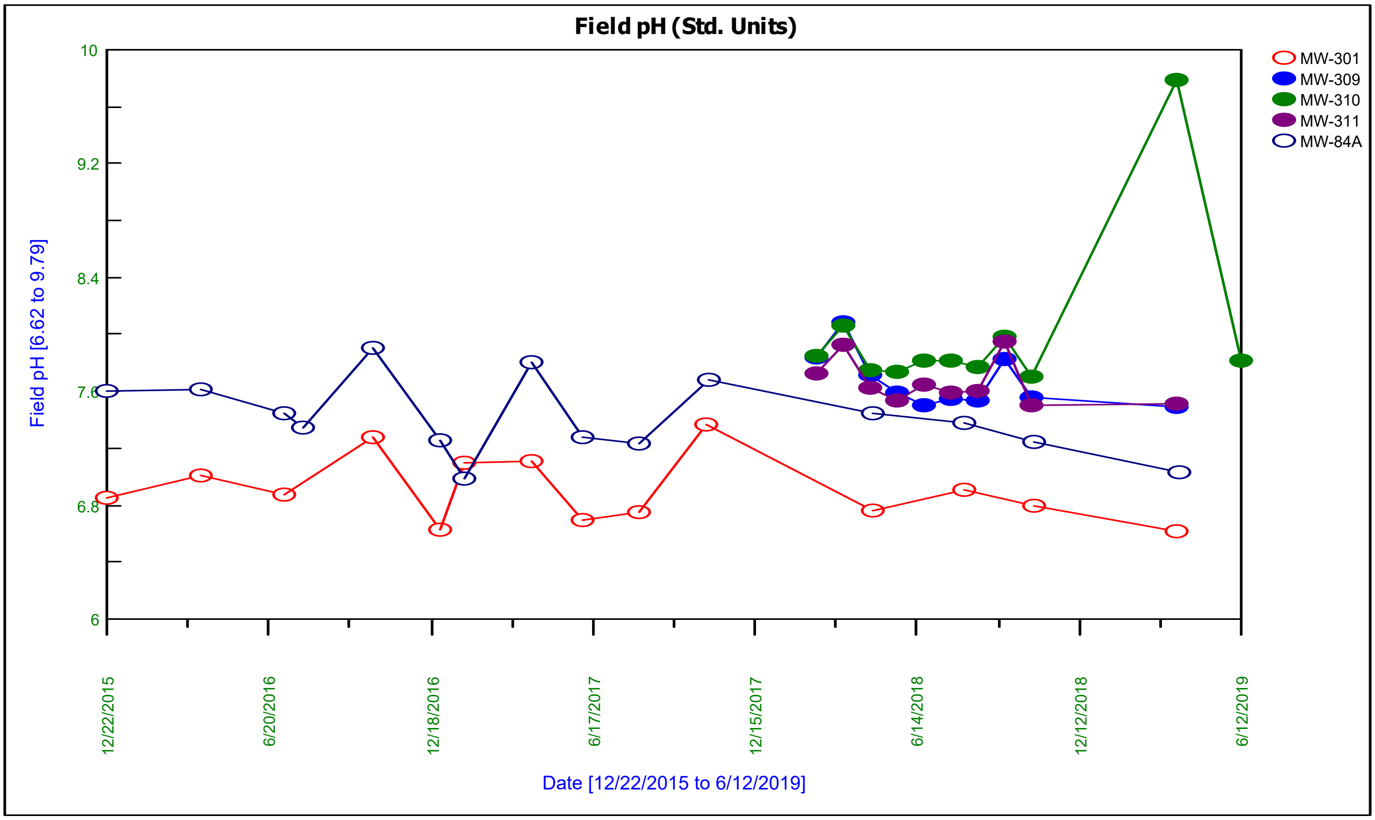
CLIENT
ALLIANT ENERGY
4902 NORTH BILTMORE LN. #1000
MADISON, WI 53718

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

PROJECT NO.	25219067.00	DRAWN BY:	KP/JMO
DRAWN:	08/23/19	CHECKED BY:	NDK
REVISED:	10/10/19	APPROVED BY:	SC 10/10/19

Appendix A

Trend Plots for CCR Wells


Field pH (Std. Units)
MW-301
MW-309
MW-310
MW-311
MW-84A
Field pH [6.62 to 9.79]
10
9.2
8.4
7.6
6.8
6
12/22/2015
6/20/2016
12/18/2016
6/17/2017
12/15/2017
6/14/2018
12/12/2018
6/12/2019
Date [12/22/2015 to 6/12/2019]

Appendix B

Regional Geologic and Hydrogeologic Background Information

WISCONSIN UNIQUE WELL NUMBER **BE363**
Source: SWAP PROJECT KEYED

State of Wi-Private Water Systems-DG/2
Department Of Natural Resources, Box 7921
Madison, WI 53707

Form 3300-77A
(Rev 02/02)bw

Depth **255** FT

Property Owner: WISCONSIN POWER & LIGHT CO
Telephone Number: - -
Mailing Address: PO BOX 98
City: PORTAGE | State: WI | Zip Code: 53901
County of Well Location: 11 COLUMBIA | SC
Co Well Permit No: W
Well Completion Date: December 30, 1971

Well Constructor: EGERER GALLOWAY WELL CORP | License #: 21
Facility ID (Public): 111021460
Address: CARMEN/STATE/N 3RD
Public Well Plan Approval#
City: MILWAUKEE | State: WI | Zip Code: 53213
Date Of Approval
Hicap Permanent Well # | Common Well #
Specific Capacity: 12.5 gpm/ft

1. Well Location
T=Town C=City V=Village
T of PACIFIC
Fire#
Street Address or Road Name and Number
Subdivision Name | Lot# | Block #

Gov't Lot or **SW** 1/4 of **SW** 1/4 of
Section **27** T **12** N R **9** **E**

2. Well Type 1 (See item 12 below)
1=New 2=Replacement 3=Reconstruction
of previous unique well # __________ constructed in ______
Reason for replaced or reconstructed Well?

1 1=Drilled 2=Driven Point 3=Jetted 4=Other

3. Well Serves # of homes and or **INDUSTRIAL**
N (eg: barn, restaurant, church, school, industry, etc.)
M=Munic O=OTM N=NonCom P=Private Z=Other X=NonPot A=Anode L=Loop H=Drillhole

High Capacity: Well? N
Property? N

4. Is the well located upslope or sideslope and not downslope from any contamination sources, including those on neighboring properties? N
Well located in floodplain? N
Distance in feet from well to nearest: (including proposed)

1. Landfill
2. Building Overhang
3. 1=Septic 2= Holding Tank
4. Sewage Absorption Unit
5. Nonconforming Pit
6. Buried Home Heating Oil Tank
7. Buried Petroleum Tank
8. 1=Shoreline 2= Swimming Pool
9. Downspout/ Yard Hydrant
10. Privy
11. Foundation Drain to Clearwater
12. Foundation Drain to Sewer
13. Building Drain 1=Cast Iron or Plastic 2=Other
14. Building Sewer 1=Gravity 2=Pressure 1=Cast Iron or Plastic 2=Other
15. Collector Sewer: ___ units ___ in . diam.
16. Clearwater Sump
17. Wastewater Sump
18. Paved Animal Barn Pen
19. Animal Yard or Shelter
20. Silo
21. Barn Gutter
22. Manure Pipe 1=Gravity 2=Pressure 1=Cast iron or Plastic 2=Other
23. Other manure Storage
24. Ditch
25. Other NR 812 Waste Source

5. Drillhole Dimensions and Construction Method

Dia.(in.)	From (ft)	To (ft)
19.0	surface	132
15.0	132	255

Upper Enlarged Drillhole / Lower Open Bedrock
-- 1. Rotary - Mud Circulation
-- 2. Rotary - Air
-- 3. Rotary - Air and Foam
-- 4. Drill-Through Casing Hammer
-- 5. Reverse Rotary
X -- 6. Cable-tool Bit _ n. dia
-- 7. Temp. Outer Casing _ in. dia. _____ depth ft. Removed ?
Other

8.

Geology Codes	Geology Type, Caving/Noncaving, Color, Hardness, etc	From (ft.)	To (ft.)
__T_	GLACIAL DRIFT	0	88
__N_	SANDSTONE	88	255

6. Casing Liner Screen

Dia. (in.)	Material, Weight, Specification Manufacturer & Method of Assembly	From (ft.)	To (ft.)
20.0	STEEL 3/8 WALL A53-B	surface	92
16.0	STEEL 3/8 WALL A53-B	0	132

Dia.(in.)	Screen type, material & slot size	From	To

7. Grout or Other Sealing Material

Method Kind of Sealing Material	From (ft.)	To (ft.)	# Sacks Cement
NEAT CEMENT	surface	132.0	

9. Static Water Level
28.0 feet B ground surface
A=Above B=Below

10. Pump Test
Pumping level 48.0 ft. below surface
Pumping at 250.0 GP 12.0 Hrs

11. Well Is: 24 in. A Grade
A=Above B=Below
Developed? N
Disinfected? Y
Capped? Y

12. Did you notify the owner of the need to permanently abandon and fill all unused wells on this property? N
If no, explain

13. Initials of Well Constructor or Supervisory Driller: GG | Date Signed: 12/30/71
Initials of Drill Rig Operator (Mandatory unless same as above) | Date Signed

Additonal Comments? | Variance Issued?
Owner Sent Label? Y | More Geology?

Batch 777777777

DEC 20 1972

WELL CONSTRUCTOR'S REPORT *CORRECTED DEC. 14, 1972
FORM 3300–15

NOTE
WHITE COPY – DIVISION'S COPY
GREEN COPY – DRILLER'S COPY
YELLOW COPY – OWNER'S COPY

STATE OF WISCONSIN
DEPARTMENT OF NATURAL RESOURCES
Box 450
Madison, Wisconsin 53701

CO-214-G

1. COUNTY: Columbia
CHECK ONE: [X] Town [ ] Village [ ] City — NAME: Pacific

2. LOCATION – ¼ Section / Section / Township / Range: SW-Sec. 27 - 12N - 9E
OR – Grid or street no. / Street name:
AND – If available subdivision name, lot & block no.:

3. OWNER AT TIME OF DRILLING: Wisconsin Power & Light Co. Well #2
ADDRESS: P. O. Box 192 Well No. 2
POST OFFICE: Madison, Wis. 53701

4. Distance in feet from well to nearest:
(Record answer in appropriate block)

BUILDING	SANITARY SEWER C. I.	SANITARY SEWER TILE	FLOOR DRAIN C. I.	FLOOR DRAIN TILE	FOUNDATION DRAIN SEWER CONNECTED	FOUNDATION DRAIN INDEPENDENT	WASTE WATER DRAIN C. I.	WASTE WATER DRAIN TILE

CLEAR WATER DRAIN C. I.	CLEAR WATER DRAIN TILE	SEPTIC TANK	PRIVY	SEEPAGE PIT	ABSORPTION FIELD	BARN	SILO	ABANDONED WELL	SINK HOLE

OTHER POLLUTION SOURCES (Give description such as dump, quarry, drainage well, stream, pond, lake, etc.)
Site approved #3320

5. Well is intended to supply water for: Industrial and Potable

NORTH WELL P.W. # 43224

6. DRILLHOLE

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
#19	Surface	152.5			
15	152.5	252.5			

7. CASING, LINER, CURBING, AND SCREEN

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
20	Steel x 3/8" A-53-B	Surface	110.5
16	Steel x 3/8" A-53-B		152.5

9. FORMATIONS

Kind	From (ft.)	To (ft.)
Glacial Drift	Surface	102
Sandstone	102	252.5

8. GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
Neat Cement	Surface	152.5

10. TYPE OF DRILLING MACHINE USED
[X] Cable Tool [ ] Direct Rotary [ ] Reverse Rotary
[ ] Rotary – air w/drilling mud [ ] Rotary – hammer with drilling mud & air [ ] Jetting with [ ] Air [ ] Water

Well construction completed on April 12 1972

Well is terminated 24 inches [X] above [ ] below final grade

11. MISCELLANEOUS DATA
Yield test: 24 Hrs. at 1000 GPM

Depth from surface to normal water level 34 ft.

Depth to water level when pumping 100 ft.

Well disinfected upon completion [X] Yes [ ] No

Well sealed watertight upon completion [X] Yes [ ] No

Water sample sent to Will submit when pump is started. laboratory on: 19

Your opinion concerning other pollution hazards, information concerning difficulties encountered, and data relating to nearby wells, screens, seals, type of casing joints, method of finishing the well, amount of cement used in grouting, blasting, sub-surface pumprooms, access pits, etc., should be given on reverse side.

SIGNATURE: EGERER-GALLOWAY WELL CORP.
Geo. M. Galloway/EP Registered Well Driller

COMPLETE MAIL ADDRESS: 13640 W. Carmen Ave.
Menomonee Falls, WI
53051

Please do not write in space below

COLIFORM TEST RESULT	GAS – 24 HRS.	GAS – 48 HRS.	CONFIRMED	REMARKS

3468

WISCONSIN UNIQUE WELL NUMBER **GS873**
Source: SWAP PROJECT KEYED

State of Wi-Private Water Systems-DG/2
Department Of Natural Resources, Box 7921
Madison, WI 53707

Form 3300-77A
(Rev 02/02)bw

Depth 310 FT

Property Owner	WISCONSIN POWER & LIGHT
Telephone Number	- -
Mailing Address	PO BOX 98
City	PORTAGE
State	WI
Zip Code	53901
County of Well Location	SC 11 COLUMBIA
Co Well Permit No	W
Well Completion Date	July 14, 1976

1. Well Location
T=Town C=City V=Village
C of PORTAGE

Fire#

Street Address or Road Name and Number

Subdivision Name | Lot# | Block #

Gov't Lot or SW 1/4 of SW 1/4 of
Section 27 T 12 N R 9 E

Well Constructor	MILAEGER WELL & PUMP
License #	82
Facility ID (Public)	111021460
Address	20950 ENTERPRISE AV
Public Well Plan Approval#	
City	BROOKFIELD
State	WI
Zip Code	53005
Date Of Approval	
Hicap Permanent Well #	43225
Common Well #	
Specific Capacity	10 gpm/ft

2. Well Type 1 (See item 12 below)
1=New 2=Replacement 3=Reconstruction
of previous unique well # __________ constructed in ______
Reason for replaced or reconstructed Well?

3. Well Serves # of homes and or GENERATING STATION
N (eg: barn, restaurant, church, school, industry, etc.)
M=Munic O=OTM N=NonCom P=Private Z=Other X=NonPot A=Anode L=Loop H=Drillhole

High Capacity: Well? N
Property? N

1 1=Drilled 2=Driven Point 3=Jetted 4=Other

4. Is the well located upslope or sideslope and not downslope from any contamination sources, including those on neighboring properties? N
Well located in floodplain? N
Distance in feet from well to nearest: (including proposed)

1. Landfill
2. Building Overhang
3. 1=Septic 2= Holding Tank
4. Sewage Absorption Unit
5. Nonconforming Pit
6. Buried Home Heating Oil Tank
7. Buried Petroleum Tank
8. 1=Shoreline 2= Swimming Pool
9. Downspout/ Yard Hydrant
10. Privy
11. Foundation Drain to Clearwater
12. Foundation Drain to Sewer
13. Building Drain
1=Cast Iron or Plastic 2=Other
14. Building Sewer 1=Gravity 2=Pressure
1=Cast Iron or Plastic 2=Other
15. Collector Sewer: ___ units ___ in . diam.
16. Clearwater Sump
17. Wastewater Sump
18. Paved Animal Barn Pen
19. Animal Yard or Shelter
20. Silo
21. Barn Gutter
22. Manure Pipe 1=Gravity 2=Pressure
1=Cast iron or Plastic 2=Other
23. Other manure Storage
24. Ditch
25. Other NR 812 Waste Source

5. Drillhole Dimensions and Construction Method

Dia.(in.)	From (ft)	To (ft)
20.0	surface	113
19.0	113	153
15.0	153	310

Upper Enlarged Drillhole / Lower Open Bedrock
-- 1. Rotary - Mud Circulation
-- 2. Rotary - Air
-- 3. Rotary - Air and Foam
-- 4. Drill-Through Casing Hammer
-- 5. Reverse Rotary
X -- 6. Cable-tool Bit _ n. dia
-- 7. Temp. Outer Casing _ in. dia. _____ depth ft.
Removed ?
Other

8. Geology

Geology Codes	Geology Type, Caving/Noncaving, Color, Hardness, etc	From (ft.)	To (ft.)
__T_	GLACIAL DRIFT	0	113
__N_	SANDSTONE	113	310

6. Casing Liner Screen

Dia. (in.)	Material, Weight, Specification Manufacturer & Method of Assembly	From (ft.)	To (ft.)
20.0	STEEL .375 ASTM 53-B 78#/FT	surface	113
16.0	STEEL .375 ASTM 53-B 62#/FT	113	310

Dia.(in.)	Screen type, material & slot size	From	To

7. Grout or Other Sealing Material

Method Kind of Sealing Material	From (ft.)	To (ft.)	# Sacks Cement
NEAT CEMENT	surface	153.0	

9. Static Water Level
25.0 feet B ground surface
A=Above B=Below

10. Pump Test
Pumping level 50.0 ft. below surface
Pumping at 250.0 GP 12.0 Hrs

11. Well Is: 18 in. A Grade
A=Above
B=Below
Developed? N
Disinfected? Y
Capped? Y

12. Did you notify the owner of the need to permanently abandon and fill all unused wells on this property? N
If no, explain

13. Initials of Well Constructor or Supervisory Driller R Date Signed 7/14/76

Initials of Drill Rig Operator (Mandatory unless same as above) Date Signed

Additonal Comments? Variance Issued?
Owner Sent Label? Y More Geology?

Batch 777777777

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

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

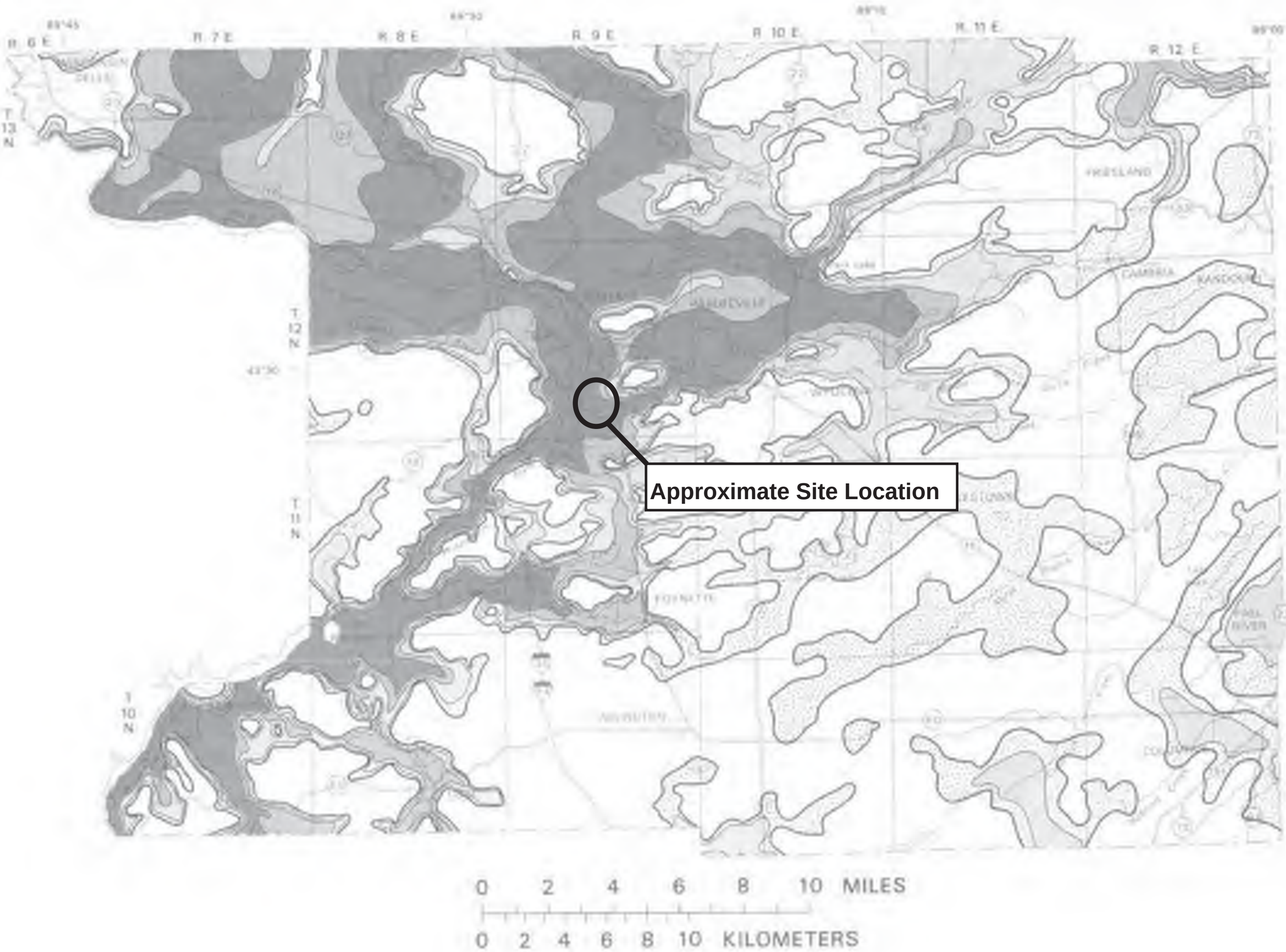
*This nomenclature and classification of rock units in this report are those of the Wisconsin Geological and Natural History Survey and do not necessarily coincide with those accepted by the U.S. Geological Survey.

Sources:

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

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

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



EXPLANATION

Probable well yields

Chances of more than 100 gallons per minute are poor

Chances of 500-1000 gallons per minute are good

Chances of 100-500 gallons per minute are good

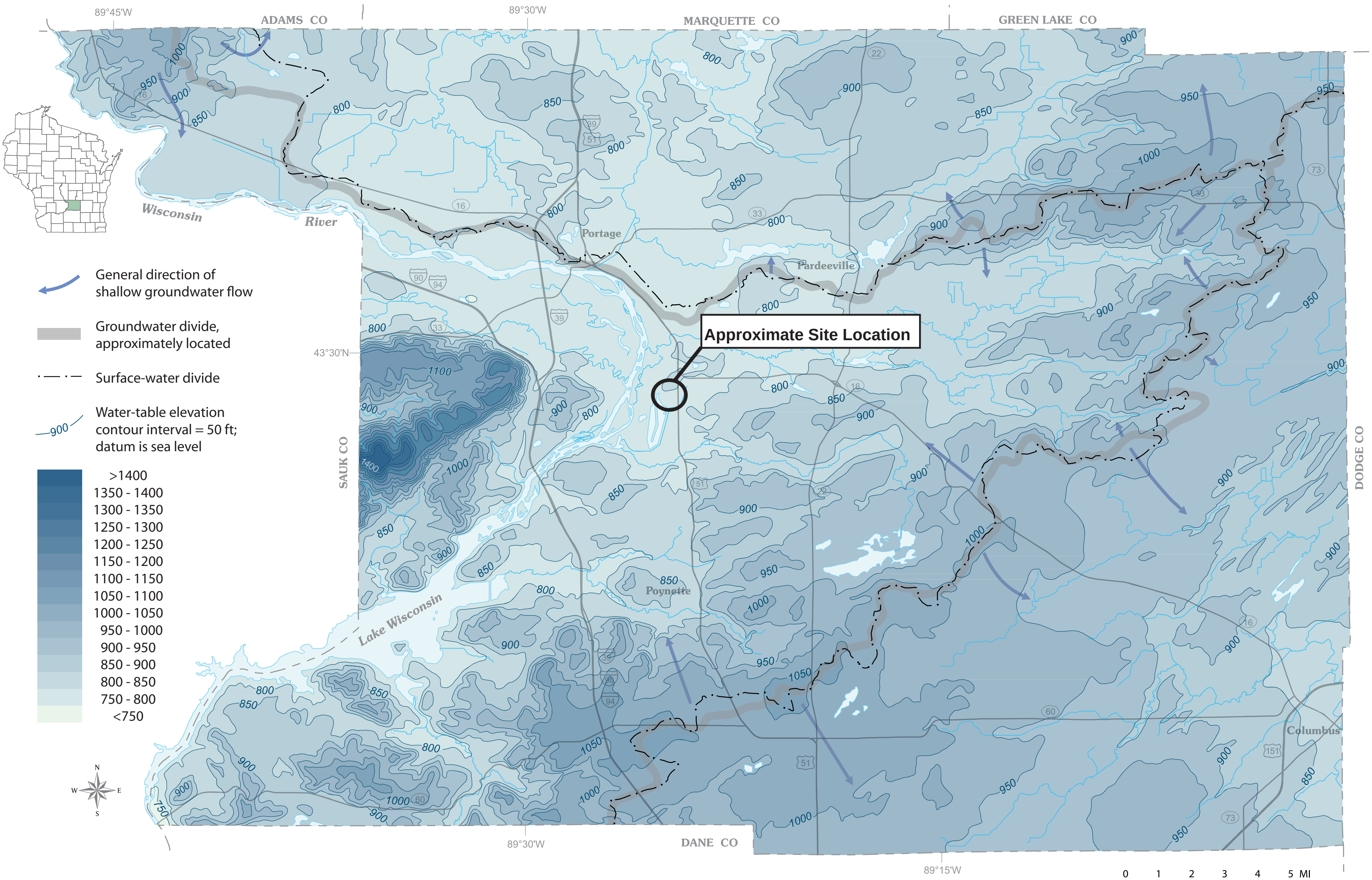
Chances of more than 1000 gallons per minute are good

Boundary of saturated sand-and-gravel aquifer

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

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

Generalized water-table elevation in Columbia County, Wisconsin



UW 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,

2019 Annual Groundwater Monitoring and Corrective Action Report

Secondary Pond
Columbia Energy Center
Pardeeville, Wisconsin

Prepared for:

Wisconsin Power and Light Company
4902 N. Biltmore Lane
Madison, Wisconsin 53718

SCS ENGINEERS

25220067.00 | August 3, 2020

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

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1.0 INTRODUCTION

This 2019 Annual Groundwater Monitoring and Corrective Action Report was prepared to support compliance with the groundwater monitoring requirements of the "Coal Combustion Residuals (CCR) Final Rule" (Rule) published by the U.S. Environmental Protection Agency (USEPA) in the *Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities;* Final Rule, dated April 17, 2015 (USEPA, 2015) and subsequent amendments. Specifically, this report was prepared to fulfill the requirements of 40 CFR 257.100 and 40 CFR 257.90(e) for inactive CCR surface impoundments. The applicable sections of the Rule are provided below in *italics*, followed by applicable information relative to the 2019 Annual Groundwater Monitoring and Corrective Action Report for the CCR unit.

This report covers the period of groundwater monitoring from January 1, 2019, through December 31, 2019.

The groundwater monitoring system for the Secondary Pond at the Columbia Energy Center (COL) monitors a single inactive CCR unit:

- COL Secondary Pond (inactive surface impoundment)

The system is designed to detect monitored constituents at the waste boundary of the COL Secondary Pond as required by 40 CFR 257.91(d). The groundwater monitoring system consists of two background wells and three downgradient monitoring wells.

Other CCR units at the COL facility include the COL Primary Ash Pond and Dry Ash Disposal Facility (Modules 1-4). Annual groundwater monitoring and corrective action reports for these existing CCR units are submitted separately on January 31 of each year in accordance with 40 CFR 257.90(e).

2.0 §257.100(E)(5) GROUNDWATER MONITORING AND CORRECTIVE ACTION FOR INACTIVE CCR SURFACE IMPOUNDMENTS

The owner or operator of the inactive CCR surface impoundment must: (i) No later than April 17, 2019, comply with groundwater monitoring requirements set forth in §§ 257.90(b) and 257.94(b); and (ii) No later than August 1, 2019, prepare the initial groundwater monitoring and corrective action report as set forth in § 257.90(e).

This report is submitted to fulfill the report requirement.

3.0 §257.90(E) ANNUAL REPORT REQUIREMENTS

Annual groundwater monitoring and corrective action report. . . . 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 location of the site is provided as Figure 1. A map showing the Secondary Pond 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 programs for the CCR unit in 2019.

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;

Three groundwater sampling events were completed for the inactive COL Secondary Pond in 2019. The established semiannual sampling for the site was followed and sampling occurred in April 2019 and October 2019. As described in Section 3.4, the site transitioned to an assessment monitoring program in 2019. The first round of assessment monitoring sampling was completed in December 2019.

Groundwater samples collected in April and October 2019 were analyzed for Appendix III constituents. The groundwater samples collected in December 2019 were analyzed for both Appendix III and Appendix IV constituents. A summary including the number of groundwater samples that were collected, and whether the sample was required by the detection monitoring or assessment monitoring program is included in Table 1. The results of the analytical laboratory analyses are provided in the laboratory reports in Appendix A1 through Appendix A3.

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);

Detection monitoring for the COL Secondary Pond was initiated in April 2019. The statistical evaluation of the April 2019 detection monitoring results completed on July 15, 2019, identified statistically significant increases (SSIs) in detection monitoring constituents at the downgradient wells. SSIs were identified for boron, chloride, and sulfate at one or more wells based on the April 2019 detection monitoring event. Wisconsin Power and Light Company (WPL) collected the first round of assessment monitoring samples in December 2019 and established an assessment monitoring program on January 13, 2020, in accordance with §257.95(b).

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 2019 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 transitioned from detection monitoring to assessment monitoring in 2019.

Summary of Key Actions Completed.

- Statistical evaluation and determination of SSIs for the April 2019 monitoring event, completed July 15, 2019.
- First annual groundwater monitoring and corrective action report completed on August 1, 2019.
- Two semiannual detection monitoring sampling and analysis events (April and October 2019).
- First assessment monitoring sampling and analysis event (December 2019).

Description of Any Problems Encountered. No problems were encountered in 2019.

Discussion of Actions to Resolve the Problems. Not applicable.

Projection of Key Activities for the Upcoming Year (2020).

- Transmittal of the results for the October 2019 detection monitoring event and notification of the initial round of assessment monitoring sampling in December 2019 (January 13, 2020).
- Establishment of assessment monitoring program (January 13, 2020).
- Establishment of groundwater protection standards (April 2020).

- Statistical evaluation and determination of any statistically significant levels exceeding the GPS for the December 2019, February 2020, and April 2020 monitoring events (July 2020).

- If one or more Appendix IV constituents is detected at a statistically significant level above the GPS, then within 30 days WPL will prepare a notification in accordance with §257.95(g) and within 90 days complete an alternative source demonstration or initiate an assessment of corrective measures (§257.95(g)(3)). WPL will also characterize the release (§257.95(g)(1)) and notify property owners (§257.95(g)(2)).

- Two semiannual groundwater sampling and analysis events (April and October 2020).

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 frequency 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 demonstration was completed in 2019.

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 been initiated, and no alternative assessment monitoring frequency has been proposed at this time.

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. Although the first round of assessment monitoring samples was collected in December 2019, the complete results were received and the assessment monitoring program was established in January 2020. The requirements of §257.95(d)(1)-(2) must be met by April 15, 2020, and included in the 2020 annual groundwater monitoring and corrective action report to be completed in 2021.

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. No alternative source demonstration for assessment monitoring was completed in 2019.

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.

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Table 1

CCR Rule Groundwater Samples Summary

Table 1. CCR Rule Groundwater Samples Summary
Columbia Energy Center Secondary Pond /
SCS Engineers Project #25220067.00

Sample Dates	Downgradient Wells			Background Wells	
	MW-306	MW-307	MW-308	MW-84A	MW-301
4/1-3/2019	D	D	D	D*	D*
10/7-9/2019	D	D	D	D*	D*
12/3/2019	A	A	A		
Total Samples	3	3	3	3	3

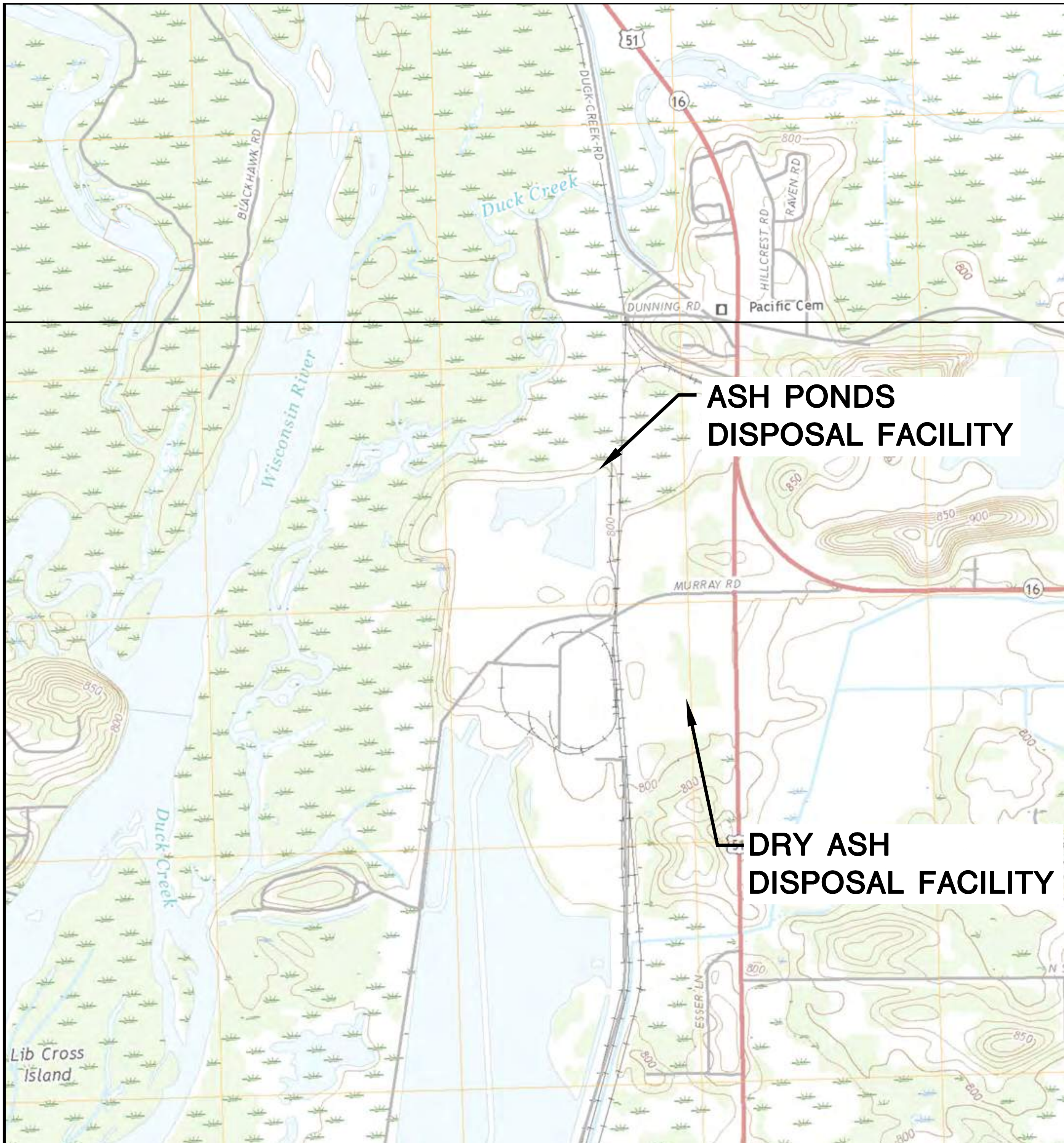
Abbreviations:
D = Detection Monitoring Program Sampling Event
A = Assessment Monitoring Program Sampling Event

Notes:
* = MW-84A and MW-301 are shared background wells with other CCR units. These wells were in detection monitoring for the Secondary Pond CCR unit, but were sampled for assessment monitoring parameters in April and October 2019 as part of assessment monitoring for the COL Primary Pond CCR unit; therefore, they were not re-sampled in December 2019.

Created by:	ACW	Date:	11/18/2019
Last revision by:	LWJ	Date:	6/26/2020
Checked by:	NDK	Date:	6/26/2020

I:\25220067.00\Deliverables\2019 Federal Annual Report - COL - SP\Tables\[Table 1_2019_GW_Samples_Summary_Table_COL_SecPond.xlsx]GW Summary

Figures



N

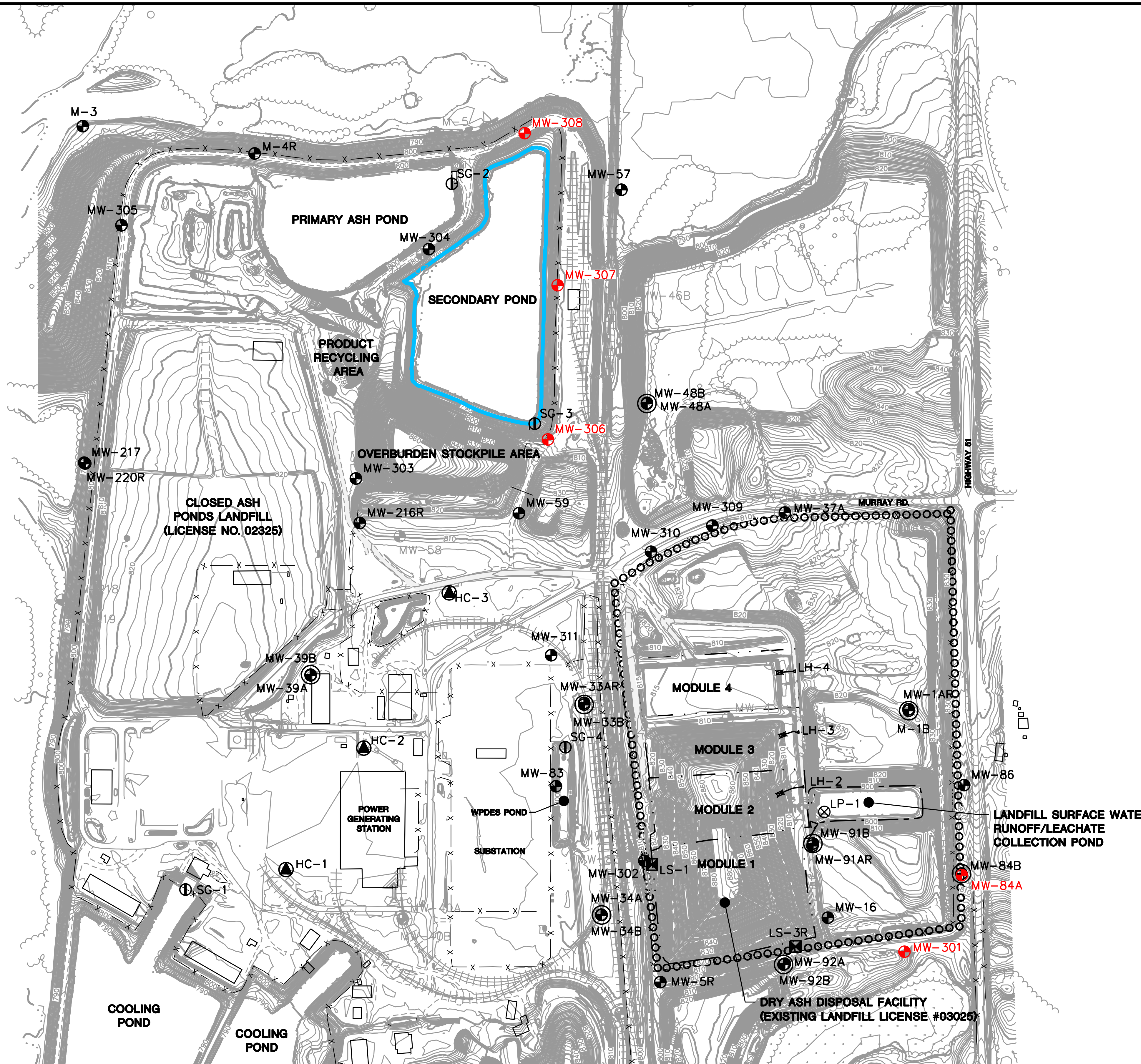
POYNETTE QUADRANGLE
WISCONSIN–COLUMBIA CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)
2018
SCALE: 1" = 2,000'

WISCONSIN

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	ENGINEER: SCS ENGINEERS 2830 DAIRY DRIVE MADISON, WI 53718-6751 PHONE: (608) 224-2830	FIGURE 1
DRAWN:	12/02/2019	CHECKED BY:	MDB		
REVISED:	01/10/2020	APPROVED BY:	TK 01/30/2020		

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



LEGEND

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

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.

PROJECT NO.	25219067.00	DRAWN BY:	BSS
DRAWN:	12/02/2019	CHECKED BY:	MDB
REVISED:	01/13/2020	APPROVED BY:	TK 01/30/2020

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
SECONDARY POND
PARDEEVILLE, WI

SITE PLAN AND MONITORING WELL LOCATIONS

FIGURE 2

I:\25219067.00\Drawings\CCR 2019 Annual Report\Secondary Pond\Site Plan and Monitoring Well Locations.dwg, 1/30/2020 3:42:25 PM

Appendix A

Laboratory Reports

A1 April 2019 Detection Monitoring

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

July 09, 2019

Meghan Blodgett
SCS ENGINEERS
2830 Dairy Drive
Madison, WI 53718

RE: Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185522

Dear Meghan Blodgett:

Enclosed are the analytical results for sample(s) received by the laboratory on April 04, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

Revised Report: Additional metals are included on this report.

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

Sincerely,

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

Enclosures

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

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

CERTIFICATIONS

Project:	25219067 ALLIANT-COLUMBIA CCR
Pace Project No.:	40185522

Green Bay Certification IDs

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

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

SAMPLE SUMMARY

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185522

Lab ID	Sample ID	Matrix	Date Collected	Date Received
40185260009	**MW-306**	Water	04/01/19 18:15	04/04/19 09:30
40185260010	**MW-307**	Water	04/01/19 17:25	04/04/19 09:30
40185260011	**MW-308**	Water	04/01/19 16:50	04/04/19 09:30
40185260012	**FIELD BLANK SC POND**	Water	04/01/19 16:50	04/04/19 09:30

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

SAMPLE ANALYTE COUNT

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185522

Lab ID	Sample ID	Method	Analysts	Analytes Reported
40185260009	**MW-306**	EPA 6020	KXS	14
			AXL	7
		SM 2540C	TMK	1
		EPA 9040	ALY	1
		EPA 300.0	HMB	3
40185260010	**MW-307**	EPA 6020	KXS	14
			AXL	7
		SM 2540C	TMK	1
		EPA 9040	ALY	1
		EPA 300.0	HMB	3
40185260011	**MW-308**	EPA 6020	KXS	14
			AXL	7
		SM 2540C	TMK	1
		EPA 9040	ALY	1
		EPA 300.0	HMB	3
40185260012	**FIELD BLANK SC POND**	EPA 6020	KXS	14
		SM 2540C	TMK	1
		EPA 9040	ALY	1
		EPA 300.0	HMB	3

REPORT OF LABORATORY ANALYSIS

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

ANALYTICAL RESULTS

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185522

Sample: MW-306 **Lab ID: 40185260009** Collected: 04/01/19 18:15 Received: 04/04/19 09:30 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Antimony	**<0.15**	ug/L	1.0	0.15	1	04/05/19 08:40	04/09/19 08:31	7440-36-0	
Arsenic	**<0.28**	ug/L	1.0	0.28	1	04/05/19 08:40	04/09/19 08:31	7440-38-2	
Barium	**10**	ug/L	4.9	1.5	1	04/05/19 08:40	04/09/19 08:31	7440-39-3	
Beryllium	**<0.18**	ug/L	1.0	0.18	1	04/05/19 08:40	04/09/19 08:31	7440-41-7	
Boron	**119**	ug/L	11.0	3.3	1	04/05/19 08:40	04/09/19 08:31	7440-42-8	
Cadmium	**<0.15**	ug/L	1.0	0.15	1	04/05/19 08:40	04/09/19 08:31	7440-43-9	
Calcium	**87300**	ug/L	250	69.8	1	04/05/19 08:40	04/09/19 08:31	7440-70-2	
Chromium	**2.2J**	ug/L	3.4	1.0	1	04/05/19 08:40	04/09/19 08:31	7440-47-3	
Cobalt	**<0.12**	ug/L	1.0	0.12	1	04/05/19 08:40	04/09/19 08:31	7440-48-4	
Lead	**<0.24**	ug/L	1.0	0.24	1	04/05/19 08:40	04/09/19 08:31	7439-92-1	
Lithium	**3.1**	ug/L	1.0	0.19	1	04/05/19 08:40	04/09/19 08:31	7439-93-2	
Molybdenum	**6.3**	ug/L	1.5	0.44	1	04/05/19 08:40	04/09/19 08:31	7439-98-7	
Selenium	**0.55J**	ug/L	1.1	0.32	1	04/05/19 08:40	04/09/19 08:31	7782-49-2	
Thallium	**<0.14**	ug/L	1.0	0.14	1	04/05/19 08:40	04/09/19 08:31	7440-28-0	
Field Data	Analytical Method:								
Field pH	**7.31**	Std. Units			1		04/01/19 18:15		
Field Specific Conductance	**592.3**	umhos/cm			1		04/01/19 18:15		
Oxygen, Dissolved	**8.46**	mg/L			1		04/01/19 18:15	7782-44-7	
REDOX	**150.0**	mV			1		04/01/19 18:15		
Turbidity	**1.61**	NTU			1		04/01/19 18:15		
Static Water Level	**786.72**	feet			1		04/01/19 18:15		
Temperature, Water (C)	**9.1**	deg C			1		04/01/19 18:15		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**310**	mg/L	20.0	8.7	1		04/08/19 15:38		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**7.4**	Std. Units	0.10	0.010	1		04/09/19 11:18		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**1.7J**	mg/L	2.0	0.50	1		04/15/19 14:02	16887-00-6	
Fluoride	**<0.10**	mg/L	0.30	0.10	1		04/15/19 14:02	16984-48-8	
Sulfate	**9.2**	mg/L	3.0	1.0	1		04/15/19 14:02	14808-79-8	

Sample: MW-307 **Lab ID: 40185260010** Collected: 04/01/19 17:25 Received: 04/04/19 09:30 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Antimony	**<0.15**	ug/L	1.0	0.15	1	04/05/19 08:40	04/09/19 08:38	7440-36-0	
Arsenic	**<0.28**	ug/L	1.0	0.28	1	04/05/19 08:40	04/09/19 08:38	7440-38-2	
Barium	**12.3**	ug/L	4.9	1.5	1	04/05/19 08:40	04/09/19 08:38	7440-39-3	
Beryllium	**<0.18**	ug/L	1.0	0.18	1	04/05/19 08:40	04/09/19 08:38	7440-41-7	

REPORT OF LABORATORY ANALYSIS

Pace Analytical®
www.pacelabs.com

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

ANALYTICAL RESULTS

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185522

Sample: MW-307 **Lab ID: 40185260010** Collected: 04/01/19 17:25 Received: 04/04/19 09:30 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Boron	**154**	ug/L	11.0	3.3	1	04/05/19 08:40	04/09/19 08:38	7440-42-8	
Cadmium	**<0.15**	ug/L	1.0	0.15	1	04/05/19 08:40	04/09/19 08:38	7440-43-9	
Calcium	**76500**	ug/L	250	69.8	1	04/05/19 08:40	04/09/19 08:38	7440-70-2	
Chromium	**<1.0**	ug/L	3.4	1.0	1	04/05/19 08:40	04/09/19 08:38	7440-47-3	
Cobalt	**0.42J**	ug/L	1.0	0.12	1	04/05/19 08:40	04/09/19 08:38	7440-48-4	
Lead	**<0.24**	ug/L	1.0	0.24	1	04/05/19 08:40	04/09/19 08:38	7439-92-1	
Lithium	**<0.19**	ug/L	1.0	0.19	1	04/05/19 08:40	04/09/19 08:38	7439-93-2	
Molybdenum	**<0.44**	ug/L	1.5	0.44	1	04/05/19 08:40	04/09/19 08:38	7439-98-7	
Selenium	**<0.32**	ug/L	1.1	0.32	1	04/05/19 08:40	04/09/19 08:38	7782-49-2	
Thallium	**<0.14**	ug/L	1.0	0.14	1	04/05/19 08:40	04/09/19 08:38	7440-28-0	
Field Data	Analytical Method:								
Field pH	**7.14**	Std. Units			1		04/01/19 17:25		
Field Specific Conductance	**662.5**	umhos/cm			1		04/01/19 17:25		
Oxygen, Dissolved	**0.12**	mg/L			1		04/01/19 17:25	7782-44-7	
REDOX	**-0.8**	mV			1		04/01/19 17:25		
Turbidity	**2.27**	NTU			1		04/01/19 17:25		
Static Water Level	**786.71**	feet			1		04/01/19 17:25		
Temperature, Water (C)	**8.2**	deg C			1		04/01/19 17:25		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**350**	mg/L	20.0	8.7	1		04/08/19 15:38		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**7.3**	Std. Units	0.10	0.010	1		04/09/19 11:19		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**13.8**	mg/L	2.0	0.50	1		04/15/19 14:14	16887-00-6	
Fluoride	**<0.10**	mg/L	0.30	0.10	1		04/15/19 14:14	16984-48-8	
Sulfate	**38.2**	mg/L	3.0	1.0	1		04/15/19 14:14	14808-79-8	

Sample: MW-308 **Lab ID: 40185260011** Collected: 04/01/19 16:50 Received: 04/04/19 09:30 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Antimony	**<0.15**	ug/L	1.0	0.15	1	04/05/19 08:40	04/09/19 08:45	7440-36-0	
Arsenic	**3.3**	ug/L	1.0	0.28	1	04/05/19 08:40	04/09/19 08:45	7440-38-2	
Barium	**54.8**	ug/L	4.9	1.5	1	04/05/19 08:40	04/09/19 08:45	7440-39-3	
Beryllium	**<0.18**	ug/L	1.0	0.18	1	04/05/19 08:40	04/09/19 08:45	7440-41-7	
Boron	**587**	ug/L	11.0	3.3	1	04/05/19 08:40	04/09/19 08:45	7440-42-8	
Cadmium	**<0.15**	ug/L	1.0	0.15	1	04/05/19 08:40	04/09/19 08:45	7440-43-9	
Calcium	**132000**	ug/L	250	69.8	1	04/05/19 08:40	04/09/19 08:45	7440-70-2	
Chromium	**<1.0**	ug/L	3.4	1.0	1	04/05/19 08:40	04/09/19 08:45	7440-47-3	

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ANALYTICAL RESULTS

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185522

Sample: MW-308 **Lab ID: 40185260011** Collected: 04/01/19 16:50 Received: 04/04/19 09:30 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Cobalt	**<0.12**	ug/L	1.0	0.12	1	04/05/19 08:40	04/09/19 08:45	7440-48-4	
Lead	**<0.24**	ug/L	1.0	0.24	1	04/05/19 08:40	04/09/19 08:45	7439-92-1	
Lithium	**<0.19**	ug/L	1.0	0.19	1	04/05/19 08:40	04/09/19 08:45	7439-93-2	
Molybdenum	**1.0J**	ug/L	1.5	0.44	1	04/05/19 08:40	04/09/19 08:45	7439-98-7	
Selenium	**<0.32**	ug/L	1.1	0.32	1	04/05/19 08:40	04/09/19 08:45	7782-49-2	
Thallium	**<0.14**	ug/L	1.0	0.14	1	04/05/19 08:40	04/09/19 08:45	7440-28-0	
Field Data	Analytical Method:								
Field pH	**7.39**	Std. Units			1		04/01/19 16:50		
Field Specific Conductance	**924**	umhos/cm			1		04/01/19 16:50		
Oxygen, Dissolved	**0.15**	mg/L			1		04/01/19 16:50	7782-44-7	
REDOX	**-137.7**	mV			1		04/01/19 16:50		
Turbidity	**3.44**	NTU			1		04/01/19 16:50		
Static Water Level	**787.53**	feet			1		04/01/19 16:50		
Temperature, Water (C)	**8.9**	deg C			1		04/01/19 16:50		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**484**	mg/L	20.0	8.7	1		04/08/19 15:38		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**7.4**	Std. Units	0.10	0.010	1		04/09/19 11:21		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**1.8J**	mg/L	2.0	0.50	1		04/15/19 14:26	16887-00-6	
Fluoride	**<0.10**	mg/L	0.30	0.10	1		04/15/19 14:26	16984-48-8	
Sulfate	**1.1J**	mg/L	3.0	1.0	1		04/15/19 14:26	14808-79-8	

Sample: FIELD BLANK SC POND **Lab ID: 40185260012** Collected: 04/01/19 16:50 Received: 04/04/19 09:30 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Antimony	**<0.15**	ug/L	1.0	0.15	1	04/05/19 08:40	04/09/19 05:14	7440-36-0	
Arsenic	**<0.28**	ug/L	1.0	0.28	1	04/05/19 08:40	04/09/19 05:14	7440-38-2	
Barium	**<1.5**	ug/L	4.9	1.5	1	04/05/19 08:40	04/09/19 05:14	7440-39-3	
Beryllium	**<0.18**	ug/L	1.0	0.18	1	04/05/19 08:40	04/09/19 05:14	7440-41-7	
Boron	**<3.3**	ug/L	11.0	3.3	1	04/05/19 08:40	04/09/19 05:14	7440-42-8	
Cadmium	**<0.15**	ug/L	1.0	0.15	1	04/05/19 08:40	04/09/19 05:14	7440-43-9	
Calcium	**<69.8**	ug/L	250	69.8	1	04/05/19 08:40	04/09/19 05:14	7440-70-2	
Chromium	**<1.0**	ug/L	3.4	1.0	1	04/05/19 08:40	04/09/19 05:14	7440-47-3	
Cobalt	**<0.12**	ug/L	1.0	0.12	1	04/05/19 08:40	04/09/19 05:14	7440-48-4	
Lead	**<0.24**	ug/L	1.0	0.24	1	04/05/19 08:40	04/09/19 05:14	7439-92-1	
Lithium	**<0.19**	ug/L	1.0	0.19	1	04/05/19 08:40	04/09/19 05:14	7439-93-2	
Molybdenum	**<0.44**	ug/L	1.5	0.44	1	04/05/19 08:40	04/09/19 05:14	7439-98-7	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 25219067 ALLIANT-COLUMBIA CCR

Pace Project No.: 40185522

Sample: FIELD BLANK SC POND **Lab ID: 40185260012** Collected: 04/01/19 16:50 Received: 04/04/19 09:30 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Selenium	**<0.32**	ug/L	1.1	0.32	1	04/05/19 08:40	04/09/19 05:14	7782-49-2	
Thallium	**<0.14**	ug/L	1.0	0.14	1	04/05/19 08:40	04/09/19 05:14	7440-28-0	
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**<8.7**	mg/L	20.0	8.7	1		04/08/19 15:39		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**7.2**	Std. Units	0.10	0.010	1		04/09/19 11:26		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**<0.50**	mg/L	2.0	0.50	1		04/15/19 14:38	16887-00-6	
Fluoride	**<0.10**	mg/L	0.30	0.10	1		04/15/19 14:38	16984-48-8	
Sulfate	**<1.0**	mg/L	3.0	1.0	1		04/15/19 14:38	14808-79-8	

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QUALITY CONTROL DATA

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185522

QC Batch: 317485 Analysis Method: EPA 6020
QC Batch Method: EPA 3010 Analysis Description: 6020 MET
Associated Lab Samples: 40185260009, 40185260010, 40185260011, 40185260012

METHOD BLANK: 1846066 Matrix: Water
Associated Lab Samples: 40185260009, 40185260010, 40185260011, 40185260012

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Antimony	ug/L	<0.15	1.0	04/09/19 04:47	
Arsenic	ug/L	<0.28	1.0	04/09/19 04:47	
Barium	ug/L	<1.5	4.9	04/09/19 04:47	
Beryllium	ug/L	<0.18	1.0	04/09/19 04:47	
Boron	ug/L	<3.3	11.0	04/09/19 04:47	
Cadmium	ug/L	<0.15	1.0	04/09/19 04:47	
Calcium	ug/L	<69.8	250	04/09/19 04:47	
Chromium	ug/L	<1.0	3.4	04/09/19 04:47	
Cobalt	ug/L	<0.12	1.0	04/09/19 04:47	
Lead	ug/L	<0.24	1.0	04/09/19 04:47	
Lithium	ug/L	<0.19	1.0	04/09/19 04:47	
Molybdenum	ug/L	<0.44	1.5	04/09/19 04:47	
Selenium	ug/L	<0.32	1.1	04/09/19 04:47	
Thallium	ug/L	<0.14	1.0	04/09/19 04:47	

LABORATORY CONTROL SAMPLE: 1846067

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Antimony	ug/L	500	500	100	80-120	
Arsenic	ug/L	500	474	95	80-120	
Barium	ug/L	500	487	97	80-120	
Beryllium	ug/L	500	492	98	80-120	
Boron	ug/L	500	486	97	80-120	
Cadmium	ug/L	500	500	100	80-120	
Calcium	ug/L	5000	4990	100	80-120	
Chromium	ug/L	500	492	98	80-120	
Cobalt	ug/L	500	485	97	80-120	
Lead	ug/L	500	463	93	80-120	
Lithium	ug/L	500	467	93	80-120	
Molybdenum	ug/L	500	465	93	80-120	
Selenium	ug/L	500	508	102	80-120	
Thallium	ug/L	500	464	93	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1846068 1846069

Parameter	Units	40185256001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Antimony	ug/L	0.32J	500	500	496	496	99	99	75-125	0	20	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185522

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1846068 1846069

Parameter	Units	40185256001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Arsenic	ug/L	0.40J	500	500	480	478	96	95	75-125	0	20	
Barium	ug/L	11.8	500	500	496	498	97	97	75-125	0	20	
Beryllium	ug/L	0.28J	500	500	481	480	96	96	75-125	0	20	
Boron	ug/L	26.9	500	500	492	498	93	94	75-125	1	20	
Cadmium	ug/L	0.21J	500	500	491	490	98	98	75-125	0	20	
Calcium	ug/L	126000	5000	5000	126000	123000	12	-46	75-125	2	20	P6
Chromium	ug/L	<1.0	500	500	484	483	97	96	75-125	0	20	
Cobalt	ug/L	0.35J	500	500	476	473	95	95	75-125	1	20	
Lead	ug/L	0.30J	500	500	467	468	93	94	75-125	0	20	
Lithium	ug/L	0.90J	500	500	463	463	92	92	75-125	0	20	
Molybdenum	ug/L	<0.44	500	500	465	464	93	93	75-125	0	20	
Selenium	ug/L	0.49J	500	500	512	513	102	103	75-125	0	20	
Thallium	ug/L	0.48J	500	500	474	476	95	95	75-125	0	20	

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QUALITY CONTROL DATA

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185522

QC Batch: 317697 | Analysis Method: SM 2540C
QC Batch Method: SM 2540C | Analysis Description: 2540C Total Dissolved Solids
Associated Lab Samples: 40185260009, 40185260010, 40185260011, 40185260012

METHOD BLANK: 1847172 | Matrix: Water
Associated Lab Samples: 40185260009, 40185260010, 40185260011, 40185260012

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	<8.7	20.0	04/08/19 15:37	

LABORATORY CONTROL SAMPLE: 1847173

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Dissolved Solids	mg/L	577	550	95	80-120	

SAMPLE DUPLICATE: 1847174

Parameter	Units	40185256003 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	726	726	0	5	

SAMPLE DUPLICATE: 1847175

Parameter	Units	40185155001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	576	580	1	5	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185522

QC Batch: 317736 Analysis Method: EPA 9040
QC Batch Method: EPA 9040 Analysis Description: 9040 pH
Associated Lab Samples: 40185260009, 40185260010, 40185260011, 40185260012

SAMPLE DUPLICATE: 1847351

Parameter	Units	40185260001 Result	Dup Result	RPD	Max RPD	Qualifiers
pH at 25 Degrees C	Std. Units	7.4	7.4	0	20	H6

SAMPLE DUPLICATE: 1847381

Parameter	Units	40185339014 Result	Dup Result	RPD	Max RPD	Qualifiers
pH at 25 Degrees C	Std. Units	7.7	7.7	0	20	H6

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QUALITY CONTROL DATA

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185522

QC Batch: 318035 — Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 — Analysis Description: 300.0 IC Anions
Associated Lab Samples: 40185260009, 40185260010, 40185260011, 40185260012

METHOD BLANK: 1848956 — Matrix: Water
Associated Lab Samples: 40185260009, 40185260010, 40185260011, 40185260012

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chloride	mg/L	<0.50	2.0	04/15/19 11:11	
Fluoride	mg/L	<0.10	0.30	04/15/19 11:11	
Sulfate	mg/L	<1.0	3.0	04/15/19 11:11	

LABORATORY CONTROL SAMPLE: 1848957

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	20	21.2	106	90-110	
Fluoride	mg/L	2	2.1	104	90-110	
Sulfate	mg/L	20	21.4	107	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1848958 — 1848959

Parameter	Units	40185548003 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	261	200	200	438	463	88	101	90-110	6	15	M0
Fluoride	mg/L	<1.0	20	20	18.0	19.8	90	99	90-110	9	15	
Sulfate	mg/L	54.2	200	200	232	252	89	99	90-110	8	15	M0

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1848960 — 1848961

Parameter	Units	40185308003 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	106	200	200	313	318	104	106	90-110	1	15	
Fluoride	mg/L	<1.0	20	20	20.6	21.5	103	108	90-110	4	15	
Sulfate	mg/L	94.8	200	200	298	309	102	107	90-110	3	15	

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

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QUALIFIERS

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185522

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.

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TNI - The NELAC Institute.

ANALYTE QUALIFIERS

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

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185522

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
40185260009	**MW-306**	EPA 3010	317485	EPA 6020	317570
40185260010	**MW-307**	EPA 3010	317485	EPA 6020	317570
40185260011	**MW-308**	EPA 3010	317485	EPA 6020	317570
40185260012	**FIELD BLANK SC POND**	EPA 3010	317485	EPA 6020	317570
40185260009	**MW-306**				
40185260010	**MW-307**				
40185260011	**MW-308**				
40185260009	**MW-306**	SM 2540C	317697		
40185260010	**MW-307**	SM 2540C	317697		
40185260011	**MW-308**	SM 2540C	317697		
40185260012	**FIELD BLANK SC POND**	SM 2540C	317697		
40185260009	**MW-306**	EPA 9040	317736		
40185260010	**MW-307**	EPA 9040	317736		
40185260011	**MW-308**	EPA 9040	317736		
40185260012	**FIELD BLANK SC POND**	EPA 9040	317736		
40185260009	**MW-306**	EPA 300.0	318035		
40185260010	**MW-307**	EPA 300.0	318035		
40185260011	**MW-308**	EPA 300.0	318035		
40185260012	**FIELD BLANK SC POND**	EPA 300.0	318035		

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40185260

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Company Name:	SCS
Branch/Location:	Madison, WI
Project Contact:	Meg Blodgett
Phone:	608-216-7362
Project Number:	25219067
Project Name:	Alliant - Columbia
Project State:	WI
Sampled By (Print):	Adam Watson
Sampled By (Sign):	Paul A. Groom for Adam Watson
PO #:	
Regulatory Program:	

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

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

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

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

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

PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX	TDS, SO4, Ph	Floride, CL	Ca, B	CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)	Profile #
FILTERED? (YES/NO)					No	No	No			
PRESERVATION (CODE)* Pick Letter					A	A	D			
001	MW 302	4-2-19	16:25	GW	X	X	X			
002	MW 33AR	4-2-19	15:30	↓						
003	MW 34A	4-2-19	14:30	↓						
004	Field Blank Mod 1	4-2-19	16:25	DI						
005	MW 309	4-2-19	9:10	GW						
006	MW 310	4-2-19	9:55	↓						
007	MW 311	4-2-19	10:50	↓						
008	Field Blank Mod 4	4-2-19	9:55	DI						
009	MW 306	4-1-19	18:15	GW						
010	MW 307	4-1-19	17:25	↓						
011	MW 308	4-1-19	16:50	↓						
012	Field Blank SC Pond	4-1-19	16:50	DI	↓	↓	↓			
~~013~~ 4/4/19 SW										

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

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

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

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

Relinquished By:	Date/Time:	Received By:	Date/Time:
Paul A. Groom	4-3-19 18:30		
Fed Ex	4-4-19 0930	Susan Mulfy	4-4-19 0930

PACE Project No. 40185260

Receipt Temp = ROI °C

Sample Receipt pH
OK / Adjusted

Cooler Custody Seal
Present / Not Present
Intact / Not Intact

Version 6.0 06/14/06

C019a(27Jun2006)

ORIGINAL

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

Sample Preservation Receipt Form

Client Name: SCS

Project # 40185260

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

Lab Lot# of pH paper: 10053581 Lab Std #ID of preservation (if pH adjusted):

Initial when completed: SKW Date/ Time:

Pace Lab #	Glass							Plastic							Vials						Jars			General									
	AG1U	AG1H	AG4S	AG4U	AG5U	AG2S	BG3U	BP1U	BP2N	BP2Z	BP3U	BP3C	BP3N	BP3S	DG9A	DG9T	VG9U	VG9H	VG9M	VG9D	JGFU	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		1																		X		2.5 / 5 / 10
006											2		1																		X		2.5 / 5 / 10
007											2		1																		X		2.5 / 5 / 10
008											2		1																		X		2.5 / 5 / 10
009											2		1																		X		2.5 / 5 / 10
010											2		1																		X		2.5 / 5 / 10
011											2		1																		X		2.5 / 5 / 10
012											2		1																		X		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

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	DG9A	40 mL amber ascorbic	JGFU	4 oz amber jar unpres
AG1H	1 liter amber glass HCL	BP2N	500 mL plastic HNO3	DG9T	40 mL amber Na Thio	WGFU	4 oz clear jar unpres
AG4S	125 mL amber glass H2SO4	BP2Z	500 mL plastic NaOH, Znact	VG9U	40 mL clear vial unpres	WPFU	4 oz plastic jar unpres
AG4U	120 mL amber glass unpres	BP3U	250 mL plastic unpres	VG9H	40 mL clear vial HCL		
AG5U	100 mL amber glass unpres	BP3C	250 mL plastic NaOH	VG9M	40 mL clear vial MeOH	SP5T	120 mL plastic Na Thiosulfate
AG2S	500 mL amber glass H2SO4	BP3N	250 mL plastic HNO3	VG9D	40 mL clear vial DI	ZPLC	ziploc bag
BG3U	250 mL clear glass unpres	BP3S	250 mL plastic H2SO4			GN:	

1610

Pace Analytical 1241 Bellevue Street, Green Bay, WI 54302	Document Name: **Sample Condition Upon Receipt (SCUR)**	Document Revised: 25Apr2018
	Document No.: **F-GB-C-031-Rev.07**	Issuing Authority: Pace Green Bay Quality Office

Sample Condition Upon Receipt Form (SCUR)

Project #:

WO# : 40185260

40185260

Client Name: SCS

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

Tracking #: 7864 3720 0524

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 - N/A **Type of Ice:** Wet Blue Dry None ☑ Samples on ice, cooling process has begun

Cooler Temperature Uncorr: ROI /Corr:

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.

Person examining contents:
Date: 4-4-19
Initials: SW

Chain of Custody Present:	☑Yes ☐No ☐N/A	1.
Chain of Custody Filled Out:	☐Yes ☑No ☐N/A	2. No pg#, Mail, Invoice 4-4-19 SW
Chain of Custody Relinquished:	☑Yes ☐No ☐N/A	3.
Sampler Name & Signature on COC:	☑Yes ☐No ☐N/A	4.
Samples Arrived within Hold Time:	☑Yes ☐No	5.
- VOA Samples frozen upon receipt	☐Yes ☐No	Date/Time:
Short Hold Time Analysis (<72hr):	☑Yes ☐No	6.
Rush Turn Around Time Requested:	☐Yes ☑No	7.
Sufficient Volume: For Analysis: ☑Yes ☐No	MS/MSD: ☐Yes ☑No ☐N/A	8.
Correct Containers Used:	☑Yes ☐No	9.
-Pace Containers Used:	☑Yes ☐No ☐N/A	
-Pace IR Containers Used:	☐Yes ☐No ☑N/A	
Containers Intact:	☑Yes ☐No	10.
Filtered volume received for Dissolved tests	☐Yes ☐No ☑N/A	11.
Sample Labels match COC: -Includes date/time/ID/Analysis Matrix: W	☐Yes ☑No ☐N/A	12. ~~004-ID is Field Blank MOD13LF~~ 009-No date + time on 250ml 4-4-19 SW
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:

Project Manager Review: AL for DM **Date:** 4/4/19

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

April 25, 2019

Meghan Blodgett
SCS ENGINEERS
2830 Dairy Drive
Madison, WI 53718

RE: Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185256

Dear Meghan Blodgett:

Enclosed are the analytical results for sample(s) received by the laboratory on April 04, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

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

Sincerely,

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

Enclosures

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

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CERTIFICATIONS

Project:	25219067 ALLIANT-COLUMBIA CCR
Pace Project No.:	40185256

Pennsylvania Certification IDs

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

Green Bay Certification IDs

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

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SAMPLE SUMMARY

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185256

Lab ID	Sample ID	Matrix	Date Collected	Date Received
40185256001	**MW-301**	Water	04/02/19 17:20	04/04/19 09:30
40185256002	**MW-84A**	Water	04/03/19 09:40	04/04/19 09:30

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SAMPLE ANALYTE COUNT

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185256

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
40185256001	**MW-301**	EPA 6020	KXS	14	PASI-G
		EPA 7470	AJT	1	PASI-G
			AXL	7	PASI-G
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	JLW	1	PASI-PA
		Total Radium Calculation	CMC	1	PASI-PA
		SM 2540C	TMK	1	PASI-G
		EPA 9040	ALY	1	PASI-G
		EPA 300.0	HMB	3	PASI-G
40185256002	**MW-84A**	EPA 6020	KXS	14	PASI-G
		EPA 7470	AJT	1	PASI-G
			AXL	7	PASI-G
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	JLW	1	PASI-PA
		Total Radium Calculation	CMC	1	PASI-PA
		SM 2540C	TMK	1	PASI-G
		EPA 9040	ALY	1	PASI-G
		EPA 300.0	HMB	3	PASI-G

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ANALYTICAL RESULTS

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185256

Sample: MW-301 **Lab ID: 40185256001** Collected: 04/02/19 17:20 Received: 04/04/19 09:30 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Antimony	**0.32J**	ug/L	1.0	0.15	1	04/05/19 08:40	04/09/19 06:15	7440-36-0	
Arsenic	**0.40J**	ug/L	1.0	0.28	1	04/05/19 08:40	04/09/19 06:15	7440-38-2	
Barium	**11.8**	ug/L	4.9	1.5	1	04/05/19 08:40	04/09/19 06:15	7440-39-3	
Beryllium	**0.28J**	ug/L	1.0	0.18	1	04/05/19 08:40	04/09/19 06:15	7440-41-7	
Boron	**26.9**	ug/L	11.0	3.3	1	04/05/19 08:40	04/09/19 06:15	7440-42-8	
Cadmium	**0.21J**	ug/L	1.0	0.15	1	04/05/19 08:40	04/09/19 06:15	7440-43-9	
Calcium	**126000**	ug/L	2500	698	10	04/05/19 08:40	04/09/19 05:48	7440-70-2	P6
Chromium	**<1.0**	ug/L	3.4	1.0	1	04/05/19 08:40	04/09/19 06:15	7440-47-3	
Cobalt	**0.35J**	ug/L	1.0	0.12	1	04/05/19 08:40	04/09/19 06:15	7440-48-4	
Lead	**0.30J**	ug/L	1.0	0.24	1	04/05/19 08:40	04/09/19 06:15	7439-92-1	
Lithium	**0.90J**	ug/L	1.0	0.19	1	04/05/19 08:40	04/09/19 06:15	7439-93-2	
Molybdenum	**<0.44**	ug/L	1.5	0.44	1	04/05/19 08:40	04/09/19 06:15	7439-98-7	
Selenium	**0.49J**	ug/L	1.1	0.32	1	04/05/19 08:40	04/09/19 06:15	7782-49-2	
Thallium	**0.48J**	ug/L	1.0	0.14	1	04/05/19 08:40	04/09/19 06:15	7440-28-0	
7470 Mercury	Analytical Method: EPA 7470 Preparation Method: EPA 7470								
Mercury	**<0.084**	ug/L	0.28	0.084	1	04/12/19 09:55	04/15/19 10:05	7439-97-6	
Field Data	Analytical Method:								
Field pH	**6.62**	Std. Units			1		04/02/19 17:20		
Field Specific Conductance	**883**	umhos/cm			1		04/02/19 17:20		
Oxygen, Dissolved	**2.20**	mg/L			1		04/02/19 17:20	7782-44-7	
REDOX	**152.1**	mV			1		04/02/19 17:20		
Turbidity	**2.02**	NTU			1		04/02/19 17:20		
Static Water Level	**787.04**	feet			1		04/02/19 17:20		
Temperature, Water (C)	**7.5**	deg C			1		04/02/19 17:20		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**462**	mg/L	20.0	8.7	1		04/09/19 12:34		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**6.8**	Std. Units	0.10	0.010	1		04/08/19 11:21		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**2.9J**	mg/L	10.0	2.5	5		04/16/19 19:51	16887-00-6	B,D3
Fluoride	**<0.50**	mg/L	1.5	0.50	5		04/16/19 19:51	16984-48-8	D3
Sulfate	**5.3J**	mg/L	15.0	5.0	5		04/16/19 19:51	14808-79-8	D3

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ANALYTICAL RESULTS

Project: 25219067 ALLIANT-COLUMBIA CCR

Pace Project No.: 40185256

Sample: MW-84A **Lab ID: 40185256002** Collected: 04/03/19 09:40 Received: 04/04/19 09:30 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Antimony	**<0.15**	ug/L	1.0	0.15	1	04/05/19 08:40	04/09/19 06:42	7440-36-0	
Arsenic	**<0.28**	ug/L	1.0	0.28	1	04/05/19 08:40	04/09/19 06:42	7440-38-2	
Barium	**14.7**	ug/L	4.9	1.5	1	04/05/19 08:40	04/09/19 06:42	7440-39-3	
Beryllium	**<0.18**	ug/L	1.0	0.18	1	04/05/19 08:40	04/09/19 06:42	7440-41-7	
Boron	**13.6**	ug/L	11.0	3.3	1	04/05/19 08:40	04/09/19 06:42	7440-42-8	
Cadmium	**<0.15**	ug/L	1.0	0.15	1	04/05/19 08:40	04/09/19 06:42	7440-43-9	
Calcium	**80100**	ug/L	250	69.8	1	04/05/19 08:40	04/09/19 06:42	7440-70-2	
Chromium	**1.8J**	ug/L	3.4	1.0	1	04/05/19 08:40	04/09/19 06:42	7440-47-3	
Cobalt	**<0.12**	ug/L	1.0	0.12	1	04/05/19 08:40	04/09/19 06:42	7440-48-4	
Lead	**<0.24**	ug/L	1.0	0.24	1	04/05/19 08:40	04/09/19 06:42	7439-92-1	
Lithium	**0.56J**	ug/L	1.0	0.19	1	04/05/19 08:40	04/09/19 06:42	7439-93-2	
Molybdenum	**<0.44**	ug/L	1.5	0.44	1	04/05/19 08:40	04/09/19 06:42	7439-98-7	
Selenium	**<0.32**	ug/L	1.1	0.32	1	04/05/19 08:40	04/09/19 06:42	7782-49-2	
Thallium	**<0.14**	ug/L	1.0	0.14	1	04/05/19 08:40	04/09/19 06:42	7440-28-0	
7470 Mercury	Analytical Method: EPA 7470 Preparation Method: EPA 7470								
Mercury	**<0.084**	ug/L	0.28	0.084	1	04/12/19 09:55	04/15/19 10:07	7439-97-6	
Field Data	Analytical Method:								
Field pH	**7.03**	Std. Units			1		04/03/19 09:40		
Field Specific Conductance	**637.2**	umhos/cm			1		04/03/19 09:40		
Oxygen, Dissolved	**9.49**	mg/L			1		04/03/19 09:40	7782-44-7	
REDOX	**103.4**	mV			1		04/03/19 09:40		
Turbidity	**1.90**	NTU			1		04/03/19 09:40		
Static Water Level	**787.35**	feet			1		04/03/19 09:40		
Temperature, Water (C)	**10.2**	deg C			1		04/03/19 09:40		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**318**	mg/L	20.0	8.7	1		04/09/19 12:34		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**7.4**	Std. Units	0.10	0.010	1		04/08/19 11:24		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**3.6**	mg/L	2.0	0.50	1		04/16/19 20:03	16887-00-6	B
Fluoride	**<0.10**	mg/L	0.30	0.10	1		04/16/19 20:03	16984-48-8	
Sulfate	**1.4J**	mg/L	3.0	1.0	1		04/16/19 20:03	14808-79-8	

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QUALITY CONTROL DATA

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185256

QC Batch: 318138 | Analysis Method: EPA 7470
QC Batch Method: EPA 7470 | Analysis Description: 7470 Mercury
Associated Lab Samples: 40185256001, 40185256002

METHOD BLANK: 1849587 | Matrix: Water
Associated Lab Samples: 40185256001, 40185256002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mercury	ug/L	<0.084	0.28	04/15/19 09:25	

LABORATORY CONTROL SAMPLE: 1849588

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury	ug/L	5	5.3	105	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1849589 1849590

Parameter	Units	40185483005 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mercury	ug/L	0.00016J mg/L	5	5	5.4	5.2	105	101	85-115	4	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.

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QUALITY CONTROL DATA

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185256

QC Batch: 317485 Analysis Method: EPA 6020
QC Batch Method: EPA 3010 Analysis Description: 6020 MET
Associated Lab Samples: 40185256001, 40185256002

METHOD BLANK: 1846066 Matrix: Water
Associated Lab Samples: 40185256001, 40185256002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Antimony	ug/L	<0.15	1.0	04/09/19 04:47	
Arsenic	ug/L	<0.28	1.0	04/09/19 04:47	
Barium	ug/L	<1.5	4.9	04/09/19 04:47	
Beryllium	ug/L	<0.18	1.0	04/09/19 04:47	
Boron	ug/L	<3.3	11.0	04/09/19 04:47	
Cadmium	ug/L	<0.15	1.0	04/09/19 04:47	
Calcium	ug/L	<69.8	250	04/09/19 04:47	
Chromium	ug/L	<1.0	3.4	04/09/19 04:47	
Cobalt	ug/L	<0.12	1.0	04/09/19 04:47	
Lead	ug/L	<0.24	1.0	04/09/19 04:47	
Lithium	ug/L	<0.19	1.0	04/09/19 04:47	
Molybdenum	ug/L	<0.44	1.5	04/09/19 04:47	
Selenium	ug/L	<0.32	1.1	04/09/19 04:47	
Thallium	ug/L	<0.14	1.0	04/09/19 04:47	

LABORATORY CONTROL SAMPLE: 1846067

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Antimony	ug/L	500	500	100	80-120	
Arsenic	ug/L	500	474	95	80-120	
Barium	ug/L	500	487	97	80-120	
Beryllium	ug/L	500	492	98	80-120	
Boron	ug/L	500	486	97	80-120	
Cadmium	ug/L	500	500	100	80-120	
Calcium	ug/L	5000	4990	100	80-120	
Chromium	ug/L	500	492	98	80-120	
Cobalt	ug/L	500	485	97	80-120	
Lead	ug/L	500	463	93	80-120	
Lithium	ug/L	500	467	93	80-120	
Molybdenum	ug/L	500	465	93	80-120	
Selenium	ug/L	500	508	102	80-120	
Thallium	ug/L	500	464	93	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1846068 1846069

Parameter	Units	40185256001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Antimony	ug/L	0.32J	500	500	496	496	99	99	75-125	0	20	

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REPORT OF LABORATORY ANALYSIS

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

QUALITY CONTROL DATA

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185256

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1846068 1846069

Parameter	Units	40185256001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Arsenic	ug/L	0.40J	500	500	480	478	96	95	75-125	0	20	
Barium	ug/L	11.8	500	500	496	498	97	97	75-125	0	20	
Beryllium	ug/L	0.28J	500	500	481	480	96	96	75-125	0	20	
Boron	ug/L	26.9	500	500	492	498	93	94	75-125	1	20	
Cadmium	ug/L	0.21J	500	500	491	490	98	98	75-125	0	20	
Calcium	ug/L	126000	5000	5000	126000	123000	12	-46	75-125	2	20	P6
Chromium	ug/L	<1.0	500	500	484	483	97	96	75-125	0	20	
Cobalt	ug/L	0.35J	500	500	476	473	95	95	75-125	1	20	
Lead	ug/L	0.30J	500	500	467	468	93	94	75-125	0	20	
Lithium	ug/L	0.90J	500	500	463	463	92	92	75-125	0	20	
Molybdenum	ug/L	<0.44	500	500	465	464	93	93	75-125	0	20	
Selenium	ug/L	0.49J	500	500	512	513	102	103	75-125	0	20	
Thallium	ug/L	0.48J	500	500	474	476	95	95	75-125	0	20	

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QUALITY CONTROL DATA

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185256

QC Batch: 317813 | Analysis Method: SM 2540C
QC Batch Method: SM 2540C | Analysis Description: 2540C Total Dissolved Solids
Associated Lab Samples: 40185256001, 40185256002

METHOD BLANK: 1847582 | Matrix: Water
Associated Lab Samples: 40185256001, 40185256002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	<8.7	20.0	04/09/19 12:32	

LABORATORY CONTROL SAMPLE: 1847583

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Dissolved Solids	mg/L	577	552	96	80-120	

SAMPLE DUPLICATE: 1847584

Parameter	Units	40185256001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	462	462	0	5	

SAMPLE DUPLICATE: 1847585

Parameter	Units	40185260001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	290	284	2	5	

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QUALITY CONTROL DATA

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185256

QC Batch: 317619 | Analysis Method: EPA 9040
QC Batch Method: EPA 9040 | Analysis Description: 9040 pH
Associated Lab Samples: 40185256001, 40185256002

SAMPLE DUPLICATE: 1846956

Parameter	Units	40185113001 Result	Dup Result	RPD	Max RPD	Qualifiers
pH at 25 Degrees C	Std. Units	1.1	1.1	7	20	H6

SAMPLE DUPLICATE: 1846957

Parameter	Units	40185204001 Result	Dup Result	RPD	Max RPD	Qualifiers
pH at 25 Degrees C	Std. Units	7.2	7.2	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.

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QUALITY CONTROL DATA

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185256

QC Batch: 317955 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 40185256001, 40185256002

METHOD BLANK: 1848305 Matrix: Water
Associated Lab Samples: 40185256001, 40185256002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chloride	mg/L	0.52J	2.0	04/16/19 10:22	
Fluoride	mg/L	<0.10	0.30	04/16/19 10:22	
Sulfate	mg/L	<1.0	3.0	04/16/19 10:22	

LABORATORY CONTROL SAMPLE: 1848306

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	20	21.6	108	90-110	
Fluoride	mg/L	2	2.0	98	90-110	
Sulfate	mg/L	20	21.7	109	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1848307 1848308

Parameter	Units	40185204004 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	43.0	100	100	149	148	106	105	90-110	1	15	
Fluoride	mg/L	<0.50	10	10	10.3	10.4	103	104	90-110	1	15	
Sulfate	mg/L	<5.0	100	100	109	109	105	105	90-110	0	15	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1848309 1848310

Parameter	Units	40185260002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	229	200	200	439	425	105	98	90-110	3	15	
Fluoride	mg/L	<0.10	2	2	1.9	2.0	97	99	90-110	2	15	
Sulfate	mg/L	201	200	200	411	397	105	98	90-110	3	15	

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ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185256

Sample: MW-301 **Lab ID: 40185256001** Collected: 04/02/19 17:20 Received: 04/04/19 09:30 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	**0.000 ± 0.278 (0.565) C:NA T:94%**	pCi/L	04/22/19 23:16	13982-63-3	
Radium-228	EPA 904.0	**0.552 ± 0.391 (0.759) C:75% T:91%**	pCi/L	04/19/19 12:45	15262-20-1	
Total Radium	Total Radium Calculation	**0.552 ± 0.669 (1.32)**	pCi/L	04/25/19 11:01	7440-14-4	

Sample: MW-84A **Lab ID: 40185256002** Collected: 04/03/19 09:40 Received: 04/04/19 09:30 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	**0.199 ± 0.391 (0.715) C:NA T:93%**	pCi/L	04/22/19 23:16	13982-63-3	
Radium-228	EPA 904.0	**0.482 ± 0.511 (1.07) C:72% T:80%**	pCi/L	04/19/19 12:45	15262-20-1	
Total Radium	Total Radium Calculation	**0.681 ± 0.902 (1.79)**	pCi/L	04/25/19 11:01	7440-14-4	

REPORT OF LABORATORY ANALYSIS

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

QUALITY CONTROL - RADIOCHEMISTRY

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185256

QC Batch: 338211 | Analysis Method: EPA 904.0
QC Batch Method: EPA 904.0 | Analysis Description: 904.0 Radium 228
Associated Lab Samples: 40185256001, 40185256002

METHOD BLANK: 1646527 | Matrix: Water
Associated Lab Samples: 40185256001, 40185256002

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-228	-0.0681 ± 0.343 (0.816) C:74% T:84%	pCi/L	04/19/19 12:45	

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QUALITY CONTROL - RADIOCHEMISTRY

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185256

QC Batch: 338210 Analysis Method: EPA 903.1
QC Batch Method: EPA 903.1 Analysis Description: 903.1 Radium-226
Associated Lab Samples: 40185256001, 40185256002

METHOD BLANK: 1646526 Matrix: Water
Associated Lab Samples: 40185256001, 40185256002

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-226	0.212 ± 0.323 (0.520) C:NA T:90%	pCi/L	04/22/19 22:44	

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QUALIFIERS

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185256

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.

LABORATORIES

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

ANALYTE QUALIFIERS

B	Analyte was detected in the associated method blank.
D3	Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.
H6	Analysis initiated outside of the 15 minute EPA required holding time.
P6	Matrix spike recovery was outside laboratory control limits due to a parent sample concentration notably higher than the spike level.

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 25219067 ALLIANT-COLUMBIA CCR
Pace Project No.: 40185256

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
40185256001	**MW-301**	EPA 3010	317485	EPA 6020	317570
40185256002	**MW-84A**	EPA 3010	317485	EPA 6020	317570
40185256001	**MW-301**	EPA 7470	318138	EPA 7470	318191
40185256002	**MW-84A**	EPA 7470	318138	EPA 7470	318191
40185256001	**MW-301**				
40185256002	**MW-84A**				
40185256001	**MW-301**	EPA 903.1	338210		
40185256002	**MW-84A**	EPA 903.1	338210		
40185256001	**MW-301**	EPA 904.0	338211		
40185256002	**MW-84A**	EPA 904.0	338211		
40185256001	**MW-301**	Total Radium Calculation	339896		
40185256002	**MW-84A**	Total Radium Calculation	339897		
40185256001	**MW-301**	SM 2540C	317813		
40185256002	**MW-84A**	SM 2540C	317813		
40185256001	**MW-301**	EPA 9040	317619		
40185256002	**MW-84A**	EPA 9040	317619		
40185256001	**MW-301**	EPA 300.0	317955		
40185256002	**MW-84A**	EPA 300.0	317955		

(Please Print Clearly)

Company Name:	SCS
Branch/Location:	Madison WI
Project Contact:	Meg Blodgett
Phone:	608 216 7362
Project Number:	25219067
Project Name:	Alliant - Columbia
Project State:	WI
Sampled By (Print):	Adam Watson
Sampled By (Sign):	Paul A. Groom for Adam Watson
PO #:	
Regulatory Program:	

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MH

CHAIN OF CUSTODY

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

Page 1 of

40185256

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

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

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

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

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

				FILTERED? (YES/NO)	Y/N	No	No	No	No			
				PRESERVATION (CODE)*	Pick Letter	A	C	C	C			
PACE LAB #	CLIENT FIELD ID	COLLECTION ① DATE	TIME	MATRIX	Analyses Requested	CL, Floride, Ph, SO4, TDS	Metals	Radium 226	Radium 228	CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)	Profile #
001	MW 301	4/3/19	1720	W		X	X	X	X			
002	MW 84A	4/3/19	0940			X	X	X	X			
003	MW 303	4/1/19	1800			X	X	X	X			
004	MW 304	4/2/19	1230									
005	MW 305	4/1/19	1410									
006	M-4R	4/1/19	1515									
007	Field Blank PPond	4/2/19	1230									

① Filled in by Lab from labels 4/4/19 SMW

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

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

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

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

Relinquished By:	Date/Time:	Received By:	Date/Time:
Paul A. Groom	4-3-19 19:00		
Fed Ex	4/4/19 0930	Susan Kuyke Pace	4/4/19 0930

PACE Project No. 40185256

Receipt Temp = ROI °C

Sample Receipt pH
OK / Adjusted

Cooler Custody Seal
Present / Not Present
Intact / Not Intact

Version 6.0 06/14/06

C019a(27Jun2006)

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CHAIN OF CUSTODY

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

(Please Print Clearly)

Company Name:	SCS
Branch/Location:	Madison WI
Project Contact:	Meg Blodgett
Phone:	608 216 7362
Project Number:	25219067
Project Name:	Alliant - Columbia
Project State:	WI
Sampled By (Print):	Adam Watson
Sampled By (Sign):	Paul A. Groom for Adam Watson
PO #:	
Regulatory Program:	

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

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

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

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

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

PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX	CL, Floride, Ph, SO4, TDS	Metals	Radium 226	Radium 228					CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)	Profile #
FILTERED? (YES/NO) Y/N					No	No	No	No							
PRESERVATION (CODE)* Pick Letter					A	C	C	C							
	MW 301	4-2-19	17:20	GW	X	X	X	X							
	MW 84A	4-3-19	9:40	GW	X	X	X	X							
	MW 303	4-1-19	18:00	GW	X	X	X	X							
	MW 304	4-2-19	12:30												
	MW 305	4-1-19	14:10												
	M-4R	4-1-19	15:15												
	Field Blank PPond	4-2-19	12:30	DI											

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

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

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

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

Relinquished By:	Date/Time:	Received By:	Date/Time:
Paul A. Groom	4-3-19 19:00		
Fed Ex	4/4/19 0930	[illegible] Pace	4/4/19 0930

PACE Project No. 40185256

Receipt Temp = °C

Sample Receipt pH
OK / Adjusted

Cooler Custody Seal
Present / Not Present
Intact / Not Intact

Version 6.0 06/14/06

ORIGINAL

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

Sample Preservation Receipt Form

Client Name: SCS

Project # 40185256

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

Lab Lot# of pH paper: 10045358 Lab Std #ID of preservation (if pH adjusted):

Initial when completed: SKW Date/ Time:

Pace Lab #	Glass AG1U	AG1H	AG4S	AG4U	AG5U	AG2S	BG3U	Plastic BP1U	BP2N	BP2Z	BP3U	BP3C	BP3N	BP3S	Vials DG9A	DG9T	VG9U	VG9H	VG9M	VG9D	Jars JGFU	WGFU	WPFU	General SP5T	ZPLC	GN	VOA Vials (>6mm) *	H2SO4 pH ≤2	NaOH+Zn Act pH ≥9	NaOH pH ≥12	HNO3 pH ≤2	pH after adjusted	Volume (mL)
001									4		2		1																		X		2.5 / 5 / 10
002									4		2		1																		X		2.5 / 5 / 10
003									4		2		1																		X		2.5 / 5 / 10
004									4		2		1																		X		2.5 / 5 / 10
005									4		2		1																		X		2.5 / 5 / 10
006									4		2		1																		X		2.5 / 5 / 10
007									4		2		1																		X		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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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

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	DG9A	40 mL amber ascorbic	JGFU	4 oz amber jar unpres
AG1H	1 liter amber glass HCL	BP2N	500 mL plastic HNO3	DG9T	40 mL amber Na Thio	WGFU	4 oz clear jar unpres
AG4S	125 mL amber glass H2SO4	BP2Z	500 mL plastic NaOH, Znact	VG9U	40 mL clear vial unpres	WPFU	4 oz plastic jar unpres
AG4U	120 mL amber glass unpres	BP3U	250 mL plastic unpres	VG9H	40 mL clear vial HCL		
AG5U	100 mL amber glass unpres	BP3C	250 mL plastic NaOH	VG9M	40 mL clear vial MeOH	SP5T	120 mL plastic Na Thiosulfate
AG2S	500 mL amber glass H2SO4	BP3N	250 mL plastic HNO3	VG9D	40 mL clear vial DI	ZPLC	ziploc bag
BG3U	250 mL clear glass unpres	BP3S	250 mL plastic H2SO4			GN:	

Pace Analytical 1241 Bellevue Street, Green Bay, WI 54302	Document Name: **Sample Condition Upon Receipt (SCUR)**	Document Revised: 25Apr2018
	Document No.: **F-GB-C-031-Rev.07**	Issuing Authority: Pace Green Bay Quality Office

Sample Condition Upon Receipt Form (SCUR)

Project #:

WO# : 40185256

40185256

Client Name: SCS

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

Tracking #: 7864 3720 0524

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 - N/A **Type of Ice:** Wet Blue Dry None ☑ Samples on ice, cooling process has begun

Cooler Temperature Uncorr: ROI /Corr:

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.

Person examining contents:
Date: 4-4-19
Initials: SW

Chain of Custody Present:	☑ Yes ☐ No ☐ N/A	1.
Chain of Custody Filled Out:	☐ Yes ☑ No ☐ N/A	2. No po#, Mail, Invoice, Collect 4-4-19 SW
Chain of Custody Relinquished:	☑ Yes ☐ No ☐ N/A	3. date & time, Lab, added to coc
Sampler Name & Signature on COC:	☑ Yes ☐ No ☐ N/A	4. Recieved updated COC via email from client 4-4-19 SW
Samples Arrived within Hold Time:	☑ Yes ☐ No	5.
- VOA Samples frozen upon receipt	☐ Yes ☐ No	Date/Time:
Short Hold Time Analysis (<72hr):	☑ Yes ☐ No	6.
Rush Turn Around Time Requested:	☐ Yes ☑ No	7.
Sufficient Volume: For Analysis: ☑ Yes ☐ No	MS/MSD: ☐ Yes ☑ No ☐ N/A	8.
Correct Containers Used:	☑ Yes ☐ No	9.
-Pace Containers Used:	☑ Yes ☐ No ☐ N/A	
-Pace IR Containers Used:	☐ Yes ☐ No ☑ N/A	
Containers Intact:	☑ Yes ☐ No	10.
Filtered volume received for Dissolved tests	☐ Yes ☐ No ☑ N/A	11.
Sample Labels match COC:	☑ Yes ☐ No ☐ N/A	12.
-Includes date/time/ID/Analysis Matrix: W		
Trip Blank Present:	☐ Yes ☐ No ☑ N/A	13.
Trip Blank Custody Seals Present	☐ Yes ☐ No ☑ N/A	
Pace Trip Blank Lot # (if purchased):		

Client Notification/ Resolution:

If checked, see attached form for additional comments ☐

Person Contacted: Date/Time:

Comments/ Resolution:

Project Manager Review: AL for DM **Date:** 4/4/19

A2 October 2019 Detection Monitoring

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

October 28, 2019

Meghan Blodgett
SCS ENGINEERS
2830 Dairy Drive
Madison, WI 53718

RE: Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196897

Dear Meghan Blodgett:

Enclosed are the analytical results for sample(s) received by the laboratory on October 10, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

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

Sincerely,

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

Enclosures

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

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CERTIFICATIONS

Project:	25219067.00 COLUMBIA CCR
Pace Project No.:	40196897

Green Bay Certification IDs

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

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SAMPLE SUMMARY

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196897

Lab ID	Sample ID	Matrix	Date Collected	Date Received
40196971009	**MW-306**	Water	10/08/19 10:55	10/10/19 09:15
40196971010	**MW-307**	Water	10/07/19 10:05	10/10/19 09:15
40196971011	**MW-308**	Water	10/07/19 13:55	10/10/19 09:15
40196971012	**FIELD BLANK SCPOND**	Water	10/08/19 10:55	10/10/19 09:15

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SAMPLE ANALYTE COUNT

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196897

Lab ID	Sample ID	Method	Analysts	Analytes Reported
40196971009	**MW-306**	EPA 6020	DS1	2
			HMG	7
		SM 2540C	TMK	1
		EPA 9040	ALY	1
		EPA 300.0	HMB	3
40196971010	**MW-307**	EPA 6020	DS1	2
			HMG	7
		SM 2540C	TMK	1
		EPA 9040	ALY	1
		EPA 300.0	HMB	3
40196971011	**MW-308**	EPA 6020	DS1	2
			HMG	7
		SM 2540C	TMK	1
		EPA 9040	ALY	1
		EPA 300.0	HMB	3
40196971012	**FIELD BLANK SCPOND**	EPA 6020	DS1	2
		SM 2540C	TMK	1
		EPA 9040	ALY	1
		EPA 300.0	HMB	3

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ANALYTICAL RESULTS

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196897

Sample: MW-306 **Lab ID: 40196971009** Collected: 10/08/19 10:55 Received: 10/10/19 09:15 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Boron	**134**	ug/L	10.0	3.0	1	10/11/19 07:55	10/15/19 11:20	7440-42-8	
Calcium	**92800**	ug/L	254	76.2	1	10/11/19 07:55	10/15/19 11:20	7440-70-2	
Field Data	Analytical Method:								
Field pH	**7.28**	Std. Units			1		10/08/19 10:55		
Field Specific Conductance	**583.0**	umhos/cm			1		10/08/19 10:55		
Oxygen, Dissolved	**9.80**	mg/L			1		10/08/19 10:55	7782-44-7	
REDOX	**109.1**	mV			1		10/08/19 10:55		
Turbidity	**1.27**	NTU			1		10/08/19 10:55		
Static Water Level	**787.47**	feet			1		10/08/19 10:55		
Temperature, Water (C)	**13.1**	deg C			1		10/08/19 10:55		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**328**	mg/L	20.0	8.7	1		10/11/19 18:22		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**7.3**	Std. Units	0.10	0.010	1		10/22/19 10:26		H6
300.0 IC Anions	Analytical Method: EPA 300.0								
Chloride	**0.64J**	mg/L	2.0	0.50	1		10/21/19 21:17	16887-00-6	
Fluoride	**<0.10**	mg/L	0.30	0.10	1		10/21/19 21:17	16984-48-8	
Sulfate	**7.8**	mg/L	3.0	1.0	1		10/21/19 21:17	14808-79-8	

Sample: MW-307 **Lab ID: 40196971010** Collected: 10/07/19 10:05 Received: 10/10/19 09:15 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Boron	**242**	ug/L	10.0	3.0	1	10/11/19 07:55	10/15/19 11:27	7440-42-8	
Calcium	**75800**	ug/L	254	76.2	1	10/11/19 07:55	10/15/19 11:27	7440-70-2	
Field Data	Analytical Method:								
Field pH	**7.24**	Std. Units			1		10/07/19 10:05		
Field Specific Conductance	**618.2**	umhos/cm			1		10/07/19 10:05		
Oxygen, Dissolved	**0.11**	mg/L			1		10/07/19 10:05	7782-44-7	
REDOX	**-98.7**	mV			1		10/07/19 10:05		
Turbidity	**1.83**	NTU			1		10/07/19 10:05		
Static Water Level	**786.99**	feet			1		10/07/19 10:05		
Temperature, Water (C)	**14.3**	deg C			1		10/07/19 10:05		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**336**	mg/L	20.0	8.7	1		10/11/19 18:22		

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
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ANALYTICAL RESULTS

Project: 25219067.00 COLUMBIA CCR

Pace Project No.: 40196897

Sample: MW-307 **Lab ID: 40196971010** Collected: 10/07/19 10:05 Received: 10/10/19 09:15 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**7.5**	Std. Units	0.10	0.010	1		10/22/19 10:48		H6
300.0 IC Anions	Analytical Method: EPA 300.0								
Chloride	**9.3**	mg/L	2.0	0.50	1		10/21/19 22:10	16887-00-6	
Fluoride	**<0.10**	mg/L	0.30	0.10	1		10/21/19 22:10	16984-48-8	
Sulfate	**27.8**	mg/L	3.0	1.0	1		10/21/19 22:10	14808-79-8	

Sample: MW-308 **Lab ID: 40196971011** Collected: 10/07/19 13:55 Received: 10/10/19 09:15 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Boron	**694**	ug/L	10.0	3.0	1	10/11/19 07:55	10/15/19 11:34	7440-42-8	
Calcium	**131000**	ug/L	254	76.2	1	10/11/19 07:55	10/15/19 11:34	7440-70-2	
Field Data	Analytical Method:								
Field pH	**7.48**	Std. Units			1		10/07/19 13:55		
Field Specific Conductance	**896**	umhos/cm			1		10/07/19 13:55		
Oxygen, Dissolved	**0.07**	mg/L			1		10/07/19 13:55	7782-44-7	
REDOX	**-170.0**	mV			1		10/07/19 13:55		
Turbidity	**6.75**	NTU			1		10/07/19 13:55		
Static Water Level	**787.18**	feet			1		10/07/19 13:55		
Temperature, Water (C)	**15.0**	deg C			1		10/07/19 13:55		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**470**	mg/L	20.0	8.7	1		10/11/19 18:22		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**7.4**	Std. Units	0.10	0.010	1		10/22/19 10:50		H6
300.0 IC Anions	Analytical Method: EPA 300.0								
Chloride	**1.6J**	mg/L	2.0	0.50	1		10/21/19 22:23	16887-00-6	
Fluoride	**<0.10**	mg/L	0.30	0.10	1		10/21/19 22:23	16984-48-8	
Sulfate	**<1.0**	mg/L	3.0	1.0	1		10/21/19 22:23	14808-79-8	

Sample: FIELD BLANK SCPOND **Lab ID: 40196971012** Collected: 10/08/19 10:55 Received: 10/10/19 09:15 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Boron	**<3.0**	ug/L	10.0	3.0	1	10/11/19 07:55	10/15/19 08:20	7440-42-8	
Calcium	**<76.2**	ug/L	254	76.2	1	10/11/19 07:55	10/15/19 08:20	7440-70-2	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196897

Sample: FIELD BLANK SCPOND **Lab ID: 40196971012** Collected: 10/08/19 10:55 Received: 10/10/19 09:15 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**<8.7**	mg/L	20.0	8.7	1		10/11/19 18:22		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**6.5**	Std. Units	0.10	0.010	1		10/22/19 10:53		H6
300.0 IC Anions	Analytical Method: EPA 300.0								
Chloride	**<0.50**	mg/L	2.0	0.50	1		10/22/19 17:30	16887-00-6	
Fluoride	**<0.10**	mg/L	0.30	0.10	1		10/22/19 17:30	16984-48-8	
Sulfate	**<1.0**	mg/L	3.0	1.0	1		10/22/19 17:30	14808-79-8	

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QUALITY CONTROL DATA

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196897

QC Batch: 337095 | Analysis Method: EPA 6020
QC Batch Method: EPA 3010 | Analysis Description: 6020 MET
Associated Lab Samples: 40196971009, 40196971010, 40196971011, 40196971012

METHOD BLANK: 1957892 | Matrix: Water
Associated Lab Samples: 40196971009, 40196971010, 40196971011, 40196971012

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Boron	ug/L	<3.0	10.0	10/15/19 07:53	
Calcium	ug/L	<76.2	254	10/15/19 07:53	

LABORATORY CONTROL SAMPLE: 1957893

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Boron	ug/L	500	474	95	80-120	
Calcium	ug/L	5000	5060	101	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1957894 1957895

Parameter	Units	40196734001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Boron	ug/L	7220	500	500	7950	8800	146	316	75-125	10	20	P6
Calcium	ug/L	87600	5000	5000	95700	98200	161	210	75-125	3	20	P6

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

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QUALITY CONTROL DATA

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196897

QC Batch: 337218 | Analysis Method: SM 2540C
QC Batch Method: SM 2540C | Analysis Description: 2540C Total Dissolved Solids
Associated Lab Samples: 40196971009, 40196971010, 40196971011, 40196971012

METHOD BLANK: 1959158 | Matrix: Water
Associated Lab Samples: 40196971009, 40196971010, 40196971011, 40196971012

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	<8.7	20.0	10/11/19 18:18	

LABORATORY CONTROL SAMPLE: 1959159

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Dissolved Solids	mg/L	547	560	102	80-120	

SAMPLE DUPLICATE: 1959160

Parameter	Units	40196967001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	574	564	2	10	

SAMPLE DUPLICATE: 1959161

Parameter	Units	40196971001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	274	278	1	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.

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QUALITY CONTROL DATA

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196897

QC Batch: 338272 | Analysis Method: EPA 9040
QC Batch Method: EPA 9040 | Analysis Description: 9040 pH
Associated Lab Samples: 40196971009, 40196971010, 40196971011, 40196971012

SAMPLE DUPLICATE: 1964592

Parameter	Units	40196615004 Result	Dup Result	RPD	Max RPD	Qualifiers
pH at 25 Degrees C	Std. Units	7.6	7.7	1	20	H6

SAMPLE DUPLICATE: 1964593

Parameter	Units	40196971009 Result	Dup Result	RPD	Max RPD	Qualifiers
pH at 25 Degrees C	Std. Units	7.3	7.3	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.

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QUALITY CONTROL DATA

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196897

QC Batch: 337822 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 40196971009, 40196971010, 40196971011

METHOD BLANK: 1962191 Matrix: Water
Associated Lab Samples: 40196971009, 40196971010, 40196971011

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chloride	mg/L	<0.50	2.0	10/21/19 11:34	
Fluoride	mg/L	<0.10	0.30	10/21/19 11:34	
Sulfate	mg/L	<1.0	3.0	10/21/19 11:34	

LABORATORY CONTROL SAMPLE: 1962192

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	20	20.1	101	90-110	
Fluoride	mg/L	2	2.0	102	90-110	
Sulfate	mg/L	20	20.1	100	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1962193 1962194

Parameter	Units	40196954007 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	14.1	20	20	33.8	33.6	99	98	90-110	1	15	
Fluoride	mg/L	<0.10	2	2	2.1	2.1	102	102	90-110	0	15	
Sulfate	mg/L	7.2	20	20	27.0	26.9	99	98	90-110	0	15	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1962195 1962196

Parameter	Units	40196971011 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	1.6J	20	20	20.9	21.3	97	99	90-110	2	15	
Fluoride	mg/L	<0.10	2	2	2.1	2.1	102	102	90-110	0	15	
Sulfate	mg/L	<1.0	20	20	20.6	20.4	102	101	90-110	1	15	

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

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QUALITY CONTROL DATA

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196897

QC Batch: 337894 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 40196971012

METHOD BLANK: 1962626 Matrix: Water
Associated Lab Samples: 40196971012

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chloride	mg/L	<0.50	2.0	10/22/19 12:43	
Fluoride	mg/L	<0.10	0.30	10/22/19 12:43	
Sulfate	mg/L	<1.0	3.0	10/22/19 12:43	

LABORATORY CONTROL SAMPLE: 1962627

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	20	19.5	98	90-110	
Fluoride	mg/L	2	2.0	100	90-110	
Sulfate	mg/L	20	19.5	97	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1962628 1962629

Parameter	Units	40196978001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	12.8	100	100	115	117	102	104	90-110	2	15	
Fluoride	mg/L	<0.50	10	10	10.7	10.9	106	108	90-110	2	15	
Sulfate	mg/L	63.0	100	100	161	163	98	100	90-110	2	15	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1962630 1962631

Parameter	Units	40197074003 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	6.1	20	20	26.1	26.3	100	101	90-110	1	15	
Fluoride	mg/L	<0.10	2	2	2.1	2.1	101	102	90-110	1	15	
Sulfate	mg/L	6.2	20	20	25.9	26.1	98	99	90-110	1	15	

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

QUALIFIERS

Project:	25219067.00 COLUMBIA CCR
Pace Project No.:	40196897

DEFINITIONS

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

ND - Not Detected at or above LOD.

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

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

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

S - Surrogate

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

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

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

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

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

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

TNI - The NELAC Institute.

ANALYTE QUALIFIERS

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

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196897

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
40196971009	**MW-306**	EPA 3010	337095	EPA 6020	337193
40196971010	**MW-307**	EPA 3010	337095	EPA 6020	337193
40196971011	**MW-308**	EPA 3010	337095	EPA 6020	337193
40196971012	**FIELD BLANK SCPOND**	EPA 3010	337095	EPA 6020	337193
40196971009	**MW-306**				
40196971010	**MW-307**				
40196971011	**MW-308**				
40196971009	**MW-306**	SM 2540C	337218		
40196971010	**MW-307**	SM 2540C	337218		
40196971011	**MW-308**	SM 2540C	337218		
40196971012	**FIELD BLANK SCPOND**	SM 2540C	337218		
40196971009	**MW-306**	EPA 9040	338272		
40196971010	**MW-307**	EPA 9040	338272		
40196971011	**MW-308**	EPA 9040	338272		
40196971012	**FIELD BLANK SCPOND**	EPA 9040	338272		
40196971009	**MW-306**	EPA 300.0	337822		
40196971010	**MW-307**	EPA 300.0	337822		
40196971011	**MW-308**	EPA 300.0	337822		
40196971012	**FIELD BLANK SCPOND**	EPA 300.0	337894		

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

CHAIN OF CUSTODY

(Please Print Clearly)

Company Name:	SCS Engineers
Branch/Location:	Madison, WI.
Project Contact:	Tom Karwoski
Phone:	608-224-2830
Project Number:	25219067.00
Project Name:	Columbia
Project State:	Wisconsin
Sampled By (Print):	Adam Watson
Sampled By (Sign):	
PO #:	
Regulatory Program:	

Quote #:	
Mail To Contact:	Tom Karwoski
Mail To Company:	SCS Engineers
Mail To Address:	2830 Dairy Dr Madison, WI 53718
Invoice To Contact:	Same
Invoice To Company:	
Invoice To Address:	
Invoice To Phone:	

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

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

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

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

PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX	Boron/Calcium	pH	TDS, Cl, F, SO4	CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)	Profile #
	FILTERED? (YES/NO) Y/N				N	N	N			
	PRESERVATION (CODE)* Pick Letter				D	A	A			
	MW-302	10/9/19	1100	W	X	X	X		001	
	MW-33AR	10/8/19	1540	W	X	X	X		002	
	MW-34A	10/8/19	1435	W	X	X	X		003	
	Field blank Mod I-3LF	10/8/19	1435	W	X	X	X		004	
	MW-309	10/8/19	1150	W	X	X	X		005	
	MW-310	10/8/19	1250	W	X	X	X		006	
	MW-311	10/8/19	1340	W	X	X	X		007	
	Field blank Mod 4	10/8/19	1150	W	X	X	X		008	
	MW-306	10/8/19	1055	W	X	X	X		009	
	MW-307	10/7/19	1005	W	X	X	X		010	
	MW-308	10/7/19	1355	W	X	X	X		011	
	Field blank SCPOND	10/8/19	1055	W	X	X	X		012	

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

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

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

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

Relinquished By:	Date/Time:	Received By:	Date/Time:
	10/9/19 1600		
CS Logistics	10/10/19 0915		10/10/19 0915

PACE Project No. 4096971

Receipt Temp = ROI °C

Sample Receipt pH
OK / Adjusted

Cooler Custody Seal
Present / Not Present
Intact / Not Intact

Version 6.0 06/14/06

C019a(27Jun2006)

ORIGINAL

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1241 Bellevue Street, Suite 9
Green Bay, WI 54302

Sample Preservation Receipt Form

Client Name: SCS Engineers Project # 40196971

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

Lab Lot# of pH paper: 10US0891 Lab Std #ID of preservation (if pH adjusted):

Initial when completed: [initials] Date/Time:

Pace Lab #	AG1U	AG1H	AG4S	AG4U	AG5U	AG2S	BG3U	BP1U	BP2N	BP2Z	BP3U	BP3B	BP3N	BP3S	DG9A	DG9T	VG9U	VG9H	VG9M	VG9D	JGFU	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)
	Glass							Plastic							Vials						Jars			General									
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		1																		X		2.5 / 5 / 10
006											2		1																		X		2.5 / 5 / 10
007											2		1																		X		2.5 / 5 / 10
008											2		1																		X		2.5 / 5 / 10
009											2		1																		X		2.5 / 5 / 10
010											2		1																		X		2.5 / 5 / 10
011											2		1																		X		2.5 / 5 / 10
012											2		1																		X		2.5 / 5 / 10
013																																	2.5 / 5 / 10
014																																	2.5 / 5 / 10
015																																	2.5 / 5 / 10
016																																	2.5 / 5 / 10
017																																	2.5 / 5 / 10
018																																	2.5 / 5 / 10
019																																	2.5 / 5 / 10
020																																	2.5 / 5 / 10

10/10/17

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	DG9A	40 mL amber ascorbic	JGFU	4 oz amber jar unpres
AG1H	1 liter amber glass HCL	BP2N	500 mL plastic HNO3	DG9T	40 mL amber Na Thio	WGFU	4 oz clear jar unpres
AG4S	125 mL amber glass H2SO4	BP2Z	500 mL plastic NaOH, Znact	VG9U	40 mL clear vial unpres	WPFU	4 oz plastic jar unpres
AG4U	120 mL amber glass unpres	BP3U	250 mL plastic unpres	VG9H	40 mL clear vial HCL		
AG5U	100 mL amber glass unpres	BP3B	250 mL plastic NaOH	VG9M	40 mL clear vial MeOH	SP5T	120 mL plastic Na Thiosulfate
AG2S	500 mL amber glass H2SO4	BP3N	250 mL plastic HNO3	VG9D	40 mL clear vial DI	ZPLC	ziploc bag
BG3U	250 mL clear glass unpres	BP3S	250 mL plastic H2SO4			GN:	

Pace Analytical 1241 Bellevue Street, Green Bay, WI 54302	Document Name: **Sample Condition Upon Receipt (SCUR)**	Document Revised: 25Apr2018
	Document No.: **F-GB-C-031-Rev.07**	Issuing Authority: Pace Green Bay Quality Office

Sample Condition Upon Receipt Form (SCUR)

Project #: **WO#: 40196971**

40196971

Client Name: SCS Engineers

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

Tracking #: 2120. 100919

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 plastic bag

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

Cooler Temperature Uncorr: ROT /Corr: —

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.

Person examining contents:
Date: 10/10/19
Initials: JW

Chain of Custody Present:	☒Yes ☐No ☐N/A	1.
Chain of Custody Filled Out:	☒Yes ☐No ☐N/A	2.
Chain of Custody Relinquished:	☒Yes ☐No ☐N/A	3.
Sampler Name & Signature on COC:	☒Yes ☐No ☐N/A	4.
Samples Arrived within Hold Time: - 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: ______

Project Manager Review: [signature] DM **Date:** 10-10-19

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

November 01, 2019

Meghan Blodgett
SCS ENGINEERS
2830 Dairy Drive
Madison, WI 53718

RE: Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196970

Dear Meghan Blodgett:

Enclosed are the analytical results for sample(s) received by the laboratory on October 10, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

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

Sincerely,

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

Enclosures

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

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CERTIFICATIONS

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196970

Pennsylvania Certification IDs

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

Green Bay Certification IDs

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

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SAMPLE SUMMARY

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196970

Lab ID	Sample ID	Matrix	Date Collected	Date Received
40196970001	**MW-301**	Water	10/09/19 12:00	10/10/19 09:15
40196970002	**MW-84A**	Water	10/09/19 13:10	10/10/19 09:15

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SAMPLE ANALYTE COUNT

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196970

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
40196970001	**MW-301**	EPA 6020	DS1	14	PASI-G
		EPA 7470	AJT	1	PASI-G
			HMG	7	PASI-G
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
		Total Radium Calculation	CMC	1	PASI-PA
		SM 2540C	TMK	1	PASI-G
		EPA 9040	ALY	1	PASI-G
		EPA 300.0	HMB	3	PASI-G
40196970002	**MW-84A**	EPA 6020	DS1	14	PASI-G
		EPA 7470	AJT	1	PASI-G
			HMG	7	PASI-G
		EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
		Total Radium Calculation	CMC	1	PASI-PA
		SM 2540C	TMK	1	PASI-G
		EPA 9040	ALY	1	PASI-G
		EPA 300.0	HMB	3	PASI-G

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ANALYTICAL RESULTS

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196970

Sample: MW-301 **Lab ID: 40196970001** Collected: 10/09/19 12:00 Received: 10/10/19 09:15 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Antimony	**<0.15**	ug/L	1.0	0.15	1	10/14/19 07:07	10/14/19 23:25	7440-36-0	
Arsenic	**0.42J**	ug/L	1.0	0.28	1	10/14/19 07:07	10/15/19 12:57	7440-38-2	
Barium	**10**	ug/L	2.3	0.70	1	10/14/19 07:07	10/14/19 23:25	7440-39-3	
Beryllium	**<0.25**	ug/L	1.0	0.25	1	10/14/19 07:07	10/15/19 12:57	7440-41-7	
Boron	**35.9**	ug/L	10.0	3.0	1	10/14/19 07:07	10/15/19 12:57	7440-42-8	
Cadmium	**<0.15**	ug/L	1.0	0.15	1	10/14/19 07:07	10/14/19 23:25	7440-43-9	
Calcium	**114000**	ug/L	254	76.2	1	10/14/19 07:07	10/15/19 12:57	7440-70-2	
Chromium	**<1.0**	ug/L	3.4	1.0	1	10/14/19 07:07	10/15/19 12:57	7440-47-3	
Cobalt	**<0.12**	ug/L	1.0	0.12	1	10/14/19 07:07	10/15/19 12:57	7440-48-4	
Lead	**<0.24**	ug/L	1.0	0.24	1	10/14/19 07:07	10/14/19 23:25	7439-92-1	
Lithium	**0.61J**	ug/L	1.0	0.22	1	10/14/19 07:07	10/15/19 12:57	7439-93-2	
Molybdenum	**<0.44**	ug/L	1.5	0.44	1	10/14/19 07:07	10/14/19 23:25	7439-98-7	
Selenium	**<0.32**	ug/L	1.1	0.32	1	10/14/19 07:07	10/15/19 12:57	7782-49-2	
Thallium	**<0.14**	ug/L	1.0	0.14	1	10/14/19 07:07	10/14/19 23:25	7440-28-0	
7470 Mercury	Analytical Method: EPA 7470 Preparation Method: EPA 7470								
Mercury	**<0.084**	ug/L	0.28	0.084	1	10/22/19 14:50	10/23/19 09:18	7439-97-6	
Field Data	Analytical Method:								
Field pH	**6.67**	Std. Units			1		10/09/19 12:00		
Field Specific Conductance	**801**	umhos/cm			1		10/09/19 12:00		
Oxygen, Dissolved	**1.67**	mg/L			1		10/09/19 12:00	7782-44-7	
REDOX	**173.0**	mV			1		10/09/19 12:00		
Turbidity	**2.12**	NTU			1		10/09/19 12:00		
Static Water Level	**788.47**	feet			1		10/09/19 12:00		
Temperature, Water (C)	**11.3**	deg C			1		10/09/19 12:00		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**418**	mg/L	20.0	8.7	1		10/15/19 16:41		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**7.0**	Std. Units	0.10	0.010	1		10/18/19 09:42		H6
300.0 IC Anions	Analytical Method: EPA 300.0								
Chloride	**1.7J**	mg/L	2.0	0.50	1		10/21/19 18:26	16887-00-6	
Fluoride	**<0.10**	mg/L	0.30	0.10	1		10/21/19 18:26	16984-48-8	
Sulfate	**8.4**	mg/L	3.0	1.0	1		10/21/19 18:26	14808-79-8	

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ANALYTICAL RESULTS

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196970

Sample: MW-84A **Lab ID: 40196970002** Collected: 10/09/19 13:10 Received: 10/10/19 09:15 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Antimony	**<0.15**	ug/L	1.0	0.15	1	10/14/19 07:07	10/14/19 23:46	7440-36-0	
Arsenic	**0.46J**	ug/L	1.0	0.28	1	10/14/19 07:07	10/15/19 13:34	7440-38-2	
Barium	**13.2**	ug/L	2.3	0.70	1	10/14/19 07:07	10/14/19 23:46	7440-39-3	
Beryllium	**<0.25**	ug/L	1.0	0.25	1	10/14/19 07:07	10/15/19 13:34	7440-41-7	
Boron	**12.0**	ug/L	10.0	3.0	1	10/14/19 07:07	10/15/19 13:34	7440-42-8	
Cadmium	**<0.15**	ug/L	1.0	0.15	1	10/14/19 07:07	10/15/19 13:34	7440-43-9	
Calcium	**73500**	ug/L	254	76.2	1	10/14/19 07:07	10/15/19 13:34	7440-70-2	
Chromium	**1.6J**	ug/L	3.4	1.0	1	10/14/19 07:07	10/15/19 13:34	7440-47-3	
Cobalt	**<0.12**	ug/L	1.0	0.12	1	10/14/19 07:07	10/15/19 13:34	7440-48-4	
Lead	**<0.24**	ug/L	1.0	0.24	1	10/14/19 07:07	10/14/19 23:46	7439-92-1	
Lithium	**0.52J**	ug/L	1.0	0.22	1	10/14/19 07:07	10/15/19 13:34	7439-93-2	
Molybdenum	**<0.44**	ug/L	1.5	0.44	1	10/14/19 07:07	10/15/19 13:34	7439-98-7	
Selenium	**<0.32**	ug/L	1.1	0.32	1	10/14/19 07:07	10/15/19 13:34	7782-49-2	
Thallium	**<0.14**	ug/L	1.0	0.14	1	10/14/19 07:07	10/14/19 23:46	7440-28-0	
7470 Mercury	Analytical Method: EPA 7470 Preparation Method: EPA 7470								
Mercury	**<0.084**	ug/L	0.28	0.084	1	10/22/19 14:50	10/23/19 09:25	7439-97-6	
Field Data	Analytical Method:								
Field pH	**7.23**	Std. Units			1		10/09/19 13:10		
Field Specific Conductance	**614.1**	umhos/cm			1		10/09/19 13:10		
Oxygen, Dissolved	**11.36**	mg/L			1		10/09/19 13:10	7782-44-7	
REDOX	**181.7**	mV			1		10/09/19 13:10		
Turbidity	**2.41**	NTU			1		10/09/19 13:10		
Static Water Level	**787.79**	feet			1		10/09/19 13:10		
Temperature, Water (C)	**11.8**	deg C			1		10/09/19 13:10		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**310**	mg/L	20.0	8.7	1		10/15/19 16:41		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**7.5**	Std. Units	0.10	0.010	1		10/18/19 09:44		H6
300.0 IC Anions	Analytical Method: EPA 300.0								
Chloride	**3.9**	mg/L	2.0	0.50	1		10/21/19 19:19	16887-00-6	
Fluoride	**<0.10**	mg/L	0.30	0.10	1		10/21/19 19:19	16984-48-8	
Sulfate	**1.3J**	mg/L	3.0	1.0	1		10/21/19 19:19	14808-79-8	

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QUALITY CONTROL DATA

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196970

QC Batch: 338359 | Analysis Method: EPA 7470
QC Batch Method: EPA 7470 | Analysis Description: 7470 Mercury
Associated Lab Samples: 40196970001, 40196970002

METHOD BLANK: 1964880 | Matrix: Water
Associated Lab Samples: 40196970001, 40196970002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mercury	ug/L	<0.084	0.28	10/23/19 09:14	

LABORATORY CONTROL SAMPLE: 1964881

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury	ug/L	5	5.3	105	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1964882 1964883

Parameter	Units	40196970001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mercury	ug/L	<0.084	5	5	5.1	5.0	101	100	85-115	1	20	

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QUALITY CONTROL DATA

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196970

QC Batch: 337277 | Analysis Method: EPA 6020
QC Batch Method: EPA 3010 | Analysis Description: 6020 MET
Associated Lab Samples: 40196970001, 40196970002

METHOD BLANK: 1959950 | Matrix: Water
Associated Lab Samples: 40196970001, 40196970002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Antimony	ug/L	<0.15	1.0	10/14/19 18:40	
Arsenic	ug/L	<0.28	1.0	10/14/19 18:40	
Barium	ug/L	<0.70	2.3	10/14/19 18:40	
Beryllium	ug/L	<0.25	1.0	10/14/19 18:40	
Boron	ug/L	<3.0	10.0	10/14/19 18:40	
Cadmium	ug/L	<0.15	1.0	10/14/19 18:40	
Calcium	ug/L	<76.2	254	10/14/19 18:40	
Chromium	ug/L	<1.0	3.4	10/14/19 18:40	
Cobalt	ug/L	<0.12	1.0	10/14/19 18:40	
Lead	ug/L	<0.24	1.0	10/14/19 18:40	
Lithium	ug/L	<0.22	1.0	10/14/19 18:40	
Molybdenum	ug/L	<0.44	1.5	10/14/19 18:40	
Selenium	ug/L	<0.32	1.1	10/14/19 18:40	
Thallium	ug/L	<0.14	1.0	10/14/19 18:40	

LABORATORY CONTROL SAMPLE: 1959951

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Antimony	ug/L	500	497	99	80-120	
Arsenic	ug/L	500	478	96	80-120	
Barium	ug/L	500	477	95	80-120	
Beryllium	ug/L	500	488	98	80-120	
Boron	ug/L	500	464	93	80-120	
Cadmium	ug/L	500	501	100	80-120	
Calcium	ug/L	5000	5080	102	80-120	
Chromium	ug/L	500	478	96	80-120	
Cobalt	ug/L	500	467	93	80-120	
Lead	ug/L	500	470	94	80-120	
Lithium	ug/L	500	477	95	80-120	
Molybdenum	ug/L	500	452	90	80-120	
Selenium	ug/L	500	494	99	80-120	
Thallium	ug/L	500	476	95	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1959952 1959953

Parameter	Units	40196861005 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Antimony	ug/L	<0.15	500	500	513	510	103	102	75-125	1	20	

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QUALITY CONTROL DATA

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196970

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1959952 1959953

Parameter	Units	40196861005 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Arsenic	ug/L	2.4	500	500	512	504	102	100	75-125	2	20	
Barium	ug/L	169	500	500	671	672	100	101	75-125	0	20	
Beryllium	ug/L	<0.25	500	500	513	469	103	94	75-125	9	20	
Boron	ug/L	73.0	500	500	582	529	102	91	75-125	10	20	
Cadmium	ug/L	<0.15	500	500	514	512	103	102	75-125	0	20	
Calcium	ug/L	90300	5000	5000	96800	99900	130	192	75-125	3	20	P6
Chromium	ug/L	<1.0	500	500	492	486	98	97	75-125	1	20	
Cobalt	ug/L	<0.12	500	500	488	484	98	97	75-125	1	20	
Lead	ug/L	<0.24	500	500	489	489	98	98	75-125	0	20	
Lithium	ug/L	12.4	500	500	518	476	101	93	75-125	8	20	
Molybdenum	ug/L	2.6	500	500	477	476	95	95	75-125	0	20	
Selenium	ug/L	<0.32	500	500	524	521	105	104	75-125	1	20	
Thallium	ug/L	<0.14	500	500	502	502	100	100	75-125	0	20	

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QUALITY CONTROL DATA

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196970

QC Batch: 337571 Analysis Method: SM 2540C
QC Batch Method: SM 2540C Analysis Description: 2540C Total Dissolved Solids
Associated Lab Samples: 40196970001, 40196970002

METHOD BLANK: 1960873 Matrix: Water
Associated Lab Samples: 40196970001, 40196970002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	<8.7	20.0	10/15/19 16:39	

LABORATORY CONTROL SAMPLE: 1960874

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Dissolved Solids	mg/L	547	558	102	80-120	

SAMPLE DUPLICATE: 1960875

Parameter	Units	40196939001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	354	368	4	10	

SAMPLE DUPLICATE: 1960876

Parameter	Units	40196970001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	418	406	3	10	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196970

QC Batch: 337952 | Analysis Method: EPA 9040
QC Batch Method: EPA 9040 | Analysis Description: 9040 pH
Associated Lab Samples: 40196970001, 40196970002

SAMPLE DUPLICATE: 1962801

Parameter	Units	40196967002 Result	Dup Result	RPD	Max RPD	Qualifiers
pH at 25 Degrees C	Std. Units	7.3	7.3	0	20	H6

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QUALITY CONTROL DATA

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196970

QC Batch: 337822 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 40196970001, 40196970002

METHOD BLANK: 1962191 Matrix: Water
Associated Lab Samples: 40196970001, 40196970002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chloride	mg/L	<0.50	2.0	10/21/19 11:34	
Fluoride	mg/L	<0.10	0.30	10/21/19 11:34	
Sulfate	mg/L	<1.0	3.0	10/21/19 11:34	

LABORATORY CONTROL SAMPLE: 1962192

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	20	20.1	101	90-110	
Fluoride	mg/L	2	2.0	102	90-110	
Sulfate	mg/L	20	20.1	100	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1962193 1962194

Parameter	Units	40196954007 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	14.1	20	20	33.8	33.6	99	98	90-110	1	15	
Fluoride	mg/L	<0.10	2	2	2.1	2.1	102	102	90-110	0	15	
Sulfate	mg/L	7.2	20	20	27.0	26.9	99	98	90-110	0	15	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1962195 1962196

Parameter	Units	40196971011 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	1.6J	20	20	20.9	21.3	97	99	90-110	2	15	
Fluoride	mg/L	<0.10	2	2	2.1	2.1	102	102	90-110	0	15	
Sulfate	mg/L	<1.0	20	20	20.6	20.4	102	101	90-110	1	15	

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ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196970

Sample: MW-301 **Lab ID: 40196970001** Collected: 10/09/19 12:00 Received: 10/10/19 09:15 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	**0.252 ± 0.351 (0.585) C:NA T:83%**	pCi/L	10/31/19 12:20	13982-63-3	
Radium-228	EPA 904.0	**0.449 ± 0.363 (0.723) C:77% T:95%**	pCi/L	10/30/19 14:23	15262-20-1	
Total Radium	Total Radium Calculation	**0.701 ± 0.714 (1.31)**	pCi/L	11/01/19 15:00	7440-14-4	

Sample: MW-84A **Lab ID: 40196970002** Collected: 10/09/19 13:10 Received: 10/10/19 09:15 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	**0.247 ± 0.292 (0.459) C:NA T:101%**	pCi/L	10/31/19 12:20	13982-63-3	
Radium-228	EPA 904.0	**-0.0240 ± 0.355 (0.827) C:78% T:89%**	pCi/L	10/30/19 14:24	15262-20-1	
Total Radium	Total Radium Calculation	**0.247 ± 0.647 (1.29)**	pCi/L	11/01/19 15:00	7440-14-4	

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QUALITY CONTROL - RADIOCHEMISTRY

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196970

QC Batch: 366494 | Analysis Method: EPA 903.1
QC Batch Method: EPA 903.1 | Analysis Description: 903.1 Radium-226
Associated Lab Samples: 40196970001, 40196970002

METHOD BLANK: 1777728 | Matrix: Water
Associated Lab Samples: 40196970001, 40196970002

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-226	0.0468 ± 0.331 (0.660) C:NA T:87%	pCi/L	10/31/19 12:20	

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QUALITY CONTROL - RADIOCHEMISTRY

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196970

QC Batch: 366493 | Analysis Method: EPA 904.0
QC Batch Method: EPA 904.0 | Analysis Description: 904.0 Radium 228
Associated Lab Samples: 40196970001, 40196970002

METHOD BLANK: 1777725 | Matrix: Water
Associated Lab Samples: 40196970001, 40196970002

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-228	-0.00340 ± 0.362 (0.843) C:80% T:79%	pCi/L	10/30/19 14:21	

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QUALIFIERS

Project:	25219067.00 COLUMBIA CCR
Pace Project No.:	40196970

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.

LABORATORIES

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

ANALYTE QUALIFIERS

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

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 25219067.00 COLUMBIA CCR
Pace Project No.: 40196970

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
40196970001	**MW-301**	EPA 3010	337277	EPA 6020	337400
40196970002	**MW-84A**	EPA 3010	337277	EPA 6020	337400
40196970001	**MW-301**	EPA 7470	338359	EPA 7470	338406
40196970002	**MW-84A**	EPA 7470	338359	EPA 7470	338406
40196970001	**MW-301**				
40196970002	**MW-84A**				
40196970001	**MW-301**	EPA 903.1	366494		
40196970002	**MW-84A**	EPA 903.1	366494		
40196970001	**MW-301**	EPA 904.0	366493		
40196970002	**MW-84A**	EPA 904.0	366493		
40196970001	**MW-301**	Total Radium Calculation	369027		
40196970002	**MW-84A**	Total Radium Calculation	369027		
40196970001	**MW-301**	SM 2540C	337571		
40196970002	**MW-84A**	SM 2540C	337571		
40196970001	**MW-301**	EPA 9040	337952		
40196970002	**MW-84A**	EPA 9040	337952		
40196970001	**MW-301**	EPA 300.0	337822		
40196970002	**MW-84A**	EPA 300.0	337822		

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

CHAIN OF CUSTODY

(Please Print Clearly)

Company Name:	SCS Engineers
Branch/Location:	Madison, WI
Project Contact:	Tom Karwoski
Phone:	608-224-2830
Project Number:	25219067.00
Project Name:	Columbia
Project State:	Wisconsin
Sampled By (Print):	Adam Watson
Sampled By (Sign):	
PO #:	
Regulatory Program:	

Quote #:	
Mail To Contact:	Tom Karwoski
Mail To Company:	SCS Engineers
Mail To Address:	2830 Dairy Dr. Madison, WI 53718
Invoice To Contact:	
Invoice To Company:	
Invoice To Address:	
Invoice To Phone:	

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

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

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

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

					Analyses Requested					
				FILTERED? (YES/NO) Y/N	N	N	N	N		
				PRESERVATION (CODE)* Pick Letter	D	D	A	A		
PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX	Radium 226 & 228	Metals See attached table	pH	TDS, Cl, F, SO4	CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)
001	MW-301	10/9/19	1200	W	X	X	X	X		001
002	MW-84A	10/9/19	1316	W	X	X	X	X		002

Profile #:

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

Transmit Prelim Rush Results by (complete what you want):
Email #1:
Email #2:
Telephone:
Fax:

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

Relinquished By:	Date/Time:	Received By:	Date/Time:
	10/9/19 1600		
CS Logistics	10/10/19 0915	Pace	10/10/19 0915

PACE Project No. 40196970

Receipt Temp = ROI °C

Sample Receipt pH
OK / Adjusted

Cooler Custody Seal
Present / Not Present
Intact / Not Intact

Version 6.0 06/14/06

C019a(27Jun2006)

ORIGINAL

40196970

Table 2. Sampling Points and Parameters - CCR Rule Sampling Program
Groundwater Monitoring - Columbia Energy Center / SCS Engineers Project #25219067

		COC #1 - Background Wells		COC #2 - Landfill Modules 1-3				COC #3 - Landfill Module 4				COC #4 - Primary Pond					COC #5 - Secondary Pond			
	Parameter	MW-301	MW-84A	MW-302	MW-33AR	MW-34A	FIELD BLANK - MOD1-3LF	MW-309	MW-310	MW-311	FIELD BLANK-MOD4	MW-303	MW-304	MW-305	MW-4R	FIELD BLANK - PPOND	MW-306	MW-307	MW-308	FIELD BLANK - SCPOND
Appendix III Parameters (Detection Monitoring)	Boron	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Calcium	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Chloride	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Fluoride	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	pH	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	Sulfate	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	TDS	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Appendix IV Parameters (Assessment Monitoring)	Antimony	x	x									x	x	x	x	x				
	Arsenic	x	x									x	x	x	x	x				
	Barium	x	x									x	x	x	x	x				
	Beryllium	x	x									x	x	x	x	x				
	Cadmium	x	x									x	x	x	x	x				
	Chromium	x	x									x	x	x	x	x				
	Cobalt	x	x									x	x	x	x	x				
	Fluoride	x	x									x	x	x	x	x				
	Lead	x	x									x	x	x	x	x				
	Lithium	x	x									x	x	x	x	x				
	Mercury	x	x									x	x	x	x	x				
	Molybdenum	x	x									x	x	x	x	x				
	Selenium	x	x									x	x	x	x	x				
	Thallium	x	x									x	x	x	x	x				
	Radium 226+228	x	x									x	x	x	x	x				
CCR Rule Field Parameters	Groundwater Elevation	x	x	x	x	x		x	x	x		x	x	x	x		x	x	x	
	pH	x	x	x	x	x		x	x	x		x	x	x	x		x	x	x	
Low-Flow Sampling Field Parameters	Well Depth	x	x	x	x	x		x	x	x		x	x	x	x		x	x	x	
	Specific Conductance	x	x	x	x	x		x	x	x		x	x	x	x		x	x	x	
	Dissolved Oxygen	x	x	x	x	x		x	x	x		x	x	x	x		x	x	x	
	ORP	x	x	x	x	x		x	x	x		x	x	x	x		x	x	x	
	Temperature	x	x	x	x	x		x	x	x		x	x	x	x		x	x	x	
	Turbidity	x	x	x	x	x		x	x	x		x	x	x	x		x	x	x	
	Color	x	x	x	x	x		x	x	x		x	x	x	x		x	x	x	
	Odor	x	x	x	x	x		x	x	x		x	x	x	x		x	x	x	

Notes: All samples are unfiltered (total).

I:\25219067.00\Data and Calculations\Tables\Lab Bottle Orders\[2019 April_COL CCR.xls]Sheet1

Pace Analytical Services, LLC
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Green Bay, WI 54302

Sample Preservation Receipt Form

Client Name: SC Engineers Project # 40196920

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

Lab Lot# of pH paper: 1GUS089 Lab Std #ID of preservation (if pH adjusted):

Initial when completed: JW Date/ Time:

	Glass							Plastic							Vials						Jars			General									
Pace Lab #	AG1U	AG1H	AG4S	AG4U	AG5U	AG2S	BG3U	BP1U	BP2N	BP2Z	BP3U	BP3B	BP3N	BP3S	DG9A	DG9T	VG9U	VG9H	VG9M	VG9D	JGFU	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

10/10/17 JW

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	DG9A	40 mL amber ascorbic	JGFU	4 oz amber jar unpres
AG1H	1 liter amber glass HCL	BP2N	500 mL plastic HNO3	DG9T	40 mL amber Na Thio	WGFU	4 oz clear jar unpres
AG4S	125 mL amber glass H2SO4	BP2Z	500 mL plastic NaOH, Znact	VG9U	40 mL clear vial unpres	WPFU	4 oz plastic jar unpres
AG4U	120 mL amber glass unpres	BP3U	250 mL plastic unpres	VG9H	40 mL clear vial HCL		
AG5U	100 mL amber glass unpres	BP3B	250 mL plastic NaOH	VG9M	40 mL clear vial MeOH	SP5T	120 mL plastic Na Thiosulfate
AG2S	500 mL amber glass H2SO4	BP3N	250 mL plastic HNO3	VG9D	40 mL clear vial DI	ZPLC	ziploc bag
BG3U	250 mL clear glass unpres	BP3S	250 mL plastic H2SO4			GN:	1 liter plastic HNO3 pres

Pace Analytical™ 1241 Bellevue Street, Green Bay, WI 54302	Document Name: **Sample Condition Upon Receipt (SCUR)**	Document Revised: 25Apr2018
	Document No.: **F-GB-C-031-Rev.07**	Issuing Authority: Pace Green Bay Quality Office

Sample Condition Upon Receipt Form (SCUR)

Project #:

WO# : 40196970

40196970

Client Name: SCS Engineers

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

Tracking #: 2120.100919

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 zip lock/plastic bag

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

Cooler Temperature Uncorr: ROI /Corr: —

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.

Person examining contents:
Date: 10/10/19
Initials: JW

Chain of Custody Present:	☒Yes	☐No	☐N/A	1.
Chain of Custody Filled Out:	☐Yes	☒No	☐N/A	2. invoice details not documented w/bottle &
Chain of Custody Relinquished:	☒Yes	☐No	☐N/A	3.
Sampler Name & Signature on COC:	☒Yes	☐No	☐N/A	4.
Samples Arrived within Hold Time:	☒Yes	☐No		5.
- VOA Samples frozen upon receipt	☐Yes	☐No		Date/Time:
Short Hold Time Analysis (<72hr):	☐Yes	☒No		6.
Rush Turn Around Time Requested:	☐Yes	☒No		7.
Sufficient Volume: For Analysis: ☒Yes ☐No MS/MSD:	☐Yes	☒No	☐N/A	8.
Correct Containers Used:	☒Yes	☐No		9.
-Pace Containers Used:	☒Yes	☐No	☐N/A	
-Pace IR Containers Used:	☐Yes	☐No	☒N/A	
Containers Intact:	☒Yes	☐No		10.
Filtered volume received for Dissolved tests	☐Yes	☐No	☒N/A	11.
Sample Labels match COC:	☒Yes	☐No	☐N/A	12.
-Includes date/time/ID/Analysis Matrix: W				
Trip Blank Present:	☐Yes	☐No	☒N/A	13.
Trip Blank Custody Seals Present	☐Yes	☐No	☒N/A	
Pace Trip Blank Lot # (if purchased):				

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

Person Contacted: Date/Time:

Comments/ Resolution:

Project Manager Review: [signature] for DM **Date:** 10-10-19

A3 December 2019 Assessment Monitoring

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

December 26, 2019

Meghan Blodgett
SCS ENGINEERS
2830 Dairy Drive
Madison, WI 53718

RE: Project: 25219067 ALLIANT-COLUMBIA
Pace Project No.: 40200888

Dear Meghan Blodgett:

Enclosed are the analytical results for sample(s) received by the laboratory on December 17, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

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

Sincerely,

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

Enclosures

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

Pace Analytical Services, LLC
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CERTIFICATIONS

Project:	25219067 ALLIANT-COLUMBIA
Pace Project No.:	40200888

Pace Analytical Services Green Bay

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

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SAMPLE SUMMARY

Project: 25219067 ALLIANT-COLUMBIA
Pace Project No.: 40200888

Lab ID	Sample ID	Matrix	Date Collected	Date Received
40200888001	**MW 306**	Water	12/13/19 14:05	12/17/19 09:20
40200888002	**MW 307**	Water	12/13/19 15:25	12/17/19 09:20
40200888003	**MW 308**	Water	12/13/19 11:40	12/17/19 09:20
40200888004	**FIELD BLANK**	Water	12/13/19 15:30	12/17/19 09:20

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SAMPLE ANALYTE COUNT

Project: 25219067 ALLIANT-COLUMBIA
Pace Project No.: 40200888

Lab ID	Sample ID	Method	Analysts	Analytes Reported
40200888001	**MW 306**	EPA 6020	KXS	14
		EPA 7470	AJT	1
			HMG	7
		SM 2540C	TMK	1
		EPA 9040	ALY	1
		EPA 300.0	HMB	3
40200888002	**MW 307**	EPA 6020	KXS	14
		EPA 7470	AJT	1
			HMG	7
		SM 2540C	TMK	1
		EPA 9040	ALY	1
		EPA 300.0	HMB	3
40200888003	**MW 308**	EPA 6020	KXS	14
		EPA 7470	AJT	1
			HMG	7
		SM 2540C	TMK	1
		EPA 9040	ALY	1
		EPA 300.0	HMB	3
40200888004	**FIELD BLANK**	EPA 6020	KXS	14
		EPA 7470	AJT	1
		SM 2540C	TMK	1
		EPA 9040	ALY	1
		EPA 300.0	HMB	3

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ANALYTICAL RESULTS

Project: 25219067 ALLIANT-COLUMBIA
Pace Project No.: 40200888

Sample: MW 306 **Lab ID: 40200888001** Collected: 12/13/19 14:05 Received: 12/17/19 09:20 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Antimony	**<0.15**	ug/L	1.0	0.15	1	12/19/19 07:21	12/21/19 17:32	7440-36-0	
Arsenic	**<0.28**	ug/L	1.0	0.28	1	12/19/19 07:21	12/21/19 17:32	7440-38-2	
Barium	**9.0**	ug/L	2.3	0.70	1	12/19/19 07:21	12/21/19 17:32	7440-39-3	
Beryllium	**<0.25**	ug/L	1.0	0.25	1	12/19/19 07:21	12/21/19 17:32	7440-41-7	
Boron	**121**	ug/L	10.0	3.0	1	12/19/19 07:21	12/21/19 17:32	7440-42-8	
Cadmium	**<0.15**	ug/L	1.0	0.15	1	12/19/19 07:21	12/21/19 17:32	7440-43-9	
Calcium	**83800**	ug/L	2540	762	10	12/19/19 07:21	12/21/19 17:05	7440-70-2	P6
Chromium	**4.1**	ug/L	3.4	1.0	1	12/19/19 07:21	12/21/19 17:32	7440-47-3	
Cobalt	**<0.12**	ug/L	1.0	0.12	1	12/19/19 07:21	12/21/19 17:32	7440-48-4	
Lead	**<0.24**	ug/L	1.0	0.24	1	12/19/19 07:21	12/21/19 02:50	7439-92-1	
Lithium	**2.2**	ug/L	1.0	0.22	1	12/19/19 07:21	12/21/19 17:32	7439-93-2	
Molybdenum	**5.8**	ug/L	1.5	0.44	1	12/19/19 07:21	12/21/19 17:32	7439-98-7	
Selenium	**0.54J**	ug/L	1.1	0.32	1	12/19/19 07:21	12/21/19 17:32	7782-49-2	1q
Thallium	**0.17J**	ug/L	1.0	0.14	1	12/19/19 07:21	12/21/19 17:32	7440-28-0	
7470 Mercury	Analytical Method: EPA 7470 Preparation Method: EPA 7470								
Mercury	**<0.084**	ug/L	0.28	0.084	1	12/20/19 10:00	12/23/19 08:09	7439-97-6	
Field Data	Analytical Method:								
Field pH	**7.29**	Std. Units			1		12/13/19 14:05		
Field Specific Conductance	**662**	umhos/cm			1		12/13/19 14:05		
Oxygen, Dissolved	**8.34**	mg/L			1		12/13/19 14:05	7782-44-7	
REDOX	**56.0**	mV			1		12/13/19 14:05		
Turbidity	**0.00**	NTU			1		12/13/19 14:05		
Static Water Level	**787.03**	feet			1		12/13/19 14:05		
Temperature, Water (C)	**11.6**	deg C			1		12/13/19 14:05		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**326**	mg/L	20.0	8.7	1		12/19/19 16:46		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**7.3**	Std. Units	0.10	0.010	1		12/20/19 11:35		H6
300.0 IC Anions	Analytical Method: EPA 300.0								
Chloride	**0.76J**	mg/L	2.0	0.43	1		12/18/19 21:50	16887-00-6	
Fluoride	**<0.095**	mg/L	0.32	0.095	1		12/18/19 21:50	16984-48-8	
Sulfate	**7.6**	mg/L	2.0	0.44	1		12/18/19 21:50	14808-79-8	

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ANALYTICAL RESULTS

Project: 25219067 ALLIANT-COLUMBIA
Pace Project No.: 40200888

Sample: MW 307 **Lab ID: 40200888002** Collected: 12/13/19 15:25 Received: 12/17/19 09:20 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Antimony	**<0.15**	ug/L	1.0	0.15	1	12/19/19 07:21	12/21/19 18:13	7440-36-0	
Arsenic	**1.1**	ug/L	1.0	0.28	1	12/19/19 07:21	12/21/19 18:13	7440-38-2	
Barium	**15.9**	ug/L	2.3	0.70	1	12/19/19 07:21	12/21/19 18:13	7440-39-3	
Beryllium	**<0.25**	ug/L	1.0	0.25	1	12/19/19 07:21	12/21/19 18:13	7440-41-7	
Boron	**281**	ug/L	10.0	3.0	1	12/19/19 07:21	12/21/19 18:13	7440-42-8	
Cadmium	**<0.15**	ug/L	1.0	0.15	1	12/19/19 07:21	12/21/19 18:13	7440-43-9	
Calcium	**78700**	ug/L	254	76.2	1	12/19/19 07:21	12/21/19 18:13	7440-70-2	
Chromium	**<1.0**	ug/L	3.4	1.0	1	12/19/19 07:21	12/21/19 18:13	7440-47-3	
Cobalt	**0.46J**	ug/L	1.0	0.12	1	12/19/19 07:21	12/21/19 18:13	7440-48-4	
Lead	**<0.24**	ug/L	1.0	0.24	1	12/19/19 07:21	12/21/19 03:30	7439-92-1	
Lithium	**0.24J**	ug/L	1.0	0.22	1	12/19/19 07:21	12/21/19 18:13	7439-93-2	
Molybdenum	**0.72J**	ug/L	1.5	0.44	1	12/19/19 07:21	12/21/19 18:13	7439-98-7	
Selenium	**<0.32**	ug/L	1.1	0.32	1	12/19/19 07:21	12/21/19 18:13	7782-49-2	1q
Thallium	**0.21J**	ug/L	1.0	0.14	1	12/19/19 07:21	12/21/19 18:13	7440-28-0	
7470 Mercury	Analytical Method: EPA 7470 Preparation Method: EPA 7470								
Mercury	**<0.084**	ug/L	0.28	0.084	1	12/20/19 10:00	12/23/19 08:16	7439-97-6	
Field Data	Analytical Method:								
Field pH	**7.18**	Std. Units			1		12/13/19 15:25		
Field Specific Conductance	**752**	umhos/cm			1		12/13/19 15:25		
Oxygen, Dissolved	**0.33**	mg/L			1		12/13/19 15:25	7782-44-7	
REDOX	**-102.7**	mV			1		12/13/19 15:25		
Turbidity	**0.00**	NTU			1		12/13/19 15:25		
Static Water Level	**785.68**	feet			1		12/13/19 15:25		
Temperature, Water (C)	**12.0**	deg C			1		12/13/19 15:25		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**354**	mg/L	20.0	8.7	1		12/19/19 16:46		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**7.2**	Std. Units	0.10	0.010	1		12/20/19 11:37		H6
300.0 IC Anions	Analytical Method: EPA 300.0								
Chloride	**16.0**	mg/L	10.0	2.2	5		12/18/19 22:03	16887-00-6	
Fluoride	**<0.48**	mg/L	1.6	0.48	5		12/18/19 22:03	16984-48-8	D3
Sulfate	**15.5**	mg/L	10.0	2.2	5		12/18/19 22:03	14808-79-8	

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ANALYTICAL RESULTS

Project: 25219067 ALLIANT-COLUMBIA
Pace Project No.: 40200888

Sample: MW 308 **Lab ID: 40200888003** Collected: 12/13/19 11:40 Received: 12/17/19 09:20 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Antimony	**<0.15**	ug/L	1.0	0.15	1	12/19/19 07:21	12/21/19 18:26	7440-36-0	
Arsenic	**3.5**	ug/L	1.0	0.28	1	12/19/19 07:21	12/21/19 18:26	7440-38-2	
Barium	**62.4**	ug/L	2.3	0.70	1	12/19/19 07:21	12/21/19 18:26	7440-39-3	
Beryllium	**<0.25**	ug/L	1.0	0.25	1	12/19/19 07:21	12/21/19 18:26	7440-41-7	
Boron	**647**	ug/L	10.0	3.0	1	12/19/19 07:21	12/21/19 18:26	7440-42-8	
Cadmium	**<0.15**	ug/L	1.0	0.15	1	12/19/19 07:21	12/21/19 18:26	7440-43-9	
Calcium	**130000**	ug/L	254	76.2	1	12/19/19 07:21	12/21/19 18:26	7440-70-2	
Chromium	**<1.0**	ug/L	3.4	1.0	1	12/19/19 07:21	12/21/19 18:26	7440-47-3	
Cobalt	**<0.12**	ug/L	1.0	0.12	1	12/19/19 07:21	12/21/19 18:26	7440-48-4	
Lead	**<0.24**	ug/L	1.0	0.24	1	12/19/19 07:21	12/21/19 03:44	7439-92-1	
Lithium	**<0.22**	ug/L	1.0	0.22	1	12/19/19 07:21	12/21/19 18:26	7439-93-2	
Molybdenum	**3.0**	ug/L	1.5	0.44	1	12/19/19 07:21	12/21/19 18:26	7439-98-7	
Selenium	**<0.32**	ug/L	1.1	0.32	1	12/19/19 07:21	12/21/19 18:26	7782-49-2	1q
Thallium	**<0.14**	ug/L	1.0	0.14	1	12/19/19 07:21	12/21/19 18:26	7440-28-0	
7470 Mercury	Analytical Method: EPA 7470 Preparation Method: EPA 7470								
Mercury	**<0.084**	ug/L	0.28	0.084	1	12/20/19 10:00	12/23/19 08:19	7439-97-6	
Field Data	Analytical Method:								
Field pH	**7.25**	Std. Units			1		12/13/19 11:40		
Field Specific Conductance	**1051**	umhos/cm			1		12/13/19 11:40		
Oxygen, Dissolved	**0.40**	mg/L			1		12/13/19 11:40	7782-44-7	
REDOX	**-154.9**	mV			1		12/13/19 11:40		
Turbidity	**0.00**	NTU			1		12/13/19 11:40		
Static Water Level	**786.43**	feet			1		12/13/19 11:40		
Temperature, Water (C)	**12.0**	deg C			1		12/13/19 11:40		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**504**	mg/L	20.0	8.7	1		12/19/19 16:47		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**7.2**	Std. Units	0.10	0.010	1		12/20/19 11:39		H6
300.0 IC Anions	Analytical Method: EPA 300.0								
Chloride	**2.3J**	mg/L	10.0	2.2	5		12/18/19 22:56	16887-00-6	D3
Fluoride	**<0.48**	mg/L	1.6	0.48	5		12/18/19 22:56	16984-48-8	D3
Sulfate	**<2.2**	mg/L	10.0	2.2	5		12/18/19 22:56	14808-79-8	D3

REPORT OF LABORATORY ANALYSIS

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

ANALYTICAL RESULTS

Project: 25219067 ALLIANT-COLUMBIA

Pace Project No.: 40200888

Sample: FIELD BLANK **Lab ID: 40200888004** Collected: 12/13/19 15:30 Received: 12/17/19 09:20 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Antimony	**<0.15**	ug/L	1.0	0.15	1	12/19/19 07:21	12/21/19 16:51	7440-36-0	
Arsenic	**<0.28**	ug/L	1.0	0.28	1	12/19/19 07:21	12/21/19 16:51	7440-38-2	
Barium	**<0.70**	ug/L	2.3	0.70	1	12/19/19 07:21	12/21/19 16:51	7440-39-3	
Beryllium	**<0.25**	ug/L	1.0	0.25	1	12/19/19 07:21	12/21/19 16:51	7440-41-7	
Boron	**<3.0**	ug/L	10.0	3.0	1	12/19/19 07:21	12/21/19 16:51	7440-42-8	
Cadmium	**<0.15**	ug/L	1.0	0.15	1	12/19/19 07:21	12/21/19 16:51	7440-43-9	
Calcium	**<76.2**	ug/L	254	76.2	1	12/19/19 07:21	12/21/19 16:51	7440-70-2	
Chromium	**2.1J**	ug/L	3.4	1.0	1	12/19/19 07:21	12/21/19 16:51	7440-47-3	
Cobalt	**<0.12**	ug/L	1.0	0.12	1	12/19/19 07:21	12/21/19 16:51	7440-48-4	
Lead	**<0.24**	ug/L	1.0	0.24	1	12/19/19 07:21	12/21/19 02:09	7439-92-1	
Lithium	**<0.22**	ug/L	1.0	0.22	1	12/19/19 07:21	12/21/19 16:51	7439-93-2	
Molybdenum	**<0.44**	ug/L	1.5	0.44	1	12/19/19 07:21	12/21/19 16:51	7439-98-7	
Selenium	**<0.32**	ug/L	1.1	0.32	1	12/19/19 07:21	12/21/19 16:51	7782-49-2	1q
Thallium	**<0.14**	ug/L	1.0	0.14	1	12/19/19 07:21	12/21/19 16:51	7440-28-0	
7470 Mercury	Analytical Method: EPA 7470 Preparation Method: EPA 7470								
Mercury	**<0.084**	ug/L	0.28	0.084	1	12/20/19 10:00	12/23/19 08:21	7439-97-6	
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**<8.7**	mg/L	20.0	8.7	1		12/19/19 16:47		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**6.3**	Std. Units	0.10	0.010	1		12/20/19 11:42		H6
300.0 IC Anions	Analytical Method: EPA 300.0								
Chloride	**<0.43**	mg/L	2.0	0.43	1		12/18/19 23:09	16887-00-6	
Fluoride	**<0.095**	mg/L	0.32	0.095	1		12/18/19 23:09	16984-48-8	
Sulfate	**<0.44**	mg/L	2.0	0.44	1		12/18/19 23:09	14808-79-8	

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QUALITY CONTROL DATA

Project: 25219067 ALLIANT-COLUMBIA
Pace Project No.: 40200888

QC Batch: 343991 Analysis Method: EPA 7470
QC Batch Method: EPA 7470 Analysis Description: 7470 Mercury
Associated Lab Samples: 40200888001, 40200888002, 40200888003, 40200888004

METHOD BLANK: 1996911 Matrix: Water
Associated Lab Samples: 40200888001, 40200888002, 40200888003, 40200888004

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mercury	ug/L	<0.084	0.28	12/23/19 08:05	

LABORATORY CONTROL SAMPLE: 1996912

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury	ug/L	5	5.2	105	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1996913 1996914

Parameter	Units	40200888001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mercury	ug/L	<0.084	5	5	5.1	5.0	103	100	85-115	3	20	

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

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QUALITY CONTROL DATA

Project: 25219067 ALLIANT-COLUMBIA
Pace Project No.: 40200888

QC Batch: 343849 Analysis Method: EPA 6020
QC Batch Method: EPA 3010 Analysis Description: 6020 MET
Associated Lab Samples: 40200888001, 40200888002, 40200888003, 40200888004

METHOD BLANK: 1996122 Matrix: Water
Associated Lab Samples: 40200888001, 40200888002, 40200888003, 40200888004

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Antimony	ug/L	<0.15	1.0	12/21/19 16:44	
Arsenic	ug/L	<0.28	1.0	12/21/19 16:44	
Barium	ug/L	<0.70	2.3	12/21/19 16:44	
Beryllium	ug/L	<0.25	1.0	12/21/19 16:44	
Boron	ug/L	<3.0	10.0	12/21/19 16:44	
Cadmium	ug/L	<0.15	1.0	12/21/19 16:44	
Calcium	ug/L	<76.2	254	12/21/19 16:44	
Chromium	ug/L	<1.0	3.4	12/21/19 16:44	
Cobalt	ug/L	<0.12	1.0	12/21/19 16:44	
Lead	ug/L	<0.24	1.0	12/21/19 02:02	
Lithium	ug/L	<0.22	1.0	12/21/19 16:44	
Molybdenum	ug/L	<0.44	1.5	12/21/19 16:44	
Selenium	ug/L	<0.32	1.1	12/21/19 16:44	
Thallium	ug/L	<0.14	1.0	12/21/19 16:44	

LABORATORY CONTROL SAMPLE: 1996123

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Antimony	ug/L	500	511	102	80-120	
Arsenic	ug/L	500	488	98	80-120	
Barium	ug/L	500	482	96	80-120	
Beryllium	ug/L	500	471	94	80-120	
Boron	ug/L	500	468	94	80-120	
Cadmium	ug/L	500	505	101	80-120	
Calcium	ug/L	5000	4960	99	80-120	
Chromium	ug/L	500	483	97	80-120	
Cobalt	ug/L	500	459	92	80-120	
Lead	ug/L	500	470	94	80-120	
Lithium	ug/L	500	459	92	80-120	
Molybdenum	ug/L	500	498	100	80-120	
Selenium	ug/L	500	511	102	80-120	
Thallium	ug/L	500	448	90	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1996124 1996125

Parameter	Units	40200888001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Antimony	ug/L	<0.15	500	500	517	520	103	104	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.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: 25219067 ALLIANT-COLUMBIA
Pace Project No.: 40200888

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1996124 1996125

Parameter	Units	40200888001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Arsenic	ug/L	<0.28	500	500	504	500	101	100	75-125	1	20	
Barium	ug/L	9.0	500	500	500	498	98	98	75-125	0	20	
Beryllium	ug/L	<0.25	500	500	486	489	97	98	75-125	1	20	
Boron	ug/L	121	500	500	619	610	100	98	75-125	1	20	
Cadmium	ug/L	<0.15	500	500	505	504	101	101	75-125	0	20	
Calcium	ug/L	83800	5000	5000	93100	92200	186	169	75-125	1	20	P6
Chromium	ug/L	4.1	500	500	494	489	98	97	75-125	1	20	
Cobalt	ug/L	<0.12	500	500	467	462	93	92	75-125	1	20	
Lead	ug/L	<0.24	500	500	485	481	97	96	75-125	1	20	
Lithium	ug/L	2.2	500	500	484	481	96	96	75-125	1	20	
Molybdenum	ug/L	5.8	500	500	519	517	103	102	75-125	0	20	
Selenium	ug/L	0.54J	500	500	521	514	104	103	75-125	1	20	
Thallium	ug/L	0.17J	500	500	455	455	91	91	75-125	0	20	

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QUALITY CONTROL DATA

Project: 25219067 ALLIANT-COLUMBIA
Pace Project No.: 40200888

QC Batch: 343898 | Analysis Method: SM 2540C
QC Batch Method: SM 2540C | Analysis Description: 2540C Total Dissolved Solids
Associated Lab Samples: 40200888001, 40200888002, 40200888003, 40200888004

METHOD BLANK: 1996444 | Matrix: Water
Associated Lab Samples: 40200888001, 40200888002, 40200888003, 40200888004

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	<8.7	20.0	12/19/19 16:43	

LABORATORY CONTROL SAMPLE: 1996445

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Dissolved Solids	mg/L	547	586	107	80-120	

SAMPLE DUPLICATE: 1996446

Parameter	Units	40200775001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	510	504	1	10	

SAMPLE DUPLICATE: 1996447

Parameter	Units	40200888001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	326	318	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.

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QUALITY CONTROL DATA

Project: 25219067 ALLIANT-COLUMBIA
Pace Project No.: 40200888

QC Batch: 343989 Analysis Method: EPA 9040
QC Batch Method: EPA 9040 Analysis Description: 9040 pH
Associated Lab Samples: 40200888001, 40200888002, 40200888003, 40200888004

SAMPLE DUPLICATE: 1996906

Parameter	Units	40200885001 Result	Dup Result	RPD	Max RPD	Qualifiers
pH at 25 Degrees C	Std. Units	7.6	7.6	0	20	H6

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

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: 25219067 ALLIANT-COLUMBIA
Pace Project No.: 40200888

QC Batch: 343670 | Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 | Analysis Description: 300.0 IC Anions
Associated Lab Samples: 40200888001, 40200888002, 40200888003, 40200888004

METHOD BLANK: 1995185 | Matrix: Water
Associated Lab Samples: 40200888001, 40200888002, 40200888003, 40200888004

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chloride	mg/L	<0.43	2.0	12/18/19 21:23	
Fluoride	mg/L	<0.095	0.32	12/18/19 21:23	
Sulfate	mg/L	<0.44	2.0	12/18/19 21:23	

LABORATORY CONTROL SAMPLE: 1995186

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	20	20.0	100	90-110	
Fluoride	mg/L	2	1.9	96	90-110	
Sulfate	mg/L	20	19.9	99	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1995187 1995188

Parameter	Units	40200794004 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	40.9	100	100	145	145	104	104	90-110	0	15	
Fluoride	mg/L	ND	10	10	10.2	10.2	102	102	90-110	1	15	
Sulfate	mg/L	17.4	100	100	121	121	103	104	90-110	0	15	

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

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QUALIFIERS

Project: 25219067 ALLIANT-COLUMBIA
Pace Project No.: 40200888

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	Analyte was measured in the associated method blank at -0.34 ug/L.
D3	Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.
H6	Analysis initiated outside of the 15 minute EPA required holding time.
P6	Matrix spike recovery was outside laboratory control limits due to a parent sample concentration notably higher than the spike level.

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 25219067 ALLIANT-COLUMBIA
Pace Project No.: 40200888

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
40200888001	**MW 306**	EPA 3010	343849	EPA 6020	343915
40200888002	**MW 307**	EPA 3010	343849	EPA 6020	343915
40200888003	**MW 308**	EPA 3010	343849	EPA 6020	343915
40200888004	**FIELD BLANK**	EPA 3010	343849	EPA 6020	343915
40200888001	**MW 306**	EPA 7470	343991	EPA 7470	344031
40200888002	**MW 307**	EPA 7470	343991	EPA 7470	344031
40200888003	**MW 308**	EPA 7470	343991	EPA 7470	344031
40200888004	**FIELD BLANK**	EPA 7470	343991	EPA 7470	344031
40200888001	**MW 306**				
40200888002	**MW 307**				
40200888003	**MW 308**				
40200888001	**MW 306**	SM 2540C	343898		
40200888002	**MW 307**	SM 2540C	343898		
40200888003	**MW 308**	SM 2540C	343898		
40200888004	**FIELD BLANK**	SM 2540C	343898		
40200888001	**MW 306**	EPA 9040	343989		
40200888002	**MW 307**	EPA 9040	343989		
40200888003	**MW 308**	EPA 9040	343989		
40200888004	**FIELD BLANK**	EPA 9040	343989		
40200888001	**MW 306**	EPA 300.0	343670		
40200888002	**MW 307**	EPA 300.0	343670		
40200888003	**MW 308**	EPA 300.0	343670		
40200888004	**FIELD BLANK**	EPA 300.0	343670		

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

Page 1 of

40200888

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CHAIN OF COUNTRY

(Please Print Clearly)

Company Name:	SCS
Branch/Location:	Madison, WI
Project Contact:	Meg Blodgett
Phone:	(608) 216-7362
Project Number:	25219067
Project Name:	Alliant - Columbia
Project State:	WI
Sampled By (Print):	Paul A. Grover
Sampled By (Sign):	Paul A. Grover
PO #:	
Regulatory Program:	

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

FILTERED? (YES/NO) Y/N: No
PRESERVATION (CODE)* Pick Letter: A/D

Analyses Requested: See Attached Appendix III + IV

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

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

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

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

PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX	See Attached Appendix III + IV	CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)	Profile #
001	MW 306	12/13/19	14:05	GW	X			
002	MW 307	↓	15:25	↓	X			
003	MW 308		11:40		X		45	
004	Field Blank	↓	15:30	DI	X			

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

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

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

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

Relinquished By:	Date/Time:	Received By:	Date/Time:
Paul A. Grover	12/16/19 10:30		
CS Logistics	12/17/19 0920	Brandon Radtke Pace	12/17/19 0920

PACE Project No. 40200888

Receipt Temp = 2.0 °C

Sample Receipt pH
OK / Adjusted

Cooler Custody Seal
Present / Not Present
Intact / Not Intact

Version 6.0 06/14/06

C019a(27Jun2006)

ORIGINAL

Pace Container Order #573266

40200888

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

Info

Project Name	25219067 Columbia CCR	Due Date	12/09/2019	Profile	x	Quote	
Project	Milewsky, Dan	Return		Carrier	Most Economical	Locatio	

Trip Blanks
- [ ] Include Trip Blanks

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

Bottles
- [ ] Boxed Cases
- [ ] Individually Wrapped
- [X] Grouped By Sample

Return Shipping Labels
- [ ] No Shipper
- [ ] With Shipper

COC Options
- [X] Number of Blanks: 2
- [ ] Pre-Printed

Misc
- [ ] Sampling Instructions
- [ ] Custody Seal
- [ ] Temp. Blanks
- [X] Coolers
- [ ] Syringes
- [ ] Extra Bubble Wrap
- [ ] Short Hold/Rush
- [X] DI: 3 Liter(s)
- [ ] USDA Regulated Soils

# of Samples	Matrix	Test	Container	Total	# of	Lot #	Notes
4	WT	Radium 226	1L Plastic HNO3 pres	5	1	090219-2EEY	
4	WT	Radium 228	1L Plastic HNO3 pres	4	0	090219-2EEY	
5	WT	Metals	250mL plastic w/HNO3	5	0	M-9-276-02BB	
5	WT	pH	250mL plastic unpres	5	0	M-9-221-04BB	
5	WT	TDS, Cl, F, SO4	250mL plastic unpres	5	0	M-9-221-04BB	

Hazard Shipping Placard In Place : NA

*Sample receiving hours are Monday through Friday 8:00 am to 6:00 pm and Saturday from 9:00 am to 12:00 pm unless special arrangements are made with your project manager.
*Pace Analytical reserves the right to return hazardous, toxic, or radioactive samples to you.
*Pace Analytical reserves the right to charge for unused bottles, as well as cost associated with sample
*Payment term are net 30 days.
*Please include the proposal number on the chain of custody to insure proper billing.

LAB USE:

Ship Date :	12/06/2019
Prepared By:	Mai Yer Her
Verified By:	

Sample

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

CLIENT USE (Optional):

Date Rec'd:	
Received By:	
Verified By:	

40200888

Table 2. Sampling Points and Parameters - CCR Rule Sampling Program
Groundwater Monitoring - Columbia Energy Center / SCS Engineers Project #25219067

		Secondary Pond			
	Parameter	MW-306	MW-307	MW-308	FIELD BLANK - SCPOND
Appendix III Parameters (Detection Monitoring)	Boron	X	X	X	X
	Calcium	X	X	X	X
	Chloride	X	X	X	X
	Fluoride	X	X	X	X
	pH	X	X	X	X
	Sulfate	X	X	X	X
	TDS	X	X	X	X
Appendix IV Parameters (Assessment Monitoring)	Antimony	X	X	X	X
	Arsenic	X	X	X	X
	Barium	X	X	X	X
	Beryllium	X	X	X	X
	Cadmium	X	X	X	X
	Chromium	X	X	X	X
	Cobalt	X	X	X	X
	Fluoride	X	X	X	X
	Lead	X	X	X	X
	Lithium	X	X	X	X
	Mercury	X	X	X	X
	Molybdenum	X	X	X	X
	Selenium	X	X	X	X
	Thallium	X	X	X	X
	Radium 226+228	X	X	X	X
CCR Rule Field Parameters	Groundwater Elevation	X	X	X	
	pH	X	X	X	
Low-Flow Sampling Field Parameters	Well Depth	X	X	X	
	Specific Conductance	X	X	X	
	Dissolved Oxygen	X	X	X	
	ORP	X	X	X	
	Temperature	X	X	X	
	Turbidity	X	X	X	
	Color	X	X	X	
	Odor	X	X	X	

Notes: All samples are unfiltered (total).

I:\25219067.00\Data and Calculations\Tables\Lab Bottle Orders\[2019 Dec_COL CCR.xls]Sheet1

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Sample Preservation Receipt Form

Client Name: SCS Project # 40200888

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

Lab Lot# of pH paper: 6US3581 Lab Std #ID of preservation (if pH adjusted):

Initial when completed: BR Date/ Time:

	Glass							Plastic							Vials						Jars			General									
Pace Lab #	AG1U	AG1H	AG4S	AG4U	AG5U	AG2S	BG3U	BP1U	BP2N	BP2Z	BP3U	BP3B	BP3N	BP3S	DG9A	DG9T	VG9U	VG9H	VG9M	VG9D	JGFU	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		1													2					X		2.5 / 5 / 10
004											2		1													2					X		2.5 / 5 / 10
005																																	2.5 / 5 / 10
006																																	2.5 / 5 / 10
007																																	2.5 / 5 / 10
008																																	2.5 / 5 / 10
009																																	2.5 / 5 / 10
010																																	2.5 / 5 / 10
011																																	2.5 / 5 / 10
012																																	2.5 / 5 / 10
013																																	2.5 / 5 / 10
014																																	2.5 / 5 / 10
015																																	2.5 / 5 / 10
016																																	2.5 / 5 / 10
017																																	2.5 / 5 / 10
018																																	2.5 / 5 / 10
019																																	2.5 / 5 / 10
020																																	2.5 / 5 / 10

12-17-19 BR

12/17/19 AL

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

AG1U	1 liter amber glass	BP1U	1 liter plastic unpres	DG9A	40 mL amber ascorbic	JGFU	4 oz amber jar unpres
AG1H	1 liter amber glass HCL	BP2N	500 mL plastic HNO3	DG9T	40 mL amber Na Thio	WGFU	4 oz clear jar unpres
AG4S	125 mL amber glass H2SO4	BP2Z	500 mL plastic NaOH, Znact	VG9U	40 mL clear vial unpres	WPFU	4 oz plastic jar unpres
AG4U	120 mL amber glass unpres	BP3U	250 mL plastic unpres	VG9H	40 mL clear vial HCL		
AG5U	100 mL amber glass unpres	BP3B	250 mL plastic NaOH	VG9M	40 mL clear vial MeOH	SP5T	120 mL plastic Na Thiosulfate
AG2S	500 mL amber glass H2SO4	BP3N	250 mL plastic HNO3	VG9D	40 mL clear vial DI	ZPLC	ziploc bag
BG3U	250 mL clear glass unpres	BP3S	250 mL plastic H2SO4			GN:	BPH 12-17-19 AL

1 liter plastic HNO3

Pace Analytical™ 1241 Bellevue Street, Green Bay, WI 54302	Document Name: Sample Condition Upon Receipt (SCUR)	Document Revised: 25Apr2018
	Document No.: F-GB-C-031-Rev.07	Issuing Authority: Pace Green Bay Quality Office

Sample Condition Upon Receipt Form (SCUR)

Project #: **WO# : 40200888**

40200888

Client Name: SCS

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

Tracking #:

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

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

Packing Material: ☒ Bubble Wrap ☒ Bubble Bags ☐ None ☐ Other

Thermometer Used SR - 93 **Type of Ice:** Wet Blue Dry None ☒ Samples on ice, cooling process has begun

Cooler Temperature Uncorr: 2.0 /Corr: 2.0

Temp Blank Present: ☐ yes ☒ no **Biological Tissue is Frozen:** ☐ yes ☐ no

Temp should be above freezing to 6°C.
Biota Samples may be received at ≤ 0°C.

Person examining contents:
Date: 12-17-19
Initials: BP

Chain of Custody Present:	☒ Yes	☐ No	☐ N/A	1. 12-17-19 BR
Chain of Custody Filled Out:	☐ Yes	☒ No	☐ N/A	2. NO Mail information, Mail information, Page
Chain of Custody Relinquished:	☒ Yes	☐ No	☐ N/A	3. number. 12-17-19 BR
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:

Project Manager Review: AL for DM **Date:** 12/17/19

Page 2 of 2

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

January 08, 2020

Meghan Blodgett
SCS ENGINEERS
2830 Dairy Drive
Madison, WI 53718

RE: Project: 25219067 ALLIANT-COLUMBIA
Pace Project No.: 40200891

Dear Meghan Blodgett:

Enclosed are the analytical results for sample(s) received by the laboratory on December 17, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Dan Milewsky
dan.milewsky@pacelabs.com
(920)469-2436
Project Manager

Enclosures

cc: Tom Karwoski, SCS ENGINEERS
Nicole Kron, SCS ENGINEERS
Jeff Maxted, ALLIANT ENERGY
Marc Morandi, ALLIANT ENERGY

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CERTIFICATIONS

Project:	25219067 ALLIANT-COLUMBIA
Pace Project No.:	40200891

Pace Analytical Services Pennsylvania

1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601
ANAB DOD-ELAP Rad Accreditation #: L2417
Alabama Certification #: 41590
Arizona Certification #: AZ0734
Arkansas Certification
California Certification #: 04222CA
Colorado Certification #: PA01547
Connecticut Certification #: PH-0694
Delaware Certification
EPA Region 4 DW Rad
Florida/TNI Certification #: E87683
Georgia Certification #: C040
Florida: Cert E871149 SEKS WET
Guam Certification
Hawaii Certification
Idaho Certification
Illinois Certification
Indiana Certification
Iowa Certification #: 391
Kansas/TNI Certification #: E-10358
Kentucky Certification #: KY90133
KY WW Permit #: KY0098221
KY WW Permit #: KY0000221
Louisiana DHH/TNI Certification #: LA180012
Louisiana DEQ/TNI Certification #: 4086
Maine Certification #: 2017020
Maryland Certification #: 308
Massachusetts Certification #: M-PA1457
Michigan/PADEP Certification #: 9991
Missouri Certification #: 235
Montana Certification #: Cert0082
Nebraska Certification #: NE-OS-29-14
Nevada Certification #: PA014572018-1
New Hampshire/TNI Certification #: 297617
New Jersey/TNI Certification #: PA051
New Mexico Certification #: PA01457
New York/TNI Certification #: 10888
North Carolina Certification #: 42706
North Dakota Certification #: R-190
Ohio EPA Rad Approval: #41249
Oregon/TNI Certification #: PA200002-010
Pennsylvania/TNI Certification #: 65-00282
Puerto Rico Certification #: PA01457
Rhode Island Certification #: 65-00282
South Dakota Certification
Tennessee Certification #: 02867
Texas/TNI Certification #: T104704188-17-3
Utah/TNI Certification #: PA014572017-9
USDA Soil Permit #: P330-17-00091
Vermont Dept. of Health: ID# VT-0282
Virgin Island/PADEP Certification
Virginia/VELAP Certification #: 9526
Washington Certification #: C868
West Virginia DEP Certification #: 143
West Virginia DHHR Certification #: 9964C
Wisconsin Approve List for Rad
Wyoming Certification #: 8TMS-L

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SAMPLE SUMMARY

Project: 25219067 ALLIANT-COLUMBIA
Pace Project No.: 40200891

Lab ID	Sample ID	Matrix	Date Collected	Date Received
40200891001	**MW 306**	Water	12/13/19 14:05	12/17/19 09:20
40200891002	**MW 307**	Water	12/13/19 15:25	12/17/19 09:20
40200891003	**MW 308**	Water	12/13/19 11:40	12/17/19 09:20
40200891004	**FIELD BLANK**	Water	12/13/19 15:30	12/17/19 09:20

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SAMPLE ANALYTE COUNT

Project: 25219067 ALLIANT-COLUMBIA
Pace Project No.: 40200891

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
40200891001	**MW 306**	EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
		Total Radium Calculation	CMC	1	PASI-PA
40200891002	**MW 307**	EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
		Total Radium Calculation	CMC	1	PASI-PA
40200891003	**MW 308**	EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
		Total Radium Calculation	CMC	1	PASI-PA
40200891004	**FIELD BLANK**	EPA 903.1	MK1	1	PASI-PA
		EPA 904.0	VAL	1	PASI-PA
		Total Radium Calculation	CMC	1	PASI-PA

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ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: 25219067 ALLIANT-COLUMBIA
Pace Project No.: 40200891

Sample: MW 306 **Lab ID: 40200891001** Collected: 12/13/19 14:05 Received: 12/17/19 09:20 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	**0.000 ± 0.428 (0.875) C:NA T:90%**	pCi/L	01/07/20 15:32	13982-63-3	
Radium-228	EPA 904.0	**0.323 ± 0.412 (0.878) C:76% T:87%**	pCi/L	01/07/20 14:04	15262-20-1	
Total Radium	Total Radium Calculation	**0.323 ± 0.840 (1.75)**	pCi/L	01/08/20 10:39	7440-14-4	

Sample: MW 307 **Lab ID: 40200891002** Collected: 12/13/19 15:25 Received: 12/17/19 09:20 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	**-0.0613 ± 0.360 (0.803) C:NA T:91%**	pCi/L	01/07/20 15:32	13982-63-3	
Radium-228	EPA 904.0	**0.188 ± 0.367 (0.806) C:80% T:87%**	pCi/L	01/07/20 14:12	15262-20-1	
Total Radium	Total Radium Calculation	**0.188 ± 0.727 (1.61)**	pCi/L	01/08/20 10:39	7440-14-4	

Sample: MW 308 **Lab ID: 40200891003** Collected: 12/13/19 11:40 Received: 12/17/19 09:20 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	**0.0522 ± 0.271 (0.562) C:NA T:89%**	pCi/L	01/07/20 15:32	13982-63-3	
Radium-228	EPA 904.0	**0.681 ± 0.432 (0.828) C:80% T:87%**	pCi/L	01/07/20 14:03	15262-20-1	
Total Radium	Total Radium Calculation	**0.733 ± 0.703 (1.39)**	pCi/L	01/08/20 10:39	7440-14-4	

Sample: FIELD BLANK **Lab ID: 40200891004** Collected: 12/13/19 15:30 Received: 12/17/19 09:20 Matrix: Water
PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	**0.675 ± 0.567 (0.844) C:NA T:84%**	pCi/L	01/07/20 15:43	13982-63-3	
Radium-228	EPA 904.0	**0.575 ± 0.401 (0.782) C:83% T:86%**	pCi/L	01/07/20 14:12	15262-20-1	
Total Radium	Total Radium Calculation	**1.25 ± 0.968 (1.63)**	pCi/L	01/08/20 10:39	7440-14-4	

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QUALITY CONTROL - RADIOCHEMISTRY

Project: 25219067 ALLIANT-COLUMBIA
Pace Project No.: 40200891

QC Batch: 377035 Analysis Method: EPA 904.0
QC Batch Method: EPA 904.0 Analysis Description: 904.0 Radium 228
Associated Lab Samples: 40200891001, 40200891002, 40200891003, 40200891004

METHOD BLANK: 1828979 Matrix: Water
Associated Lab Samples: 40200891001, 40200891002, 40200891003, 40200891004

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-228	0.221 ± 0.317 (0.681) C:86% T:84%	pCi/L	01/07/20 14:05	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
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Green Bay, WI 54302
(920)469-2436

QUALITY CONTROL - RADIOCHEMISTRY

Project: 25219067 ALLIANT-COLUMBIA
Pace Project No.: 40200891

QC Batch: 377033 | Analysis Method: EPA 903.1
QC Batch Method: EPA 903.1 | Analysis Description: 903.1 Radium-226
Associated Lab Samples: 40200891001, 40200891002, 40200891003, 40200891004

METHOD BLANK: 1828978 | Matrix: Water
Associated Lab Samples: 40200891001, 40200891002, 40200891003, 40200891004

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-226	-0.0547 ± 0.284 (0.656) C:NA T:77%	pCi/L	01/07/20 15:07	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
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Green Bay, WI 54302
(920)469-2436

QUALIFIERS

Project: 25219067 ALLIANT-COLUMBIA
Pace Project No.: 40200891

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.

LABORATORIES

PASI-PA Pace Analytical Services - Greensburg

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 25219067 ALLIANT-COLUMBIA
Pace Project No.: 40200891

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
40200891001	**MW 306**	EPA 903.1	377033		
40200891002	**MW 307**	EPA 903.1	377033		
40200891003	**MW 308**	EPA 903.1	377033		
40200891004	**FIELD BLANK**	EPA 903.1	377033		
40200891001	**MW 306**	EPA 904.0	377035		
40200891002	**MW 307**	EPA 904.0	377035		
40200891003	**MW 308**	EPA 904.0	377035		
40200891004	**FIELD BLANK**	EPA 904.0	377035		
40200891001	**MW 306**	Total Radium Calculation	378421		
40200891002	**MW 307**	Total Radium Calculation	378421		
40200891003	**MW 308**	Total Radium Calculation	378421		
40200891004	**FIELD BLANK**	Total Radium Calculation	378421		

4020891

UPPER MIDWEST REGION
MN: 612-607-1700 WI: 920-469-2436

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CHAIN OF CUSTODY

(Please Print Clearly)

Company Name:	SCS
Branch/Location:	Madison, WI
Project Contact:	Meg Blodgett
Phone:	(608) 216-7362
Project Number:	25219067
Project Name:	Alliant - Columbia
Project State:	WI
Sampled By (Print):	Paul A. Grover
Sampled By (Sign):	Paul A. Grover
PO #:	
Regulatory Program:	

*Preservation Codes
A=None B=HCL C=H2SO4 D=HNO3 E=DI Water F=Methanol G=NaOH
H=Sodium Bisulfate Solution I=Sodium Thiosulfate J=Other

FILTERED? (YES/NO) — Y/N: No
PRESERVATION (CODE)* — Pick Letter: A/D

Quote #:	
Mail To Contact:	
Mail To Company:	
Mail To Address:	
Invoice To Contact:	
Invoice To Company:	
Invoice To Address:	
Invoice To Phone:	

Data Package Options (billable)
☐ EPA Level III
☐ EPA Level IV

MS/MSD
☐ On your sample (billable)
☐ NOT needed on your sample

Matrix Codes
A = Air, B = Biota, C = Charcoal, O = Oil, S = Soil, Sl = Sludge
W = Water, DW = Drinking Water, GW = Ground Water, SW = Surface Water, WW = Waste Water, WP = Wipe

Analyses Requested: See Attached Appendix III & IV

PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX	See Attached Appendix III & IV	CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)	Profile #
001	MW 306	12/13/19	14:05	GW	X			
002	MW 307	↓	15:25	↓	X			
003	MW 308		11:40		X			
004	Field Blank	↓	15:30	DI	X			

Rush Turnaround Time Requested - Prelims
(Rush TAT subject to approval/surcharge)
Date Needed:

Transmit Prelim Rush Results by (complete what you want):

Email #1:	
Email #2:	
Telephone:	
Fax:	

Samples on HOLD are subject to special pricing and release of liability

Relinquished By:	Date/Time:	Received By:	Date/Time:
Paul A. Grover	12/16/19 10:30		
CS Logistics	12/17/19 0920	Brandon Rautha Pace	12/17/19 0920

PACE Project No. 4020891
Receipt Temp = 2.0 °C
Sample Receipt pH OK / Adjusted
Cooler Custody Seal
Present / Not Present
Intact / Not Intact

Version 6.0 06/14/06
ORIGINAL

C019a(27Jun2006)

Pace Analytical Services, LLC
1241 Bellevue Street, Suite 9
Green Bay, WI 54302

Sample Preservation Receipt Form

Client Name: SCS   Project # 40200891

All containers needing preservation have been checked and noted below: ☒Yes ☐No ☐N/A   Initial when completed: BR   Date/ Time:

Lab Lot# of pH paper: 61S3581   Lab Std #ID of preservation (if pH adjusted):

Pace Lab #	AG1U	AG1H	AG4S	AG4U	AG5U	AG2S	BG3U	BP1U	BP2N	BP2Z	BP3U	BP3B	BP3N	BP3S	DG9A	DG9T	VG9U	VG9H	VG9M	VG9D	JGFU	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)
	Glass							Plastic							Vials						Jars			General									
001											~~2~~		~~1~~													2					X		2.5 / 5 / 10
002											~~2~~		~~1~~													2					X		2.5 / 5 / 10
003											~~2~~		~~1~~													2					X		2.5 / 5 / 10
004											~~2~~		~~1~~													2					X		2.5 / 5 / 10
005																																	2.5 / 5 / 10
006																																	2.5 / 5 / 10
007																																	2.5 / 5 / 10
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018																																	2.5 / 5 / 10
019																																	2.5 / 5 / 10
020																																	2.5 / 5 / 10

12/17/19

12-17-19BR

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	DG9A	40 mL amber ascorbic	JGFU	4 oz amber jar unpres
AG1H	1 liter amber glass HCL	BP2N	500 mL plastic HNO3	DG9T	40 mL amber Na Thio	WGFU	4 oz clear jar unpres
AG4S	125 mL amber glass H2SO4	BP2Z	500 mL plastic NaOH, Znact	VG9U	40 mL clear vial unpres	WPFU	4 oz plastic jar unpres
AG4U	120 mL amber glass unpres	BP3U	250 mL plastic unpres	VG9H	40 mL clear vial HCL		
AG5U	100 mL amber glass unpres	BP3B	250 mL plastic NaOH	VG9M	40 mL clear vial MeOH	SP5T	120 mL plastic Na Thiosulfate
AG2S	500 mL amber glass H2SO4	BP3N	250 mL plastic HNO3	VG9D	40 mL clear vial DI	ZPLC	ziploc bag
BG3U	250 mL clear glass unpres	BP3S	250 mL plastic H2SO4			GN:	~~BPHJ~~ 12-17-19BR 1 liter Plastic HNO3

Pace Analytical™ 1241 Bellevue Street, Green Bay, WI 54302	Document Name: **Sample Condition Upon Receipt (SCUR)**	Document Revised: 25Apr2018
	Document No.: **F-GB-C-031-Rev.07**	Issuing Authority: Pace Green Bay Quality Office

Sample Condition Upon Receipt Form (SCUR)

Project #:

WO# : 40200891

40200891

Client Name: SCS

Courier: ☒ CS Logistics ☐ Fed Ex ☐ Speedee ☐ UPS ☐ Waltco ☐ Client ☐ Pace Other:

Tracking #:

Custody Seal on Cooler/Box Present: ☒ yes ☐ no Seals intact: ☒ yes ☐ no

Custody Seal on Samples Present: ☐ yes ☒ no Seals intact: ☐ yes ☐ no

Packing Material: ☒ Bubble Wrap ☒ Bubble Bags ☐ None ☐ Other

Thermometer Used SR - 93 **Type of Ice:** Wet Blue Dry None ☒ Samples on ice, cooling process has begun

Cooler Temperature Uncorr: 2.0 /Corr: 2.0

Temp Blank Present: ☐ yes ☒ no **Biological Tissue is Frozen:** ☐ yes ☐ no

Temp should be above freezing to 6°C.
Biota Samples may be received at ≤ 0°C.

Person examining contents:
Date: 12-17-19
Initials: BR

Chain of Custody Present:	☒Yes ☐No ☐N/A	1. 12-17-19 BR
Chain of Custody Filled Out:	☐Yes ☒No ☐N/A	2. NO Mail Information, MWSL Information, page number 12-17-19 BR
Chain of Custody Relinquished:	☒Yes ☐No ☐N/A	3.
Sampler Name & Signature on COC:	☒Yes ☐No ☐N/A	4.
Samples Arrived within Hold Time:	☒Yes ☐No	5.
- VOA Samples frozen upon receipt	☐Yes ☐No	Date/Time:
Short Hold Time Analysis (<72hr):	☐Yes ☒No	6.
Rush Turn Around Time Requested:	☐Yes ☒No	7.
Sufficient Volume: For Analysis: ☒Yes ☐No	MS/MSD: ☐Yes ☒No ☐N/A	8.
Correct Containers Used:	☒Yes ☐No	9.
-Pace Containers Used:	☒Yes ☐No ☐N/A	
-Pace IR Containers Used:	☐Yes ☐No ☒N/A	
Containers Intact:	☒Yes ☐No	10.
Filtered volume received for Dissolved tests	☐Yes ☐No ☒N/A	11.
Sample Labels match COC:	☒Yes ☐No ☐N/A	12.
-Includes date/time/ID/Analysis	Matrix: W	
Trip Blank Present:	☐Yes ☐No ☒N/A	13.
Trip Blank Custody Seals Present	☐Yes ☐No ☒N/A	
Pace Trip Blank Lot # (if purchased):		

Client Notification/ Resolution: If checked, see attached form for additional comments ☐

Person Contacted: Date/Time:

Comments/ Resolution:

Project Manager Review: AL for TN/DM **Date:** 12/17/19

Single Location

Name: WPL - Columbia

Location ID: MW-84A
Number of Sampling Dates: 18

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
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
Calcium	ug/L	74000	72200	67600	--	74000	76000	70800	73200	76100	74900	77500	76600	76000	74000	80100	73500	72700	77600
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
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
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
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
Total Dissolved Solids	mg/L	316	322	316	--	324	316	328	342	344	342	314	328	372	330	318	310	316	340
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
Temperature, Water (C)	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
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
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

Single Location

Name: WPL - Columbia

Location ID: MW-301
Number of Sampling Dates: 17

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
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
Calcium	ug/L	126000	115000	108000	118000	129000	124000	120000	111000	108000	87200	112000	105000	101000	126000	114000	113000	112000
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
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
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
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
Total Dissolved Solids	mg/L	478	486	464	490	444	514	502	458	462	362	464	502	424	462	418	462	452
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
Field Specific Conductance	umhos/cm	897	573	796	1464	859	1018	1354	698.4	691.7	561	774	799	767	883	801	868	797
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
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
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
Temperature, Water (C)	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
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
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

Single Location

Name: WPL - Columbia

Location ID: M-4R
Number of Sampling Dates: 15

Parameter Name	Units	12/22/2015	4/4/2016	7/7/2016	10/12/2016	1/25/2017	4/11/2017	6/5/2017	8/9/2017	10/24/2017	4/23/2018	8/7/2018	10/24/2018	4/1/2019	10/7/2019	5/27/2020
Boron	ug/L	1000	461	453	793	866	512	464	973	1910	905	704	1140	788	1120	644
Calcium	ug/L	105000	79400	68900	94300	103000	84800	90300	91600	67100	86400	99700	84100	106000	82400	106000
Chloride	mg/L	45.9	23.8	37.2	33.6	36.5	44	37.1	40.8	49.3	51.6	48.2	26.3	31.4	33.9	50
Fluoride	mg/L	0.22	<0.2	<0.2	0.16	0.38	0.18	0.2	0.23	<0.5	0.16	0.13	<0.1	0.17	0.17	0.13
Field pH	Std. Units	7.41	7.55	7.26	7.67	7.27	7.55	7.07	7.13	7.52	7.44	7.18	7.13	7.24	7.44	7.29
Sulfate	mg/L	112	102	88.5	82.8	144	127	131	139	187	162	151	89.2	149	128	162
Total Dissolved Solids	mg/L	544	440	410	468	570	484	494	544	474	516	646	424	524	432	594
Antimony	ug/L	0.13	0.14	0.13	<0.073	0.24	0.14	0.26	0.15	--	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
Arsenic	ug/L	0.17	0.2	0.18	0.25	0.47	<0.099	0.33	<0.28	--	0.36	<0.28	<0.28	<0.28	0.37	0.39
Barium	ug/L	25.4	16.3	17.6	27.5	24	22.5	22.3	23.8	--	16.5	23.9	23.7	24.1	21	24.2
Beryllium	ug/L	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	<0.18	<0.18	--	0.3	<0.18	<0.18	<0.18	<0.25	<0.25
Cadmium	ug/L	<0.089	<0.089	0.21	<0.089	0.1	<0.089	0.084	<0.081	--	<0.081	--	<0.15	<0.15	<0.15	<0.15
Chromium	ug/L	0.68	1.6	<0.39	0.49	0.4	0.7	<1	<1	--	<1	<1	1.3	<1	1.4	1.2
Cobalt	ug/L	0.33	0.11	0.16	0.11	0.31	0.32	0.27	0.21	--	0.16	0.12	<0.12	<0.12	<0.12	<0.12
Lead	ug/L	0.067	<0.04	0.73	<0.04	0.094	<0.04	<0.2	<0.2	--	<0.2	--	<0.24	<0.24	<0.24	<0.24
Lithium	ug/L	4.3	1.7	1.5	2.6	6.1	3.2	1.2	3.7	--	4.8	1.9	1.1	1.8	1.8	1.4
Mercury	ug/L	<0.1	<0.1	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	--	<0.13	--	<0.084	<0.084	--	<0.084
Molybdenum	ug/L	14.6	9.9	13.2	11.6	17.6	14.5	11.9	15.8	--	19.1	14.7	15.4	29.4	27.6	25.6
Selenium	ug/L	3	6.4	15.3	7.7	10.5	13.3	9.7	15	--	8.6	5.5	4.1	12.6	1.8	11.7
Thallium	ug/L	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	0.18	<0.14	--	0.21	<0.14	<0.14	<0.14	<0.14	<0.14
Radium-226	pCi/L	0.764	0.16	0.635	0.467	0.984	0.933	0.168	0.439	--	0.217	0.239	0.139	0.211	0.103	0.119
Radium-228	pCi/L	0.007	0.0865	1.1	0.0824	0.72	0.274	0.768	0.25	--	0.524	0.241	0.191	0.549	0.141	0.0036
Total Radium	pCi/L	0.771	0.247	1.74	0.549	1.7	1.21	0.936	0.689	--	0.741	0.48	0.33	0.76	0.244	0.123
Field Specific Conductance	umhos/cm	954	535	662	1332	819	1212	660.4	751	612	790	881	819	888	705	869
Oxygen, Dissolved	mg/L	0.9	3.63	0.1	0.68	0.11	0.92	1.71	0.1	0.6	1.16	0.28	1.12	1.21	2.65	4
Field Oxidation Potential	mV	106	129.6	52.4	20.9	-0.5	46	82.2	-53.6	170	40.1	118.6	137.3	190.4	177.4	203.6
Groundwater Elevation	feet	801.22	811.83	801.07	801.52	789.64	787.95	787.83	788.54	788	790.43	787.63	788.47	789.44	790.65	787.73
Temperature, Water (C)	deg C	15	11.7	13.9	16.5	14.9	11.7	12.1	15	15.8	10.6	13.9	16.4	11.2	15	11
Turbidity	NTU	--	0	0.05	0.24	0.43	0.23	0.39	0.47	2.71	0.42	0.08	3.54	1.56	1.6	0.16
pH at 25 Degrees C	Std. Units	7.3	7.6	7.3	7.1	7.2	7.5	7.4	7.6	7.5	7.4	7.3	7.4	7.4	7.4	7.7

Single Location

Name: WPL - Columbia

Location ID: MW-33AR
Number of Sampling Dates: 16

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
Boron	ug/L	954	813	794	827	812	763	760	692	697	678	601	683	682	568	548	566
Calcium	ug/L	50000	48900	50500	79000	63100	57500	66800	80700	84800	98200	99800	--	66900	131000	121000	58400
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
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
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
Sulfate	mg/L	96.2	91.5	99.2	124	132	133	139	151	164	175	163	124	112	201	182	104
Total Dissolved Solids	mg/L	356	354	364	456	440	426	446	492	598	606	692	466	388	784	634	376
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	--	--	--	--	--	--	--
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	--	--	--	--	--	--	--
Total Radium	pCi/L	0.76	0.852	1.79	1.01	1.53	0.556	0.313	0.829	1.12	--	--	--	--	--	--	--
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
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
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
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
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
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
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

Single Location

Name: WPL - Columbia

Location ID: MW-34A
Number of Sampling Dates: 17

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
Boron	ug/L	230/205	220	216	--	212	224	214	214	201	205	208	209	241	233	204	207	210
Calcium	ug/L	65300/65200	63500	60000	--	55600	62800	58900	66300	66900	67300	69600	69600	--	70100	67500	78800	58700
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
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
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
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
Total Dissolved Solids	mg/L	300/324	298	304	--	288	242	310	330	366	358	340	412	460	392	310	314	284
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	--	--	--	--	--	--	--
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	--	--	--	--	--	--	--
Total Radium	pCi/L	0.689 /0.696	0.869	--	0.788	0.602	0.509	0.477	0.215	0.373	0.348	--	--	--	--	--	--	--
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
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
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
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
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
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
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

Single Location

Name: WPL - Columbia

Location ID: MW-302
Number of Sampling Dates: 16

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
Boron	ug/L	80	78.8	134	132	106	149	322	671	833	691	1950	203	296	254	246	611
Calcium	ug/L	68800	65900	66900	71700	76100	75400	79600	88900	87100	94400	110000	--	56900	62400	61400	90500
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
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
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
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
Total Dissolved Solids	mg/L	312	312	344	360	330	384	436	466	470	446	598	280	288	290	274	404
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	--	--	--	--	--	--	--
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	--	--	--	--	--	--	--
Total Radium	pCi/L	0.184	0.505	1.21	0.4	0.252	2.6	0.555	1.45	0.731	--	--	--	--	--	--	--
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
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
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
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
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
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
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

Single Location

Name: WPL - Columbia

Location ID: MW-303
Number of Sampling Dates: 18

Parameter Name	Units	12/21/2015	4/4/2016	7/7/2016	7/28/2016	10/12/2016	1/26/2017	4/10/2017	6/6/2017	8/8/2017	10/23/2017	4/24/2018	8/8/2018	9/21/2018	10/24/2018	4/1/2019	6/19/2019	10/7/2019	5/27/2020
Boron	ug/L	3000	2130	1680	--	1770	1790	1990	1970	2080	1870	2330	1410	--	2360	2770	--	2560	2700
Calcium	ug/L	9830	36000	14200	--	44500	7330	33700	35500	20700	8850	4610	25600	--	28200	9290	--	22300	27400
Chloride	mg/L	29.6	8	45.9	--	<0.5	14.2	16.7	8.1	11.7	8.3	<10	<10	--	2.6	3.7	--	2.7	2.3
Fluoride	mg/L	<2	0.28	<4	--	<0.1	<1	<2	0.3	<1	<0.5	<2	<2	--	0.16	0.54	--	0.19	<0.48
Field pH	Std. Units	9.93	9.43	9.48	9.13	9.75	9.94	9.85	9.1	9	9.2	10.01	9.3	9.15	8.89	9.92	8.98	9.33	8.68
Sulfate	mg/L	597	311	352	--	438	453	506	445	356	467	527	449	--	327	390	--	299	326
Total Dissolved Solids	mg/L	1230	562	724	--	694	794	778	686	678	806	948	792	--	516	726	--	574	570
Antimony	ug/L	0.92	0.23	0.32	--	0.076	0.23	0.14	<0.15	<0.15	--	0.28	0.15	--	<0.15	0.29	--	0.31	0.22
Arsenic	ug/L	49.2	12.6	27.9	--	13.4	27	12.1	9.1	12	--	39.1	8.7	6	7.8	33.2	5.3	10.2	5.9
Barium	ug/L	19.1	13.6	7.5	--	19.6	6.1	16	14.5	10.5	--	5.1	14.3	--	16.6	6.5	--	11.4	13.8
Beryllium	ug/L	<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	0.36
Cadmium	ug/L	<0.089	<0.089	<0.089	--	<0.089	<0.089	<0.089	<0.081	<0.081	--	<0.081	--	--	<0.15	<0.15	--	<0.15	0.3
Chromium	ug/L	50.6	60	66.3	--	79.9	73.4	71	65.1	65.3	--	97.1	56.8	--	49.1	71.2	--	62	42.8
Cobalt	ug/L	1.8	0.46	0.6	--	0.47	0.54	0.48	0.42	0.37	--	0.8	0.58	--	0.4	0.54	--	0.51	0.49
Lead	ug/L	1.4	0.11	0.15	--	<0.04	<0.04	<0.04	<0.2	<0.2	--	<0.2	--	--	<0.24	<0.24	--	<0.24	0.32
Lithium	ug/L	1.6	1	0.77	--	1.3	0.59	1.2	1.1	0.86	--	0.61	1.1	--	1.3	0.74	--	1	1.2
Mercury	ug/L	<0.1	<0.1	<0.13	--	<0.13	<0.13	<0.13	<0.13	<0.13	--	<0.13	--	--	<0.084	<0.084	--	--	<0.084
Molybdenum	ug/L	195	62.6	69.5	--	91.9	91.2	103	87	81.6	--	138	94.8	84.7	85.5	106	64.1	87	67.1
Selenium	ug/L	126	24	26.6	--	25	32.8	25.9	18.3	19.7	--	52.9	25.1	15.8	15.1	36.5	--	16.4	18.7
Thallium	ug/L	<0.14	<0.14	0.15	--	<0.14	<0.14	<0.14	<0.14	<0.14	--	<0.14	<0.14	--	<0.14	<0.14	--	<0.14	0.28
Radium-226	pCi/L	1.25	0.375	--	0.0662	-0.377	-0.776	-0.162	0.145	0.459	--	0.0558	0	--	0.328	0.39	--	0.0995	0.168
Radium-228	pCi/L	0.404	0.185	--	0.525	0.0851	1.24	0.016	2.26	0.336	--	0.444	0.237	--	0.416	0.287	--	0.322	0.214
Total Radium	pCi/L	1.65	0.56	--	0.591	0.0851	1.24	0.016	2.41	0.795	--	0.5	0.237	--	0.744	0.677	--	0.422	0.382
Field Specific Conductance	umhos/cm	2130	641	1076	1154	1946	1134	1826	931	936	1093	1447	1095	856	823	1176	712	865	828
Oxygen, Dissolved	mg/L	1.7	4.95	2.91	3.86	7.24	6.92	6.88	6.9	5.53	5.4	4.53	7.59	8.2	8.93	5.59	7.21	7.93	9.15
Field Oxidation Potential	mV	43	30.6	-2.3	22.1	26.2	-55.3	3.9	57.5	-22	285	-22.3	126.1	20.4	70.1	19.9	206.4	65.9	116.1
Groundwater Elevation	feet	784.11	783.58	784.6	784.35	786.18	785.28	786	786.49	785.42	783.92	783.27	785.2	786.5	787.51	786.52	786.81	787.02	785.56
Temperature, Water (C)	deg C	11.2	10.7	12.2	11.9	12.1	11.6	10.7	11.3	12.5	12.3	10.9	12.7	13.28	12.5	10.8	13	12.4	11.6
Turbidity	NTU	--	0	4.27	3.38	0.14	1.52	0.74	0.41	2.09	5.67	1.42	3.51	44.4	4.71	2.4	2.24	3.31	0
pH at 25 Degrees C	Std. Units	9.5	8.8	9	--	8.8	9.2	9.1	8.9	9.1	9.3	9.4	8.9	--	8.6	9.1	--	8.8	8.2

Single Location

Name: WPL - Columbia

Location ID: MW-304
Number of Sampling Dates: 15

Parameter Name	Units	12/21/2015	4/4/2016	7/7/2016	10/13/2016	1/26/2017	4/10/2017	6/5/2017	8/8/2017	10/23/2017	4/24/2018	8/8/2018	10/24/2018	4/2/2019	10/7/2019	5/27/2020
Boron	ug/L	609	420	445	659	614	496	486	570	732	430	632	892	413	613	469
Calcium	ug/L	78800	77600	72000	77000	65700	79100	75200	79700	78300	77900	84900	72400	88300	82900	84000
Chloride	mg/L	34.2	29.3	34.2	31.4	42.8	23.5	42.3	37.5	39.5	30.1	39.1	36.9	30.8	29.4	25.2
Fluoride	mg/L	0.27	<0.2	0.23	<0.5	0.26	0.1	0.19	0.12	0.13	<0.1	<1	0.14	<0.1	<0.1	<0.095
Field pH	Std. Units	7.17	7.45	7.25	7.71	7.59	7.64	7.2	7.13	7.78	7.16	7.21	7.11	7.28	7.35	7.09
Sulfate	mg/L	71.9	71.7	66.2	46.8	56.9	63.6	97.1	68.5	57.2	43.5	76	34.1	33.1	40	42.4
Total Dissolved Solids	mg/L	420	434	402	406	388	422	500	454	390	406	530	384	394	428	412
Antimony	ug/L	0.72	<0.073	<0.073	<0.073	<0.073	<0.073	<0.15	<0.15	--	<0.15	<0.15	<0.15	<0.15	0.29	0.25
Arsenic	ug/L	2.3	1.1	1.2	1.8	0.99	0.98	1.1	1	--	0.64	0.76	1.6	0.63	3.2	1.3
Barium	ug/L	42.9	34.8	28.2	39.5	28.2	30.9	30.9	33.3	--	26.2	35.2	33.6	26.7	34.8	30.8
Beryllium	ug/L	0.34	<0.13	<0.13	<0.13	<0.13	<0.13	<0.18	<0.18	--	<0.18	<0.18	<0.18	<0.18	<0.25	0.26
Cadmium	ug/L	0.64	<0.089	0.12	<0.089	<0.089	<0.089	<0.081	<0.081	--	<0.081	--	<0.15	<0.15	<0.15	0.19
Chromium	ug/L	2.1	1.5	<0.39	<0.39	<0.39	0.65	1.9	<1	--	<1	<1	<1	<1	<1	<1
Cobalt	ug/L	1.9	1.2	0.62	0.83	0.73	0.62	0.76	0.8	--	0.36	1.1	0.88	0.67	0.92	0.69
Lead	ug/L	1.1	0.47	0.43	<0.04	<0.04	0.16	<0.2	<0.2	--	<0.2	--	<0.24	<0.24	<0.24	0.29
Lithium	ug/L	0.93	0.51	0.17	0.14	<0.11	0.16	<0.14	<0.14	--	<0.14	<0.14	<0.19	<0.19	<0.22	0.3
Mercury	ug/L	<0.1	<0.1	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	--	<0.13	--	<0.084	<0.084	--	<0.084
Molybdenum	ug/L	15.6	9.2	21.9	17.1	14.4	10.1	15.6	11.8	--	3.2	12.3	10.2	3	4.8	3.9
Selenium	ug/L	1	<0.21	<0.21	<0.21	<0.21	<0.21	<0.32	<0.32	--	<0.32	<0.32	<0.32	<0.32	<0.32	0.33
Thallium	ug/L	0.68	0.15	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	--	0.15	<0.14	<0.14	<0.14	<0.14	0.33
Radium-226	pCi/L	0.759	0.18	-0.084	0	0.426	0.413	0.437	0.266	--	0.136	-0.061	0.244	0.703	-0.154	0.0533
Radium-228	pCi/L	0.267	0.294	2.24	0.885	0.819	0.327	1.44	0.511	--	0.804	0.474	0.434	0.208	0.443	0.249
Total Radium	pCi/L	1.03	0.474	2.24	0.885	1.25	0.74	1.88	0.777	--	0.94	0.474	0.678	0.911	0.443	0.302
Field Specific Conductance	umhos/cm	770	535	680	1211	624.9	1.105	660	704	628	686.4	785	707	747	729	711
Oxygen, Dissolved	mg/L	0.8	0.45	0.33	0.59	1.96	0.58	1.37	0.69	0.3	1.45	0.29	1.08	0.3	0.28	0.61
Field Oxidation Potential	mV	96	-65.2	21.2	-68.7	-58.7	-22.2	-15.3	-43.7	94	-18	24.8	-43	14.2	-97	54.2
Groundwater Elevation	feet	786.13	792.16	787.36	788.18	789.34	788.22	788.58	789.52	788.97	789.69	788.25	789.05	789.72	790.41	789.3
Temperature, Water (C)	deg C	13.7	9.7	16.4	16.3	12.4	10.4	13.4	17.9	17.4	10.6	20.1	16.7	8.3	18.5	16.2
Turbidity	NTU	--	0	2.57	2.19	1.2	5.43	12.84	1.54	6.2	1.22	2.35	5.89	5.27	2.61	4.35
pH at 25 Degrees C	Std. Units	7.3	7.4	7.3	7.3	7.7	7.6	7.4	7.4	7.5	7.4	7.3	7.5	7.3	7.3	7.6

Single Location

Name: WPL - Columbia

Location ID: MW-305
Number of Sampling Dates: 14

Parameter Name	Units	12/21/2015	4/4/2016	7/8/2016	10/13/2016	1/25/2017	6/5/2017	8/7/2017	10/24/2017	4/23/2018	8/7/2018	10/24/2018	4/1/2019	10/7/2019	5/27/2020
Boron	ug/L	1020	525	1110	1270	733	1240	2470	2200	1200	1360	1600	692	1430	1040
Calcium	ug/L	46400	37500	47300	56700	96500	75500	80200	94100	64800	91200	60200	74700	93000	103000
Chloride	mg/L	37.1	25.3	32.4	29.4	46.1	37.1	46.9	50.2	50.6	45.7	26.2	35.8	29.3	51.3
Fluoride	mg/L	0.76	0.7	0.44	0.65	0.53	0.41	0.46	0.64	0.37	0.18	0.36	0.33	0.36	0.3
Field pH	Std. Units	7.93	8.68	8.04	8.25	8.17	7.72	7.82	8.48	9.12	8.01	7.7	8.04	7.75	8.48
Sulfate	mg/L	105	78.7	99.2	108	274	185	243	252	191	276	123	200	480	305
Total Dissolved Solids	mg/L	258	228	282	298	530	408	490	490	386	614	312	418	496	556
Antimony	ug/L	0.81	0.32	0.43	0.51	0.71	0.55	0.68	--	0.26	0.42	0.58	0.16	0.46	0.3
Arsenic	ug/L	0.56	0.34	0.26	0.27	0.78	0.37	0.43	--	0.48	0.42	0.4	<0.28	0.49	0.75
Barium	ug/L	9.8	3.9	6.4	9.4	12.7	8.2	12.9	--	6	13.5	11	8.4	15	14.2
Beryllium	ug/L	0.19	<0.13	<0.13	<0.13	<0.13	<0.18	<0.18	--	<0.18	<0.18	<0.18	<0.18	<0.25	<0.25
Cadmium	ug/L	0.31	<0.089	<0.089	<0.089	0.34	0.18	0.13	--	<0.081	--	<0.15	<0.15	<0.15	<0.15
Chromium	ug/L	1.4	1.6	1.1	0.83	1.5	1.5	<1	--	<1	<1	1.1	1.3	1.1	<1
Cobalt	ug/L	0.37	0.069	0.07	<0.036	0.44	0.26	0.2	--	<0.085	<0.085	0.13	<0.12	<0.12	<0.12
Lead	ug/L	0.38	0.056	0.27	0.2	0.38	<0.2	<0.2	--	<0.2	--	<0.24	<0.24	<0.24	<0.24
Lithium	ug/L	0.5	0.24	<0.11	0.34	0.21	0.17	0.15	--	<0.14	<0.14	0.24	<0.19	<0.22	<0.22
Mercury	ug/L	<0.1	<0.1	<0.13	<0.13	<0.13	<0.13	<0.13	--	<0.13	--	<0.084	<0.084	--	<0.084
Molybdenum	ug/L	33.2	37.3	34.8	40.2	69.1	41.3	68.7	--	54.4	55.7	45.6	47.7	56.2	60.5
Selenium	ug/L	3.7	3	4.8	3.7	6.8	3.9	5.2	--	6.9	4.8	5.4	3.2	7.7	4.2
Thallium	ug/L	0.44	<0.14	<0.14	<0.14	0.45	0.15	0.2	--	0.16	<0.14	<0.14	<0.14	<0.14	<0.14
Radium-226	pCi/L	0.253	-0.037	0.112	0.594	0	0.128	-0.121	--	0.189	0.219	0.578	0.39	0.232	0.0976
Radium-228	pCi/L	-0.223	0.0515	1.32	0.396	0.838	0.711	0.103	--	0.164	0.498	0.346	0.409	0.495	0.612
Total Radium	pCi/L	0.253	0.0515	1.43	0.99	0.838	0.839	0.103	--	0.353	0.717	0.924	0.799	0.727	0.71
Field Specific Conductance	umhos/cm	492	285.6	489.1	861	727	558.4	689	630	579.5	813	565	683	751	814
Oxygen, Dissolved	mg/L	5.5	5.6	1.17	1.38	2.31	3.06	0.55	1.3	0.78	2.04	2.78	5.14	3.53	3.16
Field Oxidation Potential	mV	234	67.3	96.1	-31.4	-27.6	73.6	99.5	115	-3.3	129.9	102.6	164.8	165.5	211.2
Groundwater Elevation	feet	788.96	812.15	789.26	789.78	789.36	789.79	789.3	788.14	787.67	788.56	790.04	790.07	790.36	787.78
Temperature, Water (C)	deg C	24.3	10.9	17	26.1	18.2	12.8	21.8	26.7	12.1	19.6	25.7	11.8	23.4	12.1
Turbidity	NTU	--	0	0.96	0.59	1.61	0	0.56	2.67	5.98	0.05	3.52	1.34	1.97	0
pH at 25 Degrees C	Std. Units	7.9	7.9	7.9	7.3	8	7.9	7.8	8	8.2	8.1	7.8	7.9	7.7	8.4

Single Location

Name: WPL - Columbia

Location ID: MW-306
Number of Sampling Dates: 12

Parameter Name	Units	1/26/2017	4/10/2017	6/5/2017	8/8/2017	10/23/2017	5/24/2018	10/24/2018	4/1/2019	10/8/2019	12/13/2019	2/3/2020	5/28/2020
Boron	ug/L	138	128	129	136	145	92	166	119	134	121	120	108
Calcium	ug/L	81200	83500	85200	84800	90700	78400	86700	87300	92800	83800	81900	84600
Chloride	mg/L	1.7	1.1	2.3	1.7	1	1.8	1.3	1.7	0.64	0.76	0.88	0.76
Fluoride	mg/L	0.15	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.095	--	<0.095
Field pH	Std. Units	8.98	7.56	7.22	6.96	7.7	7.25	7.09	7.31	7.28	7.29	7.08	6.97
Sulfate	mg/L	8.2	6.8	10.1	7.3	8.7	6.3	14.4	9.2	7.8	7.6	7.2	6.9
Total Dissolved Solids	mg/L	310	326	324	338	310	314	322	310	328	326	310	306
Antimony	ug/L	0.074	0.21	<0.15	<0.15	0.17	<0.15	<0.15	--	--	<0.15	--	<0.15
Arsenic	ug/L	0.14	0.25	<0.28	<0.28	0.29	<0.28	<0.28	--	--	<0.28	<0.28	<0.28
Barium	ug/L	19.2	14.9	8.2	11.8	16.1	11.3	8.5	--	--	9	10.2	9.7
Beryllium	ug/L	<0.13	0.14	<0.18	<0.18	<0.18	<0.18	<0.18	--	--	<0.25	--	<0.25
Cadmium	ug/L	<0.089	0.11	<0.081	<0.081	<0.081	<0.081	<0.15	--	--	<0.15	--	<0.15
Chromium	ug/L	1.6	2.2	1.8	2	2.9	2.2	1.7	--	--	4.1	2.1	2.1
Cobalt	ug/L	0.054	0.15	<0.085	<0.085	0.2	<0.085	<0.12	--	--	<0.12	<0.12	<0.12
Lead	ug/L	<0.04	0.15	<0.2	<0.2	<0.2	<0.2	0.26	--	--	<0.24	--	<0.24
Lithium	ug/L	13.9	6.8	1.6	5.7	8.6	3.8	0.51	--	--	2.2	3.1	2.7
Mercury	ug/L	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	<0.084	--	--	<0.084	--	<0.084
Molybdenum	ug/L	11.4	8.4	5	6.7	9.6	7.2	4	--	--	5.8	6.1	6.5
Selenium	ug/L	0.52	0.77	0.48	0.58	0.84	0.58	0.59	--	--	0.54	0.81	0.85
Thallium	ug/L	<0.14	0.28	<0.14	<0.14	<0.14	<0.14	<0.14	--	--	0.17	<0.14	<0.14
Radium-226	pCi/L	-0.148	0.567	0.329	0.0606	0.271	0.31	0.291	--	--	0	-0.0492	0.182
Radium-228	pCi/L	0.653	0.319	1.07	0.374	0.231	0.19	-0.378	--	--	0.323	0.759	0.308
Total Radium	pCi/L	0.653	0.886	1.4	0.435	0.502	0.5	0.291	--	--	0.323	0.759	0.49
Field Specific Conductance	umhos/cm	531.8	899	495.7	524.4	477	583	598	592.3	583	662	588	572.1
Oxygen, Dissolved	mg/L	5.91	7.81	9.6	6.27	5	8.91	8.02	8.46	9.8	8.34	8.26	9.08
Field Oxidation Potential	mV	-16.1	97.6	84.3	196.2	234	92.8	40.3	150	109.1	56	226.5	227.7
Groundwater Elevation	feet	785.5	786.22	786.85	785.69	783.97	785.79	787.66	786.72	787.47	787.03	785.77	785.77
Temperature, Water (C)	deg C	10.1	9.8	10	12.1	13.4	9.6	13.5	9.1	13.1	11.6	9.9	10.2
Turbidity	NTU	0.41	0.34	0.55	0.34	32.64	3.96	4.89	1.61	1.27	0	0.65	0.32
pH at 25 Degrees C	Std. Units	7.5	7.4	7.4	7.3	7.4	7.4	7.5	7.4	7.3	7.3	7.4	7.6

Single Location

Name: WPL - Columbia

Location ID: MW-307
Number of Sampling Dates: 12

Parameter Name	Units	1/26/2017	4/10/2017	6/5/2017	8/8/2017	10/23/2017	5/24/2018	10/24/2018	4/1/2019	10/7/2019	12/13/2019	2/3/2020	5/27/2020
Boron	ug/L	319	175	178	373	434	313	338	154	242	281	246	231
Calcium	ug/L	70300	68300	70600	72500	83700	107000	17400	76500	75800	78700	72600	77800
Chloride	mg/L	8.7	4.1	5.4	8.3	12.9	52.8	19.3	13.8	9.3	16	13.8	12.9
Fluoride	mg/L	<0.5	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.1	<0.1	<0.48	--	<0.095
Field pH	Std. Units	6.89	7.52	7.26	6.9	7.75	6.83	6.94	7.14	7.24	7.18	7.19	7.07
Sulfate	mg/L	14.2	33.1	32.6	6.7	10.7	115	47.7	38.2	27.8	15.5	15.3	13.2
Total Dissolved Solids	mg/L	318	324	324	350	362	576	398	350	336	354	340	356
Antimony	ug/L	<0.073	0.29	<0.15	<0.15	<0.15	0.39	<0.15	--	--	<0.15	--	<0.15
Arsenic	ug/L	2	0.73	0.42	1.5	3	0.7	<0.28	--	--	1.1	1.7	0.76
Barium	ug/L	10.7	9.3	7.8	13.7	15.1	13.6	4.8	--	--	15.9	13.5	13.7
Beryllium	ug/L	<0.13	<0.13	<0.18	<0.18	<0.18	<0.18	<0.18	--	--	<0.25	--	<0.25
Cadmium	ug/L	<0.089	0.27	<0.081	<0.081	<0.081	<0.081	0.21	--	--	<0.15	--	<0.15
Chromium	ug/L	<0.39	1.6	<1	<1	<1	<1	<1	--	--	<1	<1	<1
Cobalt	ug/L	0.33	0.58	0.19	0.6	0.43	2.7	0.45	--	--	0.46	1	0.55
Lead	ug/L	<0.04	0.41	<0.2	0.21	<0.2	<0.2	0.33	--	--	<0.24	--	<0.24
Lithium	ug/L	<0.11	0.3	<0.14	0.21	<0.14	0.2	0.5	--	--	0.24	0.53	<0.22
Mercury	ug/L	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	<0.084	--	--	<0.084	--	<0.084
Molybdenum	ug/L	1	0.8	0.44	0.74	1.5	0.94	<0.44	--	--	0.72	1.2	0.7
Selenium	ug/L	<0.21	0.4	<0.32	<0.32	<0.32	<0.32	<0.32	--	--	<0.32	0.78	<0.32
Thallium	ug/L	<0.14	0.37	<0.14	<0.14	<0.14	<0.14	<0.14	--	--	0.21	0.65	<0.14
Radium-226	pCi/L	-0.523	0.233	0.914	0.309	0.511	0.309	0.251	--	--	-0.0613	-0.228	0.203
Radium-228	pCi/L	0.864	1.16	1.35	0.367	0.231	0.196	0.165	--	--	0.188	0.706	0.106
Total Radium	pCi/L	0.864	1.39	2.26	0.676	0.742	0.505	0.416	--	--	0.188	0.706	0.309
Field Specific Conductance	umhos/cm	570.2	898	503.9	589.9	591	915	731	662.5	618.2	752	638.3	615.2
Oxygen, Dissolved	mg/L	0.23	0.28	0.19	0.14	0.3	0.2	0.07	0.12	0.11	0.33	0.07	0.13
Field Oxidation Potential	mV	-119.6	-19.6	-12.9	-51.1	101	-34	-68.2	-0.8	-98.7	-102.7	-80.5	-26.3
Groundwater Elevation	feet	785.36	785.64	786.07	785.19	784.79	785.09	786.57	786.71	786.99	785.68	785.57	785.35
Temperature, Water (C)	deg C	10.1	9.2	10.5	15	14.5	9.5	14.6	8.2	14.3	12	10	10.8
Turbidity	NTU	1.9	1.28	1.85	1.78	3.87	6.64	6.07	2.27	1.83	0	1.32	0.74
pH at 25 Degrees C	Std. Units	7.5	7.6	7.4	7.3	7.4	7	7.4	7.3	7.5	7.2	7.2	7.5

Single Location

Name: WPL - Columbia

Location ID: MW-308
Number of Sampling Dates: 12

Parameter Name	Units	1/26/2017	4/10/2017	6/5/2017	8/9/2017	10/23/2017	4/24/2018	10/24/2018	4/1/2019	10/7/2019	12/13/2019	2/3/2020	5/27/2020
Boron	ug/L	740	614	565	644	707	584	430	587	694	647	606	476
Calcium	ug/L	132000	129000	140000	131000	134000	126000	144000	132000	131000	130000	124000	132000
Chloride	mg/L	7.5	5.8	5.8	3.7	5.6	3.7	<2.5	1.8	1.6	2.3	1.5	1.2
Fluoride	mg/L	<0.5	<0.5	<0.5	0.11	<0.5	<0.5	<0.5	<0.1	<0.1	<0.48	--	<0.095
Field pH	Std. Units	7.38	7.56	7.09	7.25	7.51	7.1	6.78	7.39	7.48	7.25	7.29	7.1
Sulfate	mg/L	6.1	5.5	14.8	1.7	<5	<5	70.7	1.1	<1	<2.2	<2.2	2.8
Total Dissolved Solids	mg/L	544	526	508	546	486	512	566	484	470	504	468	510
Antimony	ug/L	<0.073	0.12	<0.15	<0.15	<0.15	<0.15	<0.15	--	--	<0.15	--	<0.15
Arsenic	ug/L	3.4	3.5	2.3	2.6	5.1	4.9	6.8	--	--	3.5	3.6	3.1
Barium	ug/L	70.8	95.1	66.7	75	86.6	85.4	84.8	--	--	62.4	55.6	59.1
Beryllium	ug/L	<0.13	0.17	<0.18	<0.18	<0.18	<0.18	<0.18	--	--	<0.25	--	<0.25
Cadmium	ug/L	<0.089	<0.089	<0.081	<0.081	<0.081	<0.081	<0.15	--	--	<0.15	--	<0.15
Chromium	ug/L	0.97	9.3	<1	1.1	4	7.9	<1	--	--	<1	<1	<1
Cobalt	ug/L	0.28	1.6	0.21	0.26	0.85	1.7	1	--	--	<0.12	<0.12	<0.12
Lead	ug/L	0.28	2.5	<0.2	0.37	1.2	2.5	<0.24	--	--	<0.24	--	<0.24
Lithium	ug/L	0.28	2.2	0.18	0.26	0.96	2.1	<0.19	--	--	<0.22	0.35	<0.22
Mercury	ug/L	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	<0.084	--	--	<0.084	--	<0.084
Molybdenum	ug/L	1.2	1.4	2.2	0.91	1.2	0.54	3.2	--	--	3	1.2	0.9
Selenium	ug/L	<0.21	0.72	<0.32	<0.32	0.35	0.45	<0.32	--	--	<0.32	<0.32	<0.32
Thallium	ug/L	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	<0.14	--	--	<0.14	<0.14	<0.14
Radium-226	pCi/L	0	0.295	0	0.454	-0.077	0.411	0.274	--	--	0.0522	-0.053	0.249
Radium-228	pCi/L	1.67	0.485	1.44	0.722	0.318	0.17	-0.042	--	--	0.681	0.257	0.32
Total Radium	pCi/L	1.67	0.78	1.44	1.18	0.318	0.581	0.274	--	--	0.733	0.257	0.569
Field Specific Conductance	umhos/cm	920	1457	819	864	810	902	987	924	896	1051	909	897
Oxygen, Dissolved	mg/L	1.15	0.19	0.16	0.08	0.2	0.11	0.08	0.15	0.07	0.4	0.08	0.21
Field Oxidation Potential	mV	-105.4	-106.4	-76.1	-71.4	100	-184	-147.8	-137.7	-170	-154.9	-151.7	-91.5
Groundwater Elevation	feet	785.73	786.51	786.46	785.37	784.17	782.65	787.81	787.53	787.18	786.43	786.48	786.28
Temperature, Water (C)	deg C	11.5	9	10.6	14.9	14.6	10.5	15.1	8.9	15	12	10.4	12.1
Turbidity	NTU	14.9	113.1	9.85	16.81	38.62	133.7	9.3	3.44	6.75	0	1.52	4.44
pH at 25 Degrees C	Std. Units	7.4	7.4	7.2	7.3	7.3	7.2	7.3	7.4	7.4	7.2	7.3	7.3

Single Location

Name: WPL - Columbia

Location ID: MW-309
Number of Sampling Dates: 14

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
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
Calcium	ug/L	42700	41800	39600	52700	67600	63800	93600	55200	--	45300	46900	51600	--	--
Chloride	mg/L	147	157	157	141	203	557	811	329	--	145	43.2	350	--	--
Fluoride	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<1	<0.1	<0.1	--	<0.1	<0.1	<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
Sulfate	mg/L	12.2	12.2	12	17.5	24.1	33.1	43.3	35.9	--	35.2	21.9	28.6	--	--
Total Dissolved Solids	mg/L	576	552	562	478	548	1210	1570	830	--	548	370	960	--	--
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	--	--	--	--	--	--
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	--	--	--	--	--	--
Total Radium	pCi/L	0.516	1.25	1.13	0.895	0.673	1.74	0.754	0.569	--	--	--	--	--	--
Field Specific Conductance	umhos/cm	983	1094	985	921	1057	2290	2948	1423	1424	1041	687	1785	1726	1656
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
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
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
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
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
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	--	--

Single Location

Name: WPL - Columbia

Location ID: MW-310
Number of Sampling Dates: 14

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
Boron	ug/L	67.1	62.1	60.7	59.2	61.4	69.5	64.2	80.3	--	73	--	81.8	--	74.4
Calcium	ug/L	32400	33400	32100	32100	34300	39700	38800	54100	--	38800	--	57600	55400	41100
Chloride	mg/L	19.8	21.7	22.1	68.6	59.8	118	139	152	--	76	--	190	--	128
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
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
Sulfate	mg/L	31.6	33.1	32	28	30.4	60.2	32.8	118	--	58.4	--	85.9	--	68.2
Total Dissolved Solids	mg/L	406	398	396	436	438	532	526	736	--	470	--	650	--	582
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	--	--	--	--	--	--
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	--	--	--	--	--	--
Total Radium	pCi/L	0.114	0.709	0.969	0.346	0.12	0.257	0.308	0.475	--	--	--	--	--	--
Field Specific Conductance	umhos/cm	684	765	688	840	791	998	1016	1114	1182	924	--	1226	1416	1035
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
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
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
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
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
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

Single Location

Name: WPL - Columbia

Location ID: MW-311
Number of Sampling Dates: 12

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
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
Calcium	ug/L	58000	61000	56600	62500	70700	76800	65700	75400	--	65600	63900	62200
Chloride	mg/L	2.9	2.7	2.6	3.5	3	2	2	3.9	--	1.9	1.5	1.5
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
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
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
Total Dissolved Solids	mg/L	260	274	262	304	352	372	332	424	--	276	272	326
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	--	--	--	--
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	--	--	--	--
Total Radium	pCi/L	0.608	1.14	0.898	0.162	0.0331	0.338	0.0614	0.773	--	--	--	--
Field Specific Conductance	umhos/cm	455	508.1	459.1	539	596	606.8	573.2	600	699	337.8	495.6	547.2
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
Field Oxidation Potential	mV	31	74	65.3	70.1	82.6	157	150.3	42.4	146	116.3	144.3	176.3
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
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
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
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

Attachment C4

SCS ENGINEERS

Groundwater Sampling and Analysis Plan

Columbia Energy Center
Pardeeville, Wisconsin

Prepared for:

Wisconsin Power and Light Company

4902 N Biltmore Lane
Madison, Wisconsin 53707

Prepared by:

SCS ENGINEERS
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(608) 224-2830

April 2019
File No. 25216067.18

Groundwater Sampling and Analysis Plan
Columbia Energy Center
Pardeeville, Wisconsin

Prepared for:

Wisconsin Power and Light Company
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Madison, Wisconsin 53707

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April 2019
File No. 25216067.18

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SIGNATURES PAGE

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1.0 INTRODUCTION

This Groundwater Sampling Plan (plan) summarizes groundwater sampling and analysis procedures for the Columbia Energy Center, a generating station with a coal combustion residuals (CCR) landfill and settling ponds located in Pardeeville, Wisconsin (**Figure 1**). Groundwater sampling at this site is performed to satisfy sampling requirements under United States Environmental Protection Agency (USEPA) Rule 40 CFR Part 257.50-107 (CCR rule sampling). This plan was prepared in accordance with the requirements of 40 CFR Part 257.93(a).

2.0 SAMPLING EVENTS AND PARAMETERS

Groundwater monitoring under the federal program includes semiannual sampling events beginning in October 2017. All samples collected under the CCR rule sampling program are to be unfiltered (total analysis).

A list of the locations at which water level measurements and samples will be collected is included in **Table 1**. This table includes the parameters that may be analyzed at each sampling location. Sampling point locations are shown on **Figure 2**.

3.0 FIELD METHODS

3.1 WATER LEVEL MEASUREMENTS

Depth to water and total well depth will be recorded at each monitoring well immediately prior to purging. These measurements should be taken from the top of the polyvinyl chloride (PVC) well casing. During each sampling event, depths to groundwater at all wells must be measured within a period of time short enough to avoid temporal variations in groundwater flow which could preclude accurate determination of groundwater flow rate and direction.

3.2 WELL PURGING – LOW-FLOW METHOD

Wells will be sampled using low-flow sampling techniques, as documented in USEPA publication EPA/540/S-95/504. All site wells have dedicated WellWizard ™ sampling systems for this purpose. These dedicated pump systems will be used for well purging and for sample collection.

After the initial water level measurement, the well will be purged with a consistent flow of 1 liter per minute (L/min) or less. The water level should remain stable or stabilize during the purging. If the level does not stabilize and continues to drop, the flow rate will be reduced. If the level does not stabilize with a flow rate of 50 milliliters per minute (mL/min), the well will be purged according to the procedure in **Section 3.3**. The purge rate will be measured using a calibrated device and timer, and recorded.

Purge water should be monitored until three consecutive readings, taken approximately 2 minutes or 0.5 well volumes apart, are stabilized within the provided ranges for the following parameters:

Parameter	Range
pH[1,2]	+/- 0.1 unit
Specific Conductance[1,2]	+/- 3%
Dissolved Oxygen[1,2]	+/- 10%
Oxidation/Reduction Potential[1,2]	+/- 10 millivolts
Temperature[2]	+/- 3%
Turbidity[1,2] (Required if collecting non-filtered metals samples. Recommended otherwise.)	+/- 10% for values greater than 5 NTU. If three turbidity values are less than 5 NTU, consider the values as stabilized.

References: (1): USEPA Publication EPA/540/S-95/504 and (2): USEPA Region 1 Low-Stress (Low-Flow) SOP, Revision Number 3, Revised January 19, 2010.

Measurements will be collected using a portable meter and recorded on a Groundwater Sampling Log (**Appendix A**). All parameters except turbidity must be obtained using a flow-through cell. Samples for turbidity measurements will be obtained before water enters the flow-through cell.

Meter calibration will be performed according to the manufacturer's instructions and will be documented in the field book. Observations of sample odor and color will be recorded. Visual observations of turbidity may be recorded in addition to instrument readings.

Once the readings have stabilized, which indicates that stagnant water in the well has been replaced with formation water, the well will be ready for groundwater sampling from the discharge.

3.3 WELL PURGING – IF STABLE WATER LEVEL CANNOT BE ACHIEVED

If a stable water level cannot be achieved in a well with low-flow purging methods, in a well where low-flow sampling is the intended sampling method, the well will be purged using the dedicated pump. The well will then be allowed to recover sufficiently so that the required sample volume may be collected. The sample will be collected using the dedicated low-flow pump. The pumping rate should be set as slow as practical in order to minimize sample turbidity.

If this method is used, the indicator field parameters listed in **Section 3.2** will be recorded but stability is not required. The depth to water before sample collection will be recorded.

3.4 SAMPLING PROTOCOL

3.4.1 Monitoring Wells – Low-Flow Method

After each well is determined to have stabilized (see **Section 3.2**), samples will be collected using the dedicated bladder pump. Disposable chemical-resistant (e.g., nitrile) gloves will be worn during sampling and will be changed between sampling points.

All samples will be labeled with the sample ID (monitoring well number), site name, project number, time and date of collection, analytical parameters, preservative, and the initials of the sampler. The laboratory will provide instructions regarding the preservation techniques required for each analysis. The laboratory will provide any required temperature and/or trip blanks, and will provide water and sample containers for field blanks.

3.4.2 Monitoring Wells – Low-Flow Method in Slow-Recovering Wells

At wells purged using the procedure described in **Section 3.2**, samples will be collected using the dedicated bladder pump after the well has recovered sufficiently for the required sample volume to be collected. The pumping rate during sampling will be set as low as practical in order to minimize sample turbidity. Disposable chemical-resistant (e.g., nitrile) gloves will be worn during sampling and will be changed between sampling points.

All samples will be labeled with the sample ID (monitoring well number), site name, project number, time and date of collection, analytical parameters, preservative, and the initials of the sampler. The laboratory will provide instructions regarding the preservation techniques required for each analysis. The laboratory will provide any required temperature and/or trip blanks, and will provide water and sample containers for field blanks.

3.4.3 Quality Assurance and Quality Control

A Field Blank sample will be collected during each sampling event using distilled or deionized water and sample containers provided by the laboratory. If applicable, the Field Blank bottles will be filled in an area of the site where the risk of sample contamination from CCR handling activities appears to be the greatest (e.g., next to a monitoring well, adjacent to or downwind of an active CCR handling area). The location where the Field Blank bottles were filled will be recorded in the field notes.

3.4.4 Sample Containers

Sample containers will be provided by the laboratory contractor for the sample analysis. Containers for samples that require preservation will be pre-preserved by the laboratory. The laboratory will provide sample containers for the collection of quality control samples.

3.4.5 Sample Preservation

Samples will be preserved as required for the analytical methods being used. The laboratory will provide instructions and sample containers pre-filled with preservative chemicals, if required. All samples will be kept on ice from the time of collection until they are submitted to the laboratory.

3.4.6 Sample Shipment

Samples for all parameters except radium will be packed in coolers with ice and will be shipped to the laboratory using a method that ensures delivery within required temperature limits. Radium samples do not require ice for shipping. Typically, samples will be shipped for next-day delivery using a courier service or a shipping company (e.g., FedEx or UPS).

3.5 EQUIPMENT DECONTAMINATION

Equipment that is not dedicated to a single well (e.g., water level measurement tape or non-dedicated pump) will be decontaminated between monitoring points. Decontamination will consist of cleaning with water and nonphosphate detergent (i.e., Alconox™ or equivalent), followed by a double-rinse with distilled water.

4.0 ANALYTICAL METHODS

Laboratory sample analysis will be performed using the following methods. Other methods may be substituted provided the Limit of Detection of the new method is lower than the regulatory standard(s) to which the results will be compared.

- Total Metals (except mercury) – EPA 6010 or 6020
- Mercury – EPA 7470
- Anions – EPA 9056 or EPA 300.0
- Total Dissolved Solids – SM 2540C
- Radium 226 – EPA 903.1
- Radium 228 – EPA 904.0

4.1 ANALYTICAL QUALITY ASSURANCE/QUALITY CONTROL

Samples for laboratory analysis will be submitted only to a laboratory that is certified for the methods listed in **Section 4.0**. The laboratory will have established Quality Assurance/Quality Control (QA/QC) procedures that conform to industry standards.

5.0 DOCUMENTATION

5.1 FIELD DOCUMENTATION

Water levels, purge volumes, sample times, field parameters, and general well condition information will be recorded on Groundwater Sampling Log forms (**Appendix A**).

5.2 CHAIN OF CUSTODY

Chain of Custody forms will be supplied by the laboratory and completed in the field by the sampler. An example Chain of Custody form is included in **Appendix B**. At a minimum, Chain of Custody forms will include:

- Sample IDs, date and time of sample collection, required analyses for each sample, and sample preservative (if applicable)
- Site name and project number
- Sampler's name and company
- Laboratory name and address
- Signature of person relinquishing samples for shipping

6.0 STATISTICAL ANALYSIS

Groundwater monitoring data for the Columbia Energy Center CCR units will be evaluated in accordance with 40 CFR 257.93(f)(3). The procedures to be followed for statistical analysis of groundwater monitoring data are included in **Appendix C**.

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TABLE 1

Sampling Points and Parameters – CCR Rule Sampling Program

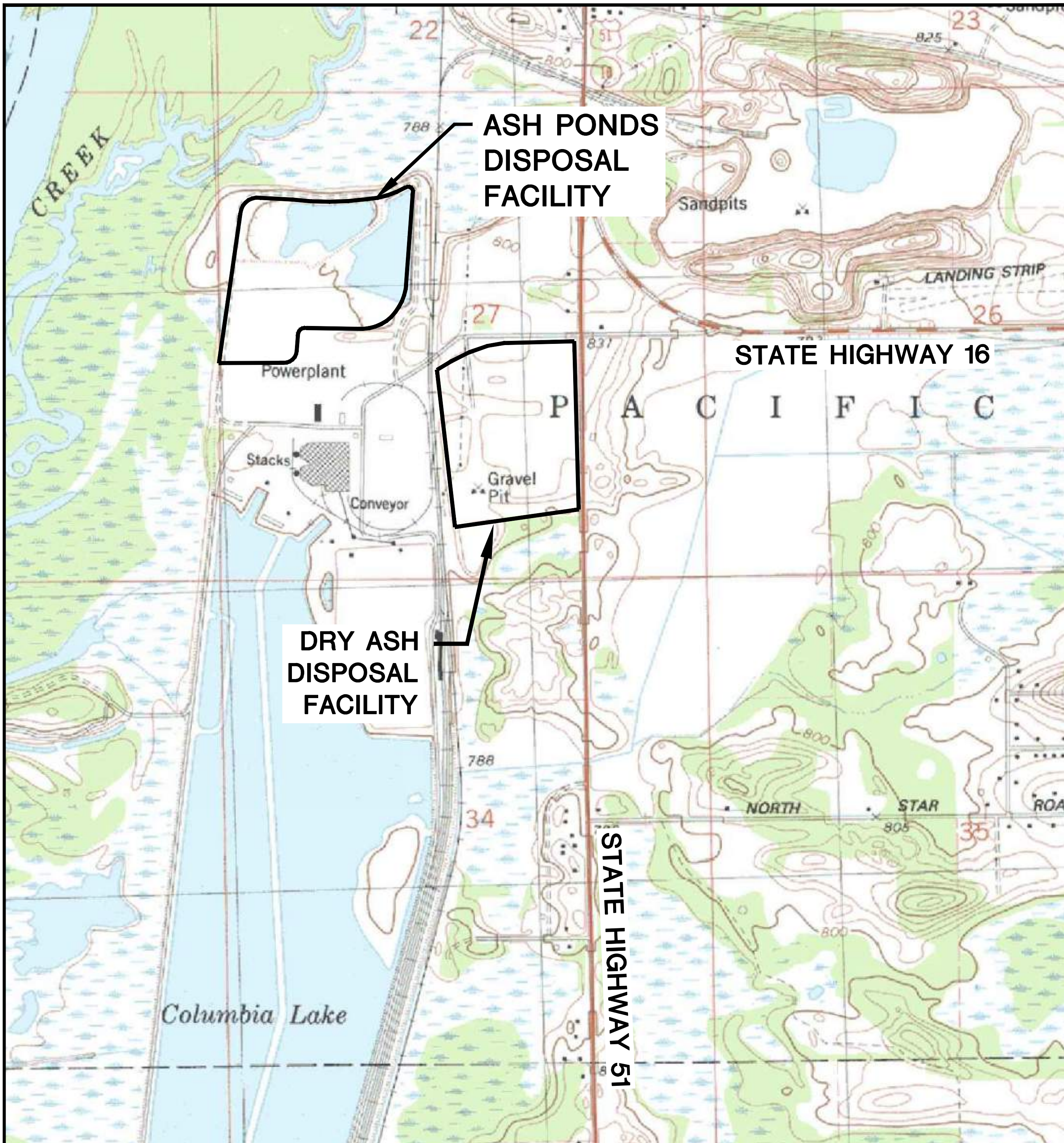
Table 1. Sampling Points and Parameters - CCR Rule Sampling Program
Groundwater Monitoring - Columbia Energy Center / SCS Engineers Project #25219067

	Parameter	MW-301	MW-84A	MW-302	MW-33AR	MW-34A	MW-303	MW-304	MW-305	M-4R	MW-306	MW-307	MW-308	MW-309	MW-310	MW-311	Field Blank
Appendix III Parameters (Detection Monitoring)	Boron	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Calcium	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Chloride	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Fluoride	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	pH	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Sulfate	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	TDS	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Appendix IV Parameters (Assessment Monitoring)	Antimony	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Arsenic	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Barium	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Beryllium	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Cadmium	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Chromium	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Cobalt	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Fluoride	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Lead	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Lithium	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Mercury	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Molybdenum	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Selenium	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Thallium	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Radium	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
CCR Rule Field Parameters	Groundwater Elevation	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
	pH	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Low-Flow Sampling Field Parameters	Well Depth	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
	Specific Conductance	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
	Dissolved Oxygen	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
	ORP	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
	Temperature	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
	Turbidity	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
	Color	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
	Odor	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

Notes: All samples are unfiltered (total).

I:\25216067.00\Deliverables\Sampling and Analysis Plan\Final for Operating Record\Final for Operating Record_Secondary Pond Update\[Table_1_COL_CCR_Rule_Sampling.xls]Sheet1

FIGURES

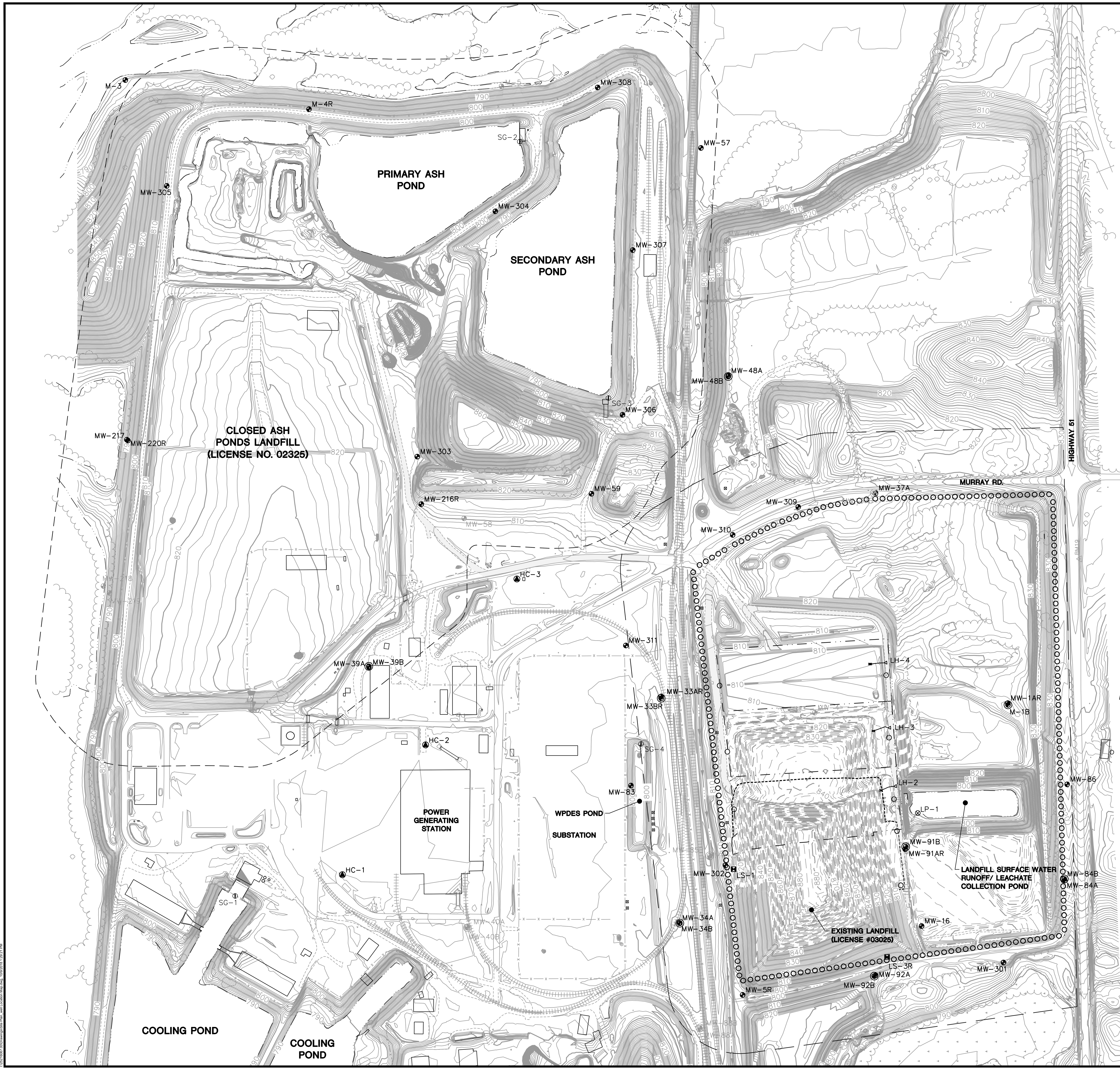


POYNETTE QUADRANGLE
WISCONSIN–COLUMBIA CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)
NW/4 POYNETTE 15' QUADRANGLE
1984
SCALE: 1" = 2,000'

CLIENT	SITE	
ALLIANT ENERGY COLUMBIA GENERATING STATION W8375 MURRAY RD. PARDEEVILLE, WISCONSIN 53954	COLUMBIA ENERGY CENTER ASH PONDS DISPOSAL FACILITY & DRY ASH FACILITY	SITE LOCATION MAP

				ENGINEER	FIGURE
PROJECT NO.	25213071.01	DRAWN BY:	KP	SCS ENGINEERS 2830 DAIRY DRIVE MADISON, WI 53718-6751 PHONE: (608) 224-2830	1
DRAWN:	08/10/09	CHECKED BY:	PEG		
REVISED:	01/23/15	APPROVED BY:			

I:\25213071\Drawings-General\FIGURE 1.dwg , 1/23/2015 4:28:28 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
- DESIGN MANAGEMENT ZONE
- APPROVED LIMITS OF WASTE
- CONSTRUCTED LIMITS OF WASTE
- WATER SUPPLY WELL
- STAFF GAUGE
- WATER TABLE WELL
- PIEZOMETER
- SURFACE WATER SAMPLE LOCATION
- LYSIMETER
- ABANDONED WATER TABLE WELL
- ABANDONED PIEZOMETER
- LEACHATE HEADWELL

NOTES;

1. BASE MAP CREATED FROM AERIAL SURVEY BY KBM, FLOWN DECEMBER 1, 2014.
2. MONITORING WELL LOCATIONS AND ELEVATIONS SURVEYED BY WISCONSIN POWER AND LIGHT, INC. IN DECEMBER 1994, NOVEMBER 1996, APRIL 2003, AND AUGUST 2012.
3. SUPPLY WELL LOCATIONS ARE APPROXIMATE AND ASSUMED BASED ON JANUARY 2013 DRAWINGS BY TRC.
4. THE LOCATIONS OF THE ASH PONDS FACILITY DESIGN MANAGEMENT ZONE DEMARCATION LINES ARE APPROXIMATE AND BASED ON THE WATER TABLE MAP (OCTOBER 2012) FIGURE BY RMT.
5. THE LOCATION OF THE ACTIVE DRY ASH LANDFILL DESIGN MANAGEMENT ZONE DEMARCATION LINE IS BASED ON A 300 FOOT OFFSET FROM THE DESIGN LIMITS OF ASH EXCEPT WHERE OFFSET WOULD EXTEND LINE BEYOND PROPERTY LINE.

FIGURE 2

SITE PLAN AND WELL LOCATION MAP

SITE: COLUMBIA ASH PONDS AND DRY ASH DISPOSAL FACILITIES

CLIENT: ALLIANT ENERGY, 4902 NORTH BILTMORE LN. #1000, MADISON, WI 53718

ENGINEER: SCS ENGINEERS, 2830 DAIRY DRIVE MADISON, WI 53718-6751, PHONE: (608) 224-2830

PROJECT NO.	25216067.18	DRAWN BY:	BJM/KP/RJG
DRAWN:	01/06/15	CHECKED BY:	
REVISED:	10/09/18	APPROVED BY:	

APPENDIX A

Low-Flow Groundwater Sampling Log

Groundwater Sampling Log

Project No. ____________________ **Site** ____________________

Well No. ____________________ **Date** ____________________

Sampling Personnel ____________________

Total Well Depth ____________________ **Sampling Device** ____________________

Depth to Water ____________________ **Other Info.** ____________________

Well Volume ____________________ **Pumping Rate** ____________________

Color/Odor ____________________ **Pump Start/Stop Time** __________ / __________

Temperature: ______ Wind Direction: N E S W **Precip:** None Light Heavy **Sky:** Cloudy Sunny Partly

Time	Depth to Water (ft)	Temp. (deg. C)	pH (standard units)	DO (mg/L)	Cond. (µs/cm)	ORP (mV)	Turbidity (NTU)	Notes
Stability Requirements – last 3 consecutive readings must be within:		+/- 3%	+/- 0.1 unit	±/- 10% or 3 readings <0.5 mg/L	+/- 3%	+/- 10mV	+/- 10% or 3 readings <5 NTU	

Type of Samples Collected: ____________________

____

Sample Date /Time: ____________________

Additional Notes: ____________________

____

____

Information: Volume in a 2-inch well = 617 ml/ft, Volume in a 4-inch well = 2,470 ml/ft: $Vol_{cyl} = \pi r^2 h$

Document2

APPENDIX B

Example Chain of Custody

(Please Print Clearly)

Company Name:	SCS Engineers
Branch/Location:	Madison, WI
Project Contact:	Tom Karwoski
Phone:	(608) 224-2830
Project Number:	25216067.17
Project Name:	WPL-COL GW Monitoring
Project State:	Wisconsin
Sampled By (Print):	
Sampled By (Sign):	
PO #:	
Regulatory Program:	

Pace Analytical®
www.pacelabs.com

UPPER MIDWEST REGION
MN: 612-607-1700 WI: 920-469-2436

Page 1 of

CHAIN OF CUSTODY

*Preservation Codes
A=None B=HCL C=H2SO4 D=HNO3 E=DI Water F=Methanol G=NaOH
H=Sodium Bisulfate Solution I=Sodium Thiosulfate J=Other

FILTERED? (YES/NO) — Y / N
PRESERVATION (CODE)* — Pick Letter

Analyses Requested

Quote #:	
Mail To Contact:	Tom Karwoski
Mail To Company:	SCS Engineers
Mail To Address:	2830 Dairy Drive Madison, WI 53718
Invoice To Contact:	Tom Karwoski
Invoice To Company:	SCS Engineers
Invoice To Address:	2830 Dairy Drive Madison, WI 53718
Invoice To Phone:	(608) 224-2830

Data Package Options (billable)
☐ EPA Level III
☐ EPA Level IV

MS/MSD
☐ On your sample (billable)
☐ NOT needed on your sample

Matrix Codes
A = Air, B = Biota, C = Charcoal, O = Oil, S = Soil, Sl = Sludge
W = Water, DW = Drinking Water, GW = Ground Water, SW = Surface Water, WW = Waste Water, WP = Wipe

PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX	CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)	Profile #
	MW-301			GW			
	MW-302			GW			
	MW-303			GW			
	MW-304			GW			
	MW-305			GW			
	M-4R			GW			
	MW-33AR			GW			
	MW-34A			GW			
	MW-84A			GW			
	Field Blank			W			

Rush Turnaround Time Requested - Prelims
(Rush TAT subject to approval/surcharge)
Date Needed:

Transmit Prelim Rush Results by (complete what you want):

Email #1:	
Email #2:	
Telephone:	
Fax:	

Samples on HOLD are subject to special pricing and release of liability

Relinquished By:	Date/Time:	Received By:	Date/Time:
Relinquished By:	Date/Time:	Received By:	Date/Time:
Relinquished By:	Date/Time:	Received By:	Date/Time:
Relinquished By:	Date/Time:	Received By:	Date/Time:
Relinquished By:	Date/Time:	Received By:	Date/Time:

PACE Project No.

Receipt Temp = °C

Sample Receipt pH
OK / Adjusted

Cooler Custody Seal
Present / Not Present
Intact / Not Intact

APPENDIX C

Statistical Methodology for Groundwater Monitoring

APPENDIX C
Statistical Methodology for Groundwater Monitoring
Columbia Energy Center – Wisconsin Power and Light Company (WPL)
October 2017

Groundwater monitoring data for the Columbia Energy Center CCR units will be evaluated in accordance with 40 CFR 257.93(f)(3), using a prediction interval procedure, in which an interval for each constituent is established from the distribution of the background data, and the level of each constituent in each compliance well is compared to the upper prediction limit.

Statistical evaluation will be performed using commercially available software (*Chemstat*, *Sanitas for Groundwater*© or similar) in general accordance with the USEPA's *Unified Guidance for Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities* dated March 2009 (Unified Guidance) (USEPA, 2009) and generally accepted procedures.

The general procedures to be followed for statistical analysis of groundwater monitoring data are outlined below.

BACKGROUND MONITORING

A minimum of eight background samples will be collected prior to October 2017 for each Appendix III and Appendix IV constituent for each well in the monitoring system to develop the initial background data set for prediction limit analysis.

DETECTION MONITORING

The following data analysis will be performed for Appendix III parameters during detection monitoring to determinate whether a statistically significant increase (SSI) has occurred:

- Data Evaluation and Validation/Censoring
- Statistical Analysis using Prediction Limits

For the prediction limit calculation, the selection of interwell or intrawell testing will be based on the considerations outlined in Chapter 6 of the Unified Guidance, including natural background spatial variability, historical contamination associated with the sources other than the CCR unit(s), indications of contamination associated with the CCR unit(s), and background sample data set sizes.

For the initial detection monitoring event, interwell testing will be performed to compare compliance well concentrations to background well concentrations. If compliance well results do not significantly exceed background results and/or an alternative source demonstration indicates that higher concentrations in a compliance well are not associated with a release from the CCR unit(s), then intrawell testing may be implemented for future monitoring.

Data Evaluation and Validation/Censoring

In preparation for statistical analysis, data evaluation and validation/censoring steps will include:

- Averaging duplicate samples
- Validation and censoring
- Outlier analysis

Averaging Duplicate Samples

Field and laboratory quality assurance/quality control may involve the collection of one field duplicate per monitoring event. For data evaluation purposes, duplicates will be averaged with the original sample to form an independent data point before statistical analysis is performed.

Validation and Censoring

To filter analytical data that may not represent valid results, data from the monitoring events will be validated. Data flagged with a "J" qualifier indicates the quantitation of the parameter is less than the laboratory's LOQ but greater than the laboratory's LOD. Data flagged with a "B" qualifier indicated that the parameter was also detected in a trip blank, field blank, and/or method blank detection.

For compliance wells, non-detect data and data flagged with a "J" or "B" qualifier will not be subjected to statistical analysis for compliance purposes. Background data flagged with a "B" qualifier may not be included in the statistical analysis to preserve the power of the test to detect a potential release from the facility.

Outlier Analysis

Outlier analysis will be performed for background data to identify potential extreme values that may be due to sampling, laboratory, transportation, or transcription errors. Outlier analysis will be performed on background data for parameters for which statistical analysis will be performed. Background observations identified as outliers may not be included in the statistical analysis to preserve the power of the test to evaluate if the parameter detections are potentially due to the CCR unit.

Outlier analysis will include visual data review as well as statistical analysis as discussed in Chapter 12 of the Unified Guidance. The formal tests for outliers involve comparing the individual data points for each parameter within the same well against the remaining data from other sampling events. Dixon's test is recommended for small data sets (i.e., $n \leq 25$). Rosner's test is recommended for large data sets (i.e., $n > 25$). Probability plots and/or box plots may also be used for visual identification of outliers.

Statistical Analysis using Prediction Limits

Statistical analysis will be conducted for Appendix III parameters validated and quantified at a concentration equal to or above the laboratory's limit of quantitation (LOQ) in the compliance wells to evaluate if the parameter detections are potentially due to the CCR unit. The statistical analysis process involves:

- Evaluating Background Data
- Assessing Data Distribution
- Calculating Upper Prediction Limits (UPLs)
- Verification Retesting (as appropriate)

Evaluating Background Data

Background data for interwell analysis will be pooled from upgradient monitoring wells MW-84A and MW-301. The dates utilized for interwell analysis for the 1st semi-annual detection monitoring event, scheduled for October 2017, will include sampling events between April 1, 2016, and October 31, 2017. Background data for intrawell analysis will include compliance well results from sampling events between April 1, 2016, and August 31, 2017.

As described above, background data will be reviewed for outliers that should be removed prior to further statistical analysis.

The background data set will be updated for future monitoring events in accordance with the Unified Guidance.

Assessing Data Distribution

The assessment of the data distribution is critical for prediction limit calculations, as the selected formula is dependent on the data distribution. The Shapiro-Wilks test of normality is used to assess the distribution of background data for datasets with fewer than 50 data points. The Shapiro-Francia test of normality is used to assess the distribution of background data for datasets with 50 data points or more. Background data that are not determined to be normally distributed will also be evaluated to determine if the distribution can be transformed to a normal distribution by transforming the data (e.g., log or square root) and applying the same tests for normality. Data sets with greater than 50% non-detects will not be subjected to a data distribution evaluation, and the UPL will set using the non-parametric method.

Calculating Upper Prediction Limits

A prediction limit or interval is used to make a statement about one or more future "like" measurements. The Unified Guidance recommends using prediction limits with retesting as a means to lower facility-wide false positive rates while maintaining adequate statistical power to detect an SSI. Prior to constructing prediction limits with retesting following the Unified Guidance, a retesting plan must be specified based on the number of statistical evaluation periods per year, number of constituents, number of monitoring wells, and number of background results. The calculated UPL is then based on the retesting plan.

For initial detection monitoring at Columbia, a 1-of-2 retesting plan will provide adequate statistical power to detect an SSI, while maintaining the annual target facility-wide false positive rate at no greater than 10% (cumulative throughout the year). The retesting plan can be modified in the future provided that the statistical power and site-wide false positive criteria are met. Any changes to the retesting plan should be documented before the sampling event begins.

The first number in the "_-of-_" retesting plan indicates the number of resamples that must not exceed the prediction limit in order to determine that an SSI has not occurred. The second number indicates the total number of samples required (i.e., the initial sample plus the resample). Therefore, in a 1-of-2 retesting approach, an SSI has occurred only if both the initial sample and the resample exceed the UPL.

The amount of background data that are below the limit of detection (LOD) plays an important role in selecting the appropriate statistical evaluation method and the resulting statistical calculation. If less than 15% of the background data observations are less than the reporting limit (non-detects), these will be replaced with one half of the reporting limit prior to running the analysis. If more than 15% but less than 50% of the background data are less than the reporting limit, the data's sample mean and sample standard deviation will be adjusted according to the method of Cohen or Aitchison. A non-parametric prediction limit will be calculated for data not transformed normal or containing greater than 50% non-detect results. As a general guideline, if 15% or fewer of the values are "not detected", the non-detect results will be replaced with the LOQ divided by two. If more than 15% but less than 50% of the values were reported as "not detected", the non-detect results will be adjusted using the Aitchison's Method or the Kaplan-Meier technique. The Aitchison's Method assumes that non-detects are actually free of the parameter being measured, so that the non-detect value can be regarded as a zero concentration. The Kaplan-Meier technique creates an estimate of the population mean and standard deviation adjusted for data censoring, based on the fitted distributional model. If 50% or greater of the data were reported as "not detected", a non-parametric statistical method will be utilized.

For any parameter with 100% non-detects in the background data, the Double Quantification rule will be used to evaluate the data for an SSI, as described in Chapter 6 of the Unified Guidance, which states:

> *A confirmed exceedance is registered if any well-constituent pair in the '100% non-detect' group exhibits quantified measurements (i.e., at or above the reporting limit [RL]) in two consecutive sample and resample events.*

When the background data are transformed to a normal distribution (e.g., data are lognormally distributed), the UPL is calculated using the transformed data and then the result is transformed back to its original scale.

When the background data or transformed data are not normally distributed or the percent of non-detects is greater than 50, a non-parametric UPL will be calculated.

Verification Retesting

For each semiannual sampling event, if an initial sample result exceeds the UPL, verification retesting may be performed. Retesting will generally be performed within 60 days of the initial sampling, to allow time to complete the sample analysis and data evaluation prior to the next semiannual event. As described above, in a 1-of-2 retesting approach, an SSI has occurred only if both the initial sample and the resample exceed the UPL.

WPL may choose not to retest one or more well/constituent pairs if the likelihood of the retest result being below the UPL appears low. If an initial sample result exceeds the UPL and the retest sample is not collected and analyzed in accordance with the retesting plan, then an SSI will be determined to have occurred.

ASSESSMENT MONITORING

If assessment monitoring is implemented, data analysis will be performed for Appendix IV parameters to determine whether an SSI over background has occurred for any required constituent. The assessment monitoring statistical evaluation process for comparison to background is the same as for detection monitoring.

Site-specific groundwater protection standard (GPS) values will be established for Appendix IV parameters in accordance with 40 CFR 257.95(h) as outlined below:

1. If an EPA maximum contaminant level (MCL) exists for a given parameter, and the UPL of the background data does not exceed the MCL, the GPS is set to the MCL.

2. If the UPL of the background data for a given parameter is greater than the EPA-MCL, the GPS is set to the background UPL.

3. If the MCL does not exist (not promulgated), the GPS is set to the background UPL.

Assessment monitoring results will be compared to the site-specific GPS values.

REVISIONS

This methodology for statistical evaluation of groundwater monitoring data may be revised as additional data are collected and/or in response to regulatory requirement or guidance changes. For example, the retesting approach may be modified as additional background results are obtained. Revisions will apply to future monitoring events performed after the change is made to the plan.

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Attachment C5

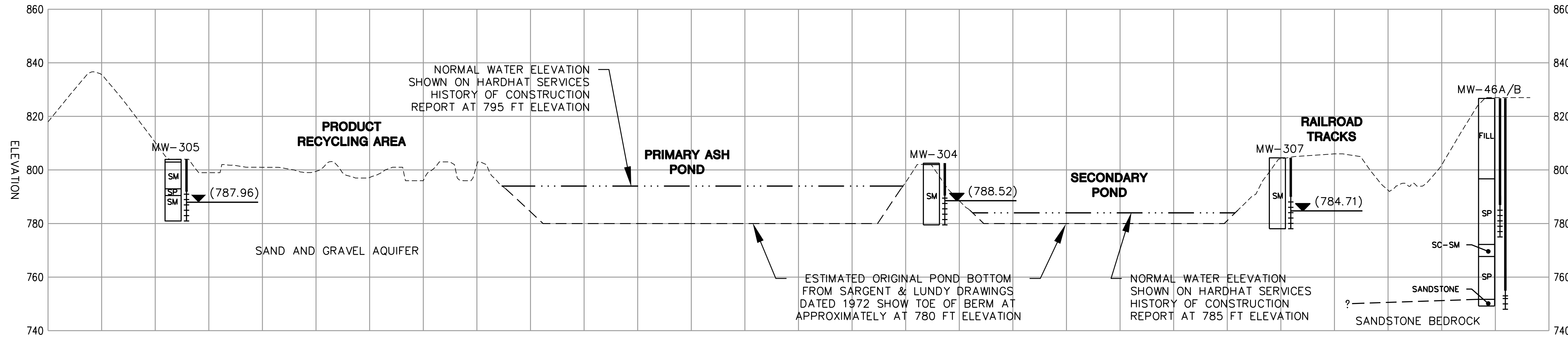
Description of Site Hydrogeology

The uppermost geologic formation beneath COL that meets the definition of the “uppermost aquifer,” as defined under 40 CFR 257.53, is the surficial sand and gravel aquifer, in Columbia County. This aquifer unit is present at the Columbia Energy Center. The unconsolidated deposits at the Columbia Energy Center are approximately 50 feet thick in the area of the primary and secondary ponds. The material is generally sandy with interbedded silty clay lenses up to 20 feet thick.

A geologic cross section was prepared with information from monitoring wells MW-304, MW-305, MW-307 abandoned well nest MW-46A and MW-46B. The cross section line runs through the Primary and Secondary Ash Ponds. The cross section location is provided on Figure 1. Unconsolidated geologic material and groundwater levels estimated using water levels measured at site monitoring wells are identified on the cross section.

A second cross-section is provided for the COL Landfill with information from borings B-2, B-16, and monitoring wells MW-37/37A. Borings B-2 and B-16 have been abandoned. Monitoring wells MW-37/37A are still in use, but are not used for CCR Rule compliance. The cross-section location is provided on the figure.

Attachment C5

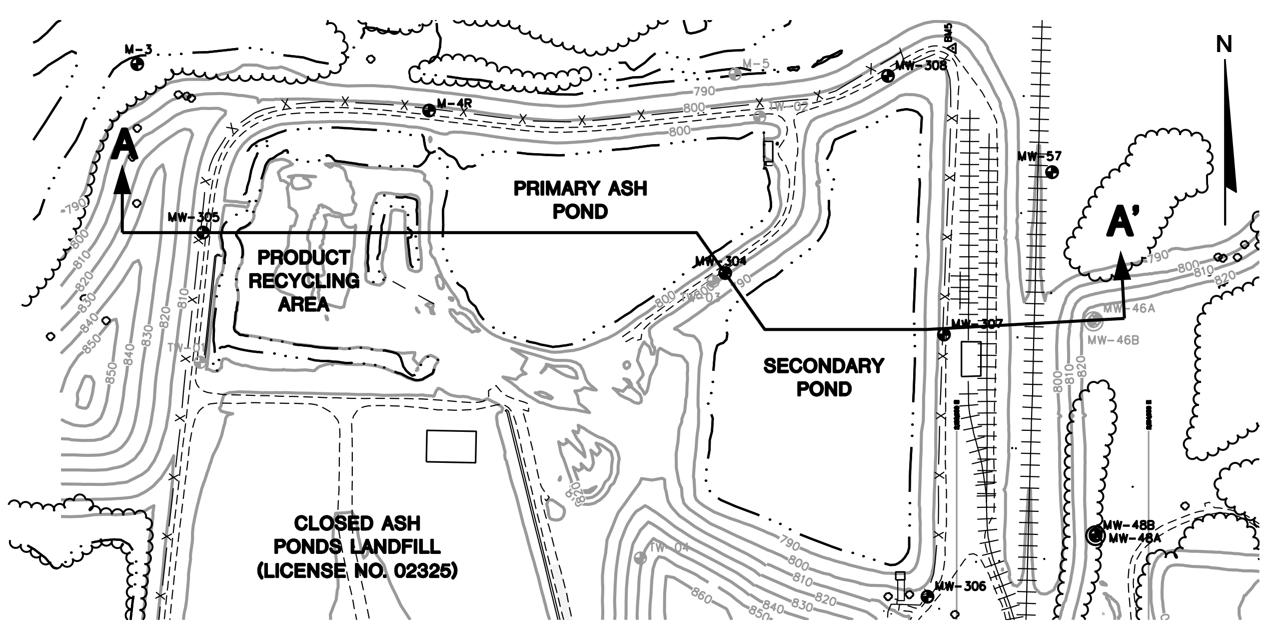


A-A'

0 200

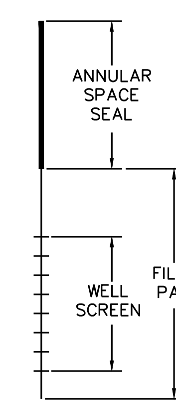
HORIZONTAL SCALE: 1" = 200'
VERTICAL SCALE: 1" = 40'
VERTICAL EXAGGERATION = 5X

LEGEND	
SP	SAND, POORLY GRADED, LITTLE OR NO FINES
SM	SILTY SAND
SC-SM	SANDY SILT TO SANDY CLAYEY SILT
(788.52)	WATER ELEVATION MEASURED ON OCTOBER 7-8, 2020



CROSS SECTION LOCATION MAP

SCALE: 1" = 500'



WELL DETAIL

CROSS SECTION A-A'

FIGURE 1

SCS ENGINEERS
2830 DAIRY DRIVE MADISON, WI 53718-6751
PHONE: (608) 224-2830

ENGINEER

ALLIANT ENERGY
COLUMBIA ENERGY CENTER
SURFACE IMPOUNDMENTS

SITE

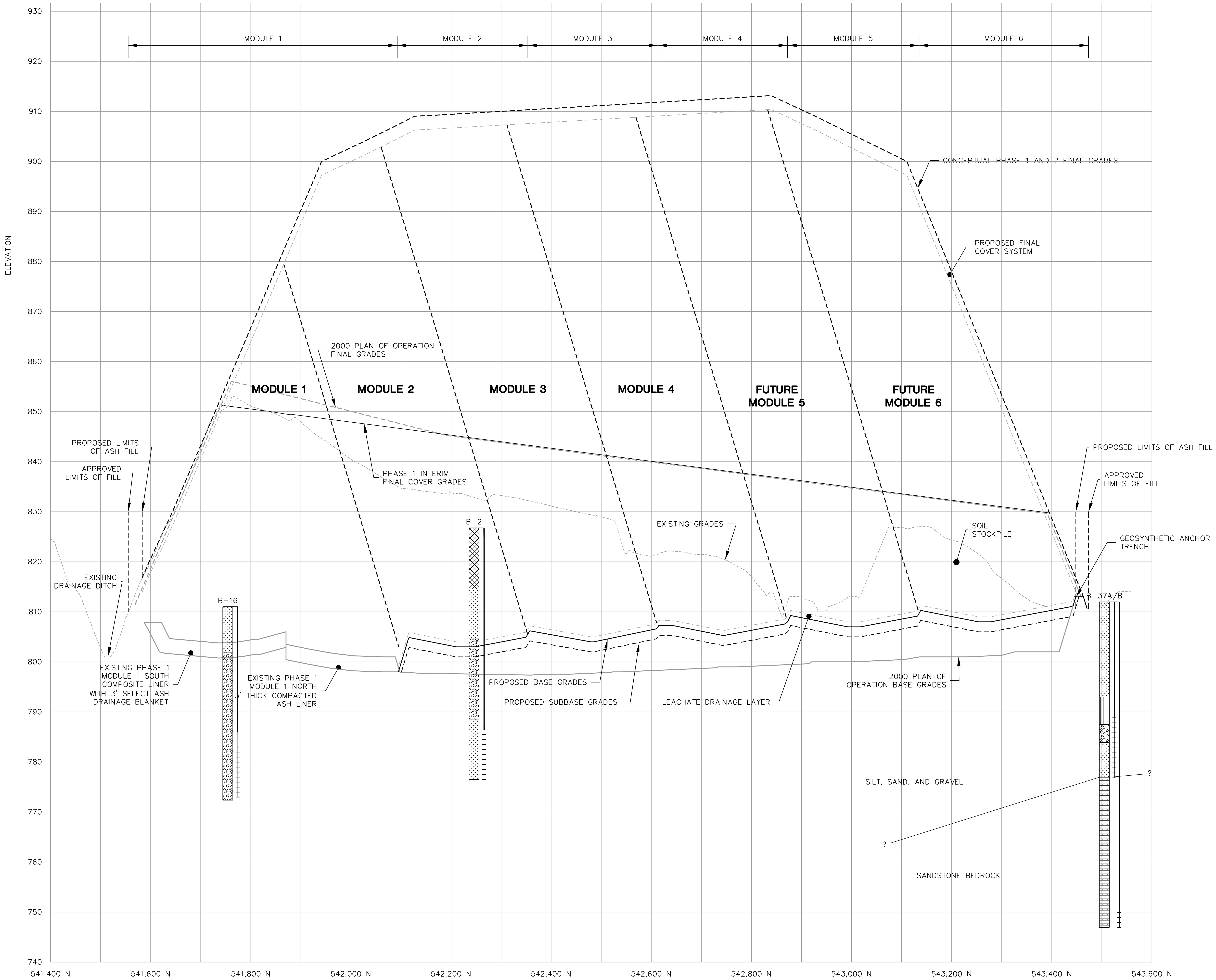
WISCONSIN POWER AND LIGHT
COLUMBIA ENERGY CENTER
W8375 MURRAY ROAD
PARDEEVILLE, WISCONSIN 53954

Wisconsin Power and Light Company

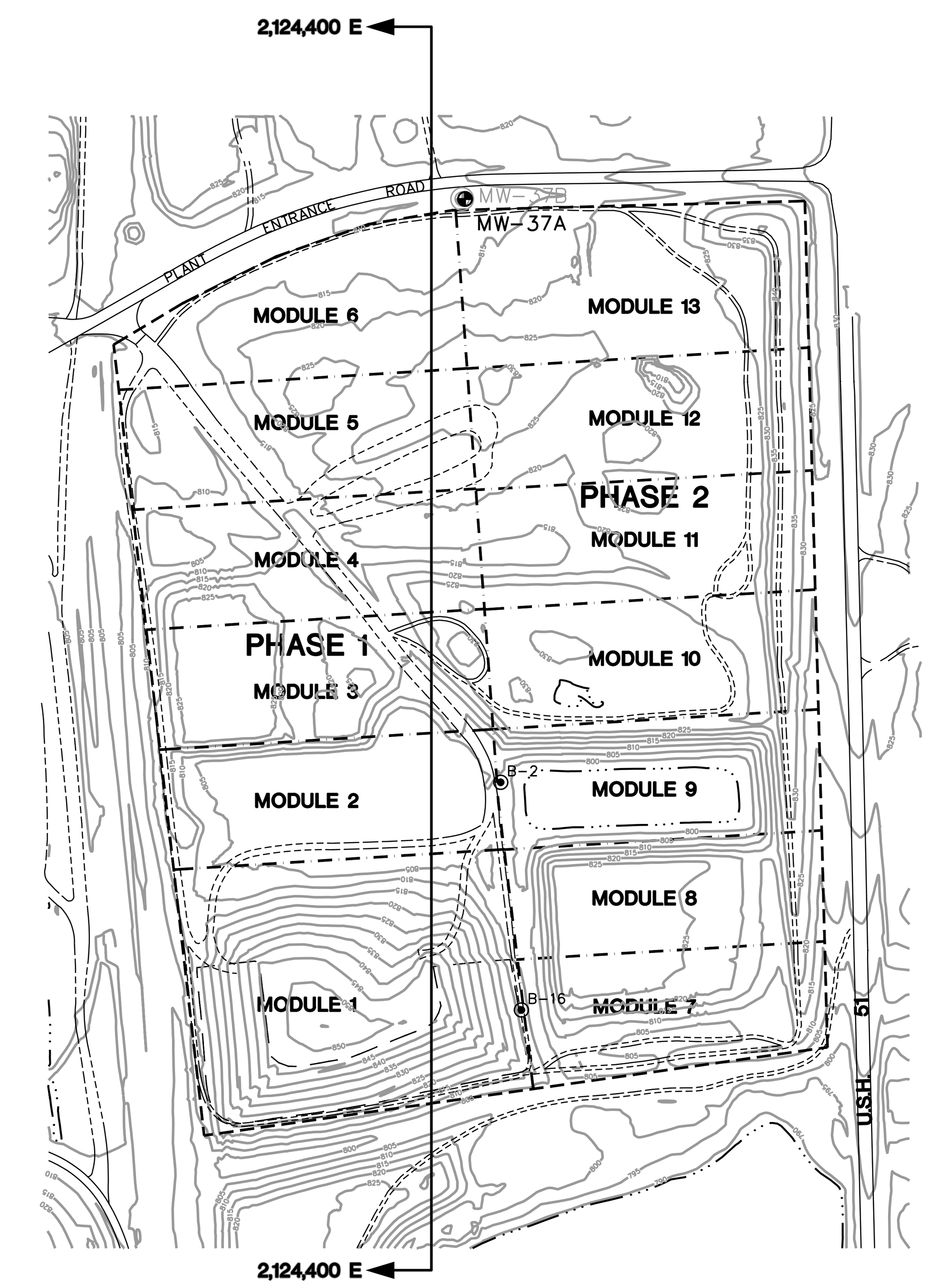
CLIENT

PROJECT NO.	25220067.00	DRAWN BY:	BSS
DRAWN:	09/16/2020	CHECKED BY:	TK
REVISED:	10/28/2020	APPROVED BY:	EJN

I:\25220067.00\Drawings\Section A.dwg, 10/28/2020 11:04:31 AM



SECTION 2,124,400 E

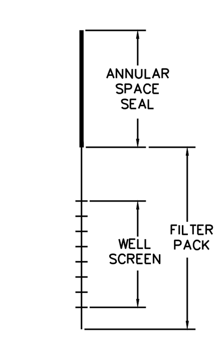


CROSS SECTION LOCATION

SCALE: 1" = 300'

LEGEND

- FILL - FINE TO MEDIUM SAND, LITTLE TO SOME SILT, TRACE CLAY, TRACE GRAVEL
- FINE TO MEDIUM SAND, TRACE TO SOME SILT AND CLAY, TRACE TO LITTLE GRAVEL
- SANDY SILT TO SANDY CLAYEY SILT
- MEDIUM TO COARSE SAND AND GRAVEL, TRACE TO SOME SILT AND CLAY
- SANDSTONE



WELL DETAIL

0 100

HORIZONTAL SCALE: 1" = 100'
VERTICAL SCALE: 1" = 10'
VERTICAL EXAGGERATION = 10X

PROJECT NO.	4071	DRAWN BY:	KRG/KP		
DRAWN:	12/03/09	CHECKED BY:	EN		
REVISED:	11/23/2020	APPROVED BY:			

ENGINEER: SCS ENGINEERS, 2830 DAIRY DRIVE MADISON, WI 53718-6751, PHONE: (608) 224-2830

CLIENT: Wisconsin Power and Light Company — WISCONSON POWER AND LIGHT, COLUMBIA ENERGY CENTER, W8375 MURRAY ROAD, PARDEEVILLE, WISCONSIN 53954

SITE: 2010 PLAN OF OPERATION UPDATE, COLUMBIA ASH DISPOSAL FACILITY, TOWN OF PACIFIC, WISCONSIN

GEOLOGIC CROSS SECTION A-A'

SHEET 12 of 16

Attachment C6

ALLIANT ENERGY
Wisconsin Power and Light Company
Columbia Energy Center

CCR SURFACE IMPOUNDMENT

STRUCTURAL STABILITY ASSESSMENT

Report Issued: October 16, 2020
Revision 1

HARD HAT SERVICES™
Engineering, Construction and Management Solutions

EXECUTIVE SUMMARY

This Structural Stability Assessment (Report) is prepared in accordance with the requirements of the United States Environmental Protection Agency (USEPA) published Final Rule for Hazardous and Solid Waste Management System – Disposal of Coal Combustion Residual from Electric Utilities (40 CFR Parts 257 and 261, also known as the CCR Rule) published on April 17, 2015 (effective October 19, 2015) and subsequent amendments.

This Report serves as the first periodic review since the initial report dated September 29, 2016. It assesses the structural stability of each CCR unit at Columbia Energy Center in Pardeeville, Wisconsin in accordance with §257.73(b) and §257.73(d) of the CCR Rule. For purposes of this Report, "CCR unit" refers to an existing CCR surface impoundment.

Primarily, this Report is focused on documenting whether the design, construction, operation, and maintenance of the CCR unit is consistent with recognized and generally accepted good engineering practices for the maximum volume of CCR and CCR wastewater which can be impounded within each CCR unit.

Table of Contents

Figures

Appendices

1 Introduction

The owner or operator of the Coal Combustion Residual (CCR) unit must conduct an initial and periodic structural stability assessments and document whether the design, construction, operation, and maintenance of the CCR unit is consistent with recognized and generally accepted good engineering practices for the maximum volume of CCR and CCR wastewater which can be impounded therein. This Report serves as the first periodic review from the initial dates September 19, 2016 is prepared in accordance with the requirements of §257.73(b) and §257.73(d) of the CCR Rule.

1.1 CCR Rule Applicability

The CCR Rule requires a periodic structural stability assessment by a qualified professional engineer (PE) for existing CCR surface impoundments with a height of 5 feet or more and a storage volume of 20 acre-feet or more; or the existing CCR surface impoundment has a height of 20 feet or more.

1.2 Structural Stability Assessment Applicability

The Columbia Energy Center (COL) in Pardeeville, Wisconsin (Figure 1) has one existing and one inactive CCR surface impoundment, identified as follows:

- COL Primary Ash Pond (existing)
- COL Secondary Ash Pond (inactive)

2 FACILITY DESCRIPTION

COL is located southeast of the City of Portage on the eastern shore of the Wisconsin River in Columbia County at W8375 Murray Road, Pardeeville, Wisconsin (Figure 1). Wisconsin River backwaters are located north of the generating station, while Lake Columbia, south of the generating plant, is a 480-acre non-contact cooling water pond.

COL is a fossil-fueled electric generating station that initiated operations in 1975. COL consists of two steam electric generating units. Sub-bituminous coal is the primary fuel for producing steam. The burning of coal produces a by-product of CCR. The CCR at COL includes bottom ash, fly ash, and spray dryer absorber waste from scrubbers. The fly ash can also be subdivided into two types, economizer fly ash and precipitator fly ash.

General Facility Information:

Date of Initial Facility Operations:	1975	
WPDES Permit Number:	WI-0002780-08-0	
Latitude / Longitude:	43° 29’ 9.73” N	89° 25’ 8.40” W
Unit Nameplate Ratings:	Unit 1 (1975): 512 MW	
	Unit 2 (1978): 511 MW	

2.1 COL Primary Ash Pond

The COL Primary Ash Pond is located north of the generating plant and west of the COL Secondary Pond. The COL Primary Ash Pond is the primary receiver of process flows from the generating plant. Process flows include CCR sluice water (bottom ash and economizer fly ash), boiler/precipitator wash water, plant floor drains, ash line freeze protection flows, bottom ash area sump water, demineralizer area sump water, and air heater sump water. Additionally, the COL Primary Ash Pond receives storm water runoff from the surrounding area, inclusive of the closed ash landfill, located south of the CCR surface impoundments.

The western half of the COL Primary Ash Pond is a CCR handling area. A shallow narrow drainage channel is located along the south, west, and north sides of the CCR handling area. The sluiced CCR is discharged into the southeast corner of the western half of the COL Primary Ash Pond. The sluiced CCR settles out through the water column as it follows the flow of the narrow channel around the southern, western, and northern sides of the existing CCR surface impoundment. The water in the channel flows to the east and discharges through a narrow cut-out of an interior dike into the northwest corner of the large open area in the eastern half of the COL Primary Ash Pond.

The majority of the CCR that is discharged into the COL Primary Ash Pond is removed during routine maintenance dredging activities of the shallow narrow channel. The CCR that is dredged is stockpiled in the western half of the COL Primary Ash Pond for dewatering. Once dewatered the CCR is run through a sieve shaker machine to separate the coarsely graded CCR from the finely graded CCR. The CCR is then transported off-site for beneficial reuse or to the on-site active dry ash landfill.

The water in the COL Primary Ash Pond is recirculated to the generating plant via effluent pumps located in the ash recirculating pump house in the northeast corner of the eastern half of the COL Primary Ash Pond. The recirculating pumps return water to the generating plant for reuse and/or treatment and disposal per the facility's Wisconsin Pollution Discharge Elimination System (WPDES) permit. Instrumentation associated with the pump house in the northeast corner of the COL Primary Ash Pond includes a submersible hydrostatic level transducer, as well as a visual staff gauge, for monitoring water elevations in the COL Primary Ash Pond. An 18-inch diameter corrugated metal pipe is located immediately south of the pump house, in the interior dike between the COL Primary Ash Pond and COL Secondary Pond. The pipe drains to the Secondary Ash Pond and is no longer used. The influent end of the hydraulic structure, on the COL Primary Ash Pond side, consists of a manually operated gate valve which is closed.

The surface area of the COL Primary Ash Pond is approximately 14.7 acres and has an embankment height of approximately 23 feet from the crest to the toe of the downstream slope. The interior storage depth of the COL Primary Ash Pond is approximately 15 feet. The total volume of impounded CCR and water within the COL Primary Ash Pond is approximately 330,000 cubic yards.

2.2 COL Secondary Ash Pond

The COL Secondary Pond is located north of the generating plant and east of the COL Primary Ash Pond. The COL Secondary Ash Pond was previously a downstream receiver of influent flows from the COL Primary Ash Pond. The water within the COL Secondary Pond, prior to 2004, was pumped to a surface impoundment identified as the polishing pond. The polishing pond was located east of the generating plant. The water pumped to the polishing pond would flow to the south through the facility's WPDES Outfall 002 into "Mint Ditch" and eventually flow into the backwaters of the Wisconsin River. Presently, the COL Secondary Pond acts as a storm water detention impoundment with the only influent sources being precipitation and storm water runoff from the surrounding area. The water within the COL Secondary Pond either infiltrates or evaporates. The water elevation within the COL Secondary Pond is normally the same as the ground water elevation under the CCR Ponds approximately 10 feet lower than the COL Primary Ash Pond.

The surface area of the COL Secondary Ash Pond is approximately 9.6 acres and has an embankment height of approximately 23 feet from the crest to the toe of the downstream slope. The interior storage depth of the COL Secondary Ash Pond is approximately 12 feet. The total volume of impounded CCR and water within the COL Secondary Ash Pond is approximately 185,000 cubic yards.

3 STRUCTURAL STABILITY ASSESSMENT- §257.73(d)

This Report documents whether the design, construction, operation, and maintenance of each CCR unit is consistent with recognized and generally accepted good engineering practices for maximum volume of CCR and CCR wastewater which can be impounded.

3.1 COL Primary Ash Pond

The COL Primary Ash Pond was constructed in 1975 on the north end of the generating station. The western end of the impoundment is now filled with CCR and is used as the dewatering area for bottom ash discharged by COL. Facility construction documents indicate the embankments were constructed of the fine glacial till sand from the upland areas where the COL is located. The COL Primary Ash Pond area extends to the edge of the Wisconsin River Flood Plain to the north and unsuitable soils were stripped off of looser fine sand that likely resulted from river deposition over the till. Details of the original COL Primary Ash Pond are shown in drawings prepared by Sargent & Lundy in 1974, Appendix A.

The embankment is constructed with four horizontal to one vertical slopes which are vegetated and mowed to control the growth of woody vegetation. The COL Primary Ash Pond has a concrete wet well with pumps to recirculate water back to facility for reuse and discharge. There is a pipe that formerly allowed excess water in the COL Primary Ash Pond to overflow to the COL Secondary Ash Pond. The pipe has a valve on the inlet side that is closed and no water flows to the COL Secondary Ash Pond.

In 2011 and 2015, subsurface soil investigations were undertaken to collect soil samples and determine the in-situ density of the embankments and install monitoring wells. The soil borings were advanced using a Geoprobe and hollow stem augers and sampling was completed with a standard split spoon (ASTM D1556), Figure 2. The density information, Appendix B, indicates the current conditions of the embankments.

Based on the annual inspections conducted by Hard Hat Services since Revision 0 of this Report, there have been no significant changes regarding settlement, instability, or reconfiguration of the COL Primary Ash Pond.

3.1.1 CCR Unit Foundation and Abutments - §257.73(d)(1)(i)

The COL Primary Ash Pond is constructed on an existing layer of loose fine sand that grades to very dense with depth. The exact thickness of the loose sand found near the toe of the embankment is not great and very dense sand is the likely foundation material at greater depths. Analysis of safety factor for the slope were completed for a soil profile that ignores the deeper very dense sand, COL Safety Factor Assessment Report, Revision 1. The results indicate the loose sand is an acceptable foundation for the long-term stability of the embankment.

3.1.2 Slope Protection - §257.73(d)(1)(ii)

The COL Primary Ash Pond is incised on the west and south sides. The north embankment crest is about 20 feet wide. The upstream and downstream slopes are four feet horizontal to one foot vertical and is comprised of shallow rooting vegetation, which is adequate to protect against surface erosion. The east embankment separates the COL Primary Ash Pond and the COL Secondary Ash Pond and is about 20 feet wide. The upstream and downstream slopes are three feet horizontal to one foot vertical and is comprised of shallow rooting vegetation, which is adequate to protect against surface erosion.

Sudden drawdown is addressed in Section 3.1.7.

3.1.3 CCR Embankment Density- §257.73(d)(1)(iii)

The embankment is constructed of fine sand that is native to the COL site. The results of soil borings taken in 2011 and 2015 show that the sand was compacted to near optimum density and the strength of the embankment sand is greater than the loose layer of sand that remains below the embankment. The stability of the four horizontal to one vertical embankment slope is controlled by the strength of the loose sand below the embankment and the embankment is stable for the normal and flood operating conditions of the COL

Primary Ash Pond. Analysis of the slope safety factor in the COL Safety Factor Assessment Report, Revision 1 indicate the foundation soils control the minimum safety factors for the slope.

3.1.4 Vegetation Management - §257.73(d)(1)(iv)

Historically, vegetation management has been conducted on a periodic basis. Annual inspections have been completed since the Revision 0 of this Report. Based on those inspections, the facility has continued to routinely manage vegetation, minimizing animal activity and deep rooting vegetation. The vegetation management has been maintained with recognized and generally accepted good engineering practices.

3.1.5 Spillway Management - §257.73(d)(1)(v)

The COL Primary Ash Pond is operated as a zero liquid discharge impoundment and does not contain a spillway in operations.

3.1.6 Hydraulic Structures - §257.73(d)(1)(vi)

The COL Primary Ash Pond is operated as a zero liquid discharge impoundment, which has a pump house that recirculates water to the generating plant. The pipe which connects the two impoundments was inspected on September 15, 2020 by Hard Hat Services and no changes were observed since Revision 0 of this Report.

3.1.7 Sudden Drawdown - §257.73(d)(1)(vii)

The toe of the embankment is in the floodplain of the Wisconsin River. When the plant was constructed in 1974, the USACE reported that the 100-year flood elevation would be 794 feet on the north embankment of the COL Primary Ash Pond due to construction in the floodplain, Appendix C. The drawdown caused by the flood receding would result in drainage from the toe of the embankment. The embankment is constructed of fine sand (expected permeability of 10^{-2} to 10^{-3} $^{cm}/_{sec}$) and is not susceptible to rapid drawdown hydraulic pressure. River flooding will not lead to toe stability issues.

3.2 COL Secondary Ash Pond

The COL Secondary Ash Pond was constructed in 1975 on the north end of the generating station. Plant construction documents indicate the embankments were constructed of the fine glacial till sand from the upland areas where COL is located. The COL Secondary Ash Pond area extends to the edge of the Wisconsin River flood plain to the north. Details of the original COL Secondary Ash Pond are shown in drawings prepared by Sargent & Lundy in 1974, Appendix A.

The embankment is constructed with four horizontal to one vertical side slopes that are vegetated and mowed to control the growth of woody vegetation. There is no groundwater gradient at the toe if the embankment since the water elevation in the impoundment is approximately the same elevation as the toe of slope.

The COL Secondary Ash Pond has a concrete wet well with pumps and an outlet structure that formerly allowed overflow to a ditch just east of the railroad tracks on the east side of the impoundment. The former discharge is closed and the COL Secondary Ash Pond is operated as a zero liquid discharge impoundment.

In 2011 and 2015, subsurface soil investigations were undertaken to collect soil samples and determine the in-situ density of the embankments and install monitoring wells. The soil borings were advanced using a Geoprobe and hollow stem augers and sampling was completed with a standard split spoon (ASTM D1556), Figure 2. The density information, Appendix B, indicates the current conditions of the embankments.

Based on the annual inspections conducted by Hard Hat Services since Revision 0 of this Report, there have been no significant changes regarding settlement, instability, or reconfiguration of the COL Secondary Ash Pond.

3.2.1 CCR Unit Foundation and Abutments - §257.73(d)(1)(i)

The COL Secondary Ash Pond is constructed on an existing layer of loose fine sand that grades to very dense with depth. The exact thickness of the loose sand found near the toe of the embankment is not great and very dense sand is the likely foundation material at greater depths. Analysis of safety factor for the slope was completed for a soil profile that ignores the deeper very dense sand, COL Safety Factor Assessment Report, Revision 1. The results indicate the loose sand is an acceptable foundation for the long-term stability of the embankment.

3.2.2 Slope Protection - §257.73(d)(1)(ii)

The COL Secondary Ash Pond is incised on the south and east sides. The north embankment crest is about 20 feet wide. The upstream and downstream slopes are four feet horizontal to one foot vertical and is comprised of shallow rooting vegetation, which is adequate to protect against surface erosion. The west embankment separates the COL Primary Ash Pond and the COL Secondary Ash Pond and is about 20 feet wide. The upstream and downstream slopes are three feet horizontal to one foot vertical and is comprised of shallow rooting vegetation, which is adequate to protect against surface erosion.

Sudden drawdown is addressed in Section 3.2.7.

3.2.3 CCR Embankment Density- §257.73(d)(1)(iii)

The embankment is constructed of fine sand that is native to the COL site. The results of soil borings taken in 2011 and 2015 show that the sand was compacted to near optimum density and the strength of the embankment sand is greater than the loose layer of sand that remains below the embankment. The stability of the four horizontal to one vertical embankment slope is controlled by the strength of the loose sand below the embankment and the embankment is stable for the normal and flood operating conditions of the COL Secondary Ash Pond. Analysis of the slope safety factor in the COL Safety Factor Assessment Report, Revision 1 indicate the foundation soils control the minimum safety factors for the slope.

3.2.4 Vegetation Management - §257.73(d)(1)(iv)

Historically, vegetation management has been conducted on a periodic basis. Annual inspections have been completed since the Revision 0 of this Report. Based on those inspections, the facility has continued to routinely manage vegetation, minimizing animal activity and deep rooting vegetation. The vegetation management has been maintained with recognized and generally accepted good engineering practices.

3.2.5 Spillway Management - §257.73(d)(1)(v)

The COL Secondary Ash Pond is operated as a zero liquid discharge impoundment and does not contain a spillway in operations.

3.2.6 Hydraulic Structures - §257.73(d)(1)(vi)

The COL Secondary Ash Pond is operated as a zero liquid discharge impoundment, which has a pump house that is no longer in use. The pipe which connects the two impoundments was inspected on September 15, 2020 by Hard Hat Services and no changes were observed since Revision 0 of this Report.

3.2.7 Sudden Drawdown - §257.73(d)(1)(vii)

The toe of the embankment is in the floodplain of the Wisconsin River. When the plant was constructed in 1974, the USACE calculated the 100 year flood elevation would be 794 feet on the north embankment of COL due to construction in the floodplain, Appendix C. The drawdown caused by the flood receding would result in drainage from the toe of the embankment. The embankment is constructed of fine sand (expected permeability of 10^{-2} to 10^{-3} $^{cm}/_{sec}$) and is not susceptible to rapid drawdown hydraulic pressure[1]. River flooding will not lead to toe stability issues.

[1] USACE, Slope Stability, EM1110-2-1902, October 2003

4 QUALIFIED PROFESSIONAL ENGINEER CERTIFICATION

To meet the requirements of 40 CFR 257.73(d)(3), I Mark W. Loerop hereby certify that I am a licensed professional engineer in the State of Wisconsin; and that, to the best of my knowledge, all information contained in this document is correct and the document was prepared in compliance with all applicable requirements in 40 CFR 257.73(b) and 40 CFR 257.73(d).

WISCONSIN
MARK W.
LOEROP
E-43783-6
NAPERVILLE
IL
PROFESSIONAL ENGINEER

By:

Name: MARK LOEROP

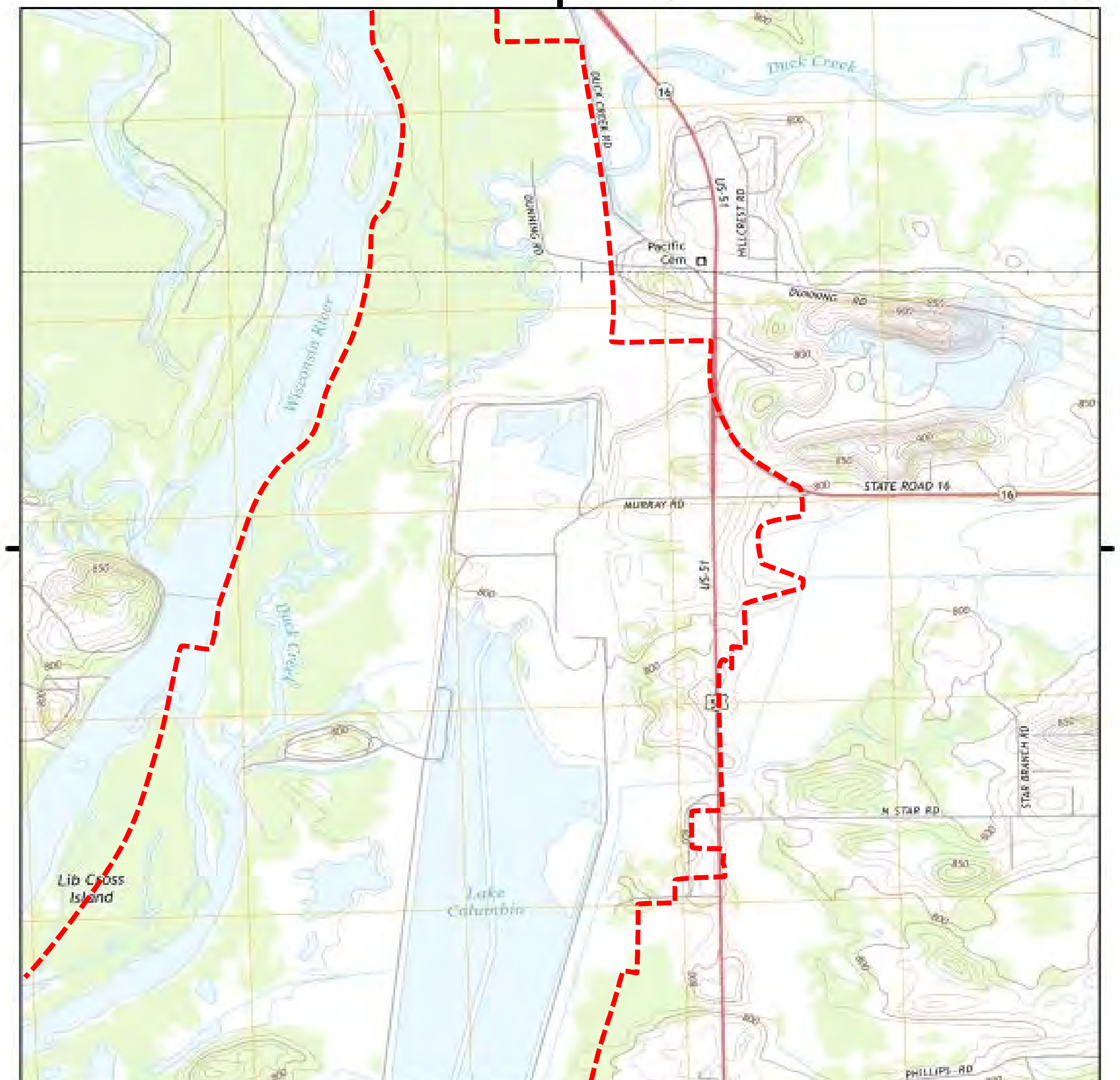
Date: OCTOBER 16, 2020

FIGURES

Alliant Energy
Wisconsin Power and Light Company
Columbia Energy Center
Pardeeville, Wisconsin

Structural Stability Assessment

Historical Topo Map 2013



This report includes information from the following map sheet(s).

Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

TP, Poynette, 2013, 7.5-minute

N, Portage, 2013, 7.5-minute

SITE NAME: Columbia Energy Center
ADDRESS: W8375 Murray Road
Pardeeville, WI 53954
CLIENT: Environmental Site Assessors

N

4555570 - 7 page 4

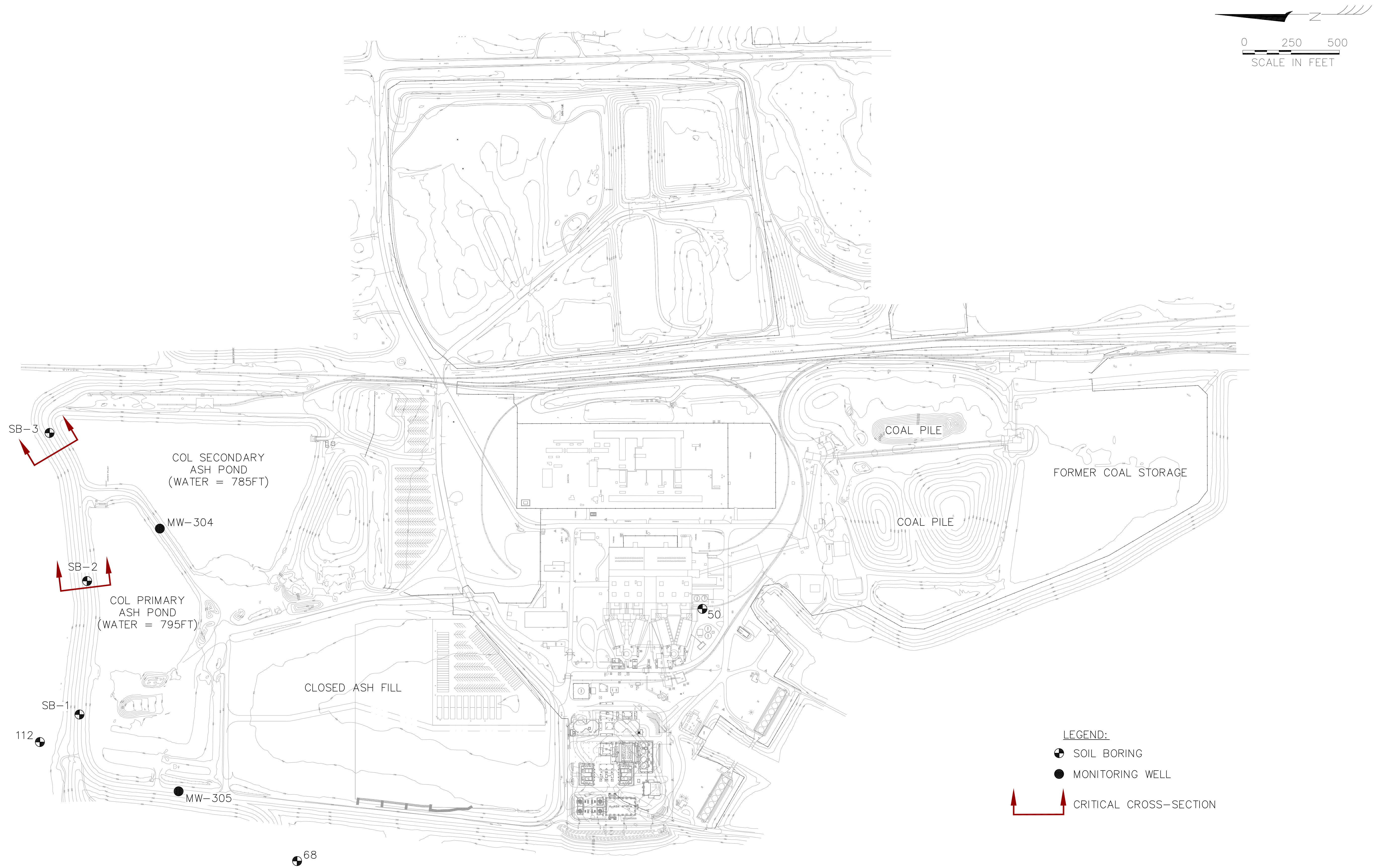
Historical Aerial Photo 6/12/2014

Approximate Property Boundary

HARD HAT SERVICES™
Engineering, Construction and Management Solutions

Site Location
Columbia Energy Center
Wisconsin Power and Light Company

Drawing
Figure 1
Date
7/12/2016



REV	DATE	BY	DESCRIPTION
5			
4			
3			
2			
1			

hard hat™ SERVICES

SCALE:	AS SHOWN
DATE:	8-22-16
DRAWN BY:	JFD
CHKD BY:	TJH
APRVD BY:	MWL

CLIENT / LOCATION
WISCONSIN POWER AND LIGHT (WPL) COMPANY
COLUMBIA ENERGY CENTER
PARDEEVILLE, WISCONSIN

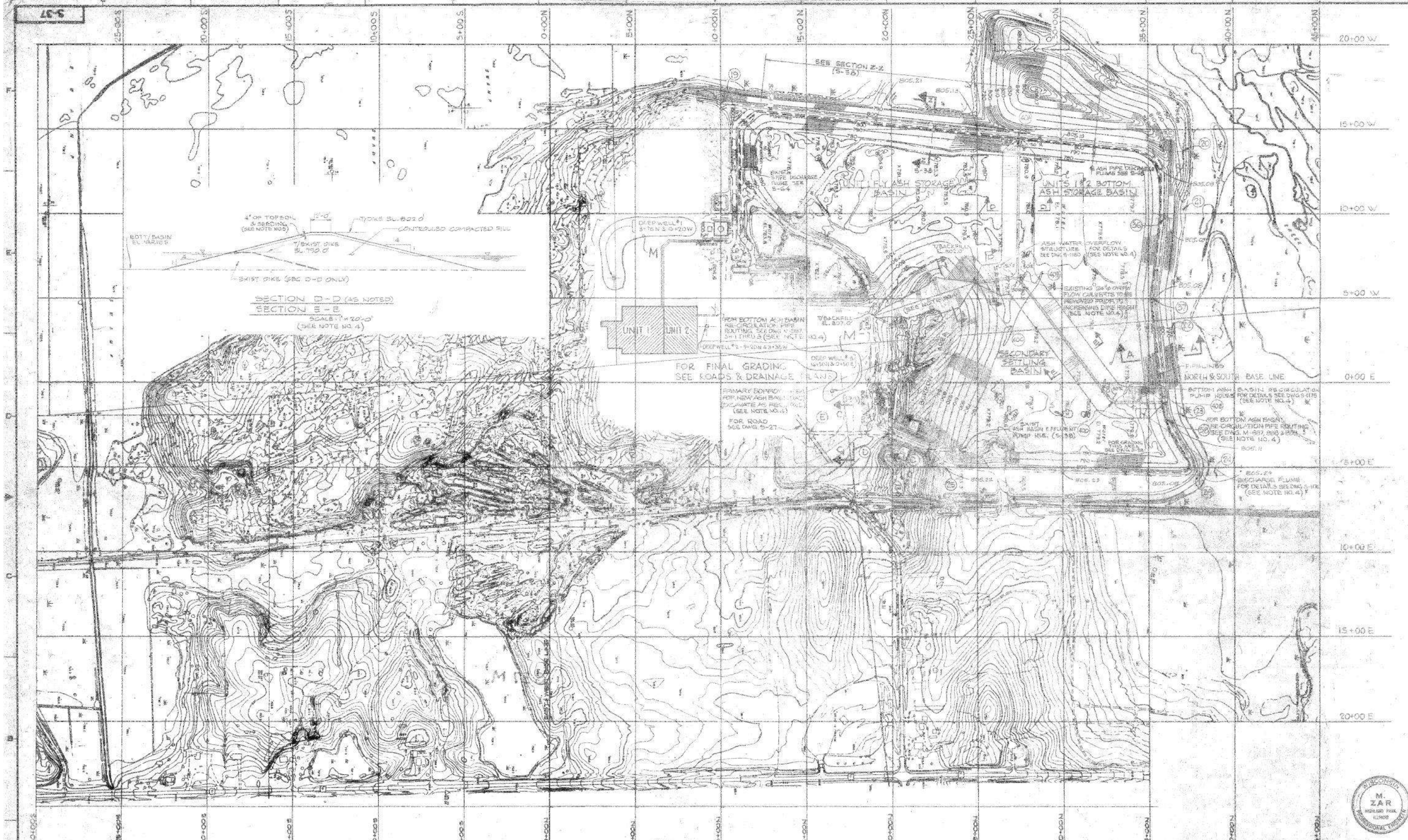
DRAWING DESCRIPTION
SAFETY FACTOR ASSESSMENT REPORT
SITE PLAN

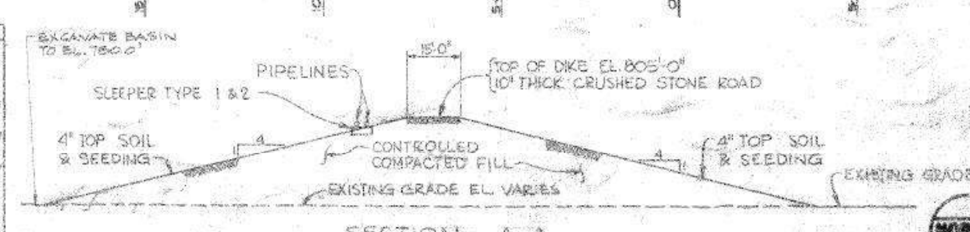
JOB 154.010.025
SHT. FIGURE 2
DWG. 154.010.025-SFA

APPENDIX A – Ash Pond Construction Drawing

Alliant Energy
Wisconsin Power and Light Company
Columbia Energy Center
Pardeeville, Wisconsin

Structural Stability Assessment





SECTION A-A
SCALE: 1"=20'-0"

POINT NO.	LOCATION		POINT NO.	LOCATION	
19	1000.0N	1650.0W	36	8610.0N	215.0E
20	5702.49N	1870.0W	39	5799.66N	544.9E
21	5702.49N	1027.96W	404	2746.0N	1464.0W
22	5664.57N	524.07W	408	2734.0N	623.0W
23	5088.25N	182.95E	406	2484.0N	596.0W
24	3599.61N	547.90E	405	3289.57N	115.55E
25	2800.0N	300.0E	408	3599.57N	115.55E
26	1500.0N	600.0E			
33	5590.0N	1475.0W			
34	5590.0N	472.0W			
37	5589.0N	500.0W			

NOTES

1. GEO SYSTEM –

PLANT COORDINATES	WIS STATE PLAN COORDINATE SYSTEM
0+00N	346500N
0+00E	2154500E

2. ALL DIKE CENTERLINE CURVES SHALL HAVE A RADIUS OF 200 FEET EXCEPT AS NOTED.
3. FOR LOCATION & PROFILE OF ACCESS ROAD TO ASH BASIN EFFLUENT PUMP HOUSE & DIKE SEE DWG. S-38.
4. ALL NEW WORK SHOWN SHALL BE DONE BY THE ASH HANDLING SYSTEM CONTRACTOR IN ACCORDANCE WITH SPECIFICATION W-2908.
5. TOPSOIL & SEEDING SHALL BE DONE FROM T/DIKE (EL 802.0) DOWN TO THE WATER LEVEL OF THE BASIN AT THE TIME OF PLACEMENT.

REFERENCE DRAWINGS

S-7	DIKE & SITEWORK PLAN - SHEET 3
S-25	ROADS & DRAINAGE PLAN - SOUTH AREA
S-26	ROADS & DRAINAGE PLAN - NORTH AREA
S-27	ROADS & DRAINAGE PLAN - EAST AREA
S-38	ASH BASIN SECTIONS & DETAILS
S-59	ASH BASIN EFFLUENT PUMP HOUSE - PLAN & SECTIONS
S-60	ASH BASIN EFFLUENT PUMP HOUSE - SECTIONS & DETAILS
S-1175	BOTTOM ASH WATER RECIRCULATION PUMP HOUSE
M687-5H1	BOTTOM ASH WATER RECIRCULATION PUMP HOUSE - PIPING
M687-5H2	BOTTOM ASH WATER RECIRCULATION PUMP HOUSE - OUTDOOR PIPING
M687-5H3	BOTTOM ASH WATER RECIRCULATION PUMP HOUSE - OUTDOOR PIPING
S-64	ASH PIPE DISCHARGE FLUME
S-1176	BOTTOM ASH WATER RECIRCULATION FOUNDATION - SECTION & DETAILS - SHEET 1
S-1180	ASH WATER OVERFLOW STRUCTURE - PLAN & SECTIONS

Drawing Revision Record

Rev.	Date	Init.	Description
0	3-10-72	GE	For Permits
A	6-6-73	GE	For Constr.
B	9-24-73	G S	[illegible]
C	3-26-74	GM	[illegible]
	6-17-74	GM	[illegible]
D	1-24-75	GM	[illegible]
E	7-25-75	[illegible]	[illegible]
F	10-1-76	[illegible]	[illegible]
G	12-23-76		[illegible]
H	2-24-77	[illegible]	[illegible]
J	8-25-77		[illegible]
K	8-23-77	[illegible]	[illegible]
L	5-19-78	[illegible]	[illegible]
M	[illegible]	[illegible]	[illegible]

ASH BASIN

COLUMBIA GENERATING STATION
WISCONSIN POWER & LIGHT CO.
PORTAGE, WISCONSIN

SCALE 1"=200'-0" UNLESS NOTED
DRAWN [illegible] 3-9-72
CHECKED [illegible] 3-9-72
ENGINEER [illegible] 3-9-72
APPROVED [illegible] 3-3-7[illegible]
JOB NO. 4742-02

SARGENT & LUNDY
CHICAGO

DRAWING NO.
S-37

M. ZAR
HIGHLAND PARK, ILLINOIS
PROFESSIONAL ENGINEER

REDRAWN 1-24-75

APPENDIX B – Soil Borings on Embankment and Foundation Soils

Alliant Energy
Wisconsin Power and Light Company
Columbia Energy Center
Pardeeville, Wisconsin

Structural Stability Assessment

State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION
Form 4400-122 Rev. 7-98

Route To: Watershed/Wastewater ☐ Waste Management ☐
Remediation/Redevelopment ☐ Other ☐

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
WPL-Columbia SCS#: 25215135.00		MW-304

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
Kevin Durst, Badger State Drilling	11/12/2015	11/12/2015	hollow stem auger

WI Unique Well No.	DNR Well ID No.	Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
VY703			Feet	802.50 Feet	8.5 in.

Local Grid Origin ☐ (estimated: ☐) or Boring Location ☒
State Plane 544671 N, 2122897 E /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	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Pocket Penetration (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
				TOPSOIL.	TOPSOIL									
			1	SILTY SAND, mostly fine, brown/tan (10YR 5/6).										
S1	24	7 8 10 12	2							M				
			3											
			4	Same as above except, trace gravel, brown tan to grey (top to bottom) 10YR 5/4.										
S2	24	14 22 26 31	5							M				
			6	Same as above except, brown/tan/grey assorted coloring.										
S3	24	16 18 22 24	7							M				
			8		SM									
			9	Same as above except, black/grey/brown, saturated area about 2" thick.										
S4	24	11 15 15 14	10							M				
			11	Same as above except, 10YR 5/3.										
S5	24	23 31 30 29	12							M				
			13											
			14	trace gravel.										
S6	20	9 10 7 5	15							M				

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature	Firm	
[signature] for Zach Watson	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-304 Use only as an attachment to Form 4400-122.

Sample: Number and Type	Sample: Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID/FID	Soil Properties: Pocket Penetration (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			16	SILTY SAND, mostly fine, brown/tan (10YR 5/6).										
S7	4		17							W				dropped spoon
			18	Same as above except, 10YR 6/3.										
			19		SM									
S8			20							W				
			21											
			22											
			23	End of boring at 23 ft bgs.										

State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 7-98

Route To: Watershed/Wastewater ☐ Waste Management ☐
Remediation/Redevelopment ☐ Other ☐

Facility/Project Name: WPL-Columbia SCS#: 25215135.00		License/Permit/Monitoring Number		Boring Number: MW-305
Boring Drilled By: Name of crew chief (first, last) and Firm: Kevin Durst, Badger State Drilling		Date Drilling Started: 11/13/2015	Date Drilling Completed: 11/13/2015	Drilling Method: hollow stem auger
WI Unique Well No.: VY716	DNR Well ID No. / Common Well Name	Final Static Water Level: Feet	Surface Elevation: 803.95 Feet	Borehole Diameter: 8.5 in.
Local Grid Origin ☐ (estimated: ☐) or Boring Location ☒ State Plane 544776.1 N, 2121537 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 Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	USCS	Graphic Log	Well Diagram	PID/FID	Pocket Penetration (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			0–1	TOPSOIL	TOPSOIL									
			1	SILTY SAND, mostly fine, brown/tan 10YR 5/8.	SM									
S1	18	5 8 9 7	2							M				
S2	18	2 3 3 4	4–5							M				
S3	18	2 8 9 8	6–7	Same as above except, trace gravel, tan 10YR 6/8 at bottom.						M				
S4	20	5 7 6 5	9–10	Same as above except, light tan 10YR 6/6, trace gravel, some large gravel chunks.						M				
S5	20	9 12 17 22	11–12	POORLY GRADED SAND, tan (10YR 6/8), trace gravel, some saturated areas.	SP					M				
S6	24	16 19 22 34	13.5–15	SILTY SAND, trace gravel, tan (10YR 5/6).	SM					W				

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature: [signature] for Zach Watson

Firm: SCS Engineers, 2830 Dairy Drive Madison, WI 53711 Tel: (608) 224-2830 Fax:

SOIL BORING LOG INFORMATION SUPPLEMENT
Form 4400-122A

Boring Number MW-305 Use only as an attachment to Form 4400-122.

Sample: Number and Type	Sample: Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID/FID	Soil Properties: Pocket Penetration (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
S7		31 30 41 50/2	16 17	SILTY SAND, trace gravel, tan (10YR 5/6), some large dolomite chunks.	SM					W				
			18	End of boring at 18 ft bgs.										

Boring Log Legend

Sample
No: (Number) Soil samples are numbered consecutively from the ground surface. Core samples are numbered consecutively from the first core run.

Type: A= Auger Cuttings	CR= Core Run	MS= Modified Spoon	PB= Pitcher Barrel
PT= Piston Tube	ST= Shelby Tube	SS= Split Spoon (2” O.D.)	WC= Wash Cuttings

Interval: The depth of sampling interval in feet below ground surface

Blow Count
The number of blows required to drive a 2-inch O.D. split-spoon sampler with a 140 pound hammer falling 30-inches. When appropriate, the sampler is driven 18 inches and blow counts are reported for each 6-inch interval. The sum of blow counts for the last two 6-inch intervals is designated as the standard penetration resistance (N) expressed as blows per foot.

Recovery in Inches
The length of sample recovered by the sampling device.

U.S.C.S. Soil Type
The Unified Soil Classification System symbol for recovered soil samples determined by visual examination or laboratory tests. Refer to ASTM D2487-69 for a detailed description of procedure and symbols. Underlined symbols denote classifications based on laboratory tests (i.e. ML), all others are based on visual classification only.

Percent Moisture
Natural moisture content of sample expressed as percent of dry weight.

q_u TSF
Unconfined compressive strength in tons per square foot obtained by hand penetrometer. Laboratory compression test values are indicated by underlining.

Contact Depth
The contact depth between soil layers is interpreted from significant changes in recovered samples and observations during drilling. Actual changes between soil layers often occur gradually and the contact depths shown on the boring logs should be considered as approximate.

Soil Description and Remarks
Soil descriptions include consistency or density, color, predominant soil types and modifying constituents.

Cohesive Soils			Cohesionless Soils	
Consistency	q_u (TSF)	Blows/ft.	Density	Blows/ft.
Very Soft	less than 0.25	0-1	Very Loose	4 or less
Soft	0.25 to 0.50	2-4	Loose	5 to 10
Medium Stiff	0.50 to 1.00	5-8	Medium Dense	11 to 30
Stiff	1.00 to 2.00	9-15	Dense	30 to 50
Very Stiff	2.00 to 4.00	15-30	Very Dense	Over 50
Hard	more than 4.00	Over 30		

Particle Size Description		Definition of Terms	
Boulder =	Larger than 12 inches	Trace =	5 to 12 percent by weight
Cobble =	3 to 12 inches	Some =	12 to 30 percent by weight
Gravel =	0.187 to 3 inches	And =	Approximately equal fractions
Sand =	0.074 to 4.76 mm	( ) =	Driller’s observation
Silt and Clay =	smaller than 0.074 mm		

Piezo.
(Piezometer) Screened interval of the piezometer installation is denoted by cross-hatching.

General Note
The boring log and related information depicted subsurface conditions only at the specified locations and date indicated. Soil conditions and water levels at other locations may differ from conditions occurring at these boring locations. Also the passage of time may result in a change in the conditions at these boring locations.

Soil Test Boring Refusal
Defined as any material causing a blow count greater that 50 blows/6 inches. Such material may include bedrock, “floating” rock slabs, boulders, dense gravel seams, hard pan clay, or cemented soils. Refusal is usually indicated in fractional notation showing number of blows as the numerator and inches of penetration as the denominator.

CABENO

Environmental Field Services, LLC

BORING LOG

CLIENT: Aether dbs

COORDINATES: *N NOT SURVEYED* *E NOT SURVEYED*

PROJECT: Alliant Columbia Station

BORING NO.: *SB1*

LOGGED BY: *John Noyes*
EDITED BY: *John Noyes*
CHECKED BY: *Chris Sullivan*
DATE BEGAN: *06-01-11*
DATE FINISHED: *06-01-11*
GROUND SURFACE ELEVATION:

DEPTH TO WATER WHILE DRILLING	SAMPLE NO. AND TYPE	SAMPLE RECOVERY	SAMPLE INFROMATION	POCKET PENETROMETER (TONS/FT2)	CONSISTENCY vs. DEPTH	DEPTH IN FEET	PROFILE	DESCRIPTION
						0		SAND & GRAVEL; light brown to orange; fine to coarse grained; well graded; dry to moist. (Fill)
	SP1	4.7'/5'						SAND; light brown; fine grained; poorly graded; moist. (Fill)
						-5		
	SP2	5'/5'						
▽								@ 8.5' grades wet
						-10		
	SP3	4'/5'						@ 13' grades yellow to light tan
						-15		@ 15' grades fine to coarse, well graded
	SP4	5'/5'						@ 17' grades fine sand w/ well rounded gravels, trace silt/clay
						-20		Bottom of boring @ 19'
						-25		

CABENO

Environmental Field Services, LLC

BORING LOG

CLIENT: Aether dbs

COORDINATES: *N NOT SURVEYED* *E NOT SURVEYED*

PROJECT: Alliant Columbia Station

BORING NO.: *SB2*

LOGGED BY: *John Noyes*
EDITED BY: *John Noyes*
CHECKED BY: *Chris Sullivan*
DATE BEGAN: *06-01-11*
DATE FINISHED: *06-01-11*
GROUND SURFACE ELEVATION:

DEPTH TO WATER WHILE DRILLING	SAMPLE NO. AND TYPE	SAMPLE RECOVERY	SAMPLE INFROMATION	POCKET PENETROMETER (TONS/FT2)	CONSISTENCY vs. DEPTH	DEPTH IN FEET	PROFILE	DESCRIPTION
						0		SAND; light brown to orange; fine grained; poorly graded; dry to moist; trace gravels. (Fill)
	SP1	5'/5'						
						-5		@ 5' grades trace silt
	SP2	5'/5'						
						-10		@ 10' to 13', very hard & dense; seems overconsolidated; more recovery than push
	SP3	5'/3'						
						-15		Bottom of boring @ 13' Boring advanced W/ Geoprobe Model 6610DT using 60-inch Macrocore sampling system. Boring backfilled to groundsurface w/ bentonite chips on 06-1-11.
						-20		

CABENO

Environmental Field Services, LLC

BORING LOG

CLIENT: Aether dbs

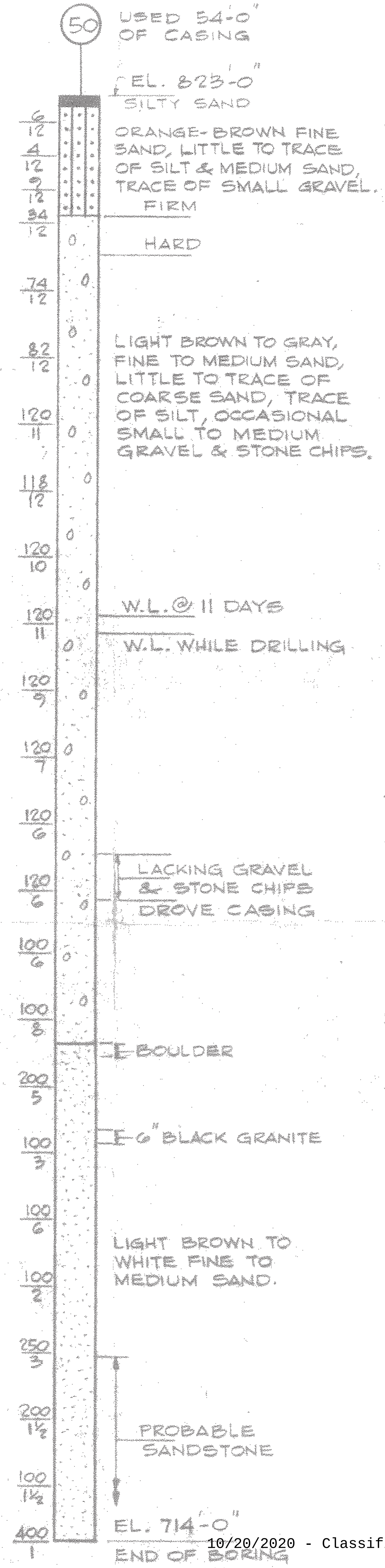
COORDINATES: *N NOT SURVEYED* *E NOT SURVEYED*

PROJECT: Alliant Columbia Station

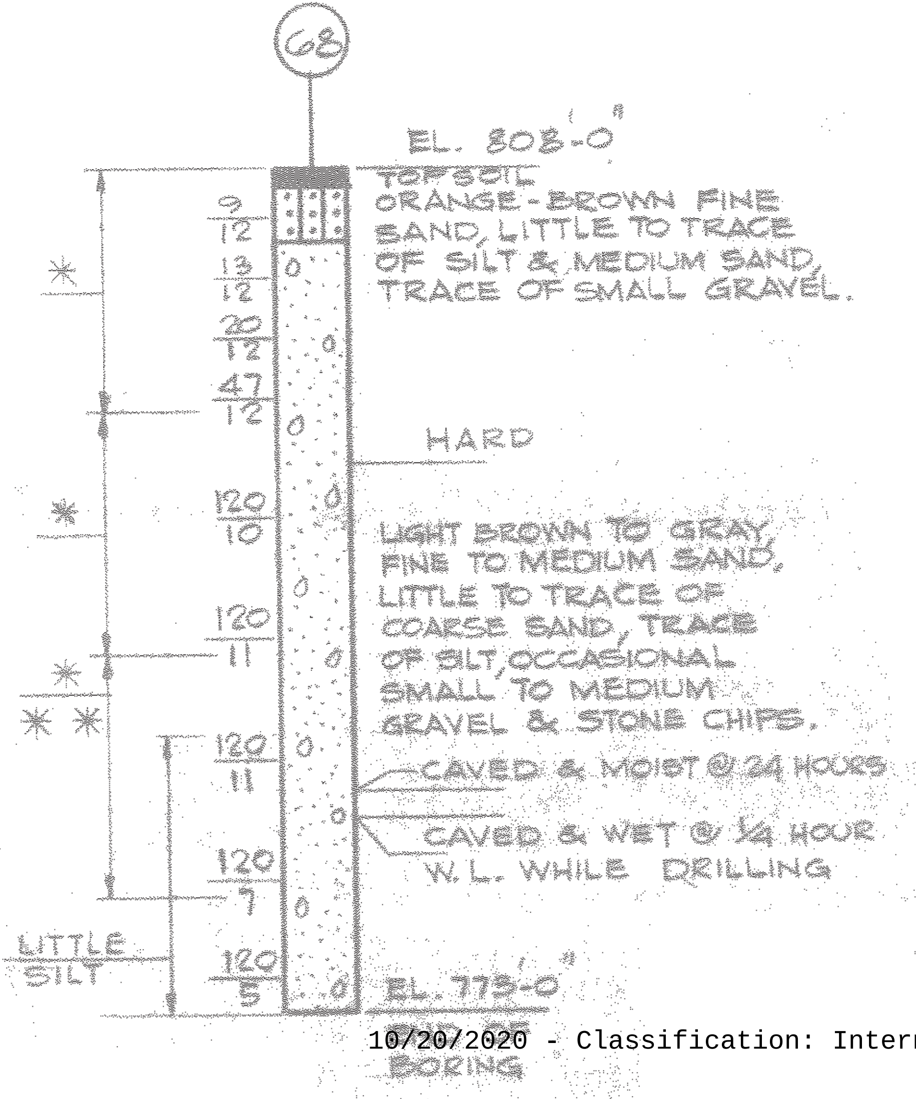
BORING NO.: *SB3*

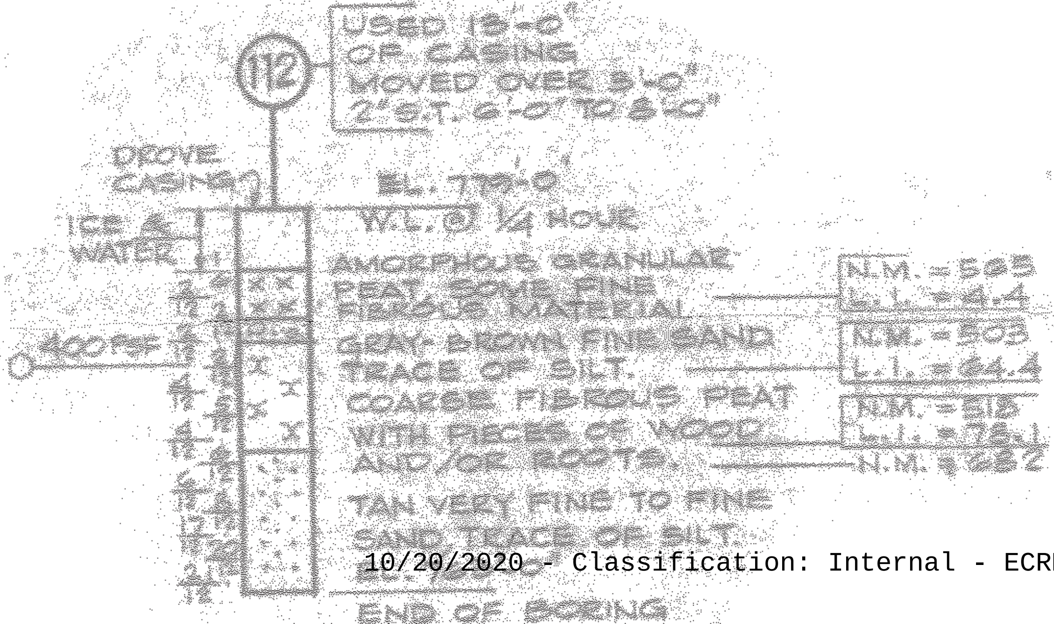
LOGGED BY: *John Noyes*
EDITED BY: *John Noyes*
CHECKED BY: *Chris Sullivan*
DATE BEGAN: *06-01-11*
DATE FINISHED: *06-01-11*
GROUND SURFACE ELEVATION:

DEPTH TO WATER WHILE DRILLING	SAMPLE NO. AND TYPE	SAMPLE RECOVERY	SAMPLE INFROMATION	POCKET PENETROMETER (TONS/FT2)	CONSISTENCY vs. DEPTH	DEPTH IN FEET	PROFILE	DESCRIPTION
						0		SAND; light brown to orange; fine grained; poorly graded; dry to moist; trace gravels. (Fill)
	SP1	5'/5'						
						-5		
	SP2	5'/5'						
						-10		
	SP3	5'/5'						
						-15		
▽								@ 16' grades gray and wet.
	SP4	5'/5'						
						-20		
	SP5	5'/5'						
						-25		PEAT; brown; dry; non-plastic. (PT)
								Clayey SILT; gray; non-plastic; hard; moist. (ML)
	SP6	1'/1'						Bottom of boring @ 26'
								Boring advanced W/ Geoprobe Model 6610DT using 60-inch Macrocore sampling system. Boring backfilled to groundsurface w/ bentonite chips on 06-1-11.
						-30		



10/20/2020 - Classif

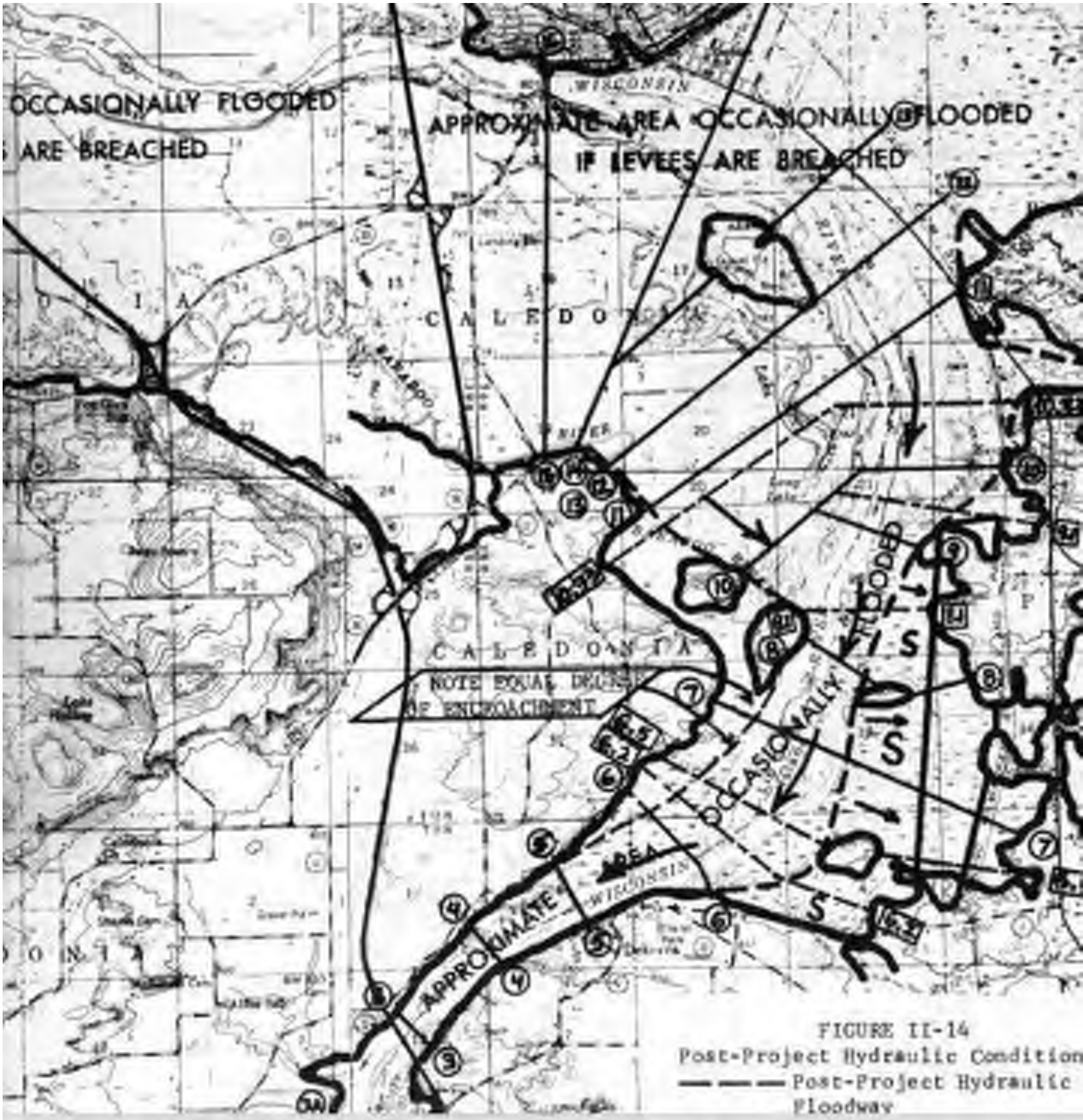

68
EL. 808-0"
TOPSOIL
ORANGE-BROWN FINE SAND, LITTLE TO TRACE OF SILT & MEDIUM SAND, TRACE OF SMALL GRAVEL.
9/12
13/12
20/12
47/12
HARD
120/10
LIGHT BROWN TO GRAY, FINE TO MEDIUM SAND, LITTLE TO TRACE OF COARSE SAND, TRACE OF SILT, OCCASIONAL SMALL TO MEDIUM GRAVEL & STONE CHIPS.
120/11
120/11
CAVED & MOIST @ 24 HOURS
CAVED & WET @ 1/4 HOUR
W.L. WHILE DRILLING
120/7
LITTLE SILT
120/5
EL. 779-0"
END OF BORING


112
USED 18'-0"
OF CASING
MOVED OVER 3'-0"
2" S.T. 6'-0" TO 8'-0"
DROVE
CASING
EL. 779-0
W.L. @ 1/4 HOUR
ICE & WATER
400 PSF
AMORPHOUS GRANULAR
PEAT, SOME FINE
FIBROUS MATERIAL
GRAY-BROWN FINE SAND
TRACE OF SILT.
COARSE FIBROUS PEAT
WITH PIECES OF WOOD
AND/OR ROOTS.
N.M. = 585
L.I. = 44.4
N.M. = 503
L.I. = 64.4
N.M. = 512
L.I. = 73.1
N.M. = 232
TAN VERY FINE TO FINE
SAND TRACE OF SILT.
END OF BORING

APPENDIX C – 100 Year Flood Prediction

Alliant Energy
Wisconsin Power and Light Company
Columbia Energy Center
Pardeeville, Wisconsin

Structural Stability Assessment



HEC Analysis
1974 Draft Environmental Impact Report/Impact of Construction of Columbia Energy Center
Prepared by USACE
River Cross-Section 8 and 10 at North End of COL

Flood Elevation Prediction by Section with COL construction in Flood Plaim

TABLE II-11 - WISCONSIN RIVER LEVELS*
REGIONAL FLOOD (100 Year)

(123,000 cfs below confluence with Baraboo River & 115,000 cfs above)

Section	River Mile	Natural	w/Dike Proposal** of 5/26/71	Increased Stage
1A	102.0	780.00	780.00	0
2A	103.6	782.60	782.60	0
3A	105.3	784.68	784.68	0
3	106.15	786.69	786.69	0
4	106.85	789.07	789.07	0
5	107.65	790.89	790.89	0
6	108.50	792.40	792.40	0
7	109.55	793.11	793.11	0
8	110.50	793.39	793.69	+0.30
8A	110.60	793.43	793.74	+0.31
10	112.10	794.23	794.66	+0.43
11	112.70	794.46	794.97	+0.51
12	113.00	794.56	795.06	+0.50
13	113.50	794.79	795.26	+0.47
14	114.35	795.29	795.78	+0.49
16	115.75	797.73	797.99	+0.26

*After revision, represents a flood with a 100+ year frequency.
**Equal degree of encroachment.

Attachment C7

ALLIANT ENERGY
Wisconsin Power and Light Company
Columbia Energy Center

CCR SURFACE IMPOUNDMENT

SAFETY FACTOR ASSESSMENT

Report Issued: October 16, 2020
Revision 1

HARD HAT SERVICES™
Engineering, Construction and Management Solutions

EXECUTIVE SUMMARY

This Safety Factor Assessment (Report) is prepared in accordance with the requirements of the United States Environmental Protection Agency (USEPA) published Final Rule for Hazardous and Solid Waste Management System – Disposal of Coal Combustion Residual (CCR) from Electric Utilities (40 CFR Parts 257 and 261, also known as the CCR Rule) published on April 17, 2015 (effective October 19, 2015) and subsequent amendments.

This Report serves as the first periodic review since the initial report dated September 19, 2016. It assesses the safety factors of each CCR unit at Columbia Energy Center in Pardeeville, Wisconsin in accordance with §257.73(b) and §257.73(e) of the CCR Rule. For purposes of this Report, "CCR unit" refers to existing CCR surface impoundments.

Primarily, this Report is focused on assessing if each CCR surface impoundment achieves the minimum safety factors, which include:

- Static factor of safety under long-term, maximum storage pool loading condition,
- Static factor of safety under the maximum surcharge pool loading condition,
- Seismic factor of safety; and,
- Post-Liquefaction factor of safety for embankments constructed of soils that have susceptibility to liquefaction.

Table of Contents

Figures

Appendices

1 Introduction

The owner or operator of the Coal Combustion Residual (CCR) unit must conduct an initial and periodic safety factor assessments to determine if each CCR surface impoundment achieves the minimum safety factors, which include:

- Static factor of safety under long-term, maximum storage pool loading condition,
- Static factor of safety under the maximum surcharge pool loading condition,
- Seismic factor of safety; and,
- Post-Liquefaction factor of safety for embankments constructed of soils that have susceptibility to liquefaction.

This Report serves as the first periodic review from the initial dated September 19, 2016 and has been prepared in accordance with the requirements of §257.73(b) and §257.73(e) of the CCR Rule.

1.1 CCR Rule Applicability

The CCR Rule requires a periodic safety factor assessment by a qualified professional engineer (PE) for existing CCR surface impoundments with a height of 5 feet or more and a storage volume of 20 acre-feet or more; or the existing CCR surface impoundment has a height of 20 feet or more.

1.2 Safety Factor Assessment Applicability

The Columbia Energy Center (COL) in Pardeeville, Wisconsin (Figure 1) has one existing and one inactive CCR surface impoundments, identified as follows:

- COL Primary Ash Pond (existing)
- COL Secondary Ash Pond (inactive)

Each of the identified CCR surface impoundments meet the requirements of §257.73(b)(1) and/or §257.73(b)(2), they are subject to the periodic safety factor assessment requirements of §257.73(e) of the CCR Rule.

2 FACILITY DESCRIPTION

COL is located southeast of the City of Portage on the eastern shore of the Wisconsin River in Columbia County at W8375 Murray Road, Pardeeville, Wisconsin (Figure 1). Wisconsin River backwaters are located north of the generating station, while Lake Columbia, south of the generating plant, is a 480-acre non-contact cooling water pond.

COL is a fossil-fueled electric generating station that initiated operations in 1975. COL consists of two steam electric generating units. Sub-bituminous coal is the primary fuel for producing steam. The burning of coal produces a by-product of CCR. The CCR at COL includes bottom ash, fly ash, and spray dryer absorber waste from scrubbers. The fly ash can also be subdivided into two types, economizer fly ash and precipitator fly ash.

General Facility Information:

Date of Initial Facility Operations:	1975	
WPDES Permit Number:	WI-0002780-08-0	
Latitude / Longitude:	43° 29′ 9.73″ N	89° 25′ 8.40″ W
Unit Nameplate Ratings:	Unit 1 (1975): 512 MW	
	Unit 2 (1978): 511 MW	

2.1 COL Primary Ash Pond

The COL Primary Ash Pond is located north of the generating plant and west of the COL Secondary Pond. The COL Primary Ash Pond is the primary receiver of process flows from the generating plant. Process flows include CCR sluice water (bottom ash and economizer fly ash), boiler/precipitator wash water, plant floor drains, ash line freeze protection flows, bottom ash area sump water, demineralizer area sump water, and air heater sump water. Additionally, the COL Primary Ash Pond receives storm water runoff from the surrounding area, inclusive of the closed ash landfill, located south of the CCR surface impoundments.

The western half of the COL Primary Ash Pond is a CCR handling area. A shallow narrow drainage channel is located along the south, west, and north sides of the CCR handling area. The sluiced CCR is discharged into the southeast corner of the western half of the COL Primary Ash Pond. The sluiced CCR settles out through the water column as it follows the flow of the narrow channel around the southern, western, and northern sides of the existing CCR surface impoundment. The water in the channel flows to the east and discharges through a narrow cut-out of an interior dike into the northwest corner of the large open area in the eastern half of the COL Primary Ash Pond.

The majority of the CCR that is discharged into the COL Primary Ash Pond is removed during routine maintenance dredging activities of the shallow narrow channel. The CCR that is dredged is stockpiled in the western half of the COL Primary Ash Pond for dewatering. Once dewatered the CCR is run through a sieve shaker machine to separate the coarsely graded CCR from the finely graded CCR. The CCR is then transported off-site for beneficial reuse or to the on-site active dry ash landfill.

The water in the COL Primary Ash Pond is recirculated to the generating plant via effluent pumps located in the ash recirculating pump house in the northeast corner of the eastern half of the COL Primary Ash Pond. The recirculating pumps return water to the generating plant for reuse and/or treatment and disposal per the facility's Wisconsin Pollution Discharge Elimination System (WPDES) permit. Instrumentation associated with the pump house in the northeast corner of the COL Primary Ash Pond includes a submersible hydrostatic level transducer, as well as a visual staff gauge, for monitoring water elevations in the COL Primary Ash Pond. An 18-inch diameter corrugated metal pipe is located immediately south of the pump house, in the interior dike between the COL Primary Ash Pond and COL Secondary Pond. The pipe drains to the Secondary Ash Pond and is no longer used. The influent end of the hydraulic structure, on the COL Primary Ash Pond side, consists of a manually operated gate valve which is closed.

The surface area of the COL Primary Ash Pond is approximately 14.7 acres and has an embankment height of approximately 23 feet from the crest to the toe of the downstream slope. The interior storage depth of the COL Primary Ash Pond is approximately 15 feet. The total volume of impounded CCR and water within the COL Primary Ash Pond is approximately 330,000 cubic yards.

2.2 COL Secondary Ash Pond

The COL Secondary Pond is located north of the generating plant and east of the COL Primary Ash Pond. The COL Secondary Ash Pond was previously a downstream receiver of influent flows from the COL Primary Ash Pond. The water within the COL Secondary Pond, prior to 2004, was pumped to a surface impoundment identified as the polishing pond. The polishing pond was located east of the generating plant. The water pumped to the polishing pond would flow to the south through the facility's WPDES Outfall 002 into "Mint Ditch" and eventually flow into the backwaters of the Wisconsin River. Presently, the COL Secondary Pond acts as a storm water detention impoundment with the only influent sources being precipitation and storm water runoff from the surrounding area. The water within the COL Secondary Pond either exfiltrates or evaporates. The water elevation within the COL Secondary Pond is normally the same as the ground water elevation under the CCR Ponds approximately 10 feet lower than the COL Primary Ash Pond.

The surface area of the COL Secondary Ash Pond is approximately 9.6 acres and has an embankment height of approximately 23 feet from the crest to the toe of the downstream slope. The interior storage depth of the COL Secondary Ash Pond is approximately 12 feet. The total volume of impounded CCR and water within the COL Secondary Ash Pond is approximately 185,000 cubic yards.

3 SAFETY FACTOR ASSESSMENT- §257.73(e)

This Report documents if each CCR surface impoundment achieves the minimum safety factors, which are identified on the table below.

Safety Factor Assessment	Minimum Safety Factor
Static Safety Factor Under Maximum Storage Pool Loading	1.50
Static Safety Factor Under Maximum Surcharge Pool Loading	1.40
Seismic Safety Factor	1.00
Liquefaction Safety Factor	1.20

3.1 Safety Factor Assessment Methods

The safety factor assessment is completed with the two dimensional limit-equilibrium slope stability analyses program STABL5M (1996)[1]. The program analyzes many potential failure circles or block slides by random generation of failure surfaces using the toe and crest search boundaries set for each analysis. The solution occurs by balancing the resisting forces along the failure plane due to the Mohr-Columb failure strength parameters of friction angle and cohesion. The gravity driving forces are divided by the resisting forces to produce a safety factor for the slope. The minimum of hundreds of searches is presented as the applicable safety factor.

There are both total stress and effective stress friction angle and cohesion values for soil. In the case of cohesionless soil (gravel, sand and silt) the friction angle value is the same for total stress and effective stress analysis and there is no cohesion. At the COL Primary Ash Pond and COL Secondary Ash Pond only cohesionless soil is present in and under the embankments.

[1] STABL User Manual by Ronald A. Siegal, Purdue University, June 4, 1975 and STABL5 – The Spencer Method of Slices: Final Report by J. R. Carpenter, Purdue University, August 28, 1985

3.1.1 Soil Conditions in and under the impoundments

The subsurface soil conditions have not changed since Revision 0 of this Report. The COL Primary Ash Pond and COL Secondary Ash Pond are subdivided from a larger outer embankment constructed of compacted fine sand. The soil below the foundation of the embankment is loose fine sand from backwaters of the Wisconsin River underlain by very dense fine sand deposited by glaciation. Borings taken in 1971 indicated that rock is located at approximately 90 feet below the top of the embankments, Appendix A.

In addition to the 1971 borings, borings were taken in the embankment in June of 2011 and indicate the embankment soil is dense fine sand (SP). Borings from 2015 were taken in the embankment between the COL Primary Ash Pond and COL Secondary Ash Pond for the installation of monitoring wells also indicates the embankments are dense sand, Appendix A.

The boring logs from 1971 indicate that the foundation soil is the same as the embankment soil. However, the boring logs indicate that the upper part of the foundation sand is loose and transitions to very dense with depth. The results of the borings taken in 2015 indicate the embankment sand is dense to very dense.

The density observations from the soil borings were used to assign soil properties to the embankment and foundation soils using NAVFACS DM-7[2], Appendix B. The internal friction angles selected based on the Standard Split Spoon (SPT) results reported on the borings are:

Soil Type	Internal Friction Angle °	Total Unit Weight (lb/ft3)
Embankment Sand	35	120
Foundation Sand	30	110

The very dense sand found below the loose sand was not included in the modeled soil

---

[2] Naval Facilities Engineering Command Design Manual DM-7, Figure 3-7 "Density versus Angle of Internal Friction for Cohesionless Soils", March 1971

profile, since its exact depth in the foundation of the embankments is unknown. Ignoring the very dense sand will produce a conservative slope safety factor.

3.1.2 Design water surface in impoundments maximum normal pool and maximum pool under design inflow storm

The flows have not been significantly modified since the initial Report. The COL Primary Ash Pond receives process water from the facility at the rate of approximately 1.5 MGD. The water is recycled back to the facility whenever the water elevation in the impoundment reaches 795 feet. The COL Primary Ash Pond is therefore assigned a normal pool elevation of 795 feet. The COL Primary Ash Pond does not have an outlet structure and would overflow across the interior embankment into the COL Secondary Ash Pond at elevation 802 feet, Figure 2. During the design 100 year return period the impoundment water would rise to elevation 799 feet by accumulating all of the runoff from the COL Primary Ash Pond watershed, Inflow Flood Control Plan §257.82.

The COL Secondary Ash Pond is no longer used for COL process water handling and operates as a zero liquid discharge pond accumulating only the rainfall from its watershed. The normal impoundment water elevation is equivalent to the ground water elevation at 785 feet and the accumulated design storm water elevation is 787 feet, Inflow Flood Control Plan §257.82. Accumulated storm water will exfiltrate from the impoundment due to the permeable nature of the impoundment foundation soil SCS Engineers[3]

3.1.3 Selection of Seismic Design Parameters and Description of Method

The design earthquake ground acceleration is selected from the United States Geologic Survey (USGS) detailed seismic design maps based on the latitude and longitude of the COL. The peak ground acceleration (PGA) value is selected for a 2% probability of exceedance in 50 years (2500 year return period) as required by §257.53. Since the site soils with the exception of a thin loose sand foundation layer are dense to very dense

[3] SCS Engineers, "Columbia Energy Center – Monitoring Well Documentation Report", February 9, 2016.

sand and extend to bedrock at 90 feet, the site class as defined in the 2009 International Building Code 1613.5.5 is Site Class D. For Site Class D the ground surface PGA for slope stability and liquefaction assessment is 0.055 g, Appendix C.

3.1.4 Liquefaction Assessment Method and Parameters

Certain soils may have zero effective stress (liquefaction) during an earthquake of from static shear of a saturated embankment slope. Soils that will liquefy include loose or very loose uniform fine sand or silt, and low plasticity clay (plastic index of less than 12). The liquefaction resistance of a soil is based on its strength and effective confining stress. The strength of the saturated embankment and foundation sand is measured by the SPT results shown on the borings in Appendix A.

The test results for Boring MW-304 on the interior embankment and 112 at the toe of the COL Primary Ash Pond embankment, Figure 2, are indicative of the soil resistance to liquefaction.

The simplified assessment of liquefaction procedure as first proposed by Seed and most recently updated and published by Idriss and Boulanger[4] is used to assess the potential for liquefaction of the river silt. The procedure uses the strengths determined by the SPT test adjusted to normalize for overburden pressure and for fines content to determine the cyclic resistance ratio for the soil at earthquake magnitude 7.5 and at 1 atmosphere pressure. The cyclic resistance ratio is then adjusted for the actual earthquake magnitude of the design event which is 7.7 for a New Madrid Fault source earthquake[5]. The cyclic stress ratio caused by the design surface PGA is then used to determine the actual cyclic stress ratio at 65% of maximum strain at depth in the soil profile. The cyclic resistance ratio is divided by the cyclic stress ratio to determine the factor of safety for liquefaction.

---

[4] Idriss I. M. and R. W. Boulanger, "Soil Liquefaction During Earthquakes", EERI MNO-12, 2008.

[5] Elnashi et al, "Impact of Earthquakes on the Central USA", FEMA Report 8-02, Mid-American Earthquake Center, 2002

The results for the soil profile typical of the COL Primary Ash Pond and COL Secondary Ash Pond is shown in Appendix C. The results indicate that the loose foundation sand will not liquefy during the site design earthquake.

3.2 COL Primary Ash Pond

The COL Primary Ash Pond has not significantly changed or been modified since the initial Report, Revision 0. The impoundment is incised on the east and south sides of the impoundment. On the north and west sides the impoundment is created by construction of on-site fine sand embankments constructed with an outer slope of 4 horizontal to 1 vertical. The northern end of the embankment has the greatest height with the toe located in the floodplain of the Wisconsin River at elevation 782 feet and is selected as the critical cross-section, Figure2. The crest elevation of the embankment is 804 feet.

3.2.1 Static Safety Factor Assessment Under Maximum Storage Pool Loading - §257.73(e)(1)(i)

The critical cross-section is analyzed with the maximum storage pool under normal operations at elevation 795 feet. The phreatic surface in the embankment is calculated to exist at the toe of the embankment based on Huang[6] and using a permeability of 10^{-2} $^{cm}/_{sec}$. Analysis for both a circular and block sliding surface, Appendix D, show a minimum factor of safety of 1.9 for the circular slide surface.

3.2.2 Static Safety Factor Assessment Under Maximum Surcharge Pool Loading - §257.73(e)(1)(ii)

The COL Primary Ash Pond storm water elevation at the end of the design 100 year storm is elevation 799 feet. The increase in water elevation is considered without exfiltration loss through the permeable impoundment bottom and assumes the plant recovers all process water discharged to the impoundment. Analysis for both a circular and block slide surface, Appendix D, show a minimum factor of safety of 1.8 for a circular slide surface.

---

[6] Huang Yuag H., Stability Analysis of Earth Slopes, Van Nostrand Rienhold, 1983

3.2.3 Seismic Safety Factor Assessment - §257.73(e)(1)(iii)

The COL Primary Ash Pond was assigned a pseudo-static earthquake coefficient equal to 0.055 g and a vertical downward component equal to $^2/_3$ of the horizontal component (0.04 g) as recommended by Newmark[7]. Analysis for both circular and block slide surfaces, Appendix D, show a minimum factor of safety of 1.5 for a circular slide surface.

3.2.4 Liquefaction Safety Factor Assessment - §257.73(e)(1)(iv)

The embankment and foundation soils of the COL Primary Ash Pond will not liquefy during the design earthquake. No post-liquefaction slope stability assessment is required.

3.3 COL Secondary Ash Pond

The COL Secondary Ash Pond has not significantly changed or been modified since the initial Report, Revision 0. The COL Secondary Ash Pond is incised on the east and south sides of the impoundment. The north side the impoundment is created by construction of on-site fine sand embankments constructed with an outer slope of 4 horizontal to 1 vertical. The west side is an interior embankment that separates the COL Secondary Ash Pond from the COL Primary Ash Pond. The northern end of the embankment has the greatest height with the toe located in the floodplain of the Wisconsin River at elevation 783 feet and is selected as the critical cross-section, Figure 2. The crest elevation of the embankment is 804 feet.

3.3.1 Static Safety Factor Assessment Under Maximum Storage Pool Loading - §257.73(e)(1)(i)

The critical cross-section is analyzed with the maximum storage pool under normal operations at elevation 785 feet. The phreatic surface in the embankment is assumed to be at the toe of the outer slope only two foot below the water elevation in the impoundment. Analysis for both a circular and block sliding surface, Appendix D, show a minimum factor of safety of 2.2 for the circular slide surface.

---

[7] Newmark, N. M. and W. J. Hall, "Earthquake Spectra and Design", EERI Monograph, Earthquake Engineering Research Institute, Berkeley, California, 1982

3.3.2 Static Safety Factor Assessment Under Maximum Surcharge Pool Loading - §257.73(e)(1)(ii)

The COL Secondary Ash Pond storm water elevation at the end of the design 100 year storm is elevation 787 feet. The increase in water elevation is considered without exfiltration loss through the permeable impoundment bottom. Analysis for both a circular and block slide surface, Appendix D, show a minimum factor of safety of 2.2 for a circular slide surface.

3.3.3 Seismic Safety Factor Assessment - §257.73(e)(1)(iii)

The COL Secondary Ash Pond was assigned a pseudo-static earthquake coefficient equal to 0.055 g and a vertical downward component equal to $^2/_3$ of the horizontal component (0.04 g) as recommended by Newmark[8]. Analysis for both circular and block slide surfaces, Appendix D, show a minimum factor of safety of 1.7 for a circular slide surface.

3.3.4 Liquefaction Safety Factor Assessment - §257.73(e)(1)(iv)

The embankment and foundation soils of the COL Secondmary Ash Pond will not liquefy during the design earthquake. No post-liquefaction slope stability assessment is required.

---

[8] Newmark, N. M. and W. J. Hall, "Earthquake Spectra and Design", EERI Monograph, Earthquake Engineering Research Institute, Berkeley, California, 1982

4 Results Summary

The results of the safety factor assessment indicate that the embankment of the COL Primary Ash Pond and COL Secondary Ash Pond meets the requirements of §257.73(e). The results are summarized as:

	Static Stability Normal Water Elevation	Static Stability Flood Water Elevation	Pseudo Static Earthquake with Normal Water Elevation	Liquefaction Potential	Post Earthquake Static Stability Normal Water Elevation
Required Safety Factor	1.5	1.4	1.0		1.2
COL Primary Ash Pond	1.9	1.8	1.5	no	Not Applicable
COL Secondary Ash Pond	2.2	2.2	1.7	no	Not Applicable

5 QUALIFIED PROFESSIONAL ENGINEER CERTIFICATION

To meet the requirements of 40 CFR 257.73(e)(2), I Mark W. Loerop hereby certify that I am a licensed professional engineer in the State of Wisconsin; and that, to the best of my knowledge, all information contained in this document is correct and the document was prepared in compliance with all applicable requirements in 40 CFR 257.73(b) and 40 CFR 257.73(e).

WISCONSIN
MARK W.
LOEROP
E-43783-6
NAPERVILLE
IL
PROFESSIONAL ENGINEER

By: ____________

Name: MARK LOEROP

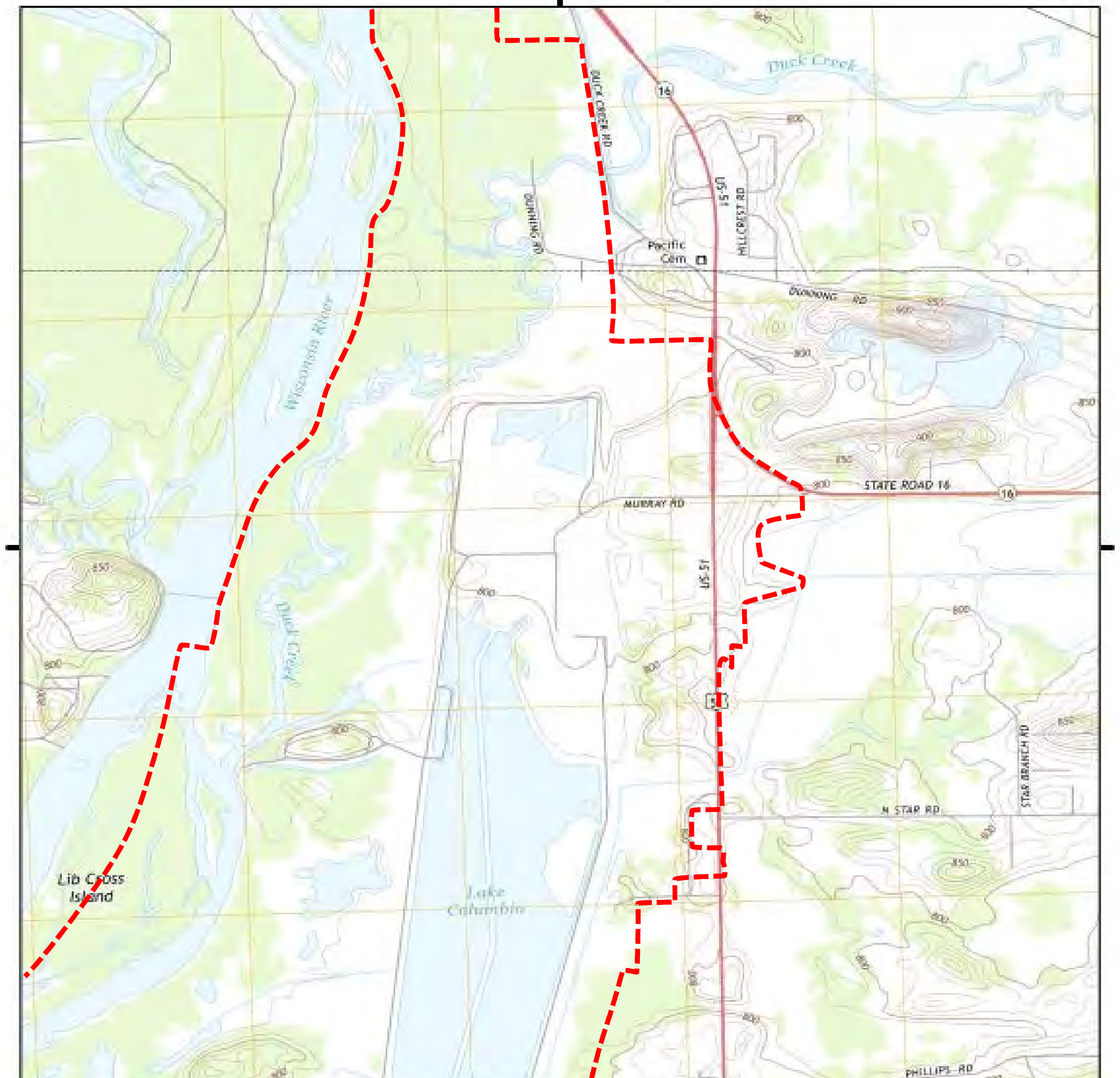
Date: OCTOBER 16, 2020

FIGURES

Alliant Energy
Wisconsin Power and Light Company
Columbia Energy Center
Pardeeville, Wisconsin

Safety Factor Assessment

Historical Topo Map 2013



This report includes information from the following map sheet(s).

Miles 0.25 0.5 1 1.5

NW N NE W E SW S SE

TP, Poynette, 2013, 7.5-minute

N, Portage, 2013, 7.5-minute

SITE NAME: Columbia Energy Center
ADDRESS: W8375 Murray Road
Pardeeville, WI 53954
CLIENT: Environmental Site Assessors

N

4555570 - 7 page 4

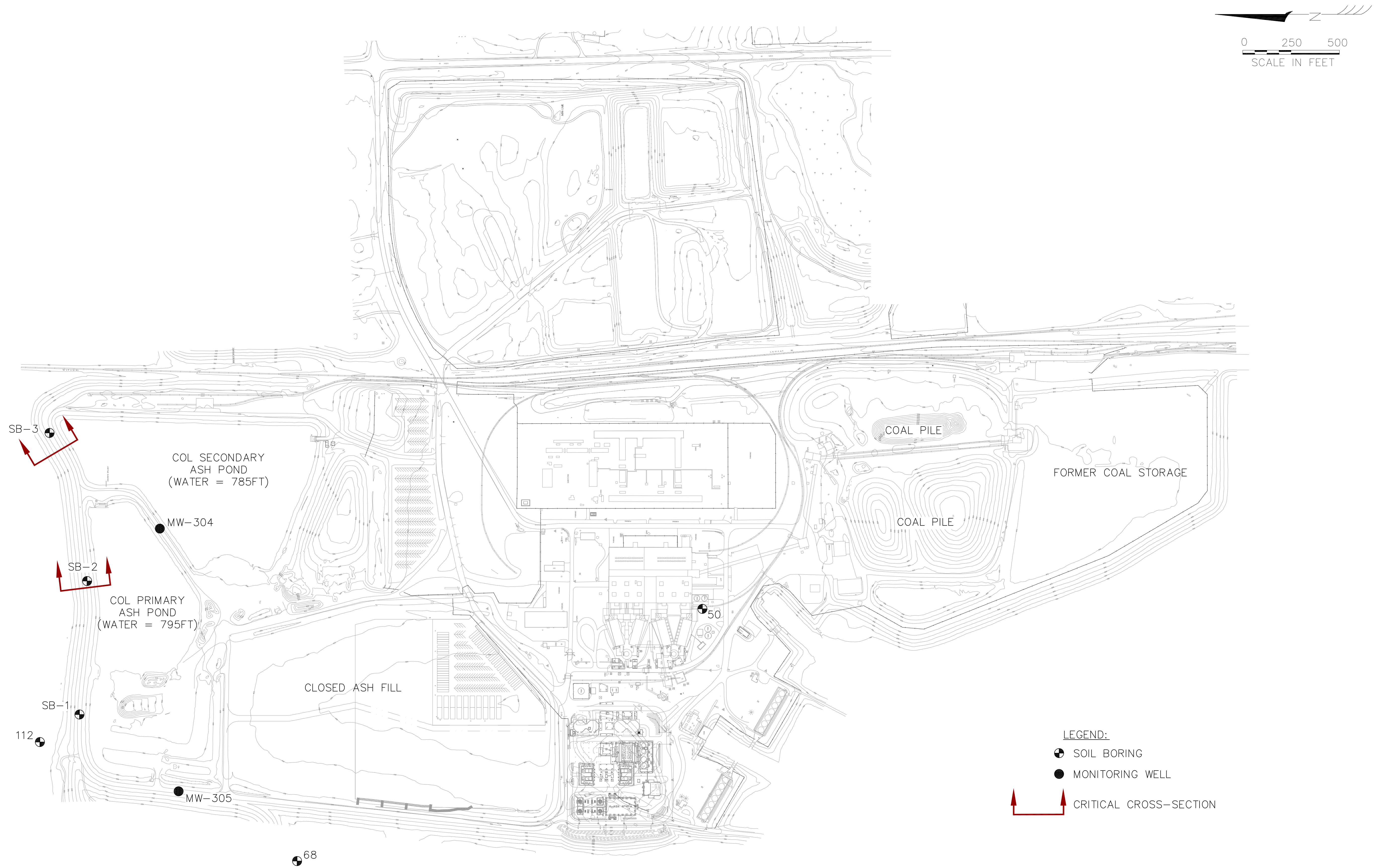
Historical Aerial Photo 6/12/2014

Approximate Property Boundary

HARD HAT SERVICES™
Engineering, Construction and Management Solutions

Site Location
Columbia Energy Center
Wisconsin Power and Light Company

Drawing
Figure 1
Date
7/12/2016



REV	DATE	BY	DESCRIPTION
5			
4			
3			
2			
1			

hard hat™ SERVICES

SCALE:	AS SHOWN
DATE:	8-22-16
DRAWN BY:	JFD
CHKD BY:	TJH
APRVD BY:	MWL

CLIENT / LOCATION
WISCONSIN POWER AND LIGHT (WPL) COMPANY
COLUMBIA ENERGY CENTER
PARDEEVILLE, WISCONSIN

DRAWING DESCRIPTION
SAFETY FACTOR ASSESSMENT REPORT
SITE PLAN

JOB 154.010.025
SHT. FIGURE 2
DWG. 154.010.025-SFA

APPENDIX A – Soil Borings

Alliant Energy
Wisconsin Power and Light Company
Columbia Energy Center
Pardeeville, Wisconsin

Safety Factor Assessment

State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION

Form 4400-122 Rev. 7-98

Route To: Watershed/Wastewater ☐ Waste Management ☐
Remediation/Redevelopment ☐ Other ☐

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
WPL-Columbia SCS#: 25215135.00		MW-304

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
Kevin Durst Badger State Drilling	11/12/2015	11/12/2015	hollow stem auger

WI Unique Well No.	DNR Well ID No.	Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
VY703			Feet	802.50 Feet	8.5 in.

Local Grid Origin ☐ (estimated: ☐) or Boring Location ☒
State Plane 544671 N, 2122897 E /C/N
1/4 of 1/4 of Section 27, T 12 N, R 9 E
Lat ___° ___' ___"
Long ___° ___' ___"
Local Grid Location ☐ N ☐ E
Feet ☐ S Feet ☐ W

Facility ID	County	County Code	Civil Town/City/ or Village
	Columbia	11	Portage

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID/FID	Pocket Penetration (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
				TOPSOIL.	TOPSOIL									
			1	SILTY SAND, mostly fine, brown/tan (10YR 5/6).										
S1	24	7 8 10 12	2							M				
			3											
			4	Same as above except, trace gravel, brown tan to grey (top to bottom) 10YR 5/4.										
S2	24	14 22 26 31	5							M				
			6	Same as above except, brown/tan/grey assorted coloring.										
S3	24	16 18 22 24	7							M				
			8		SM									
			9	Same as above except, black/grey/brown, saturated area about 2" thick.										
S4	24	11 15 15 14	10							M				
			11	Same as above except, 10YR 5/3.										
S5	24	23 31 30 29	12							M				
			13											
			14	trace gravel.										
S6	20	9 10 7 5	15							M				

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature	Firm	
[signature] for Zach Watson	SCS Engineers 2830 Dairy Drive Madison, WI 53711	Tel: (608) 224-2830 Fax:

SOIL BORING LOG INFORMATION SUPPLEMENT
Form 4400-122A

Boring Number MW-304 Use only as an attachment to Form 4400-122.

Sample: Number and Type	Sample: Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID/FID	Soil Properties: Pocket Penetration (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			16	SILTY SAND, mostly fine, brown/tan (10YR 5/6).										
S7	4		17							W				dropped spoon
			18											
			19	Same as above except, 10YR 6/3.	SM									
S8			20							W				
			21											
			22											
			23	End of boring at 23 ft bgs.										

State of Wisconsin
Department of Natural Resources

SOIL BORING LOG INFORMATION
Form 4400-122 Rev. 7-98

Route To: Watershed/Wastewater ☐ Waste Management ☐
Remediation/Redevelopment ☐ Other ☐

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
WPL-Columbia SCS#: 25215135.00		MW-305

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
Kevin Durst Badger State Drilling	11/13/2015	11/13/2015	hollow stem auger

WI Unique Well No.	DNR Well ID No.	Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
VY716			Feet	803.95 Feet	8.5 in.

Local Grid Origin ☐ (estimated: ☐) or Boring Location ☒
State Plane 544776.1 N, 2121537 E S/C/N
1/4 of 1/4 of Section 27, T 12 N, R 9 E
Lat ° ' "
Long ° ' "
Local Grid Location ☐ N Feet ☐ S ☐ E Feet ☐ W

Facility ID	County	County Code	Civil Town/City/ or Village
	Columbia	11	Portage

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID/FID	Pocket Penetration (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			0-1	TOPSOIL	TOPSOIL									
			1	SILTY SAND, mostly fine, brown/tan 10YR 5/8.										
S1	18	5 8 9 7	2							M				
S2	18	2 3 3 4	4.5							M				
			6	Same as above except, trace gravel, tan 10YR 6/8 at bottom.	SM									
S3	18	2 8 9 8	7							M				
			9	Same as above except, light tan 10YR 6/6, trace gravel, some large gravel chunks.										
S4	20	5 7 6 5	9.5							M				
S5	20	9 12 17 22	11-12	POORLY GRADED SAND, tan (10YR 6/8), trace gravel, some saturated areas.	SP					M				
S6	24	16 19 22 34	13.5-15	SILTY SAND, trace gravel, tan (10YR 5/6).	SM					W				

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature: [signature] for Zach Watson
Firm: SCS Engineers
2830 Dairy Drive Madison, WI 53711
Tel: (608) 224-2830
Fax:

SOIL BORING LOG INFORMATION SUPPLEMENT
Form 4400-122A

Boring Number MW-305 Use only as an attachment to Form 4400-122.

Sample: Number and Type	Sample: Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	PID/FID	Soil Properties: Pocket Penetration (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
S7		31 30 41 50/2	16–18	SILTY SAND, trace gravel, tan (10YR 5/6), some large dolomite chunks.	SM					W				
			18	End of boring at 18 ft bgs.										

Boring Log Legend

Sample
No: (Number) Soil samples are numbered consecutively from the ground surface. Core samples are numbered consecutively from the first core run.

Type:	A= Auger Cuttings	CR= Core Run	MS= Modified Spoon	PB= Pitcher Barrel
	PT= Piston Tube	ST= Shelby Tube	SS= Split Spoon (2" O.D.)	WC= Wash Cuttings

Interval: The depth of sampling interval in feet below ground surface

Blow Count
The number of blows required to drive a 2-inch O.D. split-spoon sampler with a 140 pound hammer falling 30-inches. When appropriate, the sampler is driven 18 inches and blow counts are reported for each 6-inch interval. The sum of blow counts for the last two 6-inch intervals is designated as the standard penetration resistance (N) expressed as blows per foot.

Recovery in Inches
The length of sample recovered by the sampling device.

U.S.C.S. Soil Type
The Unified Soil Classification System symbol for recovered soil samples determined by visual examination or laboratory tests. Refer to ASTM D2487-69 for a detailed description of procedure and symbols. Underlined symbols denote classifications based on laboratory tests (i.e. ML), all others are based on visual classification only.

Percent Moisture
Natural moisture content of sample expressed as percent of dry weight.

q_u TSF
Unconfined compressive strength in tons per square foot obtained by hand penetrometer. Laboratory compression test values are indicated by underlining.

Contact Depth
The contact depth between soil layers is interpreted from significant changes in recovered samples and observations during drilling. Actual changes between soil layers often occur gradually and the contact depths shown on the boring logs should be considered as approximate.

Soil Description and Remarks
Soil descriptions include consistency or density, color, predominant soil types and modifying constituents.

Cohesive Soils			Cohesionless Soils	
Consistency	q_u (TSF)	Blows/ft.	Density	Blows/ft.
Very Soft	less than 0.25	0-1	Very Loose	4 or less
Soft	0.25 to 0.50	2-4	Loose	5 to 10
Medium Stiff	0.50 to 1.00	5-8	Medium Dense	11 to 30
Stiff	1.00 to 2.00	9-15	Dense	30 to 50
Very Stiff	2.00 to 4.00	15-30	Very Dense	Over 50
Hard	more than 4.00	Over 30		

Particle Size Description		Definition of Terms	
Boulder =	Larger than 12 inches	Trace =	5 to 12 percent by weight
Cobble =	3 to 12 inches	Some =	12 to 30 percent by weight
Gravel =	0.187 to 3 inches	And =	Approximately equal fractions
Sand =	0.074 to 4.76 mm	( ) =	Driller's observation
Silt and Clay =	smaller than 0.074 mm		

Piezo.
(Piezometer) Screened interval of the piezometer installation is denoted by cross-hatching.

General Note
The boring log and related information depicted subsurface conditions only at the specified locations and date indicated. Soil conditions and water levels at other locations may differ from conditions occurring at these boring locations. Also the passage of time may result in a change in the conditions at these boring locations.

Soil Test Boring Refusal
Defined as any material causing a blow count greater that 50 blows/6 inches. Such material may include bedrock, "floating" rock slabs, boulders, dense gravel seams, hard pan clay, or cemented soils. Refusal is usually indicated in fractional notation showing number of blows as the numerator and inches of penetration as the denominator.

CABENO

Environmental Field Services, LLC

BORING LOG

CLIENT: Aether dbs

COORDINATES: *N NOT SURVEYED* *E NOT SURVEYED*

PROJECT: Alliant Columbia Station

BORING NO.: *SB1*

LOGGED BY: *John Noyes*
EDITED BY: *John Noyes*
CHECKED BY: *Chris Sullivan*
DATE BEGAN: *06-01-11*
DATE FINISHED: *06-01-11*
GROUND SURFACE ELEVATION:

DEPTH TO WATER WHILE DRILLING	SAMPLE NO. AND TYPE	SAMPLE RECOVERY	SAMPLE INFROMATION	POCKET PENETROMETER (TONS/FT2)	CONSISTENCY vs. DEPTH	DEPTH IN FEET	PROFILE	DESCRIPTION
						0		SAND & GRAVEL; light brown to orange; fine to coarse grained; well graded; dry to moist. (Fill)
	SP1	4.7'/5'						SAND; light brown; fine grained; poorly graded; moist. (Fill)
						-5		
	SP2	5'/5'						
▽								@ 8.5' grades wet
						-10		
	SP3	4'/5'						@ 13' grades yellow to light tan
						-15		@ 15' grades fine to coarse, well graded
	SP4	5'/5'						@ 17' grades fine sand w/ well rounded gravels, trace silt/clay
						-20		Bottom of boring @ 19'
						-25		

CABENO

Environmental Field Services, LLC

BORING LOG

CLIENT: Aether dbs

COORDINATES: *N NOT SURVEYED* *E NOT SURVEYED*

PROJECT: Alliant Columbia Station

BORING NO.: *SB2*

LOGGED BY: *John Noyes*
EDITED BY: *John Noyes*
CHECKED BY: *Chris Sullivan*
DATE BEGAN: *06-01-11*
DATE FINISHED: *06-01-11*
GROUND SURFACE ELEVATION:

DEPTH TO WATER WHILE DRILLING	SAMPLE NO. AND TYPE	SAMPLE RECOVERY	SAMPLE INFROMATION	POCKET PENETROMETER (TONS/FT2)	CONSISTENCY vs. DEPTH	DEPTH IN FEET	PROFILE	DESCRIPTION
						0		SAND; light brown to orange; fine grained; poorly graded; dry to moist; trace gravels. (Fill)
	SP1	5'/5'						
						-5		@ 5' grades trace silt
	SP2	5'/5'						
						-10		@ 10' to 13', very hard & dense; seems overconsolidated; more recovery than push
	SP3	5'/3'						
						-15		Bottom of boring @ 13' Boring advanced W/ Geoprobe Model 6610DT using 60-inch Macrocore sampling system. Boring backfilled to groundsurface w/ bentonite chips on 06-1-11.
						-20		

CABENO

Environmental Field Services, LLC

BORING LOG

CLIENT: Aether dbs

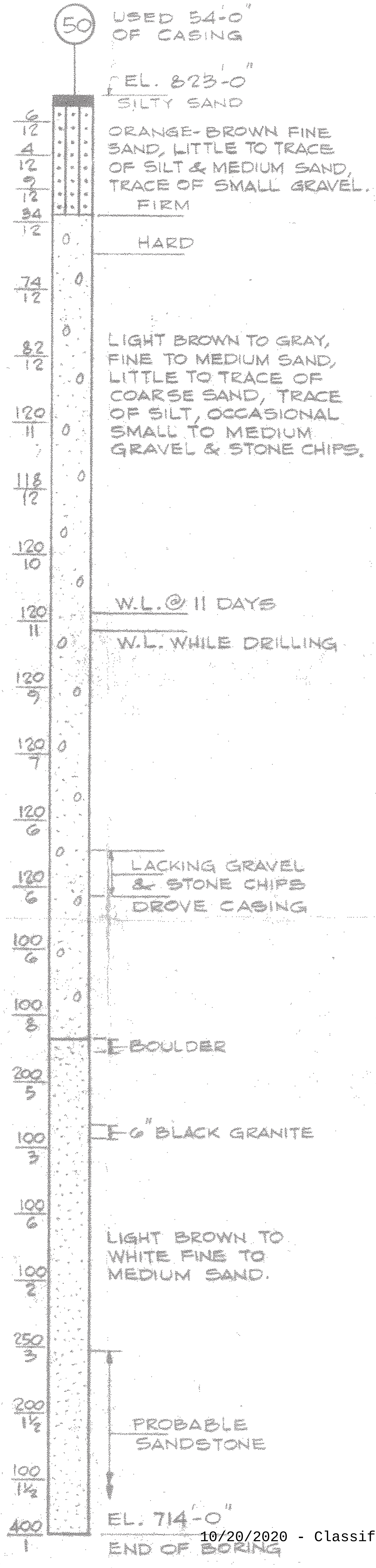
PROJECT: Alliant Columbia Station

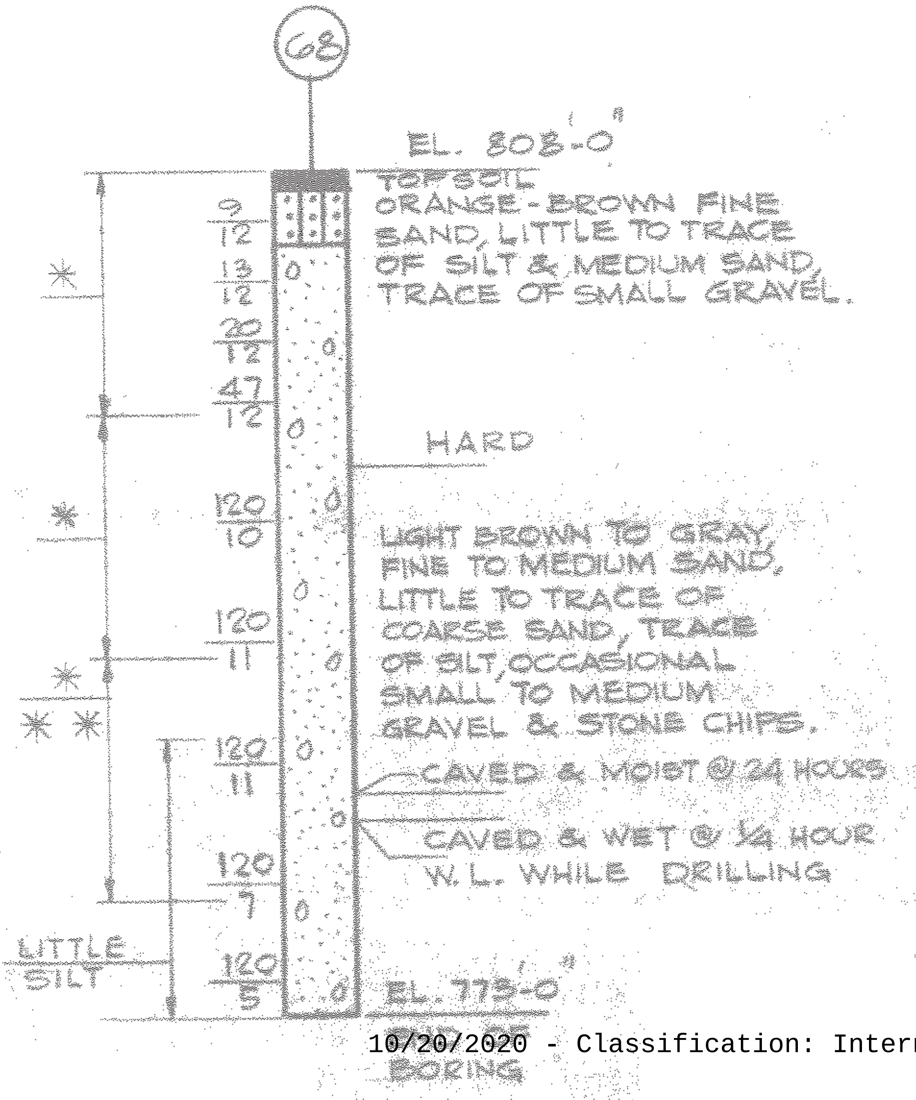
COORDINATES: *N NOT SURVEYED* *E NOT SURVEYED*

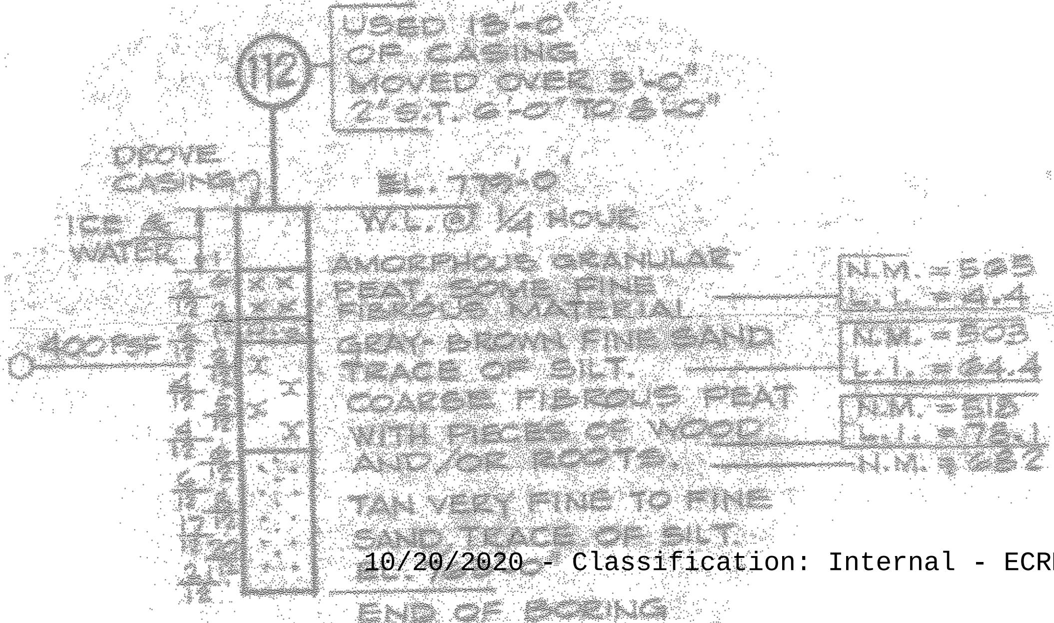
BORING NO.: *SB3*

LOGGED BY: *John Noyes*
EDITED BY: *John Noyes*
CHECKED BY: *Chris Sullivan*
DATE BEGAN: *06-01-11*
DATE FINISHED: *06-01-11*
GROUND SURFACE ELEVATION:

DEPTH TO WATER WHILE DRILLING	SAMPLE NO. AND TYPE	SAMPLE RECOVERY	SAMPLE INFROMATION	POCKET PENETROMETER (TONS/FT2)	CONSISTENCY vs. DEPTH	DEPTH IN FEET	PROFILE	DESCRIPTION
						0		SAND; light brown to orange; fine grained; poorly graded; dry to moist; trace gravels. (Fill)
	SP1	5'/5'						
						-5		
	SP2	5'/5'						
						-10		
	SP3	5'/5'						
						-15		
▽								@ 16' grades gray and wet.
	SP4	5'/5'						
						-20		
	SP5	5'/5'						
						-25		PEAT; brown; dry; non-plastic. (PT)
								Clayey SILT; gray; non-plastic; hard; moist. (ML)
	SP6	1'/1'						Bottom of boring @ 26' Boring advanced W/ Geoprobe Model 6610DT using 60-inch Macrocore sampling system. Boring backfilled to groundsurface w/ bentonite chips on 06-1-11.
						-30		


50
USED 54'-0" OF CASING
EL. 823'-0"
SILTY SAND
6/12
4/12
9/12
ORANGE-BROWN FINE SAND, LITTLE TO TRACE OF SILT & MEDIUM SAND, TRACE OF SMALL GRAVEL.
FIRM
34/12
HARD
74/12
82/12
LIGHT BROWN TO GRAY, FINE TO MEDIUM SAND, LITTLE TO TRACE OF COARSE SAND, TRACE OF SILT, OCCASIONAL SMALL TO MEDIUM GRAVEL & STONE CHIPS.
120/11
118/12
120/10
W.L. @ 11 DAYS
120/11
W.L. WHILE DRILLING
120/9
120/7
120/6
LACKING GRAVEL & STONE CHIPS
120/6
DROVE CASING
100/6
100/8
BOULDER
200/5
6" BLACK GRANITE
100/3
100/6
LIGHT BROWN TO WHITE FINE TO MEDIUM SAND.
100/2
250/3
200/1½
PROBABLE SANDSTONE
100/1½
EL. 714'-0"
400/1
END OF BORING


68
EL. 808'-0"
TOPSOIL
ORANGE-BROWN FINE SAND, LITTLE TO TRACE OF SILT & MEDIUM SAND, TRACE OF SMALL GRAVEL.
9/12
13/12
20/12
47/12
HARD
120/10
LIGHT BROWN TO GRAY, FINE TO MEDIUM SAND, LITTLE TO TRACE OF COARSE SAND, TRACE OF SILT, OCCASIONAL SMALL TO MEDIUM GRAVEL & STONE CHIPS.
120/11
120/11
CAVED & MOIST @ 24 HOURS
CAVED & WET @ 1/4 HOUR
W. L. WHILE DRILLING
120/7
LITTLE SILT
120/5
EL. 779'-0"
END OF BORING


112
USED 18'-0"
OF CASING
MOVED OVER 3'-0"
2" S.T. 6'-0" TO 8'-0"
DROVE
CASING
EL. 779.0
ICE &
WATER
W.L. @ 1/4 HOUR
AMORPHOUS GRANULAR
PEAT, SOME FINE
FIBROUS MATERIAL
400 PSF
GRAY-BROWN FINE SAND
TRACE OF SILT.
COARSE FIBROUS PEAT
WITH PIECES OF WOOD
AND/OR ROOTS.
TAN VERY FINE TO FINE
SAND TRACE OF SILT.
END OF BORING
N.M. = 583
L.I. = 84.4
N.M. = 503
L.I. = 64.4
N.M. = 512
L.I. = 78.1
N.M. = 232

APPENDIX B – Strength of Embankment Soil

Alliant Energy
Wisconsin Power and Light Company
Columbia Energy Center
Pardeeville, Wisconsin

Safety Factor Assessment

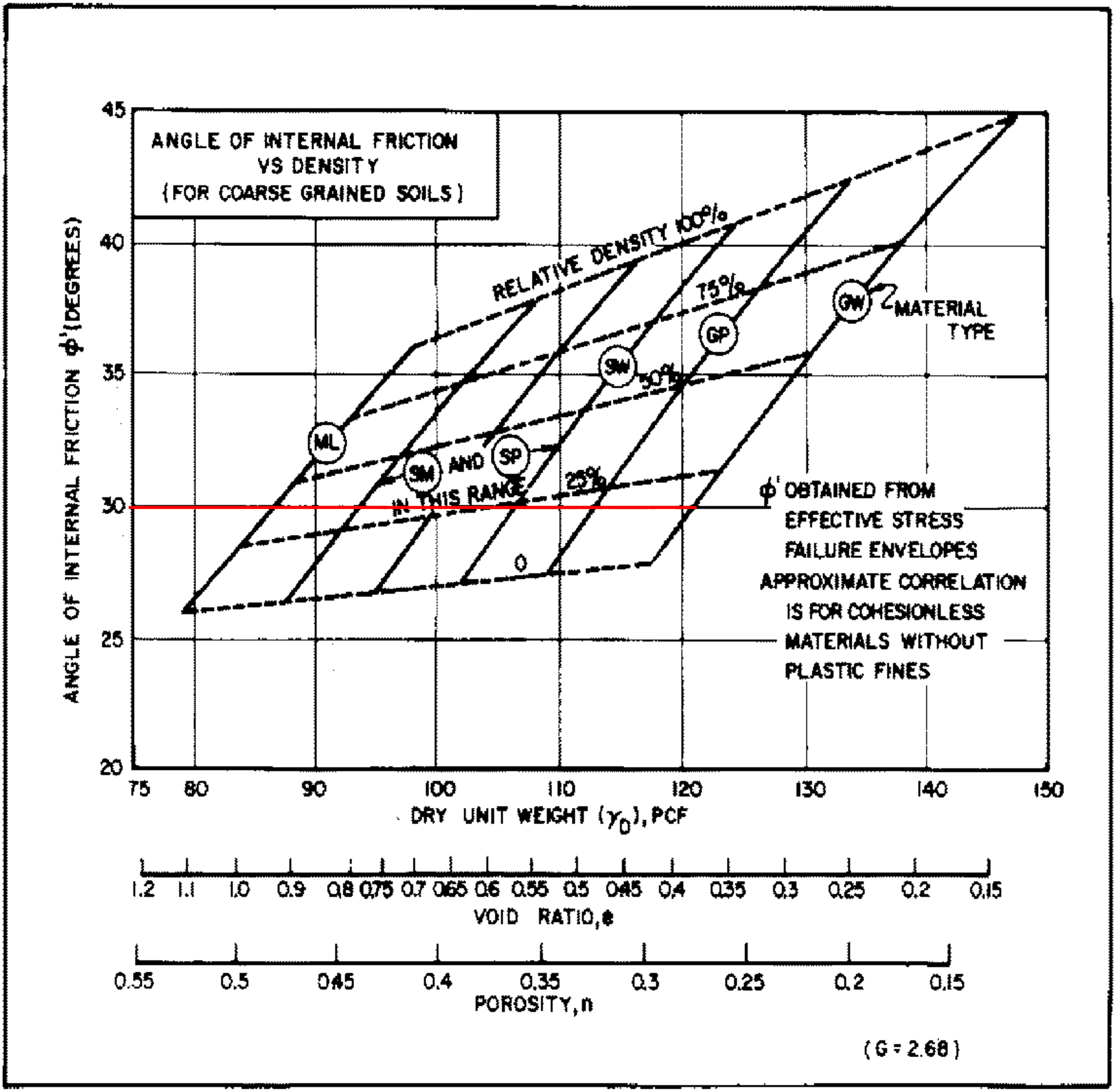


FIGURE 7

Correlations of Strength Characteristics for Granular Soils

APPENDIX C – Earthquake and Liquefaction Analysis

Alliant Energy
Wisconsin Power and Light Company
Columbia Energy Center
Pardeeville, Wisconsin

Safety Factor Assessment

USGS Design Maps Detailed Report

ASCE 7-10 Standard (43.489°N, 89.418°W)

Site Class D – "Stiff Soil", Risk Category I/II/III

Section 11.4.1 — Mapped Acceleration Parameters

Note: Ground motion values provided below are for the direction of maximum horizontal spectral response acceleration. They have been converted from corresponding geometric mean ground motions computed by the USGS by applying factors of 1.1 (to obtain S_S) and 1.3 (to obtain S_1). Maps in the 2010 ASCE-7 Standard are provided for Site Class B. Adjustments for other Site Classes are made, as needed, in Section 11.4.3.

From Figure 22-1 [1]	S_S = 0.072 g
From Figure 22-2 [2]	S_1 = 0.041 g

Section 11.4.2 — Site Class

The authority having jurisdiction (not the USGS), site-specific geotechnical data, and/or the default has classified the site as Site Class D, based on the site soil properties in accordance with Chapter 20.

Table 20.3–1 Site Classification

Site Class	$\bar{v}_S$	$\bar{N}$ or $\bar{N}_{ch}$	$\bar{s}_u$
A. Hard Rock	>5,000 ft/s	N/A	N/A
B. Rock	2,500 to 5,000 ft/s	N/A	N/A
C. Very dense soil and soft rock	1,200 to 2,500 ft/s	>50	>2,000 psf
D. Stiff Soil	600 to 1,200 ft/s	15 to 50	1,000 to 2,000 psf
E. Soft clay soil	<600 ft/s	<15	<1,000 psf
	Any profile with more than 10 ft of soil having the characteristics: • Plasticity index PI > 20, • Moisture content w ≥ 40%, and • Undrained shear strength $\bar{s}_u$ < 500 psf		
F. Soils requiring site response analysis in accordance with Section 21.1	See Section 20.3.1		

For SI: 1ft/s = 0.3048 m/s 1lb/ft² = 0.0479 kN/m²

Section 11.4.3 — Site Coefficients and Risk–Targeted Maximum Considered Earthquake (MCE_R) Spectral Response Acceleration Parameters

Table 11.4–1: Site Coefficient F_a

Site Class	Mapped MCE $_R$ Spectral Response Acceleration Parameter at Short Period				
	$S_S \leq 0.25$	$S_S = 0.50$	$S_S = 0.75$	$S_S = 1.00$	$S_S \geq 1.25$
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.2	1.2	1.1	1.0	1.0
D	$\boxed{1.6}$	1.4	1.2	1.1	1.0
E	2.5	1.7	1.2	0.9	0.9
F	See Section 11.4.7 of ASCE 7				

Note: Use straight–line interpolation for intermediate values of S_S

For Site Class = D and S_S = 0.072 g, F_a = 1.600

Table 11.4–2: Site Coefficient F_v

Site Class	Mapped MCE $_R$ Spectral Response Acceleration Parameter at 1–s Period				
	$S_1 \leq 0.10$	$S_1 = 0.20$	$S_1 = 0.30$	$S_1 = 0.40$	$S_1 \geq 0.50$
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.7	1.6	1.5	1.4	1.3
D	$\boxed{2.4}$	2.0	1.8	1.6	1.5
E	3.5	3.2	2.8	2.4	2.4
F	See Section 11.4.7 of ASCE 7				

Note: Use straight–line interpolation for intermediate values of S_1

For Site Class = D and S_1 = 0.041 g, F_v = 2.400

Equation (11.4-1):	$S_{MS} = F_aS_S = 1.600 \times 0.072 = 0.116$ g
Equation (11.4-2):	$S_{M1} = F_vS_1 = 2.400 \times 0.041 = 0.099$ g

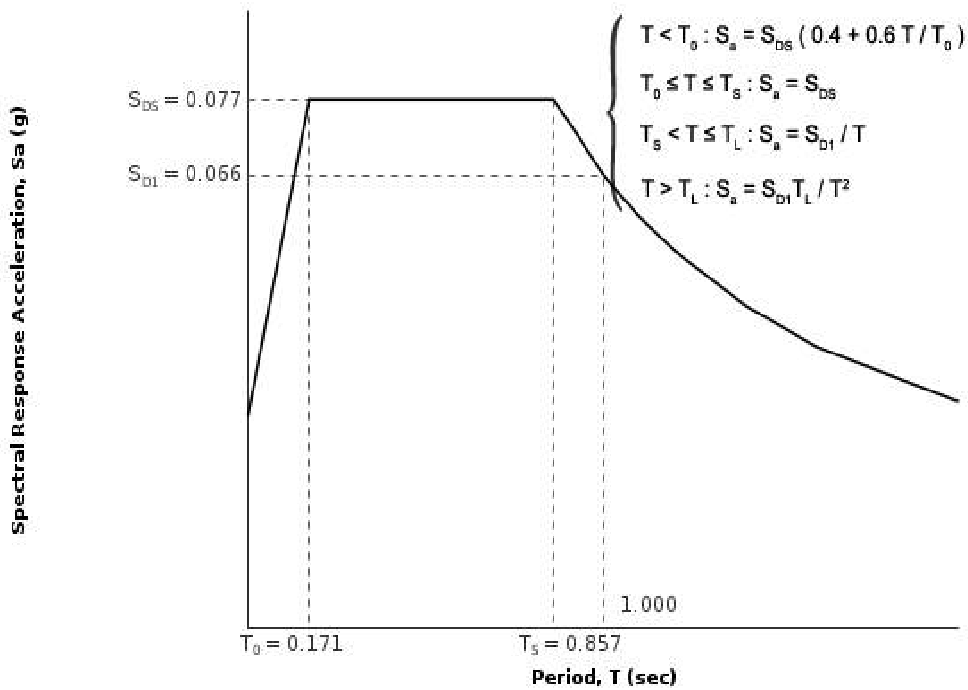
Section 11.4.4 — Design Spectral Acceleration Parameters

Equation (11.4-3):	$S_{DS} = ⅔ S_{MS} = ⅔ \times 0.116 = 0.077$ g
Equation (11.4-4):	$S_{D1} = ⅔ S_{M1} = ⅔ \times 0.099 = 0.066$ g

Section 11.4.5 — Design Response Spectrum

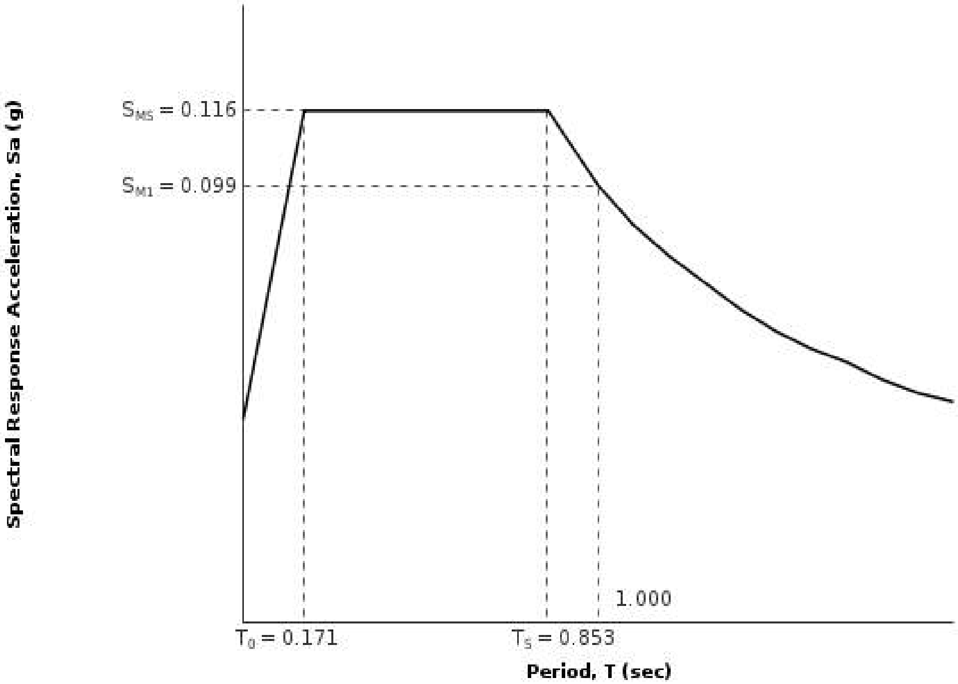
From Figure 22-12 [3]	T_L = 12 seconds

Figure 11.4-1: Design Response Spectrum



Section 11.4.6 — Risk-Targeted Maximum Considered Earthquake (MCE_R) Response Spectrum

The MCE_R Response Spectrum is determined by multiplying the design response spectrum above by 1.5.



Section 11.8.3 — Additional Geotechnical Investigation Report Requirements for Seismic Design Categories D through F

From Figure 22-7 [4]	PGA = 0.034
Equation (11.8–1):	$PGA_M = F_{PGA}PGA = 1.600 \times 0.034 = 0.055$ g

Table 11.8–1: Site Coefficient F_{PGA}

Site Class	Mapped MCE Geometric Mean Peak Ground Acceleration, PGA				
	PGA ≤ 0.10	PGA = 0.20	PGA = 0.30	PGA = 0.40	PGA ≥ 0.50
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.2	1.2	1.1	1.0	1.0
D	$\boxed{1.6}$	1.4	1.2	1.1	1.0
E	2.5	1.7	1.2	0.9	0.9
F	See Section 11.4.7 of ASCE 7				

Note: Use straight–line interpolation for intermediate values of PGA

For Site Class = D and PGA = 0.034 g, F_{PGA} = 1.600

Section 21.2.1.1 — Method 1 (from Chapter 21 – Site-Specific Ground Motion Procedures for Seismic Design)

From Figure 22-17 [5]	C_{RS} = 0.905
From Figure 22-18 [6]	C_{R1} = 0.868

Section 11.6 — Seismic Design Category

Table 11.6-1 Seismic Design Category Based on Short Period Response Acceleration Parameter

VALUE OF S_{DS}	RISK CATEGORY		
	I or II	III	IV
S_{DS} < 0.167g	A	A	A
0.167g ≤ S_{DS} < 0.33g	B	B	C
0.33g ≤ S_{DS} < 0.50g	C	C	D
0.50g ≤ S_{DS}	D	D	D

For Risk Category = I and S_{DS} = 0.077 g, Seismic Design Category = A

Table 11.6-2 Seismic Design Category Based on 1-S Period Response Acceleration Parameter

VALUE OF S_{D1}	RISK CATEGORY		
	I or II	III	IV
S_{D1} < 0.067g	A	A	A
0.067g ≤ S_{D1} < 0.133g	B	B	C
0.133g ≤ S_{D1} < 0.20g	C	C	D
0.20g ≤ S_{D1}	D	D	D

For Risk Category = I and S_{D1} = 0.066 g, Seismic Design Category = A

Note: When S_1 is greater than or equal to 0.75g, the Seismic Design Category is E for buildings in Risk Categories I, II, and III, and F for those in Risk Category IV, irrespective of the above.

Seismic Design Category ≡ "the more severe design category in accordance with Table 11.6-1 or 11.6-2" = A

Note: See Section 11.6 for alternative approaches to calculating Seismic Design Category.

References

1. Figure 22-1: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-1.pdf
2. Figure 22-2: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-2.pdf
3. Figure 22-12: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-12.pdf
4. Figure 22-7: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-7.pdf
5. Figure 22-17: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-17.pdf
6. Figure 22-18: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-18.pdf

Simplified Seed and Idriss Liquefaction Analysis
SPT Based Analysis
Lansing Generating Station
Interstate Electric Power - Columbia Energy Center
Equations from "Soil Liquefaction During Earthqakes" Idriss & Boulanger
SPT values at Boring MW-304 & 112 (sand starting at top elevation 782)

Input Parameters:

Peak Ground Acceleration (g) =	0.055
Earthquake Magnitude, M =	7.7
Water Table Depth (ft) =	16
Average Soil Density above water table (lb/ft^3) =	115.0
Average Soil Density below water table (lb/ft^3) =	120.0
Borehole Diameter (mm) =	100

Rod Lengths assumed equal to depth plus 5.0 feet (for the above ground extension)

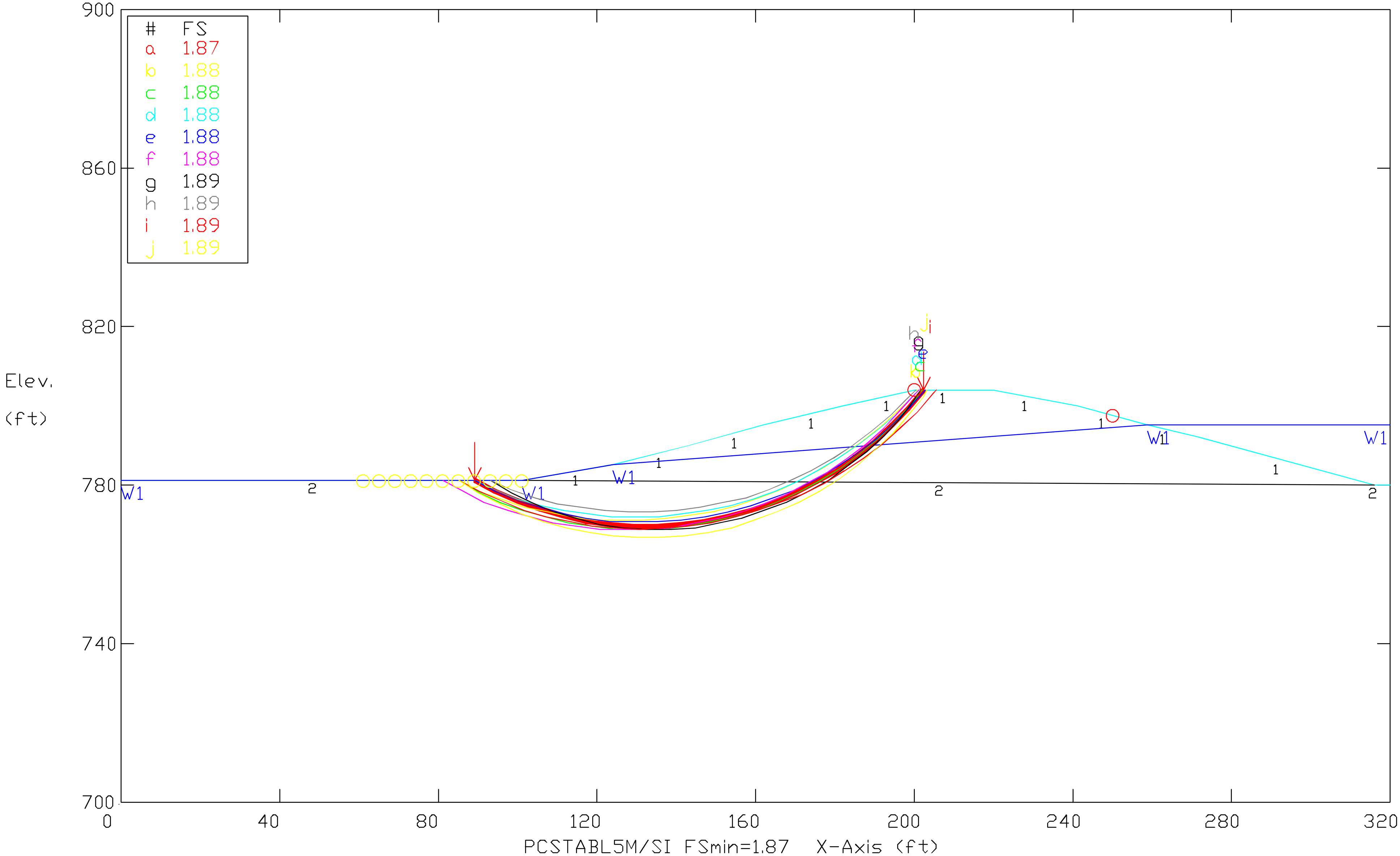
SPT #	Depth (ft)	Measured N	Soil Type (USCS)	Flag "Clay" "Unsaturated"	Fines Content (%)	Energy Ratio, ER (%)	C_e	C_b	C_r	N_{60}	σ_{vc} (lb/ft^2)	σ_{vc}' (lb/ft^2)	C_n	$(N_1)_{60}$	ΔN for fines content	$(N_1)_{60\text{-}cs}$	Stress Reduction Coeff, r_d	CSR	MSF for sand	k_σ for sand	CRR 7.5M & 1 atm	CRR	Factor of Safety
1	2	18	SP	Unsaturated	5	75%	1.25	1	0.75	16.9	230	230	1.70	28.7	0.0	28.7	1.00	0.036	0.95	1.10	0.414	n.a.	n.a.
2	4.5	48	SP	Unsaturated	5	75%	1.25	1	0.75	45.0	518	518	1.70	76.5	0.0	76.5	1.00	0.036	0.95	1.10	2.000	n.a.	n.a.
3	7	40	SP	Unsaturated	5	75%	1.25	1	0.8	40.0	805	805	1.62	64.9	0.0	64.9	0.99	0.035	0.95	1.10	2.000	n.a.	n.a.
4	9.5	30	SP	Unsaturated	5	75%	1.25	1	0.85	31.9	1093	1093	1.39	44.4	0.0	44.4	0.99	0.035	0.95	1.10	2.000	n.a.	n.a.
5	12	61	SP	Unsaturated	5	75%	1.25	1	0.85	64.8	1380	1380	1.24	80.3	0.0	80.3	0.98	0.035	0.95	1.10	2.000	n.a.	n.a.
6	14.5	17	SP	Unsaturated	5	75%	1.25	1	0.85	18.1	1668	1668	1.13	20.4	0.0	20.4	0.97	0.035	0.95	1.03	0.210	n.a.	n.a.
7	17	6	SP		5	75%	1.25	1	0.95	7.1	1960	1898	1.06	7.5	0.0	7.5	0.96	0.036	0.95	1.01	0.102	0.097	2.00
8	19.5	6	SP		5	75%	1.25	1	0.95	7.1	2260	2042	1.02	7.3	0.0	7.3	0.96	0.038	0.95	1.00	0.100	0.095	2.00
9	22	6	SP		5	75%	1.25	1	0.95	7.1	2560	2186	0.98	7.0	0.0	7.0	0.95	0.040	0.95	1.00	0.098	0.093	2.00
10	25	20	SP		5	75%	1.25	1	0.95	23.8	2920	2358	0.95	22.5	0.0	22.5	0.94	0.042	0.95	0.98	0.241	0.225	2.00
11	30	47	SP		5	75%	1.25	1	1	58.8	3520	2646	0.89	52.5	0.0	52.5	0.92	0.044	0.95	0.93	2.000	1.772	2.00

APPENDIX D – Slope Stability Analysis

Alliant Energy
Wisconsin Power and Light Company
Columbia Energy Center
Pardeeville, Wisconsin

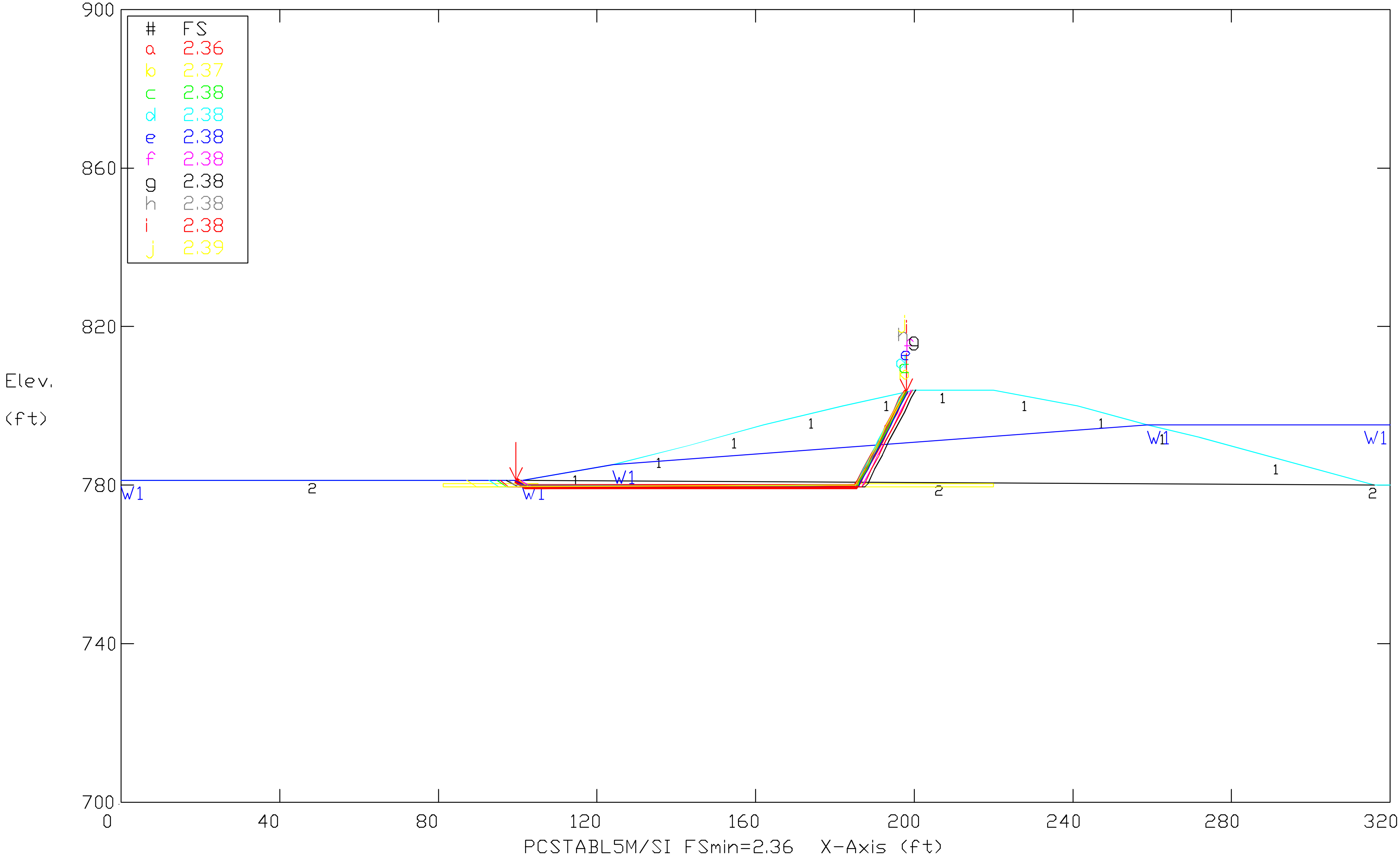
Safety Factor Assessment

COL Primary Impoundment Outer Dike Static Case & Normal Water Levels
Ten Most Critical. E:COL31C.PLT 07-29-16 11:06am



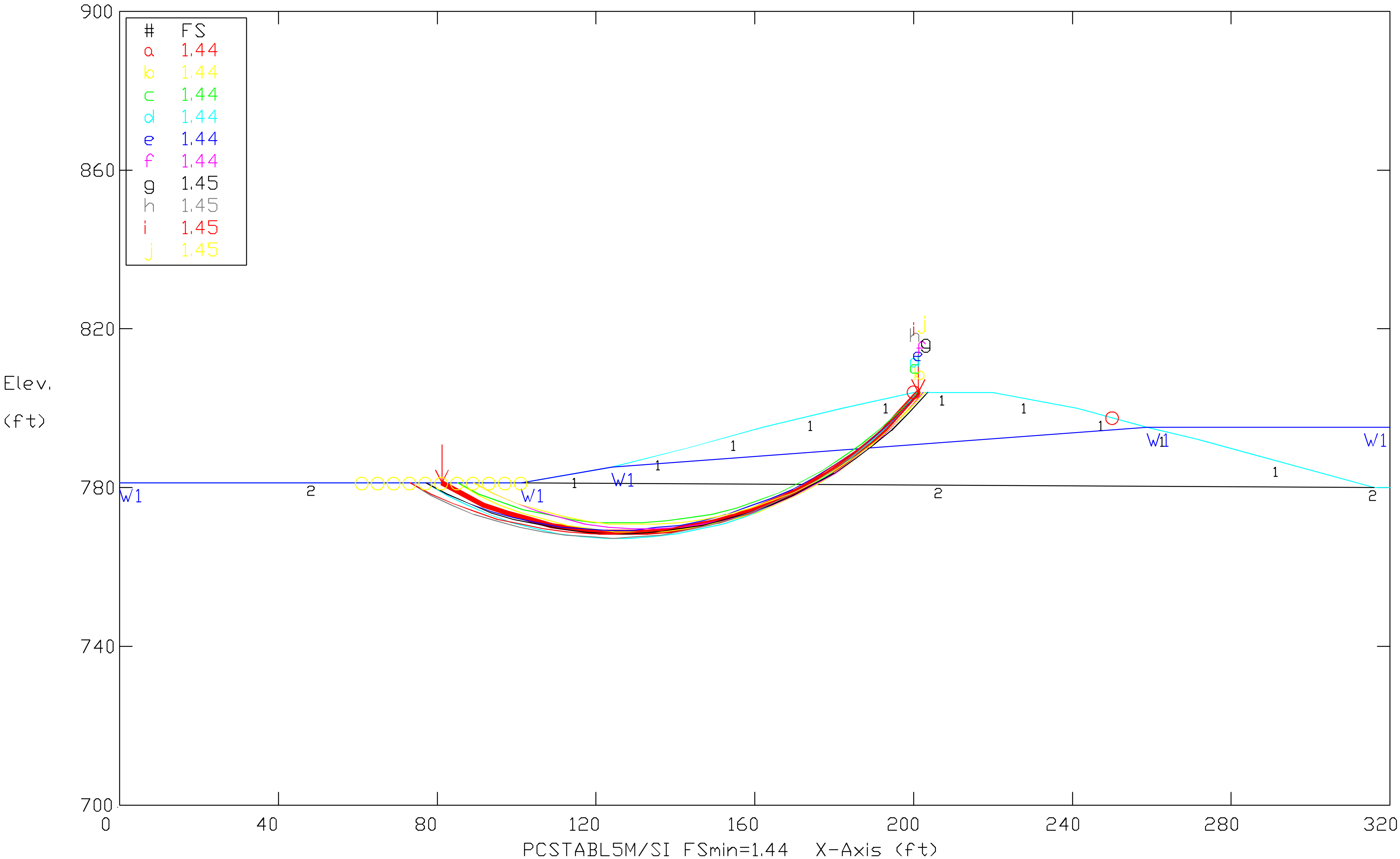
Soil Type No. Label	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1 Sand	120	120	0	35	0	0	W1
2 Sand	110	110	0	30	0	0	W1

COL Primary Impoundment Outer Dike Static Case & Normal Water Levels
Ten Most Critical. E:COL31B.PLT 07-29-16 11:04am



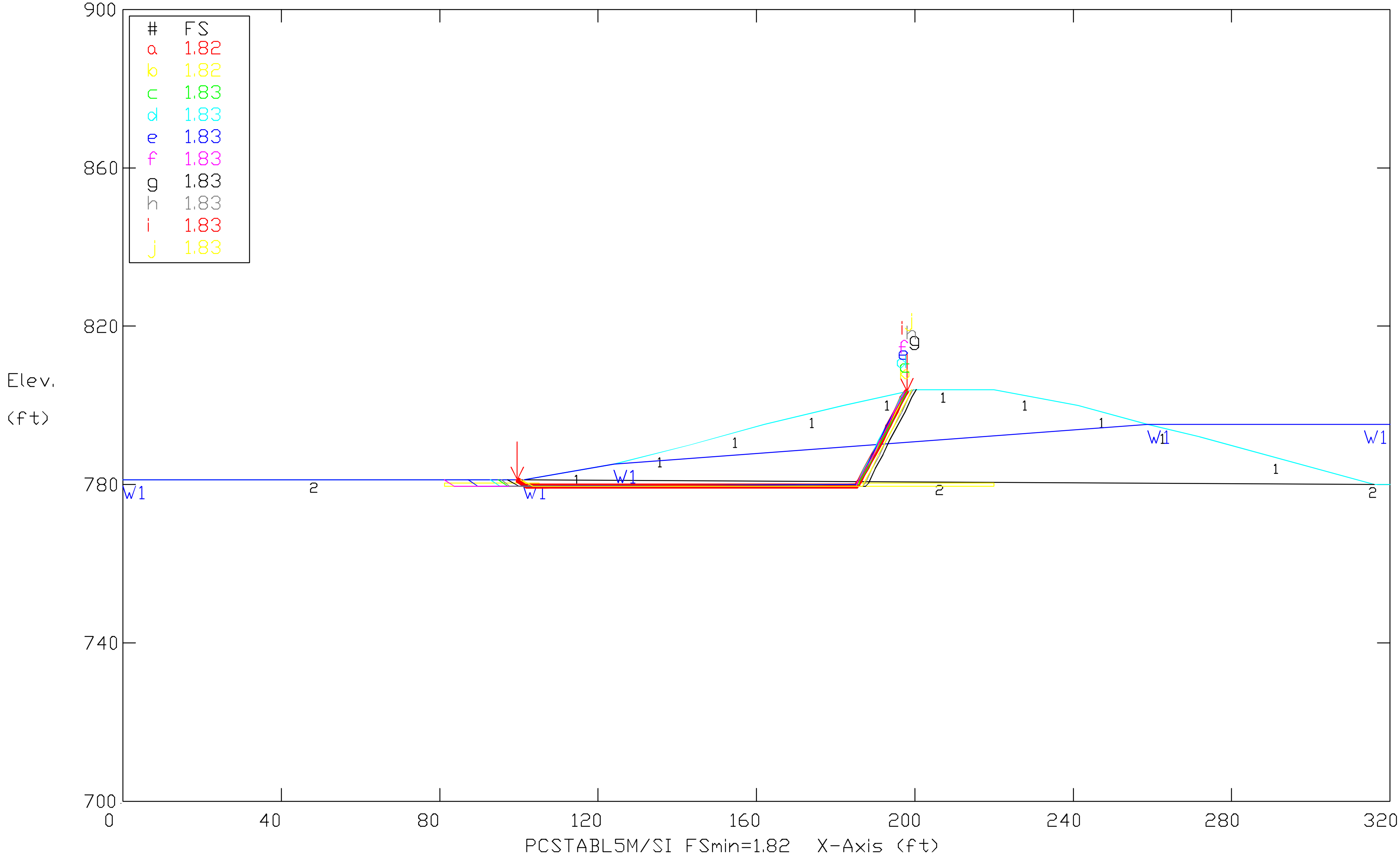
Soil Type No. Label	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1 Sand	120	120	0	35	0	0	W1
2 Sand	110	110	0	30	0	0	W1

COL Primary Impoundment Outer Dike Earthquake Case & Normal Water Levels
Ten Most Critical. E:COL31CEQ.PLT 07-29-16 11:07am



Soil Type No.	Label	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	Sand	120	120	0	35	0	0	W1
2	Sand	110	110	0	30	0	0	W1

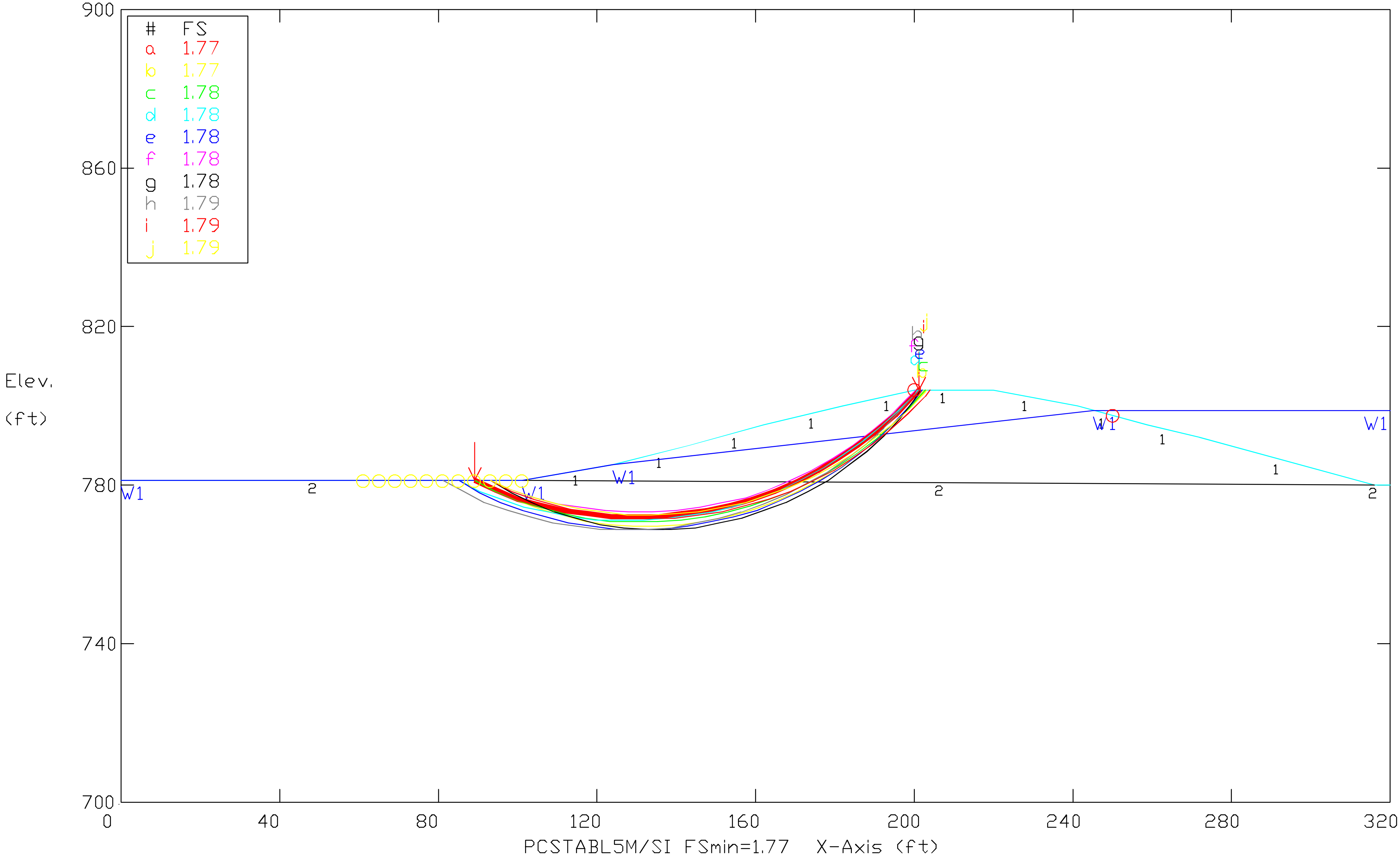
COL Primary Impoundment Outer Dike Earthquake Case & Normal Water Levels
Ten Most Critical. E:COL31BEQ.PLT 07-29-16 11:05am



Soil Type No. Label	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1 Sand	120	120	0	35	0	0	W1
2 Sand	110	110	0	30	0	0	W1

10/20/2020 - Classification: Internal - ECRM7775248

COL Primary Impoundment Outer Dike Static Case & 100-Year Water Levels
Ten Most Critical. E:COL32C.PLT 07-29-16 11:09am



Soil Type No.	Label	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	Sand	120	120	0	35	0	0	W1
2	Sand	110	110	0	30	0	0	W1

COL Primary Impoundment Outer Dike Static Case & 100-Year Water Levels
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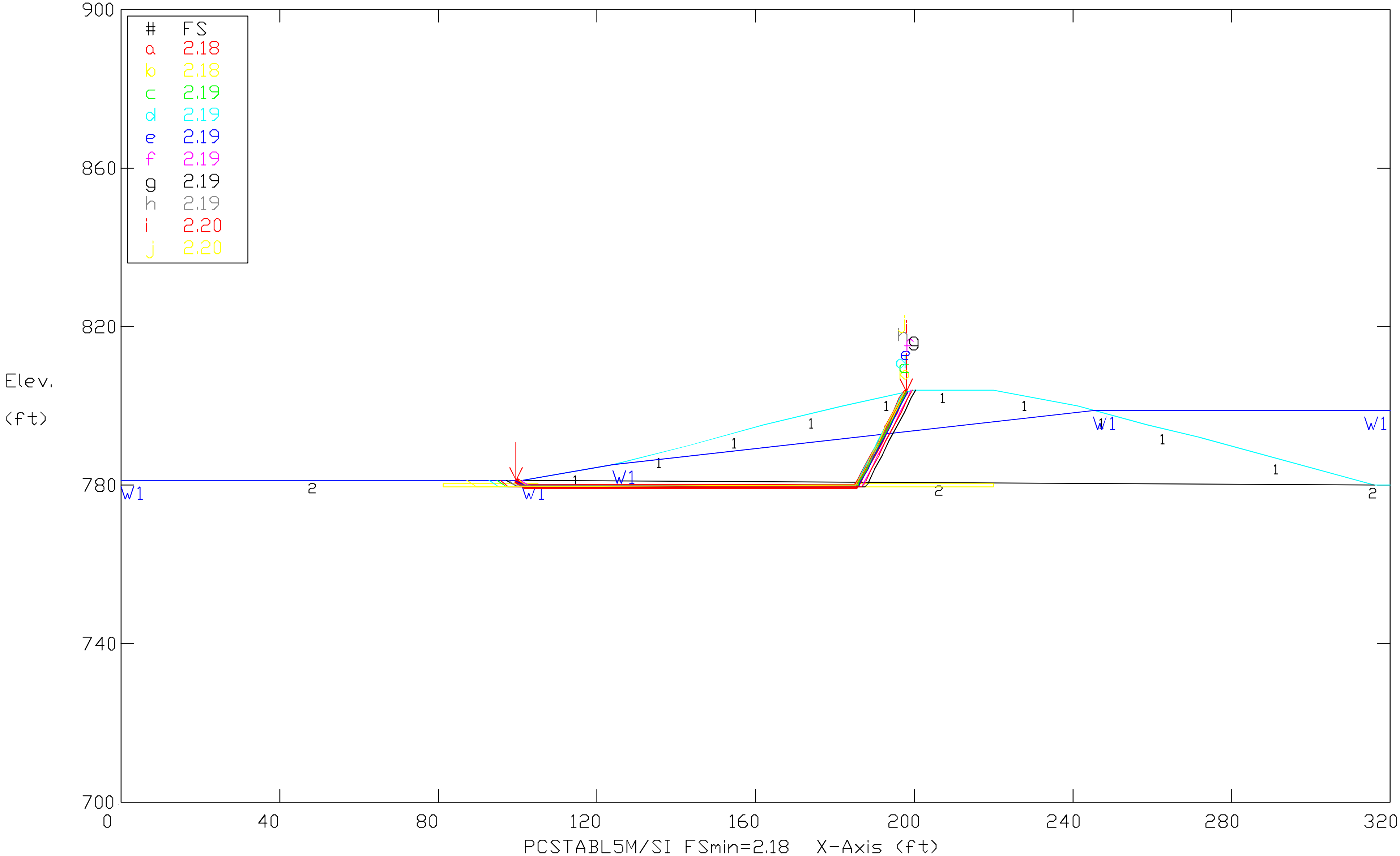
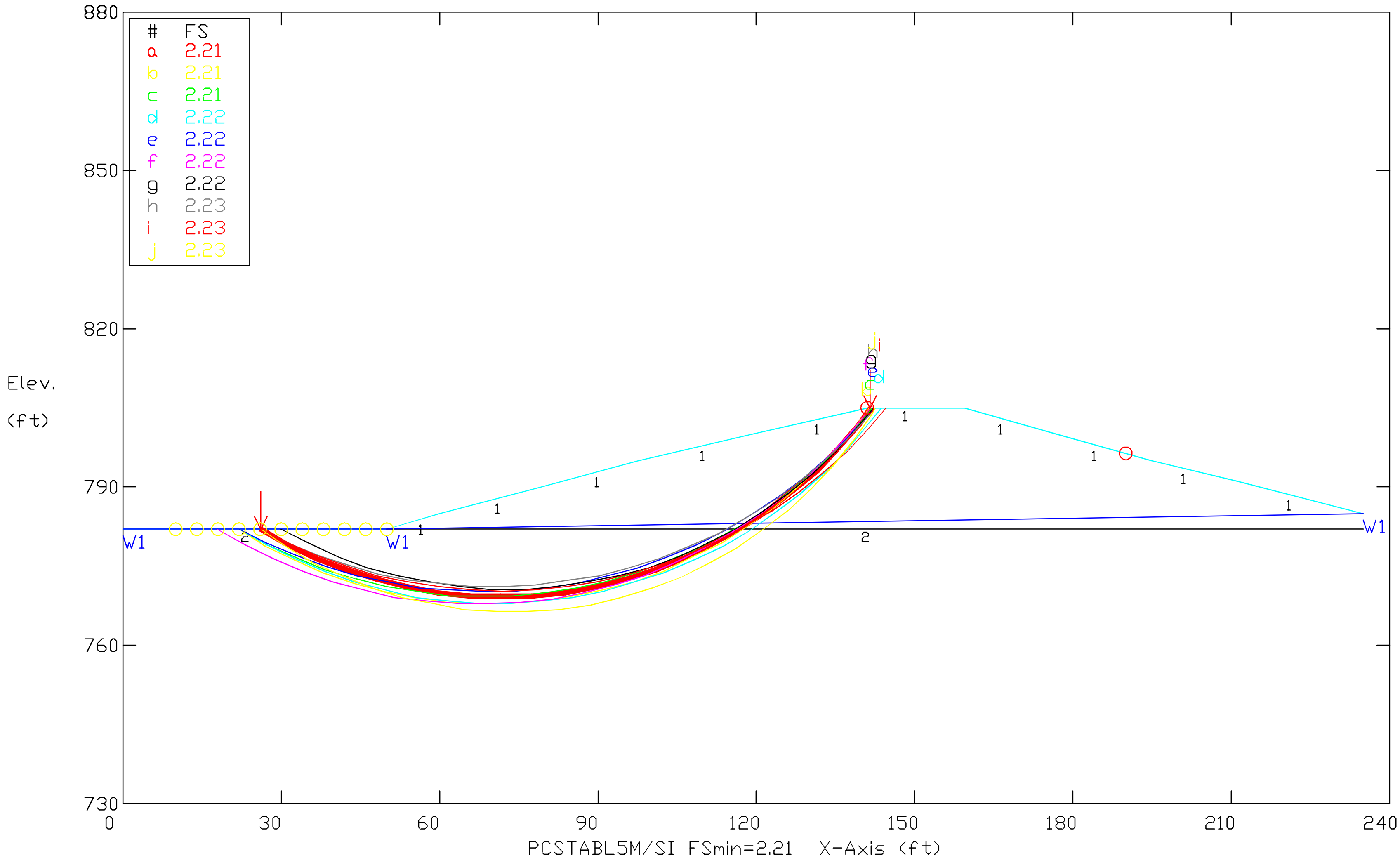


Soil Type No. Label	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1 Sand	120	120	0	35	0	0	W1
2 Sand	110	110	0	30	0	0	W1

COL Secondary Impoundment Outer Dike Static Case & Normal Water Levels
Ten Most Critical. E:COL41C.PLT 07-29-16 9:47am



Soil Type No. Label	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1 Sand	120	120	0	35	0	0	W1
2 Sand	110	110	0	30	0	0	W1

COL Secondary Impoundment Outer Dike Static Case & Normal Water Levels
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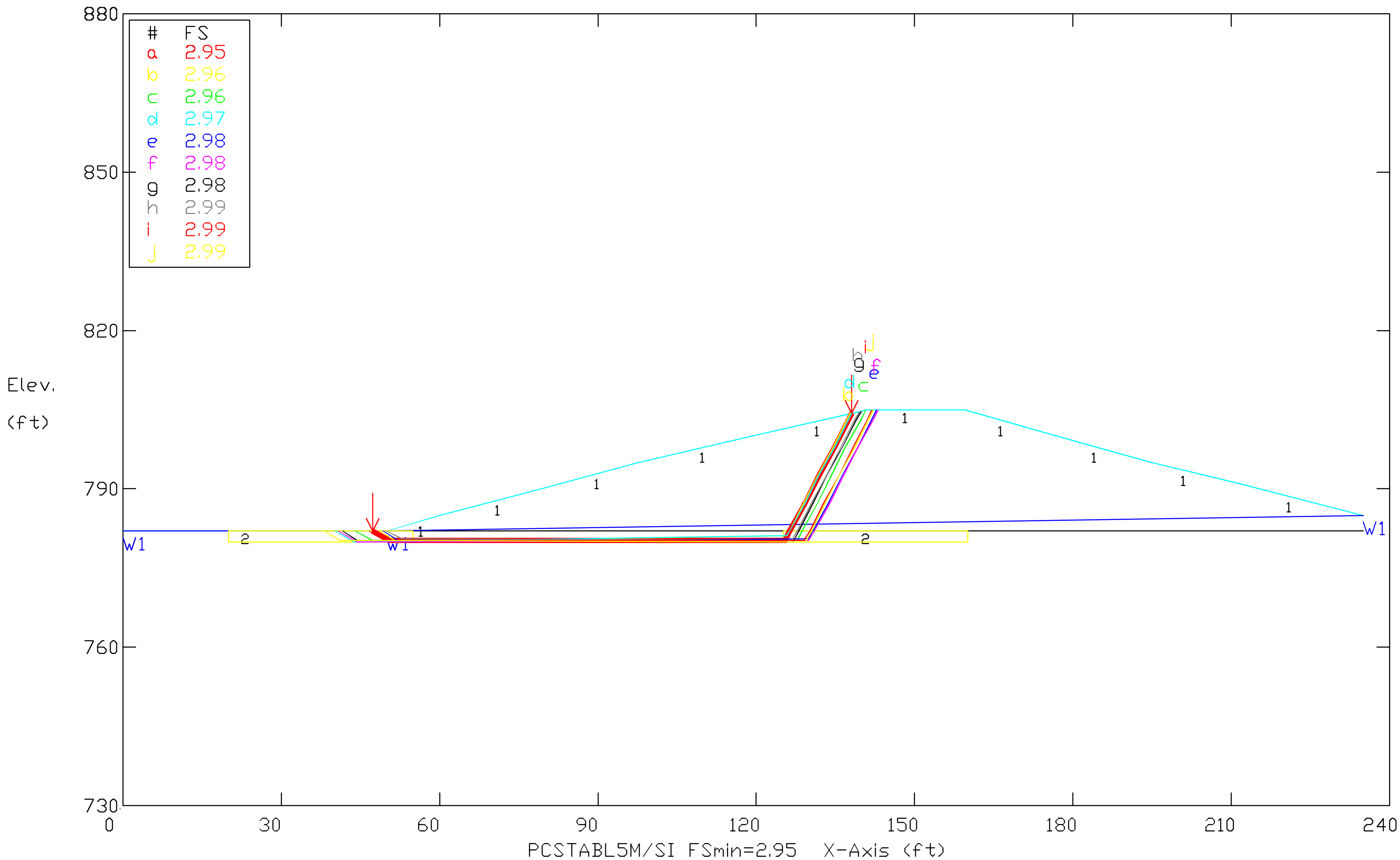
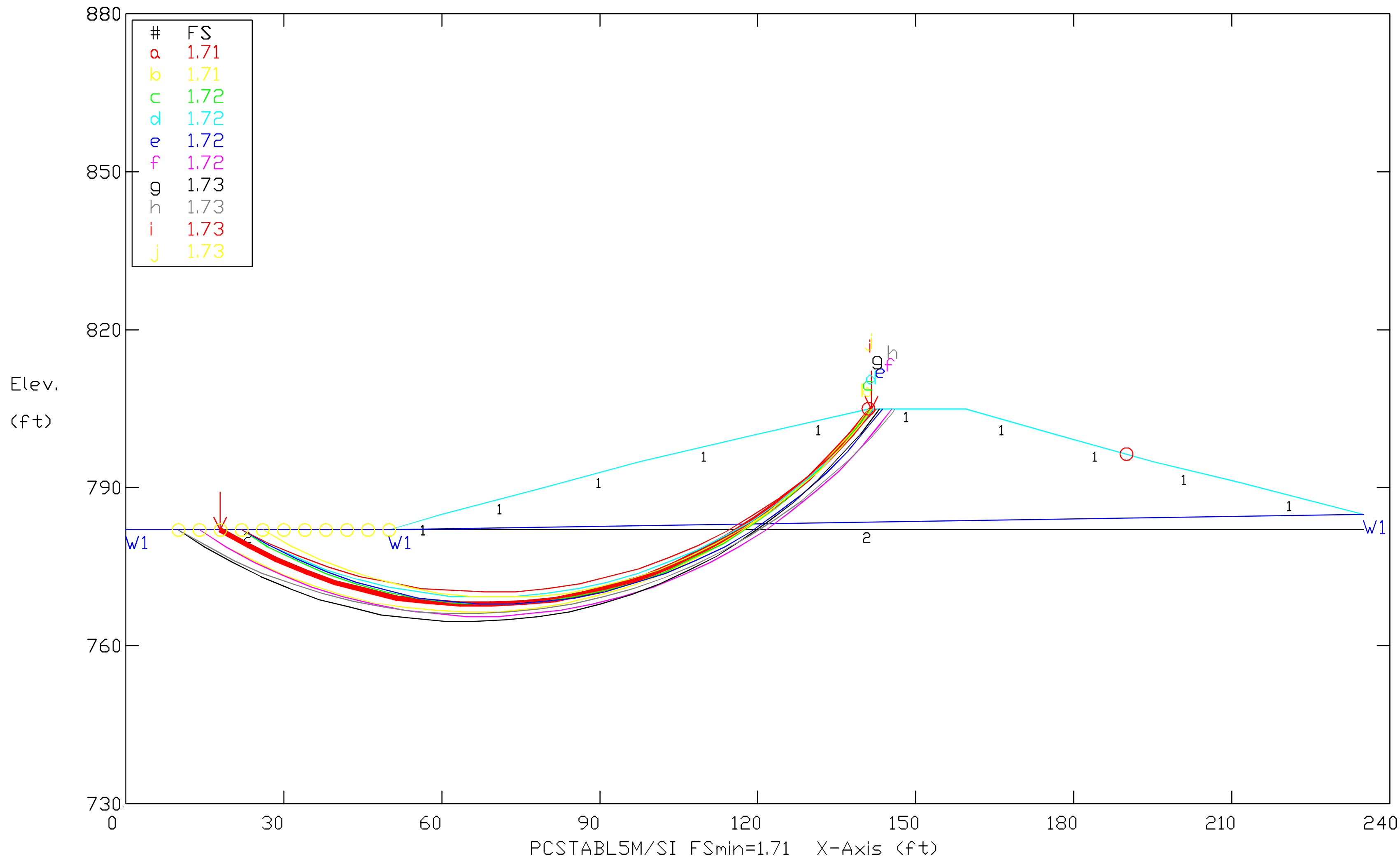


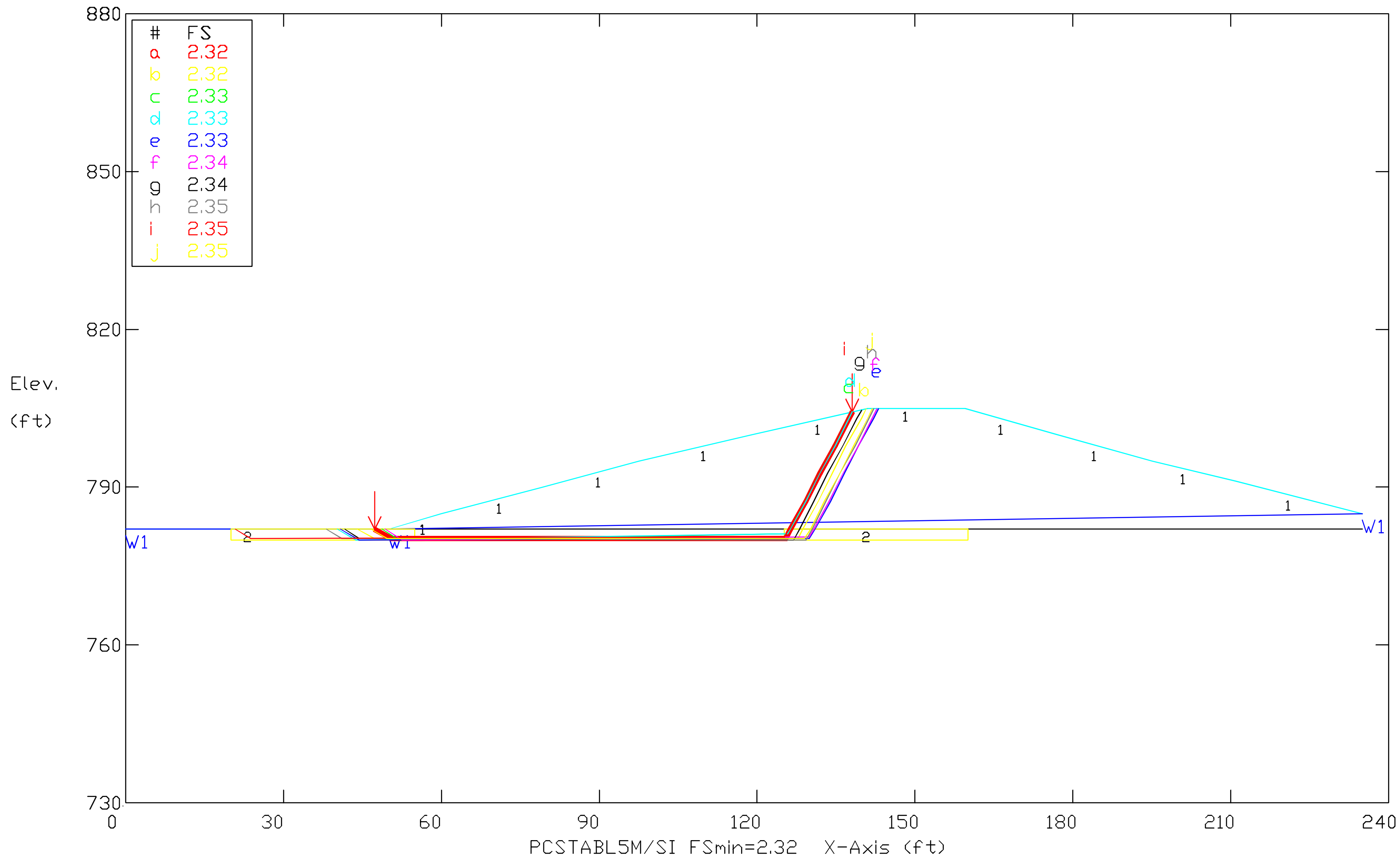
Soil Type No.	Label	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	Sand	120	120	0	35	0	0	W1
2	Sand	110	110	0	30	0	0	W1

COL Secondary Impoundment Outer Dike Earthquake Case & Normal Water Levels
Ten Most Critical. E:COL41CEQ.PLT   07-29-16   9:48am



Soil Type No. Label	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1 Sand	120	120	0	35	0	0	W1
2 Sand	110	110	0	30	0	0	W1

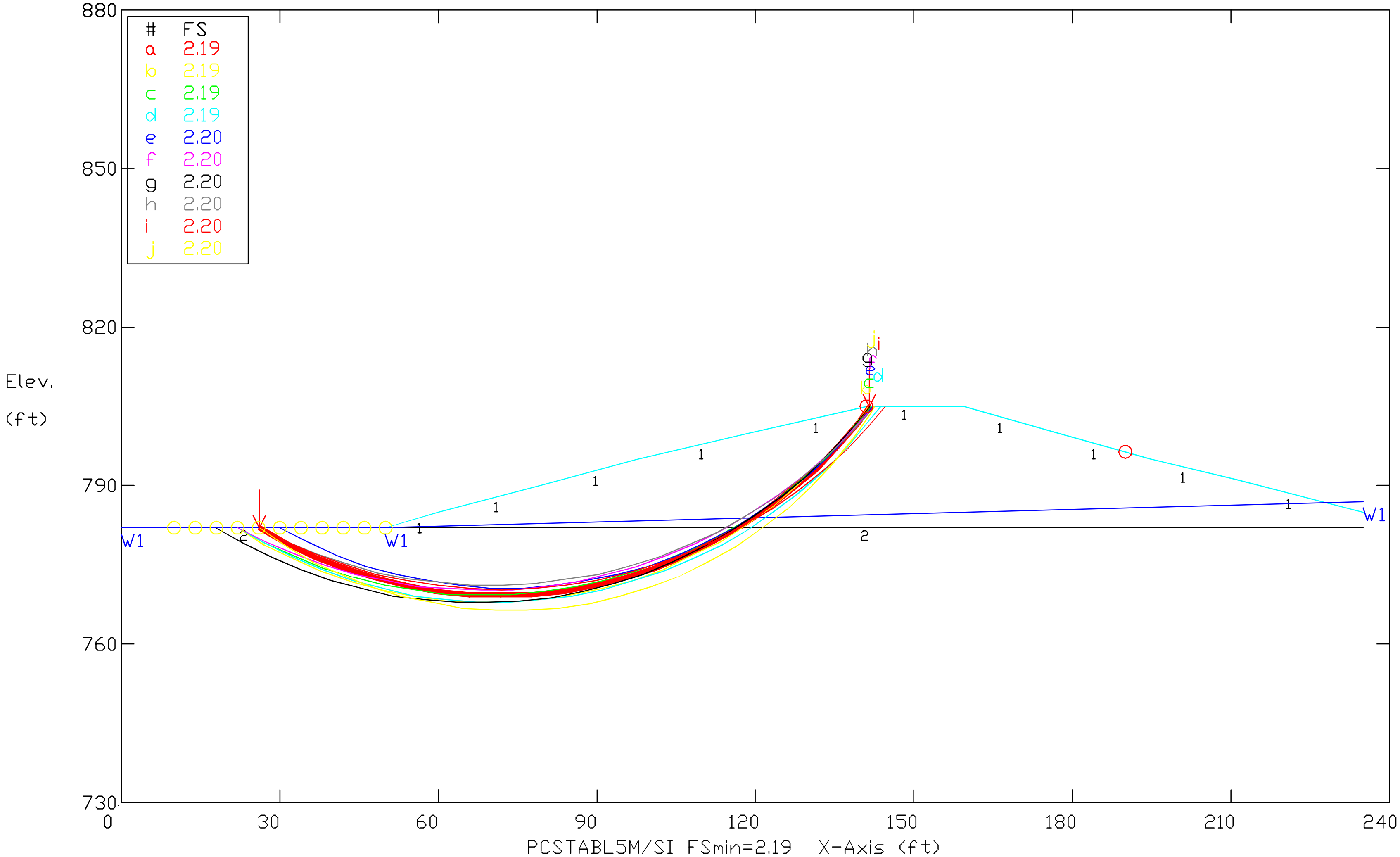
COL Secondary Impoundment Outer Dike Earthquake Case & Normal Water Levels
Ten Most Critical. E:COL41BEQ.PLT 07-29-16 9:46am



Soil Type No. Label	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1 Sand	120	120	0	35	0	0	W1
2 Sand	110	110	0	30	0	0	W1

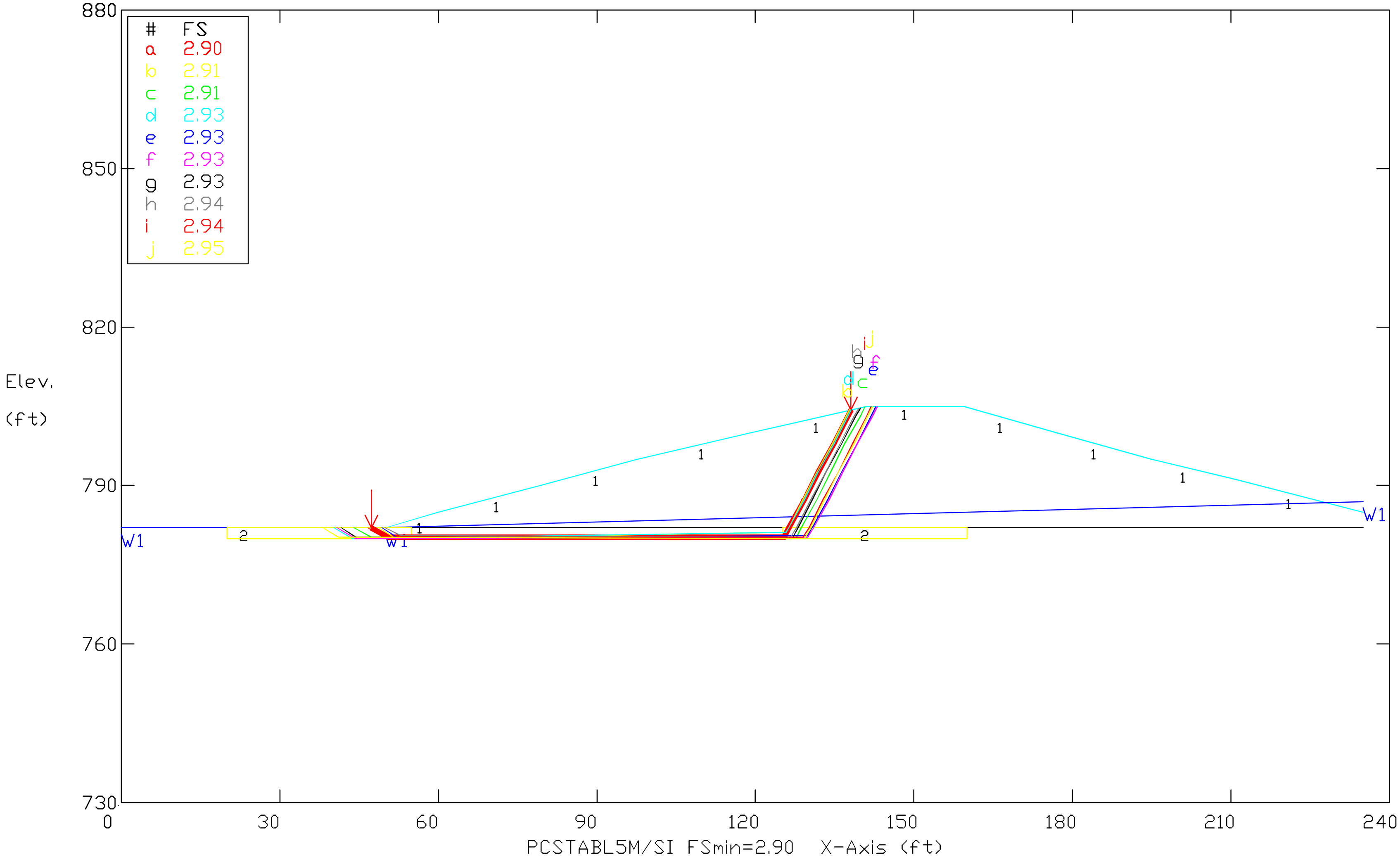
COL Secondary Impoundment Outer Dike Static Case & 100-Year Water Levels

Ten Most Critical. E:COL42C.PLT 07-29-16 10:00am



Soil Type No. Label	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1 Sand	120	120	0	35	0	0	W1
2 Sand	110	110	0	30	0	0	W1

COL Secondary Impoundment Outer Dike Static Case & 100-Year Water Levels
Ten Most Critical. E:COL42B.PLT 07-29-16 9:58am



Soil Type No. Label	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1 Sand	120	120	0	35	0	0	W1
2 Sand	110	110	0	30	0	0	W1

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