2019 Annual Groundwater Monitoring and Corrective Action Report

Edgewater Generating Station
Sheboygan, Wisconsin

Prepared for:

Alliant Energy

SCS ENGINEERS

25219068.00 | January 31, 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) 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 at the Edgewater Generating Station is a multiunit system. The Edgewater Generation Station has four existing CCR units which are contiguous:

- EDG Slag Pond (existing CCR surface impoundment)
- EDG North A-Pond (existing CCR surface impoundment)
- EDG South A-Pond (existing CCR surface impoundment)
- EDG B-Pond (existing surface CCR impoundment)

The system is designed to detect monitored constituents at the waste boundary of the CCR units as required by 40 CFR 257.91(d). The groundwater monitoring system consists of one upgradient and three 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 of the site location is provided as **Figure 1**. A map with an aerial image showing the CCR units and all background (or upgradient) and downgradient monitoring wells with identification numbers for the groundwater monitoring program is provided as **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 units 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 samples were collected from each CCR monitoring well in 2019, as part of the semiannual groundwater sampling for the detection monitoring program at Edgewater Generating Station (Table 1). The date of sample collection, field measurements, and the analytical results of the analytical laboratory analyses are provided in Appendix A.

Assessment monitoring has not been initiated for the CCR units at the Edgewater Generating Station.

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 in 2019. The Edgewater Generating Station CCR units 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, fluoride, field pH, and sulfate were identified; however, alternative source demonstrations (ASDs) were completed, demonstrating that a source other than the CCR units was 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 is currently in detection monitoring.

Summary of Key Actions Completed (2019):

- 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 alternative source demonstration (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

Edgewater Generating Station /
SCS Engineers Project #25219068.00

Sample Dates	Downgradient Wells			Background Well
	MW-301	MW-302	MW-303	2R-OW
4/8/2019	D	D	D	D
10/7/2019	D	D	D	D
Total Samples	2	2	2	2

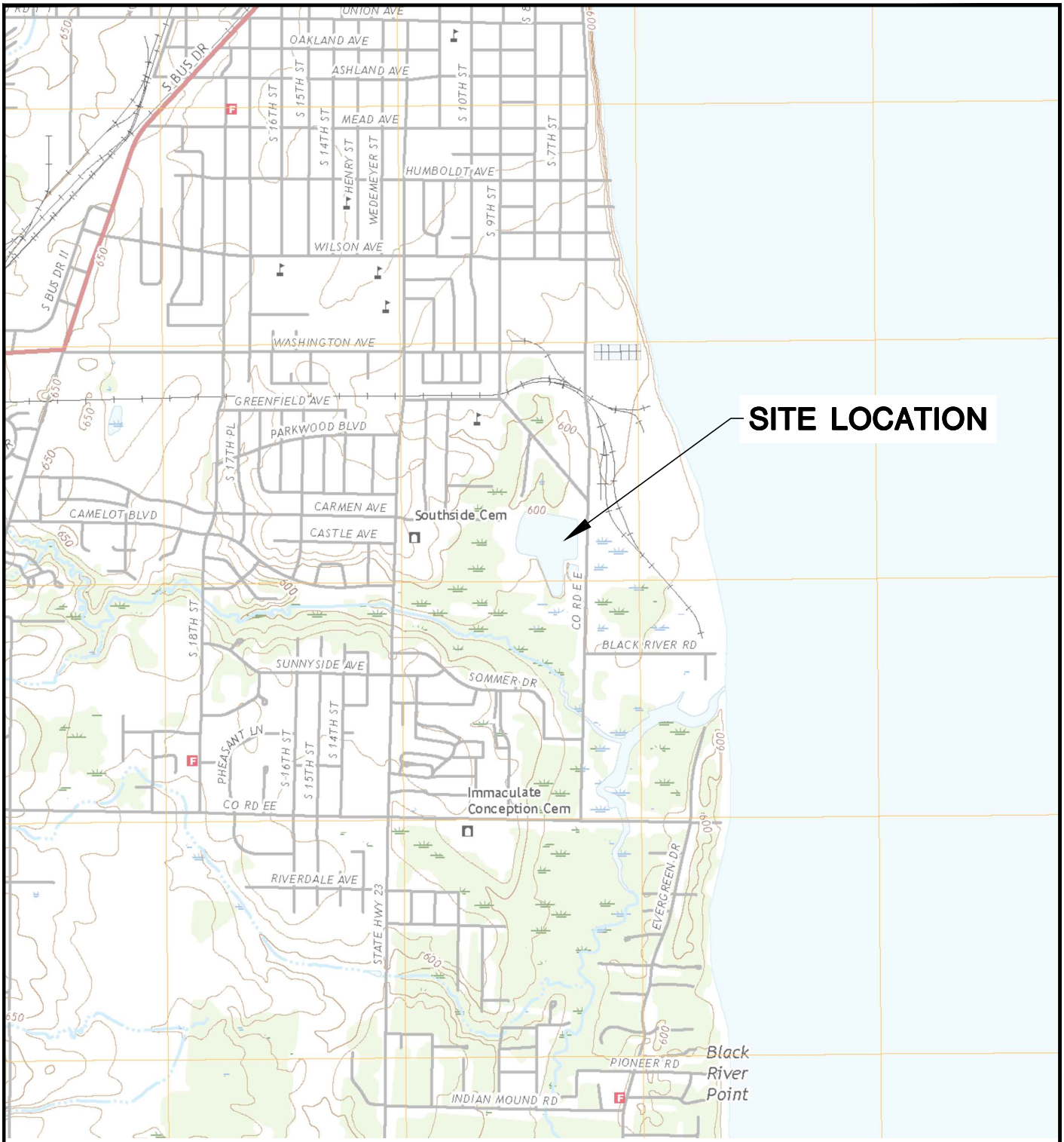
Abbreviations:
D = Required by Detection Monitoring Program

Created by:	NDK	Date:	1/4/2018
Last revision by:	LWJ	Date:	11/19/2019
Checked by:	NDK	Date:	12/24/2019

I:\25219068.00\Deliverables\2019 Annual Report - CCR\Table\[Table 1. GW Sampling Summary Table -EDG 2019.xlsx]GW Summary

Figures

1 Site Location Map
2 Site Plan and Monitoring Well Locations



N

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

CLIENT	WISCONSIN POWER AND LIGHT EDGEWATER GENERATING STATION 3739 LAKESHORE DRIVE SHEBOYGAN, WI 53081	SITE	ALLIANT ENERGY EDGEWATER GENERATING STATION SHEBOYGAN, WI

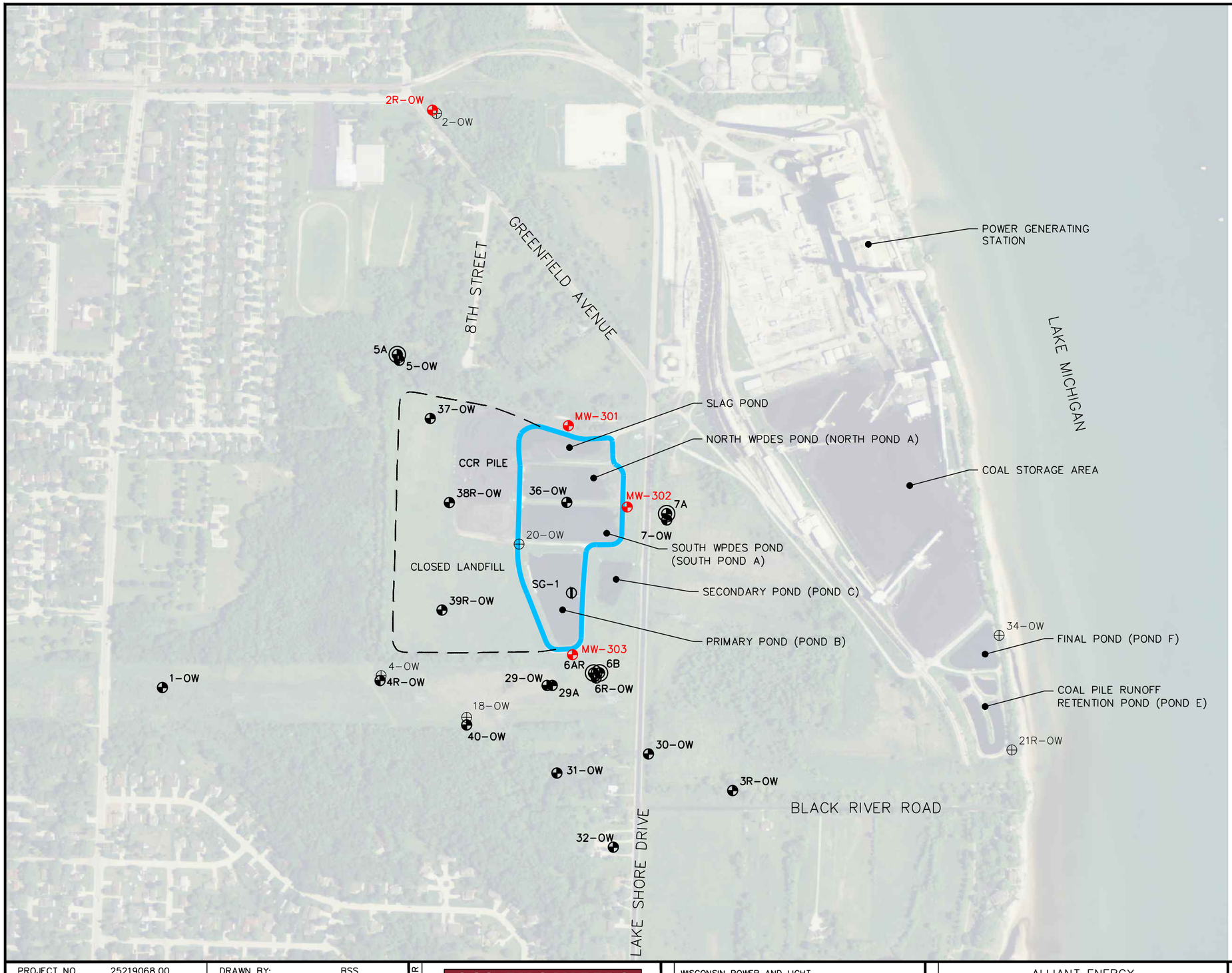
SITE LOCATION MAP

PROJECT NO.	25219068.00	DRAWN BY:	BSS
DRAWN:	11/20/19	CHECKED BY:	MDB
REVISED:	11/20/19	APPROVED BY:	TK 01/30/2020

ENGINEER

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

FIGURE
1



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LEGEND

- CCR RULE MONITORING WELL
- ADDITIONAL MONITORING WELL
- ADDITIONAL PIEZOMETER
- ABANDONED MONITORING WELL
- CCR UNITS
- CLOSED LANDFILL LIMITS

NOTES:

1. AERIAL PHOTOGRAPH FROM THE NATIONAL AGRICULTURE IMAGERY PROGRAM AND PUBLISHED BY THE USDA FSA AERIAL PHOTOGRAPHY FIELD OFFICE. DATE OF IMAGE IS OCTOBER 1, 2013.
2. WELL LOCATIONS ARE APPROXIMATE AND ARE BASED ON OCTOBER 2011 WATER TABLE MAP PREPARED BY TRC.
3. CCR UNIT LIMITS AND CLOSED LANDFILL LOCATION ARE APPROXIMATE.
4. MONITORING WELLS MW-301, MW-302, AND MW-303 WERE INSTALLED BY BADGER STATE DRILLING BETWEEN JANUARY 14 AND FEBRUARY 4, 2016.

500 0 500

SCALE: 1" = 500'

PROJECT NO.	25219068.00	DRAWN BY:	BSS
DRAWN:	11/20/2019	CHECKED BY:	MDB
REVISED:	01/09/2020	APPROVED BY:	TK 01/30/2020

ENGINEER

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

CLIENT

WISCONSIN POWER AND LIGHT
EDGEWATER GENERATING STATION
3739 LAKESHORE DRIVE
SHEBOYGAN, WI 53081

SITE

ALLIANT ENERGY
EDGEWATER GENERATING STATION
SHEBOYGAN, WI

SITE PLAN AND MONITORING WELL LOCATIONS

FIGURE 2

I:\25219068.00\Drawings\CCR 2019 Annual Report\Site Plan and Monitoring Well Locations.dwg, 1/30/2020 3:44:39 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 25, 2019

Meghan Blodgett
SCS ENGINEERS
2830 Dairy Drive
Madison, WI 53718

RE: Project: 25219068.00 EDGEWATER CLOSED
Pace Project No.: 40185658

Dear Meghan Blodgett:
Enclosed are the analytical results for sample(s) received by the laboratory on April 11, 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: 25219068.00 EDGEWATER CLOSED
Pace Project No.: 40185658

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

REPORT OF LABORATORY ANALYSIS

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

SAMPLE SUMMARY

Project: 25219068.00 EDGEWATER CLOSED
Pace Project No.: 40185658

Lab ID	Sample ID	Matrix	Date Collected	Date Received
40185658001	**MW-301**	Water	04/08/19 10:50	04/11/19 10:00
40185658002	**MW-302**	Water	04/08/19 12:30	04/11/19 10:00
40185658003	**MW-303**	Water	04/08/19 11:40	04/11/19 10:00
40185658004	**2R-OW**	Water	04/08/19 13:55	04/11/19 10:00
40185658005	**FIELD BLANK**	Water	04/08/19 14:00	04/11/19 10:00

Pace Analytical Services, LLC
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Green Bay, WI 54302
(920)469-2436

SAMPLE ANALYTE COUNT

Project: 25219068.00 EDGEWATER CLOSED
Pace Project No.: 40185658

Lab ID	Sample ID	Method	Analysts	Analytes Reported
40185658001	**MW-301**	EPA 6020	DS1, KXS	2
			RMW	7
		SM 2540C	TMK	1
		EPA 9040	ALY	1
		EPA 300.0	HMB	3
40185658002	**MW-302**	EPA 6020	DS1, KXS	2
			RMW	7
		SM 2540C	TMK	1
		EPA 9040	ALY	1
		EPA 300.0	HMB	3
40185658003	**MW-303**	EPA 6020	DS1, KXS	2
			RMW	7
		SM 2540C	TMK	1
		EPA 9040	ALY	1
		EPA 300.0	HMB	3
40185658004	**2R-OW**	EPA 6020	DS1, KXS	2
			RMW	7
		SM 2540C	TMK	1
		EPA 9040	ALY	1
		EPA 300.0	HMB	3
40185658005	**FIELD BLANK**	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: 25219068.00 EDGEWATER CLOSED
Pace Project No.: 40185658

Sample: MW-301 **Lab ID: 40185658001** Collected: 04/08/19 10:50 Received: 04/11/19 10:00 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	**7310**	ug/L	220	66.0	20	04/12/19 08:15	04/17/19 20:02	7440-42-8	
Calcium	**77500**	ug/L	250	69.8	1	04/12/19 08:15	04/16/19 21:27	7440-70-2	
Field Data	Analytical Method:								
Field pH	**8.18**	Std. Units			1		04/08/19 10:50		
Field Specific Conductance	**1022**	umhos/cm			1		04/08/19 10:50		
Oxygen, Dissolved	**6.2**	mg/L			1		04/08/19 10:50	7782-44-7	
REDOX	**55**	mV			1		04/08/19 10:50		
Turbidity	**32.91**	NTU			1		04/08/19 10:50		
Static Water Level	**598.92**	feet			1		04/08/19 10:50		
Temperature, Water (C)	**9.0**	deg C			1		04/08/19 10:50		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**724**	mg/L	20.0	8.7	1		04/15/19 11:55		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**7.9**	Std. Units	0.10	0.010	1		04/16/19 11:33		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**11.4**	mg/L	2.0	0.50	1		04/20/19 00:35	16887-00-6	
Fluoride	**0.29J**	mg/L	0.30	0.10	1		04/20/19 00:35	16984-48-8	
Sulfate	**322**	mg/L	60.0	20.0	20		04/22/19 12:23	14808-79-8	

Sample: MW-302 **Lab ID: 40185658002** Collected: 04/08/19 12:30 Received: 04/11/19 10:00 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	**1670**	ug/L	110	33.0	10	04/12/19 08:15	04/17/19 20:09	7440-42-8	
Calcium	**64800**	ug/L	250	69.8	1	04/12/19 08:15	04/16/19 21:34	7440-70-2	
Field Data	Analytical Method:								
Field pH	**7.98**	Std. Units			1		04/08/19 12:30		
Field Specific Conductance	**519**	umhos/cm			1		04/08/19 12:30		
Oxygen, Dissolved	**1.6**	mg/L			1		04/08/19 12:30	7782-44-7	
REDOX	**-95**	mV			1		04/08/19 12:30		
Turbidity	**59.51**	NTU			1		04/08/19 12:30		
Static Water Level	**595.68**	feet			1		04/08/19 12:30		
Temperature, Water (C)	**11.9**	deg C			1		04/08/19 12:30		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**324**	mg/L	20.0	8.7	1		04/15/19 11:55		

REPORT OF LABORATORY ANALYSIS

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

ANALYTICAL RESULTS

Project: 25219068.00 EDGEWATER CLOSED
Pace Project No.: 40185658

Sample: MW-302 **Lab ID: 40185658002** Collected: 04/08/19 12:30 Received: 04/11/19 10:00 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		04/16/19 11:42		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**18.4**	mg/L	2.0	0.50	1		04/20/19 00:47	16887-00-6	
Fluoride	**0.87**	mg/L	0.30	0.10	1		04/20/19 00:47	16984-48-8	M0
Sulfate	**71.7**	mg/L	15.0	5.0	5		04/22/19 12:35	14808-79-8	

Sample: MW-303 **Lab ID: 40185658003** Collected: 04/08/19 11:40 Received: 04/11/19 10:00 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	**2930**	ug/L	110	33.0	10	04/12/19 08:15	04/17/19 20:15	7440-42-8	
Calcium	**135000**	ug/L	250	69.8	1	04/12/19 08:15	04/16/19 21:40	7440-70-2	
Field Data	Analytical Method:								
Field pH	**7.15**	Std. Units			1		04/08/19 11:40		
Field Specific Conductance	**1196**	umhos/cm			1		04/08/19 11:40		
Oxygen, Dissolved	**0.3**	mg/L			1		04/08/19 11:40	7782-44-7	
REDOX	**-85**	mV			1		04/08/19 11:40		
Turbidity	**61.84**	NTU			1		04/08/19 11:40		
Static Water Level	**588.88**	feet			1		04/08/19 11:40		
Temperature, Water (C)	**10.3**	deg C			1		04/08/19 11:40		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**668**	mg/L	20.0	8.7	1		04/15/19 11:56		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**6.9**	Std. Units	0.10	0.010	1		04/16/19 11:44		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**20.0**	mg/L	10.0	2.5	5		04/23/19 21:35	16887-00-6	
Fluoride	**<0.50**	mg/L	1.5	0.50	5		04/23/19 21:35	16984-48-8	D3
Sulfate	**<5.0**	mg/L	15.0	5.0	5		04/23/19 21:35	14808-79-8	D3

Sample: 2R-OW **Lab ID: 40185658004** Collected: 04/08/19 13:55 Received: 04/11/19 10:00 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	**35.8**	ug/L	11.0	3.3	1	04/12/19 08:15	04/17/19 20:22	7440-42-8	
Calcium	**121000**	ug/L	250	69.8	1	04/12/19 08:15	04/16/19 21:47	7440-70-2	

REPORT OF LABORATORY ANALYSIS

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

ANALYTICAL RESULTS

Project: 25219068.00 EDGEWATER CLOSED
Pace Project No.: 40185658

Sample: 2R-OW **Lab ID: 40185658004** Collected: 04/08/19 13:55 Received: 04/11/19 10:00 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Field Data	Analytical Method:								
Field pH	**8.57**	Std. Units			1		04/08/19 13:55		
Field Specific Conductance	**1077**	umhos/cm			1		04/08/19 13:55		
Oxygen, Dissolved	**0.6**	mg/L			1		04/08/19 13:55	7782-44-7	
REDOX	**75**	mV			1		04/08/19 13:55		
Turbidity	**8.59**	NTU			1		04/08/19 13:55		
Static Water Level	**609.50**	feet			1		04/08/19 13:55		
Temperature, Water (C)	**6.7**	deg C			1		04/08/19 13:55		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**610**	mg/L	20.0	8.7	1		04/15/19 11:56		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**7.5**	Std. Units	0.10	0.010	1		04/16/19 11:49		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**55.3**	mg/L	2.0	0.50	1		04/23/19 22:14	16887-00-6	
Fluoride	**<0.10**	mg/L	0.30	0.10	1		04/23/19 22:14	16984-48-8	
Sulfate	**10.6**	mg/L	3.0	1.0	1		04/23/19 22:14	14808-79-8	

Sample: FIELD BLANK **Lab ID: 40185658005** Collected: 04/08/19 14:00 Received: 04/11/19 10:00 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	04/12/19 08:15	04/15/19 13:15	7440-42-8	
Calcium	**<69.8**	ug/L	250	69.8	1	04/12/19 08:15	04/15/19 13:15	7440-70-2	
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**14.0J**	mg/L	20.0	8.7	1		04/15/19 11:56		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**8.1**	Std. Units	0.10	0.010	1		04/16/19 11:51		H6
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**<0.50**	mg/L	2.0	0.50	1		04/23/19 22:27	16887-00-6	
Fluoride	**<0.10**	mg/L	0.30	0.10	1		04/23/19 22:27	16984-48-8	
Sulfate	**<1.0**	mg/L	3.0	1.0	1		04/23/19 22:27	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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

QUALITY CONTROL DATA

Project: 25219068.00 EDGEWATER CLOSED
Pace Project No.: 40185658

QC Batch: 318132 Analysis Method: EPA 6020
QC Batch Method: EPA 3010 Analysis Description: 6020 MET
Associated Lab Samples: 40185658001, 40185658002, 40185658003, 40185658004, 40185658005

METHOD BLANK: 1849562 Matrix: Water
Associated Lab Samples: 40185658001, 40185658002, 40185658003, 40185658004, 40185658005

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Boron	ug/L	<3.3	11.0	04/15/19 13:01	
Calcium	ug/L	<69.8	250	04/15/19 13:01	

LABORATORY CONTROL SAMPLE: 1849563

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Boron	ug/L	500	478	96	80-120	
Calcium	ug/L	5000	4900	98	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1849564 1849565

Parameter	Units	40185656001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Boron	ug/L	68.0	500	500	557	556	98	97	75-125	0	20	
Calcium	ug/L	89000	5000	5000	90100	91100	23	42	75-125	1	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

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

QUALITY CONTROL DATA

Project: 25219068.00 EDGEWATER CLOSED
Pace Project No.: 40185658

QC Batch: 318389 Analysis Method: SM 2540C
QC Batch Method: SM 2540C Analysis Description: 2540C Total Dissolved Solids
Associated Lab Samples: 40185658001, 40185658002, 40185658003, 40185658004, 40185658005

METHOD BLANK: 1850749 Matrix: Water
Associated Lab Samples: 40185658001, 40185658002, 40185658003, 40185658004, 40185658005

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	<8.7	20.0	04/15/19 11:54	

LABORATORY CONTROL SAMPLE: 1850750

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Dissolved Solids	mg/L	577	588	102	80-120	

SAMPLE DUPLICATE: 1850751

Parameter	Units	40185606019 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	1010	1020	1	5	

SAMPLE DUPLICATE: 1850752

Parameter	Units	40185654001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	230	250	8	5	R1

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

REPORT OF LABORATORY ANALYSIS

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

QUALITY CONTROL DATA

Project: 25219068.00 EDGEWATER CLOSED
Pace Project No.: 40185658

QC Batch: 318500 Analysis Method: EPA 9040
QC Batch Method: EPA 9040 Analysis Description: 9040 pH
Associated Lab Samples: 40185658001, 40185658002, 40185658003, 40185658004, 40185658005

SAMPLE DUPLICATE: 1851026

Parameter	Units	40185479001 Result	Dup Result	RPD	Max RPD	Qualifiers
pH at 25 Degrees C	Std. Units	6.8	6.8	0	20	H6

SAMPLE DUPLICATE: 1851027

Parameter	Units	40185514001 Result	Dup Result	RPD	Max RPD	Qualifiers
pH at 25 Degrees C	Std. Units	7.9	8.0	1	20	H6

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

REPORT OF LABORATORY ANALYSIS

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

QUALITY CONTROL DATA

Project: 25219068.00 EDGEWATER CLOSED
Pace Project No.: 40185658

QC Batch: 318652 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 40185658001, 40185658002

METHOD BLANK: 1851803 Matrix: Water
Associated Lab Samples: 40185658001, 40185658002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chloride	mg/L	<0.50	2.0	04/19/19 18:53	
Fluoride	mg/L	<0.10	0.30	04/19/19 18:53	
Sulfate	mg/L	<1.0	3.0	04/19/19 18:53	

LABORATORY CONTROL SAMPLE: 1851804

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	20	20.2	101	90-110	
Fluoride	mg/L	2	2.1	105	90-110	
Sulfate	mg/L	20	20.3	101	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1851805 1851806

Parameter	Units	40185587001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	15.4	20	20	37.3	37.2	109	109	90-110	0	15	
Fluoride	mg/L	0.16J	2	2	2.4	2.4	110	111	90-110	0	15	M0
Sulfate	mg/L	27.4	20	20	48.5	50.2	106	114	90-110	3	15	M0

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1851807 1851808

Parameter	Units	40185658002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	18.4	20	20	40.1	40.1	108	108	90-110	0	15	
Fluoride	mg/L	0.87	2	2	3.1	3.1	112	112	90-110	0	15	M0
Sulfate	mg/L	71.7	100	100	172	176	100	104	90-110	2	15	

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

REPORT OF LABORATORY ANALYSIS

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

QUALITY CONTROL DATA

Project: 25219068.00 EDGEWATER CLOSED
Pace Project No.: 40185658

QC Batch: 319139 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 40185658003, 40185658004, 40185658005

METHOD BLANK: 1854578 Matrix: Water
Associated Lab Samples: 40185658003, 40185658004, 40185658005

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chloride	mg/L	<0.50	2.0	04/23/19 21:08	
Fluoride	mg/L	<0.10	0.30	04/23/19 21:08	
Sulfate	mg/L	<1.0	3.0	04/23/19 21:08	

LABORATORY CONTROL SAMPLE: 1854579

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	20	19.8	99	90-110	
Fluoride	mg/L	2	2.0	99	90-110	
Sulfate	mg/L	20	19.8	99	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1854580 1854581

Parameter	Units	40185658003 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	20.0	100	100	121	122	101	102	90-110	1	15	
Fluoride	mg/L	<0.50	10	10	10.1	10.3	100	101	90-110	1	15	
Sulfate	mg/L	<5.0	100	100	99.8	101	100	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.

REPORT OF LABORATORY ANALYSIS

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

QUALIFIERS

Project: 25219068.00 EDGEWATER CLOSED
Pace Project No.: 40185658

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

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.
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.
R1	RPD value was outside control limits.

Pace Analytical Services, LLC
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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 25219068.00 EDGEWATER CLOSED
Pace Project No.: 40185658

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
40185658001	**MW-301**	EPA 3010	318132	EPA 6020	318258
40185658002	**MW-302**	EPA 3010	318132	EPA 6020	318258
40185658003	**MW-303**	EPA 3010	318132	EPA 6020	318258
40185658004	**2R-OW**	EPA 3010	318132	EPA 6020	318258
40185658005	**FIELD BLANK**	EPA 3010	318132	EPA 6020	318258
40185658001	**MW-301**				
40185658002	**MW-302**				
40185658003	**MW-303**				
40185658004	**2R-OW**				
40185658001	**MW-301**	SM 2540C	318389		
40185658002	**MW-302**	SM 2540C	318389		
40185658003	**MW-303**	SM 2540C	318389		
40185658004	**2R-OW**	SM 2540C	318389		
40185658005	**FIELD BLANK**	SM 2540C	318389		
40185658001	**MW-301**	EPA 9040	318500		
40185658002	**MW-302**	EPA 9040	318500		
40185658003	**MW-303**	EPA 9040	318500		
40185658004	**2R-OW**	EPA 9040	318500		
40185658005	**FIELD BLANK**	EPA 9040	318500		
40185658001	**MW-301**	EPA 300.0	318652		
40185658002	**MW-302**	EPA 300.0	318652		
40185658003	**MW-303**	EPA 300.0	319139		
40185658004	**2R-OW**	EPA 300.0	319139		
40185658005	**FIELD BLANK**	EPA 300.0	319139		

JK

Pace Analytical®
www.pacelabs.com

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

40185658

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:	Mey Blodgett
Phone:	608-216-7362
Project Number:	25219068.00
Project Name:	Edgewater Closed Ash Fill
Project State:	WI
Sampled By (Print):	Gary Stukel
Sampled By (Sign):	Gary Stukel
PO #:	Regulatory Program:

Quote #:	
Mail To Contact:	
Mail To Company:	
Mail To Address:	
Invoice To Contact:	
Invoice To Company:	SCS Engineers
Invoice To Address:	2830 Dairy Dr Madison WI 53718
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
SI = Sludge	WP = Wipe

FILTERED? (YES/NO)
PRESERVATION (CODE)*

PACE LAB #	CLIENT FIELD ID	COLLECTION DATE	COLLECTION TIME	MATRIX	Y/N	Pick Letter	Analyses Requested: Boron	Calcium	Chloride	Fluoride	pH	Sulfate	TDS	CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)	Profile #
					N	D	P	A	A	A	A	A				
001	MW-301	3/8/19	1050	GW		X	X	X	X	X	X	X				
002	MW-302	3/8/19	1230	GW		X	X	X	X	X	X	X				
003	MW-303	3/8/19	1140	GW		X	X	X	X	X	X	X				
004	2R-OW	3/8/19	1355	GW		X	X	X	X	X	X	X				
005	Field Blank	3/8/19	1400	W		X	X	X	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:
Gary Stukel	9/10/19 0800	Mary Fannin	4/10/19 1100
Mary Fannin	4/10/19 1430		
[illegible]	4-11-19 1000	[illegible]	4/11/1000

PACE Project No.: 40185658

Receipt Temp = R0.1 °C

Sample Receipt pH: OK / Adjusted

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

C019a(27Jun2006)

Version 6.0, 06/14/06

ORIGINAL

1241 Bellevue Street, Suite
Green Bay, WI 5430

Sample Preservation Receipt Form

Client Name: SCS Engineers Project # 40185658

All containers needing preservation have been checked and noted below: ☑Yes ☐No ☐N/A Initial when completed: CKW Date/ Time:

Lab Lot# of pH paper: 166358 Lab Std #ID of preservation (if pH adjusted):

	Glass							Plastic							Vials						Jars			General			VOA Vials (>6mm) *						
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		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											0		1																		X		2.5 / 5 / 10
006																																	2.5 / 5 / 10
007																																	2.5 / 5 / 10
008																																	2.5 / 5 / 10
009																																	2.5 / 5 / 10
010																																	2.5 / 5 / 10
011																																	2.5 / 5 / 10
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:	

033

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)

Client Name: SCS Engineers Project #: WO#: 40185658

40185658

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: RoI /Corr: _____

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

Person examining contents: Date: 4-11-19 Initials: SCL

Temp should be above freezing to 6°C.
Biota Samples may be received at ≤ 0°C.

Chain of Custody Present:	☑Yes ☐No ☐N/A	1.
Chain of Custody Filled Out:	☐Yes ☑No ☐N/A	2. No pg #; Mail 4-11-19 SCL
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.
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: AT 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 23, 2019

Meghan Blodgett
SCS ENGINEERS
2830 Dairy Drive
Madison, WI 53718

RE: Project: 25216068 ALLIANT EDGE 1-4 CCR
Pace Project No.: 40196734

Dear Meghan Blodgett:
Enclosed are the analytical results for sample(s) received by the laboratory on October 08, 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: 25216068 ALLIANT EDGE 1-4 CCR
Pace Project No.: 40196734

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

REPORT OF LABORATORY ANALYSIS

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

SAMPLE SUMMARY

Project: 25216068 ALLIANT EDGE 1-4 CCR
Pace Project No.: 40196734

Lab ID	Sample ID	Matrix	Date Collected	Date Received
40196734001	**MW-301**	Water	10/07/19 12:20	10/08/19 09:45
40196734002	**MW-302**	Water	10/07/19 14:25	10/08/19 09:45
40196734003	**MW-303**	Water	10/07/19 13:20	10/08/19 09:45
40196734004	**2R-OW**	Water	10/07/19 11:05	10/08/19 09:45
40196734005	**FIELD BLANK**	Water	10/07/19 00:00	10/08/19 09:45

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

SAMPLE ANALYTE COUNT

Project: 25216068 ALLIANT EDGE 1-4 CCR
Pace Project No.: 40196734

Lab ID	Sample ID	Method	Analysts	Analytes Reported
40196734001	**MW-301**	EPA 6020	DS1	2
			AXL	7
		SM 2540C	TMK	1
		EPA 9040	ALY	1
		EPA 300.0	HMB	3
40196734002	**MW-302**	EPA 6020	DS1	2
			AXL	7
		SM 2540C	TMK	1
		EPA 9040	ALY	1
		EPA 300.0	HMB	3
40196734003	**MW-303**	EPA 6020	DS1	2
			AXL	7
		SM 2540C	TMK	1
		EPA 9040	ALY	1
		EPA 300.0	HMB	3
40196734004	**2R-OW**	EPA 6020	DS1	2
			AXL	6
		SM 2540C	TMK	1
		EPA 9040	ALY	1
		EPA 300.0	HMB	3
40196734005	**FIELD BLANK**	EPA 6020	DS1	2
		SM 2540C	TMK	1
		EPA 9040	ALY	1
		EPA 300.0	HMB	3

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ANALYTICAL RESULTS

Project: 25216068 ALLIANT EDGE 1-4 CCR
Pace Project No.: 40196734

Sample: MW-301 **Lab ID: 40196734001** Collected: 10/07/19 12:20 Received: 10/08/19 09:45 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Boron	**7220**	ug/L	200	60.6	20	10/11/19 07:55	10/17/19 13:37	7440-42-8	P6
Calcium	**87600**	ug/L	2540	762	10	10/11/19 07:55	10/15/19 08:34	7440-70-2	P6
Field Data	Analytical Method:								
Field pH	**7.56**	Std. Units			1		10/07/19 12:20		
Field Specific Conductance	**1052**	umhos/cm			1		10/07/19 12:20		
Oxygen, Dissolved	**2.7**	mg/L			1		10/07/19 12:20	7782-44-7	
REDOX	**146**	mV			1		10/07/19 12:20		
Turbidity	**79.44**	NTU			1		10/07/19 12:20		
Static Water Level	**599.56**	feet			1		10/07/19 12:20		
Temperature, Water (C)	**12.2**	deg C			1		10/07/19 12:20		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**694**	mg/L	20.0	8.7	1		10/10/19 17:09		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**7.8**	Std. Units	0.10	0.010	1		10/15/19 11:27		H6
300.0 IC Anions	Analytical Method: EPA 300.0								
Chloride	**11.1**	mg/L	2.0	0.50	1		10/16/19 17:24	16887-00-6	
Fluoride	**0.24J**	mg/L	0.30	0.10	1		10/16/19 17:24	16984-48-8	
Sulfate	**312**	mg/L	30.0	10.0	10		10/17/19 11:21	14808-79-8	

Sample: MW-302 **Lab ID: 40196734002** Collected: 10/07/19 14:25 Received: 10/08/19 09:45 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Boron	**1730**	ug/L	10.0	3.0	1	10/11/19 07:55	10/15/19 09:36	7440-42-8	
Calcium	**67500**	ug/L	254	76.2	1	10/11/19 07:55	10/15/19 09:36	7440-70-2	
Field Data	Analytical Method:								
Field pH	**7.86**	Std. Units			1		10/07/19 14:25		
Field Specific Conductance	**487**	umhos/cm			1		10/07/19 14:25		
Oxygen, Dissolved	**1.3**	mg/L			1		10/07/19 14:25	7782-44-7	
REDOX	**124**	mV			1		10/07/19 14:25		
Turbidity	**32.69**	NTU			1		10/07/19 14:25		
Static Water Level	**595.58**	feet			1		10/07/19 14:25		
Temperature, Water (C)	**13.5**	deg C			1		10/07/19 14:25		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**290**	mg/L	20.0	8.7	1		10/10/19 17:09		

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 25216068 ALLIANT EDGE 1-4 CCR
Pace Project No.: 40196734

Sample: MW-302 **Lab ID: 40196734002** Collected: 10/07/19 14:25 Received: 10/08/19 09:45 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		10/15/19 11:20		H6
300.0 IC Anions	Analytical Method: EPA 300.0								
Chloride	**17.8**	mg/L	2.0	0.50	1		10/16/19 17:38	16887-00-6	
Fluoride	**0.85**	mg/L	0.30	0.10	1		10/16/19 17:38	16984-48-8	
Sulfate	**55.7**	mg/L	3.0	1.0	1		10/16/19 17:38	14808-79-8	

Sample: MW-303 **Lab ID: 40196734003** Collected: 10/07/19 13:20 Received: 10/08/19 09:45 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Boron	**2830**	ug/L	10.0	3.0	1	10/11/19 07:55	10/15/19 09:50	7440-42-8	
Calcium	**136000**	ug/L	254	76.2	1	10/11/19 07:55	10/15/19 09:50	7440-70-2	
Field Data	Analytical Method:								
Field pH	**6.90**	Std. Units			1		10/07/19 13:20		
Field Specific Conductance	**1127**	umhos/cm			1		10/07/19 13:20		
Oxygen, Dissolved	**0.2**	mg/L			1		10/07/19 13:20	7782-44-7	
REDOX	**122**	mV			1		10/07/19 13:20		
Turbidity	**94.01**	NTU			1		10/07/19 13:20		
Static Water Level	**588.77**	feet			1		10/07/19 13:20		
Temperature, Water (C)	**11.8**	deg C			1		10/07/19 13:20		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**584**	mg/L	20.0	8.7	1		10/10/19 17:09		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**7.0**	Std. Units	0.10	0.010	1		10/15/19 11:29		H6
300.0 IC Anions	Analytical Method: EPA 300.0								
Chloride	**19.1**	mg/L	10.0	2.5	5		10/16/19 17:51	16887-00-6	
Fluoride	**<0.50**	mg/L	1.5	0.50	5		10/16/19 17:51	16984-48-8	D3
Sulfate	**<5.0**	mg/L	15.0	5.0	5		10/16/19 17:51	14808-79-8	D3

Sample: 2R-OW **Lab ID: 40196734004** Collected: 10/07/19 11:05 Received: 10/08/19 09:45 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Boron	**58.8**	ug/L	10.0	3.0	1	10/11/19 07:55	10/15/19 09:57	7440-42-8	
Calcium	**132000**	ug/L	254	76.2	1	10/11/19 07:55	10/15/19 09:57	7440-70-2	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 25216068 ALLIANT EDGE 1-4 CCR
Pace Project No.: 40196734

Sample: 2R-OW **Lab ID: 40196734004** Collected: 10/07/19 11:05 Received: 10/08/19 09:45 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
Field Data	Analytical Method:								
Field pH	**6.88**	Std. Units			1		10/07/19 11:05		
Field Specific Conductance	**1261**	umhos/cm			1		10/07/19 11:05		
Oxygen, Dissolved	**2.5**	mg/L			1		10/07/19 11:05	7782-44-7	
REDOX	**148**	mV			1		10/07/19 11:05		
Static Water Level	**609.39**	feet			1		10/07/19 11:05		
Temperature, Water (C)	**14.0**	deg C			1		10/07/19 11:05		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**706**	mg/L	20.0	8.7	1		10/10/19 17:09		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**7.1**	Std. Units	0.10	0.010	1		10/15/19 11:30		H6
300.0 IC Anions	Analytical Method: EPA 300.0								
Chloride	**88.8**	mg/L	10.0	2.5	5		10/17/19 11:34	16887-00-6	
Fluoride	**<0.10**	mg/L	0.30	0.10	1		10/16/19 18:04	16984-48-8	
Sulfate	**13.2**	mg/L	3.0	1.0	1		10/16/19 18:04	14808-79-8	

Sample: FIELD BLANK **Lab ID: 40196734005** Collected: 10/07/19 00:00 Received: 10/08/19 09:45 Matrix: Water

Parameters	Results	Units	LOQ	LOD	DF	Prepared	Analyzed	CAS No.	Qual
6020 MET ICPMS	Analytical Method: EPA 6020 Preparation Method: EPA 3010								
Boron	**<3.0**	ug/L	10.0	3.0	1	10/11/19 07:55	10/15/19 08:00	7440-42-8	
Calcium	**<76.2**	ug/L	254	76.2	1	10/11/19 07:55	10/15/19 08:00	7440-70-2	
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**<8.7**	mg/L	20.0	8.7	1		10/10/19 17:09		
9040 pH	Analytical Method: EPA 9040								
pH at 25 Degrees C	**6.8**	Std. Units	0.10	0.010	1		10/15/19 11:32		H6
300.0 IC Anions	Analytical Method: EPA 300.0								
Chloride	**<0.50**	mg/L	2.0	0.50	1		10/16/19 18:17	16887-00-6	
Fluoride	**<0.10**	mg/L	0.30	0.10	1		10/16/19 18:17	16984-48-8	
Sulfate	**<1.0**	mg/L	3.0	1.0	1		10/16/19 18:17	14808-79-8	

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: 25216068 ALLIANT EDGE 1-4 CCR
Pace Project No.: 40196734

QC Batch: 337095 Analysis Method: EPA 6020
QC Batch Method: EPA 3010 Analysis Description: 6020 MET
Associated Lab Samples: 40196734001, 40196734002, 40196734003, 40196734004, 40196734005

METHOD BLANK: 1957892 Matrix: Water
Associated Lab Samples: 40196734001, 40196734002, 40196734003, 40196734004, 40196734005

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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QUALITY CONTROL DATA

Project: 25216068 ALLIANT EDGE 1-4 CCR
Pace Project No.: 40196734

QC Batch: 337052 Analysis Method: SM 2540C
QC Batch Method: SM 2540C Analysis Description: 2540C Total Dissolved Solids
Associated Lab Samples: 40196734001, 40196734002, 40196734003, 40196734004, 40196734005

METHOD BLANK: 1957339 Matrix: Water
Associated Lab Samples: 40196734001, 40196734002, 40196734003, 40196734004, 40196734005

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	<8.7	20.0	10/10/19 17:08	

LABORATORY CONTROL SAMPLE: 1957340

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Dissolved Solids	mg/L	547	544	99	80-120	

SAMPLE DUPLICATE: 1957341

Parameter	Units	40196734001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	694	704	1	10	

SAMPLE DUPLICATE: 1957342

Parameter	Units	40196880006 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	328	348	6	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.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: 25216068 ALLIANT EDGE 1-4 CCR
Pace Project No.: 40196734

QC Batch: 337490 Analysis Method: EPA 9040
QC Batch Method: EPA 9040 Analysis Description: 9040 pH
Associated Lab Samples: 40196734001, 40196734002, 40196734003, 40196734004, 40196734005

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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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: 25216068 ALLIANT EDGE 1-4 CCR
Pace Project No.: 40196734

QC Batch: 337252 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Analysis Description: 300.0 IC Anions
Associated Lab Samples: 40196734001, 40196734002, 40196734003, 40196734004, 40196734005

METHOD BLANK: 1959861 Matrix: Water
Associated Lab Samples: 40196734001, 40196734002, 40196734003, 40196734004, 40196734005

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chloride	mg/L	<0.50	2.0	10/16/19 10:46	
Fluoride	mg/L	<0.10	0.30	10/16/19 10:46	
Sulfate	mg/L	<1.0	3.0	10/16/19 10:46	

LABORATORY CONTROL SAMPLE: 1959862

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chloride	mg/L	20	20.7	103	90-110	
Fluoride	mg/L	2	2.1	105	90-110	
Sulfate	mg/L	20	20.6	103	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1959863 1959864

Parameter	Units	40196679001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	490	400	400	856	864	91	93	90-110	1	15	
Fluoride	mg/L	<2.0	40	40	41.2	42.5	103	106	90-110	3	15	
Sulfate	mg/L	89.6	400	400	480	493	98	101	90-110	3	15	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1959865 1959866

Parameter	Units	40197022001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chloride	mg/L	37.6	100	100	138	138	101	100	90-110	1	15	
Fluoride	mg/L	26.2	100	100	74.6	72.9	48	47	90-110	2	15	M0
Sulfate	mg/L	<5.0	100	100	102	102	98	98	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.

REPORT OF LABORATORY ANALYSIS

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QUALIFIERS

Project: 25216068 ALLIANT EDGE 1-4 CCR
Pace Project No.: 40196734

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

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.
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: 25216068 ALLIANT EDGE 1-4 CCR
Pace Project No.: 40196734

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
40196734001	**MW-301**	EPA 3010	337095	EPA 6020	337193
40196734002	**MW-302**	EPA 3010	337095	EPA 6020	337193
40196734003	**MW-303**	EPA 3010	337095	EPA 6020	337193
40196734004	**2R-OW**	EPA 3010	337095	EPA 6020	337193
40196734005	**FIELD BLANK**	EPA 3010	337095	EPA 6020	337193
40196734001	**MW-301**				
40196734002	**MW-302**				
40196734003	**MW-303**				
40196734004	**2R-OW**				
40196734001	**MW-301**	SM 2540C	337052		
40196734002	**MW-302**	SM 2540C	337052		
40196734003	**MW-303**	SM 2540C	337052		
40196734004	**2R-OW**	SM 2540C	337052		
40196734005	**FIELD BLANK**	SM 2540C	337052		
40196734001	**MW-301**	EPA 9040	337490		
40196734002	**MW-302**	EPA 9040	337490		
40196734003	**MW-303**	EPA 9040	337490		
40196734004	**2R-OW**	EPA 9040	337490		
40196734005	**FIELD BLANK**	EPA 9040	337490		
40196734001	**MW-301**	EPA 300.0	337252		
40196734002	**MW-302**	EPA 300.0	337252		
40196734003	**MW-303**	EPA 300.0	337252		
40196734004	**2R-OW**	EPA 300.0	337252		
40196734005	**FIELD BLANK**	EPA 300.0	337252		

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

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CHAIN OF CUSTODY

401960734

(Please Print Clearly)	
Company Name:	SCS Engineers
Branch/Location:	Madison WI
Project Contact:	Tom Karowski
Phone:	
Project Number:	25216068
Project Name:	Alliant Edgewater I-4
Project State:	WI
Sampled By (Print):	Charlie Bills
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:	
Mail To Company:	
Mail To Address:	
Invoice To Contact:	
Invoice To Company:	SCS Engineers
Invoice To Address:	2830 Dairy Dr. Madison WI
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	FILTERED? (YES/NO) Y/N	PRESERVATION (CODE)* Pick Letter	Analyses Requested: Boron, Calcium	Chloride, Fluoride	pH, Sulfate, TDS
001	MW-301	10-7-19	1220	GW	N	D	X	X	X
002	MW-302	10-7-19	1425	GW	N	A	X	X	X
003	MW-303	10-7-19	1320	GW	N	A	X	X	X
004	2R-OW	10-7-19	1105	GW	N	A	X	X	X
005	Field Blank	10-7-19	1155	W	N	A	X	X	X

CLIENT COMMENTS	LAB COMMENTS (Lab Use Only)	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:
	10-7-19 @ 1800		
Fedex	10/8/19 0945		
			10/8/19 0945

PACE Project No.: 401960734
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 Analytical Services, LLC
1241 Bellevue Street, Suite 9
Green Bay, WI 54302

Sample Preservation Receipt Form

Client Name: SCS Project #/PM: 401960784

All containers needing preservation have been checked and noted below: ☐Yes ☐No ☐N/A Lab Lot# of pH paper: 10450891 Lab Std #ID of preservation (if pH adjusted):

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																																	2.5 / 5 / 10
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020																																	2.5 / 5 / 10

10/8/19

Initial when completed: Date/ Time:

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#: 40196734

Client Name: SCS

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

Tracking #: 7765 7343 9346

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: 10.1 /Corr:

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

Person examining contents: Date: 10/8/19 Initials:

Temp should be above freezing to 6°C.
Biota Samples may be received at ≤ 0°C.

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: -Includes date/time/ID/Analysis Matrix: W	☑Yes ☐No ☐N/A	12.
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: HMR for DM **Date:** 10/8/19

Appendix B

Alternative Source Demonstrations

B1 Alternative Source Demonstration, October 2018 Detection Monitoring

Alternative Source Demonstration
October 2018 Detection Monitoring

Edgewater Generating Station
Sheboygan, Wisconsin

Prepared for:

SCS ENGINEERS

25219068.00 | April 15, 2019

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

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Appendix A Trend Plots for CCR Wells

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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 Edgewater Generating Station Ash Ponds. I am a duly licensed Professional Engineer under the laws of the State of Wisconsin.

SC Clark 4-12-19

(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, 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 Edgewater Generating Station (EDG). 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], 2018b). The October 2017 ASD (dated April 2018) and April 2018 ASD concluded that several lines of evidence demonstrated that SSIs reported for boron, fluoride, pH, and sulfate concentrations in the downgradient monitoring wells (MW-301, MW-302, and MW 303) were likely due to leachate from the closed landfill, which is not subject to the requirements of 40 CFR 257.50-107.

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

EDG is located at 3739 Lakeshore Drive in Sheboygan, Sheboygan County, Wisconsin (**Figure 1**). EDG is an active coal-burning generating station. The EDG property includes a closed landfill and a series of CCR settling ponds, located on the opposite side of Lakeshore Drive from the plant itself (**Figure 1**). The EDG landfill is closed and no longer receives CCR. The groundwater monitoring system at the EDG is a multi-unit system. EDG has four existing CCR Units which are contiguous:

- EDG Slag Pond (existing CCR surface impoundment)
- EDG North A-Pond (existing CCR surface impoundment)
- EDG South A- Pond (existing CCR surface impoundment)
- EDG B-Pond (existing surface CCR impoundment)

A map showing the CCR Units and all background (or upgradient) and downgradient monitoring wells with identification numbers for the groundwater monitoring program is provided as **Figure 2**.

The closed CCR landfill (Wisconsin Department of Natural Resources [WDNR] Permit No. 2524) is located immediately west of the ponds. The landfill contains primarily fly ash with some slag, and was closed in 1987. Because this CCR landfill did not accept CCR after October 19, 2015, the landfill is not subject to the requirements of 40 CFR 257.50-107. The closed landfill is unlined and is known to be impacting groundwater at the site (SCS, 2016). Previous investigations done at the site (BT2, Inc., 1993; RMT, 1997) concluded that the groundwater impacts downgradient of the landfill and ponds were attributable to groundwater interaction with the landfill, rather than to leakage from the ponds.

1.3 STATISTICALLY SIGNIFICANT INCREASES IDENTIFIED

SSIs were identified for boron, fluoride, field pH, 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 October 2017 and April 2018 results are also included for comparison. The constituent concentrations with SSIs above the background concentration are highlighted in the table.

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 boron, field pH, fluoride, and sulfate results from background and compliance sampling are provided in **Table 2**. The laboratory reports for the April and October 2018 detection monitoring events were included in the 2018 Annual Groundwater Monitoring and Corrective Action Report submitted in January 2019. 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.

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
- Groundwater Flow Direction

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

For the purposes of groundwater monitoring, the unconsolidated sand and gravel aquifer is considered to be the uppermost aquifer, as defined under 40 CFR 257.53, at the EDG ponds. The sand and gravel aquifer is present in some parts of Sheboygan County (Skinner and Borman, 1973). Boring logs from monitoring wells at the EDG ponds and for nearby private wells indicate that the unconsolidated material at, and near, the site contains a significant amount of sand. Private well logs from the surrounding area indicate that the sand and gravel aquifer has been used as a water source; however, several older sand wells in the area have been replaced with bedrock water supply wells.

The dolomite aquifer underlies the unconsolidated material at the site. The total thickness of the dolomite aquifer at the site is unknown. The dolomite aquifer is underlain by the Maquoketa shale, which is a confining unit. The Maquoketa shale is underlain by the Cambrian-Ordovician sandstone aquifer. This sequence of sedimentary bedrock units is over 1,500 feet thick in the site vicinity.

The regional groundwater flow in the unconsolidated sand and gravel aquifer in the vicinity of the site is to the east and slight southeast.

2.2 CCR MONITORING SYSTEM

The groundwater monitoring system established under the CCR Rule consists of one upgradient (background) monitoring well and three downgradient monitoring wells, as shown on **Figure 2**. The upgradient monitoring well is 2R-OW. The downgradient monitoring wells include MW-301, MW-302, and MW-303. The CCR compliance monitoring wells were installed in the unconsolidated sediments with screens in the uppermost soil layer producing appreciable water, which was a sandy silt unit. Well depths range from approximately 14.5 to 40 feet, measured from the top of the well casing.

2.3 OTHER MONITORING WELLS

Sixteen groundwater monitoring wells currently exist at the EDG site as part of the monitoring system developed for the state monitoring program for the closed landfill. The well locations are shown on **Figure 2**. These monitoring wells are used to monitor groundwater conditions at the site under the WDNR state monitoring program.

Monitoring wells for the state monitoring program are installed in the unconsolidated material at the site. This shallow monitoring system includes water table wells and piezometers. Well depths range from approximately 9 to 43 feet, measured from the top of the well casing.

2.4 GROUNDWATER FLOW DIRECTION

Shallow groundwater in the area of the EDG site generally flows to the south-southeast, toward Fish Creek, which discharges into Lake Michigan. There is some localized groundwater mounding associated with the EDG ponds. The water table map shown on **Figure 3** represents the site conditions of the unconsolidated deposits during the October 2018 detection monitoring event. The water table map shows a generally south-southeast flow direction, with localized groundwater mounding in the area of the EDG ponds. The groundwater elevations at the CCR wells during the October 2018 detection monitoring event are in **Table 3**.

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 REVIEW

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.

The field pH trend plots were also reviewed for any anomalous results that might indicate a possible sampling or field analysis error (e.g., calibration error or incorrect sample identification). The time series plots are provided in Appendix A. The field pH results reported for all wells for the August 2016 background monitoring event were anomalously low, which is most likely due to a calibration error or other problem with the field pH meter for that event. During the statistical evaluation of the background data from well 2R-OW to develop the Upper Prediction Limit (UPL) for field pH, the August 2016 field pH result was identified as an outlier and was not used in the UPL calculation. Although the compliance wells also had outlier pH results for August 2016, the anomalous results for those wells were not considered when evaluating SSI determinations for the October 2018 detection monitoring, because an interwell analysis was used for the SSI evaluation, comparing current compliance well results to UPLs based on background well results.

Because boron, fluoride, 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 report for the October 2018 detection monitoring was reviewed to determine if any laboratory analysis error or issue that may have caused or contributed to the observed SSI for boron, fluoride, 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. Laboratory reports for the background monitoring and the October 2017 detection monitoring event were included in the 2017 Annual Groundwater Monitoring and Corrective Action Report for the facility, and laboratory reports for the April and October 2018 detection monitoring events were included in the 2018 Annual Groundwater Monitoring and Corrective Action Report. Laboratory reports were reviewed as part of the ASD preparation for each detection monitoring event.

Based on the review of the laboratory reports, SCS did not identify any indication that the SSI concentrations 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 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). Time series plots for the parameters with SSIs are provided in **Appendix A**. No indications of sampling or laboratory errors were noted based on the time series review. The October 2018 boron, pH, fluoride, and sulfate results for MW-301, MW-302, and MW-303 are consistent with the historical data.

3.3 STATISTICAL EVALUATION REVIEW

The review of the statistical results and methods includes 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, sulfate, field pH, and fluoride SSIs at MW-301, MW-302, and MW-303; identifies the most likely alternative source(s); and presents the lines of evidence indicating that an alternative source is most likely the cause of the observed SSIs for boron, sulfate, field pH, and fluoride.

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 UPLs calculated based on sampling of the background well (2R-OW). 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 and sulfate SSIs. These parameters were detected at higher concentrations than would likely be present naturally.

Natural variation may have contributed to the SSI for pH at MW-301 and MW-302. The UPL was calculated based on pH results at background well 2R-OW for the eight CCR Rule background monitoring events and the October 24, 2017, detection monitoring event. Based on these results the calculated UPL was 7.47, and the reported pH at MW-301 was 8.02 and at MW 302 was 7.78.

Although the results exceed the UPL, the historical pH results for 2R-OW include pH values up to 7.98, indicating variability in the background. This suggests that the SSIs for pH may be partially or completely due to natural variation.

Natural variation may also have caused or contributed to the SSI for fluoride at MW-302. Elevated natural fluoride concentrations significantly higher than those reported for the downgradient wells (above 2 milligrams per liter [mg/L]) have been observed in a region in eastern Wisconsin extending along the Lake Michigan shoreline from Kewaunee County in the north to the Illinois border in the south, as described Luczaj, J., and Masarik, K, 2015, *Groundwater Quantity and Quality Issues in a Water-Rich Region: Examples from Wisconsin, USA*. The authors note that most of the wells with elevated fluoride appear to be drawing from the Pleistocene glacial sediments and Silurian dolomite units. Skinner and Borman (1973) and Kammerer (1995) also identify the Lake Michigan shoreline area of eastern Wisconsin as having somewhat elevated fluoride concentrations in groundwater.

The fluoride concentrations reported for MW-302 for October 2017 through October 2018 were just above the laboratory's limit of quantitation (LOQ), at 0.84 mg/L in October 2017, 0.78 mg/L in April 2018, and 0.81 mg/L in October 2018. These results are within the range of reported natural concentrations, indicating that the fluoride concentration observed in this well is likely due to natural variability in the glacial sediments and shallow groundwater. As discussed below, there is also a potential that fluoride in MW-302 is associated with impacts from the closed CCR landfill.

4.1.2 Man-Made Alternative Sources

Man-made alternative sources that could potentially contribute to the boron, fluoride, pH, and sulfate SSIs could include the closed CCR landfill, the coal storage area, or other plant operations. Based on the groundwater flow directions and on previous investigations at the site, the closed landfill appears to be the most likely cause of the SSIs for wells MW-301, MW-302, and MW-303.

4.2 LINES OF EVIDENCES

The lines of evidence indicating that the SSIs for boron, sulfate, fluoride, and pH in compliance wells MW-301, MW-302, and MW-303, relative to the background well, are due to an alternative source include:

1. A previous study of the CCR ponds and the closed CCR landfill determined that the landfill was the primary source of groundwater impacts in the area, based on multiple lines of evidence.

2. Past and current monitoring performed under the state monitoring program shows that boron, sulfate, fluoride, and elevated pH are all present in the CCR landfill leachate.

3. Past and current monitoring performed under the state monitoring program shows that the highest boron and sulfate concentrations are in the monitoring wells near and downgradient from the CCR landfill.

Lines of evidence regarding natural variability as an additional alternative source of the fluoride and pH SSIs are discussed above in **Section 4.1.1**.

Each of these lines of evidence and the supporting data were discussed in detail in the ASD for the October 2017 detection monitoring event (SCS, 2018b). The lines of evidence are discussed briefly below, focusing on any updated information collected since the previous ASDs.

4.2.1 Previous CCR Pond and Landfill Study

A previous investigation titled *Field Investigation Report: Edgewater Closed Ash Disposal Facility*, completed by BT2 in 1993, found that groundwater impacts were likely due to the closed landfill (Figure 2) located immediately west of the ponds (BT2, 1993). The purpose of the 1993 investigation was to investigate the likely impact on groundwater quality of lining or abandoning the CCR impoundments (referred to in the report as the Wisconsin Pollutant Discharge Elimination System [WPDES] lagoons). The results from the investigation indicated that the CCR impoundments were not the primary source of downgradient groundwater impacts, and that closure or lining was not warranted. The WDNR concurred with that finding in a letter dated April 20, 1994.

The primary lines of evidence from the 1993 report that supported this finding, and support the ASD for boron, sulfate, fluoride, and pH, included:

- Water samples collected from each of the ponds met the Wisconsin groundwater enforcement standards established under NR 140, Wisconsin Administrative Code.
- Soil borings installed in the material below the larger ash pond, where the slag pond and the WDPES lagoons (North Pond A and South Pond A) were constructed is almost entirely slag material. Water leaking out of the lagoons and moving downward would encounter primarily slag, which is relatively inert, and not fly ash. Additionally, results for water leach testing of site-wide composite samples of fly ash and slag confirmed that the fly ash had a higher potential than slag to impact groundwater. Water leach test results for the fly ash composite sample were higher for boron, sulfate, fluoride, and pH in comparison to the slag composite sample.
- Water leach testing for individual boring samples of fly ash and/or slag also confirmed that fly ash leachate had significantly higher concentrations of boron and sulfate than slag leachate. Boron leach test results for nine samples from borings around and between the ponds, consisting mainly of slag, ranged from less than 16 to 206 µg/L.
- Water sampling within the landfill and pond area, in CCR above the native soil, documented that groundwater/leachate within the landfill had significantly higher concentrations of boron than the groundwater/leachate within the slag berms immediately adjacent to and between the Slag Pond, North/South Pond A, and Pond B.
- Groundwater monitoring results indicated that the highest concentrations of boron and sulfate were in monitoring wells downgradient from the landfill, including 18-OW and 29-OW. Elevated boron and sulfate were also reported for samples from wells 4-OW and 5-OW, located near the southwest and northwest corners of the landfill. Monitoring wells 6-OW and 7-OW, located east and southeast of the ponds, had much lower concentrations of boron and sulfate.

In the April 1994 approval letter, the WDNR approved the 1993 investigation of the WPDES lagoons/CCR impoundments and concurred with the findings of the report. The WDNR requested additional monitoring from the four new monitoring wells installed within the CCR (36-OW, 37-OW, 38R-OW, and 39R-OW) and requested the addition of fluoride and arsenic to the monitoring program for these groundwater/leachate head wells.

The results of the additional monitoring were reported to the WDNR in a Groundwater Assessment Report dated September 30, 1997. The WDNR responded to the 1997 report in a letter dated April 16, 1998, which stated, “We agree with the report’s finding that the WPDES ponds [Slag Pond,

North Pond A, and South Pond A] do not appear to be significantly contributing to the contaminant plume downgradient of the facility. No further remedial action concerning the influence of the ponds on the landfill is warranted at this time. "The WDNR also noted that the leachable constituents migrating from the saturated portion of the closed landfill have stabilized or also decreased since the landfill's closure and capping.

4.2.2 CCR Constituents in Landfill Leachate

Past and current monitoring performed under the state monitoring program shows that boron, sulfate, fluoride, and elevated pH are all present in the CCR landfill leachate. Recent groundwater and leachate monitoring results for boron, sulfate, and pH in samples from the state monitoring program wells are summarized in **Table 4** (April 2016 through October 2018). The leachate head wells monitoring conditions within the CCR landfill are 37-OW, 38R-OW, and 39R-OW, listed near the end of the table.

Boron: Boron concentrations in samples from leachate head wells 37-OW, 38R-OW, and 39R-OW have generally exceeded those reported for the CCR monitoring wells.

Sulfate: Sulfate concentrations in samples from, leachate head wells 37-OW, 38R-OW, and 39R-OW have generally exceeded those reported for the CCR monitoring wells.

Field pH: Field pH results for the three leachate head wells continue to have pH measurements that are slightly higher than the pH UPL calculated from the well 2R-OW background data. Ten of the 15 leachate field pH readings for April 2016 through October 2018 were higher than the calculated UPL. While slightly higher pH values were reported for the CCR well samples in October 2018, the range of pH values for the CCR compliance wells has generally been similar to recent pH results for leachate wells 37-OW and 38R-OW. Historically pH values at leachate head well 39R-OW were in the range of 8 to 9, but pH has followed a gradual decreasing trend at this well since routine monitoring began in 1994.

Fluoride: Fluoride is not part of the routine state monitoring program for the closed CCR landfill, but was sampled from the leachate wells (37-OW, 38R-OW, and 39R-OW) and the pond berm well (36-OW) from 1994 to 1997, as requested by the WDNR. The fluoride concentrations ranged from 0.25 to 0.97 mg/L (**Table 5**). The highest results were for leachate head well 39R-OW, and all four samples from this well exceeded the October 2018 fluoride concentration for MW-302.

Based on these results, the fly ash disposal in the closed CCR landfill is a likely historical source of elevated boron, sulfate, pH, and fluoride.

4.2.3 State Program Groundwater Monitoring Results

Current monitoring performed under the state monitoring program continues to show that the highest boron and sulfate concentrations are in the monitoring wells near and downgradient from the CCR landfill. State program monitoring results for the CCR Rule detection monitoring parameters that overlap with the state program are summarized in **Table 4**, and well locations are on **Figure 2**.

Consistent with the conditions observed at the time of the 1993 report, the recent groundwater monitoring results indicate that the highest concentrations of boron and sulfate are in monitoring wells downgradient from the landfill, including 18-OW (recently replaced by 40 OW) and 29 OW. Elevated boron and sulfate also continue to be reported for samples from wells 4-OW and 5-OW, located near the southwest and northwest corners of the landfill.

5.0 ASD CONCLUSIONS

The lines of evidence discussed above regarding the SSIs reported for boron, fluoride, field pH, and sulfate concentrations in downgradient monitoring wells MW-301, MW-302, and/or MW 303 demonstrate that the SSIs are likely primarily due to leachate from the closed landfill, which is not subject to the requirements of 40 CFR 257.50-107. The landfill is regulated by the WDNR under the solid waste program. The SSIs for fluoride and field pH at MW-301 and MW 302 may also be partially due to natural variability within the glacial sediment aquifer.

6.0 SITE GROUNDWATER MONITORING RECOMMENDATIONS

In accordance with section 257.94(e)(2) of the CCR Rule, the EDG pond site may continue with detection monitoring based on this ASD. The ASD report will be included in the 2018 Annual Report due January 31, 2019.

7.0 REFERENCES

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Kammerer, P.A. Jr., 1995, Ground-Water Flow and Quality in Wisconsin's Shallow Aquifer System, U.S. Geological Survey, Water-Resources Investigations Report 90-4171.

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

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Tables

1 Detection Monitoring Results Summary – October 2017 – October 2018
2 Analytical Results – CCR Ponds Detection Monitoring Program
3 Groundwater Elevations – CCR Rule Monitoring Wells
4 Analytical Results – Closed Landfill State Monitoring Program Wells
5 Analytical Results – Closed Landfill Leachate Fluoride Monitoring

Table 1
Detection Monitoring Results Summary - October 2017 - October 2018
Edgewater Generating Station

Parameter Name	Units	Interwell Upper Prediction Limit (UPL)	Background Well			Compliance Wells								
			2R-OW			MW-301			MW-302			MW-303		
			10/24/2017	4/2/2018	10/1/2018	10/24/2017	4/2/2018	10/1/2018	10/24/2017	4/2/2018	10/1/2018	10/24/2017	4/2/2018	10/1/2018
Boron	ug/L	107	55.9	19.7	34.7	**8,820**	**7,950**	**8,230**	**1,760**	**1,800**	**1,570**	**3,480**	**3,040**	**2,360**
Calcium	mg/L	206,247	170,000	121,000	190,000	87,200	78,900	88,800	68,100	68,000	64,700	173,000	146,000	139,000
Chloride	mg/L	378	305	108	462	11.9	11.2	11.5	18.9	18.5	18.6	20.4	19.7	4.3
Fluoride	mg/L	LOQ (varies by well)	<0.1 U	0.12 J	<0.10	<0.1 U	0.25 J	0.2 J	**0.84**	**0.78**	**0.81**	<0.5 U	<0.5 U	<0.10
Field pH	Std. Units	7.47	7.23	7.29	7.03	7.43	**8.02**	**7.71**	**7.6**	**7.78**	**7.99**	7.14	6.86	6.93
Sulfate	mg/L	35	29.3	17.2	37.2	**341**	**332**	**318**	**72.2**	**72.7**	**59.2**	<5 U	<5.0 U	<0.10
Total Dissolved Solids	mg/L	1,145	1010	680	1,260	772	752	722	316	314	306	566	630	620

149 Statistically significant increase at compliance well

Notes:

1. UPL based on parametric prediction limit based on 1-of-2 resampling methodology for all parameters except calcium and fluoride.
2. UPL for fluoride is non-parametric based on quantitation limit. UPL for calcium based on non-parametric prediction limit (highest background value).
3. UPLs calculated from background well results for April 2016 through October 2017.

Table 2. Analytical Results - CCR Ponds Detection Monitoring Program
Edgewater Generating Station, Sheboygan, Wisconsin / SCS Engineers Project #25219068.00

Well Group	Well	Collection Date	Boron (µg/L)	Field pH (Std. Units)	Fluoride (mg/L)	Sulfate (mg/L)
Background	2R-OW	4/8/2016	100	7.34	<0.2 U	19.5
		6/20/2016	22.4	7.02	<0.2 U	28.0
		8/9/2016	32.6	6.10	<0.2 U	25.4
		10/20/2016	43.1	6.98	<0.1 U	21.6
		1/24/2017	31.2	7.15	<0.1 U	23.9
		4/6/2017	70.6	7.01	<0.1 U	17.6
		6/6/2017	45.2	6.86	<0.1 U	17.8
		8/1/2017	35.7	7.00	<0.1 U	28.8
		10/23/2017	55.9	7.23	<0.1 U	29.3
		4/2/2018	19.7	7.29	0.12 J	17.2
		10/1/2018	34.7	7.03	<0.10	37.2
Compliance	MW-301	4/11/2016	8,550	7.91	0.33 J	372
		6/20/2016	8,190	7.48	0.36 J	343
		8/9/2016	8,450	6.47	0.33 J	368
		10/20/2016	8,620	7.68	0.34	369
		1/23/2017	9,280	8.03	0.42	372
		4/6/2017	8,370	7.98	0.21 J	367
		6/6/2017	9,160	7.70	<0.1 U	362
		8/2/2017	8,610	7.58	0.32	340
		10/24/2017	8,820	7.43	<0.1 U	341
		4/2/2018	7,950	8.02	0.25 J	332
		10/1/2018	8,230	7.71	0.2 J	318
	MW-302	4/8/2016	1,950	8.01	0.83	75.1
		6/20/2016	2,010	7.73	1.3 J	89.6
		8/9/2016	2,000	6.55	0.8	80.7
		10/20/2016	2,150	7.89	0.8	77.2
		1/24/2017	2,000	7.98	0.89 J	71.1
		4/6/2017	1,970	7.99	0.76	85.8
		6/6/2017	1,970	7.84	0.9	88.5
		8/2/2017	1,890	7.76	0.78	80.2
		10/24/2017	1,760	7.60	0.84	72.2
		4/2/2018	1,800	7.78	0.78	72.7
		10/1/2018	1,570	7.99	0.81	59.2
Compliance	MW-303	4/8/2016	4,210	7.04	<0.2 U	3 J
		6/20/2016	3,360	6.79	<1 U	11.4 J
		8/9/2016	3,860	6.09	<0.2 U	2.4 J
		10/20/2016	3,740	6.94	<0.5 U	5.6 J
		1/24/2017	4,210	6.94	<0.5 U	<5 U
		4/6/2017	4,170	6.88	<0.5 U	<5 U
		6/6/2017	4,570	7.00	<0.5 U	<5 U
		8/2/2017	3,780	6.94	<0.5 U	<5 U
		10/24/2017	3,480	7.14	<0.5 U	<5 U
		4/2/2018	3,040	6.86	<0.5 U	<5 U
		10/1/2018	2,360	6.93	<0.10	<1.0

Table 2. Analytical Results - CCR Ponds Detection Monitoring Program
Edgewater Generating Station, Sheboygan, Wisconsin / SCS Engineers Project #25219068.00

Abbreviations:
µg/L = micrograms per liter or parts per billion (ppb)
mg/L = milligrams per liter or parts per million (ppm)
-- = not analyzed

U = Not detected

J = Estimated value below laboratory's limit of quantitation (LOQ)

Notes:
1. Complete laboratory reports included in 2017 Annual Groundwater Monitoring and Corrective Action Report, Edgewater Generating Station.

Created by:	NDK	Date:	3/2/2018
Last revision by:	NAS	Date:	3/6/2019
Checked by:	NDK	Date:	3/18/2019

I:\25216068.00\Deliverables\2018 ASD Report No. 3\Tables\[EDG-closed- Tables 1,2, and 3.xlsx]Table 2- CCR Analytical

Table 3. Groundwater Elevations - CCR Rule Monitoring Wells
Edgewater Generating Station, Sheboygan, Wisconsin
SCS Engineers Project #25219068.00

Ground Water Elevation in feet above mean sea level (amsl)				
Well Number	**MW-301**	**MW-302**	**MW-303**	**2R-OW**
Top of Casing Elevation (feet amsl)	604.42	615.15	611.99	612.72
Screen Length (ft)	5.00	5.00	5.00	10.00
Total Depth (ft from top of casing)	27.47	40.00	33.26	14.50
Top of Well Screen Elevation (ft)	581.95	580.15	579.60	--
Measurement Date				
April 8, 2016	599.75	596.19	589.04	609.68
June 20, 2016	598.30	595.68	587.22	606.70
August 9, 2016	598.00	595.53	587.72	605.74
October 20, 2016	598.50	595.46	588.37	607.27
January 23-24, 2017	597.10	596.30	588.84	609.64
April 6, 2017	600.04	593.57	589.04	609.72
June 6, 2017	598.77	595.86	588.44	607.63
August 1, 2017	597.40	595.22	587.36	604.59
October 24, 2017	597.20	595.25	587.97	601.74
April 2, 2018	598.54	595.71	588.77	607.87
October 1, 2018	597.60	595.28	588.17	604.61
Bottom of Well Elevation (ft)	576.95	575.15	578.73	598.22

Notes:
Groundwater elevations compiled from field notes during sampling events.
-- = not measured

Created by:	NDK	Date:	2/28/2018
Last rev. by:	NAS	Date:	3/6/2019
Checked by:	NDK	Date:	3/18/2019

I:\25216068.00\Deliverables\2018 ASD Report No. 3\Tables\[EDG-closed- Tables 1,2, and 3.xlsx]Table 3. GW elev - CCR

Table 4. 2016 - 2018 Groundwater Analytical Results - Closed Landfill State Monitoring Program Wells
WPL - Edgewater Generating Station / SCS Project #25219068
Sheboygan, Wisconsin

Point Name	Reporting Period	ph-Field (standard units)	Boron, dissolved (µg/L as B)	Sulfate, dissolved (mg/L as SO_4)
Monitoring Wells				
2R-OW	2016-Apr	7.45	26.6	30.9
2R-OW	2016-Oct	6.98	40.4	22.9
2R-OW	2017-Apr	7.3	69.3 J	28.6
2R-OW	2017-Oct	7.66	35.2	32.9
2R-OW	2018-Apr	7.29	23.3	18.2
2R-OW	2018-Oct	7.03	41.8	35.5
3R-OW	2016-Apr	7.41	392	533
3R-OW	2016-Oct	7.32	468	372
3R-OW	2017-Apr	7.35	400	409
3R-OW	2017-Oct	7.39	389	637
3R-OW	2018-Apr	7.24	351	498
3R-OW	2018-Oct	7.03	462	495
4R-OW	2016-Apr	7.69	7,710	120
4R-OW	2016-Oct	7.71	17,300	252
4R-OW	2017-Apr	7.44	12,600	180
4R-OW	2017-Oct	7.31	15,700	178
4R-OW	2018-Apr	7.51	12,700	164
4R-OW	2018-Oct	7.22	8,630	129
5-OW	2016-Apr	7.64	4,330	215
5-OW	2016-Oct	7.75	5,970	210
5-OW	2017-Apr	7.51	5,490	258
5-OW	2017-Oct	7.54	6,040	230
5-OW	2018-Apr	7.90	3,900	143
5-OW	2018-Oct	7.43	6,180	226
7-OW	2016-Apr	8.14	610	255
7-OW	2016-Oct	7.59	964	251
7-OW	2017-Apr	8.1	761	259
7-OW	2017-Oct	7.73	1,130	246
7-OW	2018-Apr	8.08	818	243
7-OW	2018-Oct	7.69	1,150	218
29-A	2016-Apr	9.07	357	40.9
29-A	2016-Oct	8.54	264	39.6
29-A	2017-Apr	9.09	365	41.5
29-A	2017-Oct	8.97	278	42.1
29-A	2018-Apr	8.72	264	39.4
29-A	2018-Oct	8.38	268	39.2

Table 4. 2016 - 2018 Groundwater Analytical Results - Closed Landfill State Monitoring Program Wells
WPL - Edgewater Generating Station / SCS Project #25219068
Sheboygan, Wisconsin

Point Name	Reporting Period	ph-Field (standard units)	Boron, dissolved (µg/L as B)	Sulfate, dissolved (mg/L as SO_4)
Monitoring Wells (continued)				
29-OW	2016-Apr	8.03	10,600	120
29-OW	2016-Oct	7.69	10,900	85.7
29-OW	2017-Apr	8.49	9,500	77
29-OW	2017-Oct	8.15	9,060	62
29-OW	2018-Apr	7.97	8,640	102
29-OW	2018-Oct	7.84	11,000	109
30-OW	2016-Apr	8.26	79	4.8
30-OW	2016-Oct	7.56	113	4.6
30-OW	2017-Apr	8.47	176	7.5
30-OW	2017-Oct	7.44	135	16.7
30-OW	2018-Apr	7.96	94.5	21.5
30-OW	2018-Oct	7.47	115	11.4
31-OW	2016-Apr	7.63	114	91.2
31-OW	2016-Oct	7.68	35	63.3
31-OW	2017-Apr	7.99	77	82.4
31-OW	2017-Oct	7.79	190	70.3
31-OW	2018-Apr	7.71	30.8	51.5
31-OW	2018-Oct	7.64	36.7	62.7
40-OW	2016-Apr	8.04	8,030	731
40-OW	2016-Oct	7.91	29,400	768
40-OW	2017-Apr	7.97	8,680	849
40-OW	2017-Oct	7.91	8,800	873
40-OW	2018-Apr	7.93	9,790	771
40-OW	2018-Oct	7.51	11,300	797
Leachate Monitoring Wells				
37-OW	2016-Apr	7.49	19,100	759
37-OW	2016-Oct	7.31	12,500	439
37-OW	2017-Apr	8.01	15,900	633
37-OW	2017-Oct	7.24	9,440	264
37-OW	2018-Apr	7.68	5,890	159
37-OW	2018-Oct	7.42	16,600	555
38R-OW	2016-Apr	8.00	33,800	1,000
38R-OW	2016-Oct	7.71	17,100	514
38R-OW	2017-Apr	7.86	21,100	932
38R-OW	2017-Oct	7.72	10,800	364
38R-OW	2018-Apr	7.72	4,250	123
38R-OW	2018-Oct	7.98	32,400	956

Table 4. 2016 - 2018 Groundwater Analytical Results - Closed Landfill State Monitoring Program Wells
WPL - Edgewater Generating Station / SCS Project #25219068
Sheboygan, Wisconsin

Point Name	Reporting Period	ph-Field (standard units)	Boron, dissolved (µg/L as B)	Sulfate, dissolved (mg/L as SO_4)
Leachate Monitoring Wells (continued)				
39R-OW	2016-Apr	7.26	10,100	534
39R-OW	2016-Oct	7.32	29,900	1,390
39R-OW	2017-Apr	7.44	22,400	1,150
39R-OW	2017-Oct	7.52	32,800	1,400
39R-OW	2018-Apr	7.76	28,800	772
39R-OW	2018-Oct	7.4	24,700	1,160

Abbreviations:
µg/L = micrograms per liter or parts per billion (ppb)
mg/L = milligrams per liter or parts per million (ppm)
-- : not measured
MSL = mean sea level

Notes:
-- : not measured

Laboratory Notes:
J: Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

Created by:	SCC	Date:	2/24/2014
Last revision by:	NDK	Date:	3/18/2019
Checked by:	MDB	Date:	3/18/2019

I:\25216068.00\Deliverables\2018 ASD Report No. 3\Tables\[EDG-closed- Tables 1,2, and 3.xlsx]Table 4. GW quality Data

Table 5. Analytical Results - Closed Landfill Leachate Fluoride Monitoring
Edgewater Generating Station, Sheboygan, Wisconsin
SCS Engineers Project #25216068.00

Collection Date	Fluoride (mg/L)			
	36-OW	37-OW	38R-OW	39R-OW
9/8/1994	0.25	0.62	0.57	0.79
9/14/1995	0.38	0.51	0.71	0.87
9/17/1996	0.56	0.42	0.71	0.97
9/16/1997	0.60	0.44	0.73	0.97

Abbreviations:
mg/L = milligrams per liter or parts per million (ppm)

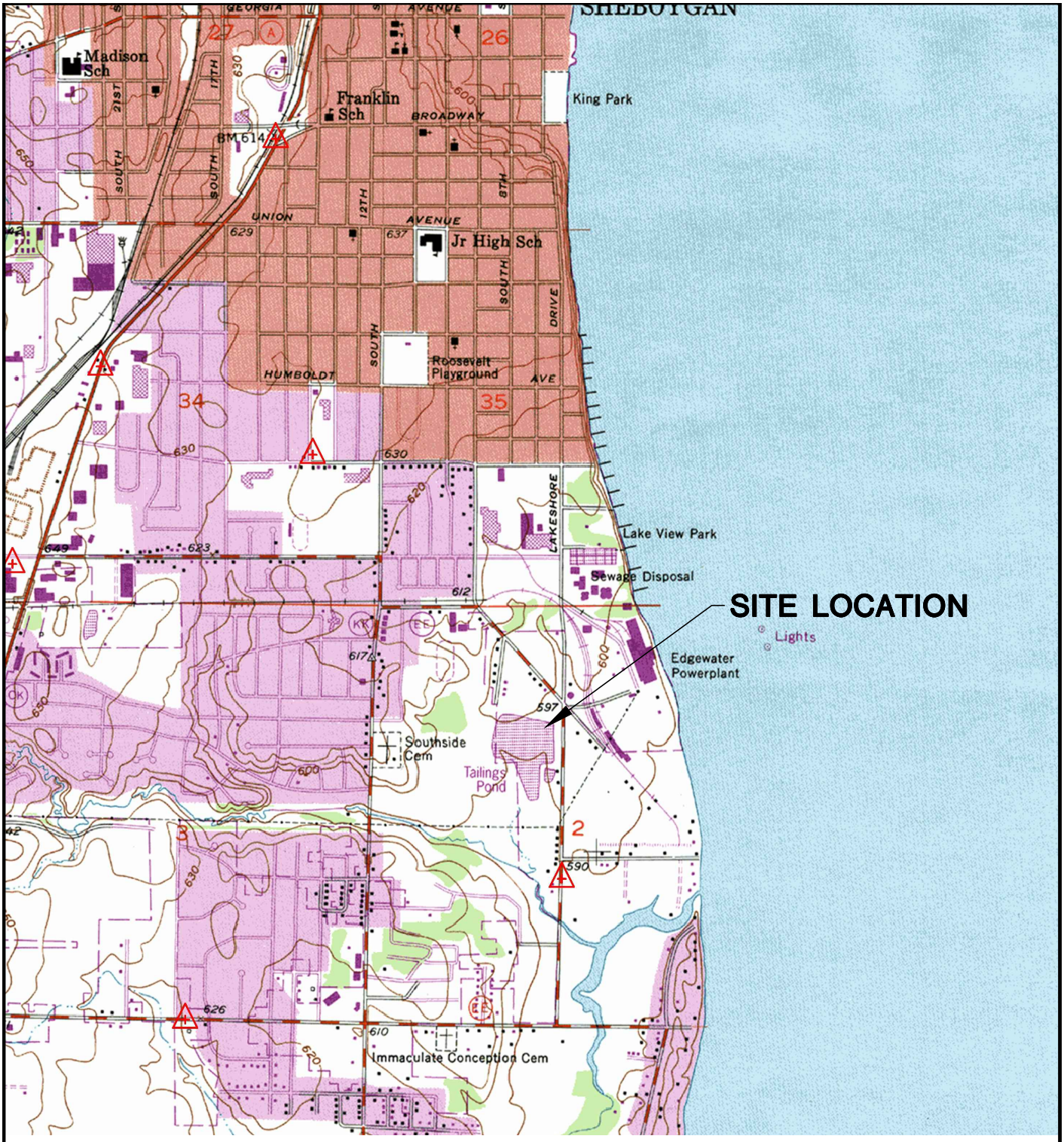
Notes:
1. Data compiled from WDNR Groundwater Environmental Monitoring System (GEMS) website.

Created by:	NDK	Date:	3/5/2018
Last revision by:	NDK	Date:	3/5/2018
Checked by:	AJR	Date:	4/5/2018

I:\25216068.00\Reports\2018 ASD Report No. 2\Tables\[EDG-closed- Tables 1,2, and 3.xlsx]Table 5- Fl resu

Figures

1 Site Location Map
2 Monitoring Well Location Map
3 Water Table Map – October 1, 2018



N

SHEBOYGAN SOUTH QUADRANGLE
WISCONSIN–SHEBOYGAN CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)
NW/4 SHEBOYGAN SOUTH 15' QUADRANGLE
1994
SCALE: 1" = 2,000'

CLIENT	WISCONSIN POWER AND LIGHT EDGEWATER GENERATING STATION 3739 LAKESHORE DRIVE SHEBOYGAN, WI 53081	SITE	EDGEWATER 1–4 (CLOSED) ASH DISPOSAL FACILITY

SITE LOCATION MAP

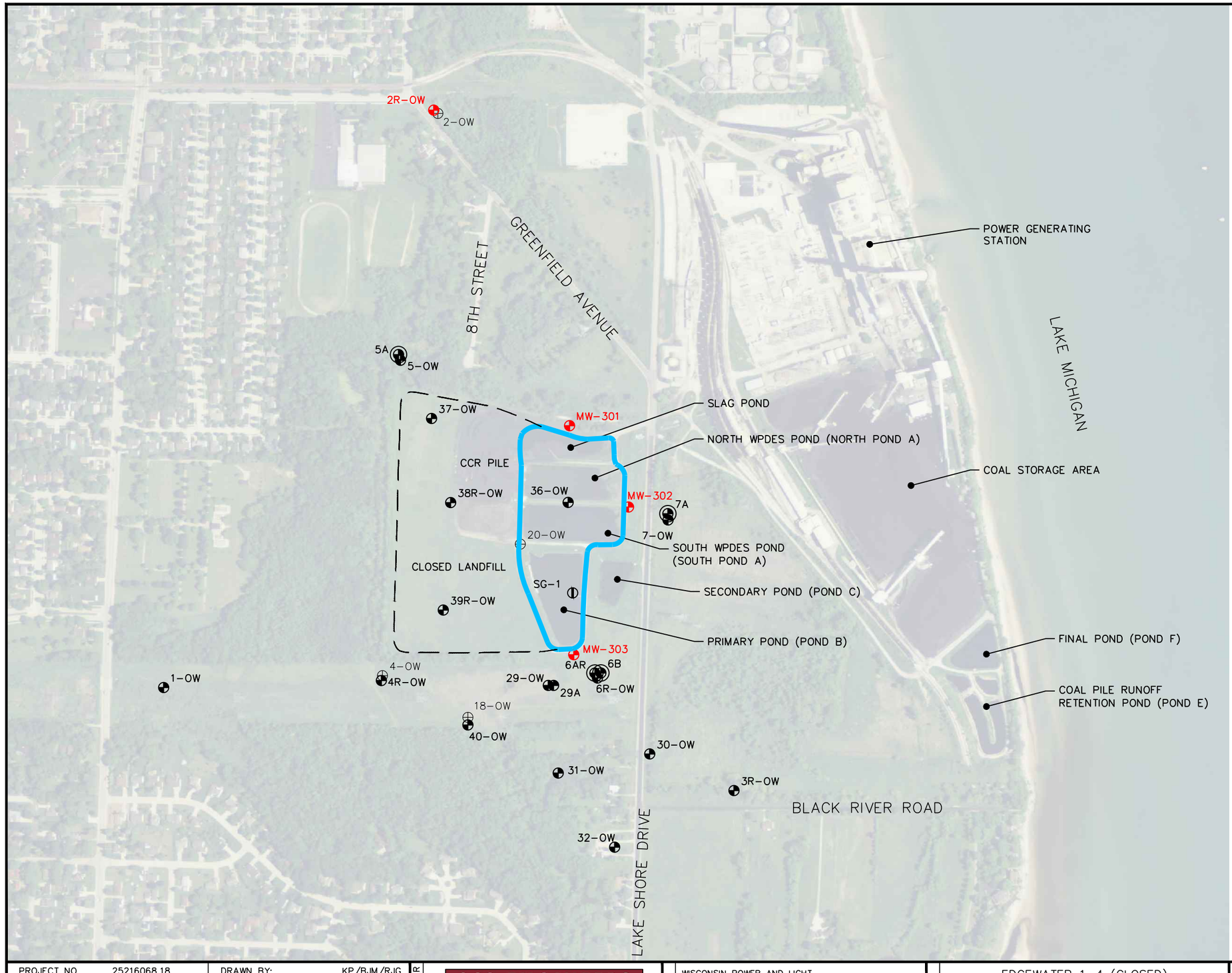
PROJECT NO.	25216068.18	DRAWN BY:	KP
DRAWN:	02/28/14	CHECKED BY:	MB
REVISED:	02/28/14	APPROVED BY:	SC 04/16/18

ENGINEER

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

FIGURE
1

I:\25216068.00\Drawings\Site Loc.dwg, 4/9/2019 11:19:08 AM



N

LEGEND

- ABANDONED MONITORING WELL
- MONITORING WELL
- PIEZOMETER
- CCR RULE MONITORING WELL
- CCR RULE LIMITS
- CLOSED LANDFILL LIMITS

NOTES:

1. AERIAL PHOTOGRAPH FROM THE NATIONAL AGRICULTURE IMAGERY PROGRAM AND PUBLISHED BY THE USDA FSA AERIAL PHOTOGRAPHY FIELD OFFICE. DATE OF IMAGE IS OCTOBER 1, 2013.
2. EXISTING WELL LOCATIONS ARE APPROXIMATE AND ARE BASED ON OCTOBER 2011 WATER TABLE MAP PREPARED BY TRC.
3. CCR RULE LIMITS AND CLOSED LANDFILL LOCATION ARE APPROXIMATE.
4. NEW MONITORING WELL LOCATIONS WERE SURVEYED BY CQM, INC. ON FEBRUARY 12, 2016.

500 0 500

SCALE: 1" = 500'

PROJECT NO.	25216068.18	DRAWN BY:	KP/BJM/RJG
DRAWN:	02/28/14	CHECKED BY:	KAK
REVISED:	10/09/18	APPROVED BY:	TK 04/09/19

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

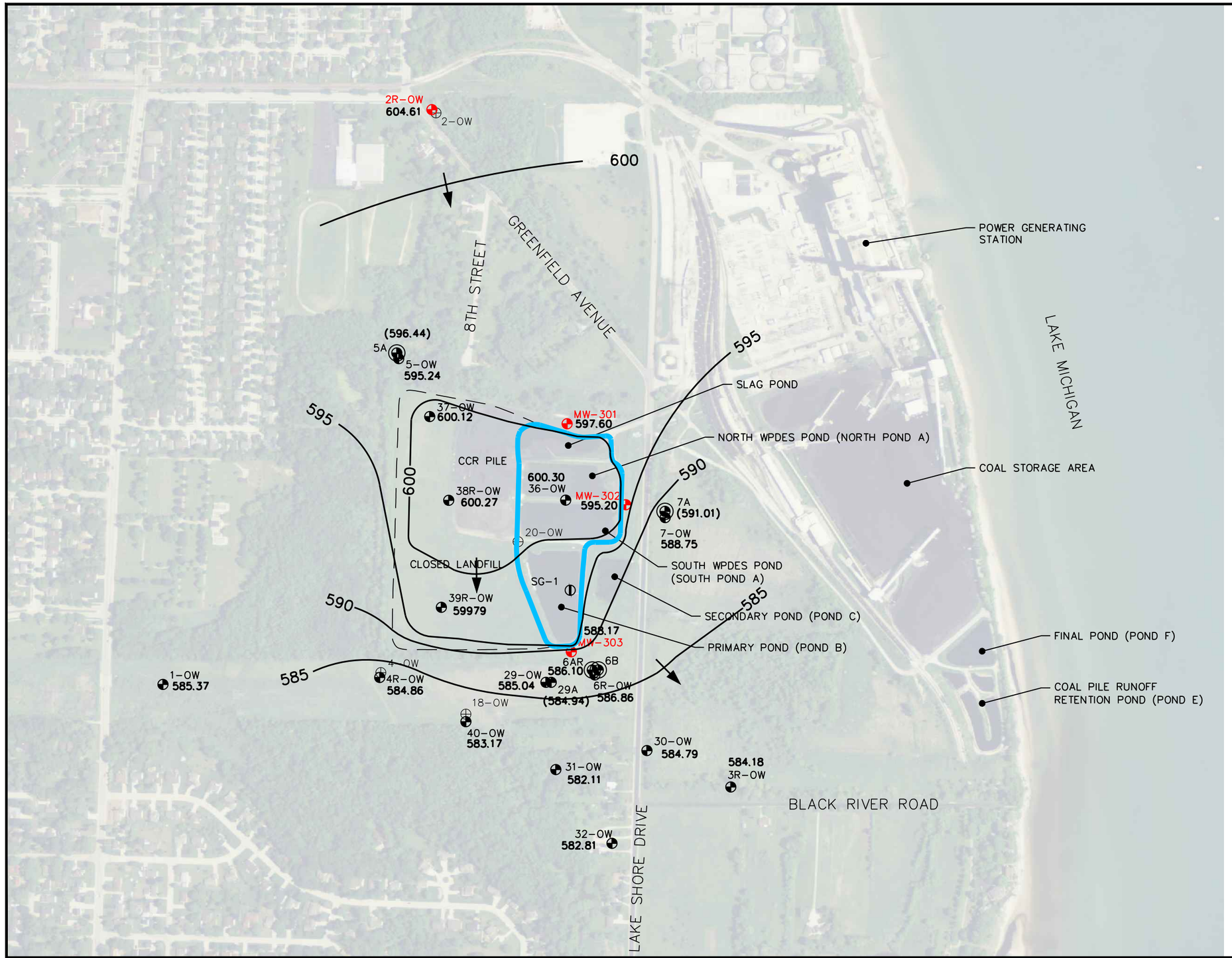
CLIENT: WISCONSIN POWER AND LIGHT
EDGEWATER GENERATING STATION
3739 LAKESHORE DRIVE
SHEBOYGAN, WI 53081

SITE: EDGEWATER 1-4 (CLOSED)
ASH DISPOSAL FACILITY
SHEBOYGAN, WISCONSIN

MONITORING WELL LOCATION MAP

FIGURE 2

I:\25216068.00\Drawings\2. Monitoring Well Location Map.dwg, 4/9/2019 10:31:03 AM



N

LEGEND

⊕	ABANDONED MONITORING WELL
◒	MONITORING WELL
◉	PIEZOMETER
◒	CCR RULE MONITORING WELL
▬	CCR RULE LIMITS
— — —	CLOSED LANDFILL LIMITS
598.54	WATER TABLE ELEVATION (OCTOBER 1, 2018)
(596.44)	PIEZOMETRIC SURFACE ELEVATION (OCTOBER 1, 2018)
———	WATER TABLE CONTOUR (5' INTERVAL)
→	APPROXIMATE GROUNDWATER FLOW DIRECTION

NOTES:

1. AERIAL PHOTOGRAPH FROM THE NATIONAL AGRICULTURE IMAGERY PROGRAM AND PUBLISHED BY THE USDA FSA AERIAL PHOTOGRAPHY FIELD OFFICE. DATE OF IMAGE IS OCTOBER 1, 2013.
2. EXISTING WELL LOCATIONS ARE APPROXIMATE AND ARE BASED ON OCTOBER 2011 WATER TABLE MAP PREPARED BY TRC.
3. DESIGN MANAGEMENT ZONE LOCATION IS APPROXIMATE.
4. NEW MONITORING WELL LOCATIONS WERE SURVEYED BY CQM, INC. ON FEBRUARY 12, 2016.

500 0 500

SCALE: 1" = 500'

PROJECT NO.	25216068.18	DRAWN BY:	BSS/RJG
DRAWN:	09/11/18	CHECKED BY:	MDB
REVISED:	11/12/18	APPROVED BY:	TK 04/09/19

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

CLIENT: WISCONSIN POWER AND LIGHT
EDGEWATER GENERATING STATION
3739 LAKESHORE DRIVE
SHEBOYGAN, WI 53081

SITE: EDGEWATER 1-4 (CLOSED)
ASH DISPOSAL FACILITY
SHEBOYGAN, WISCONSIN

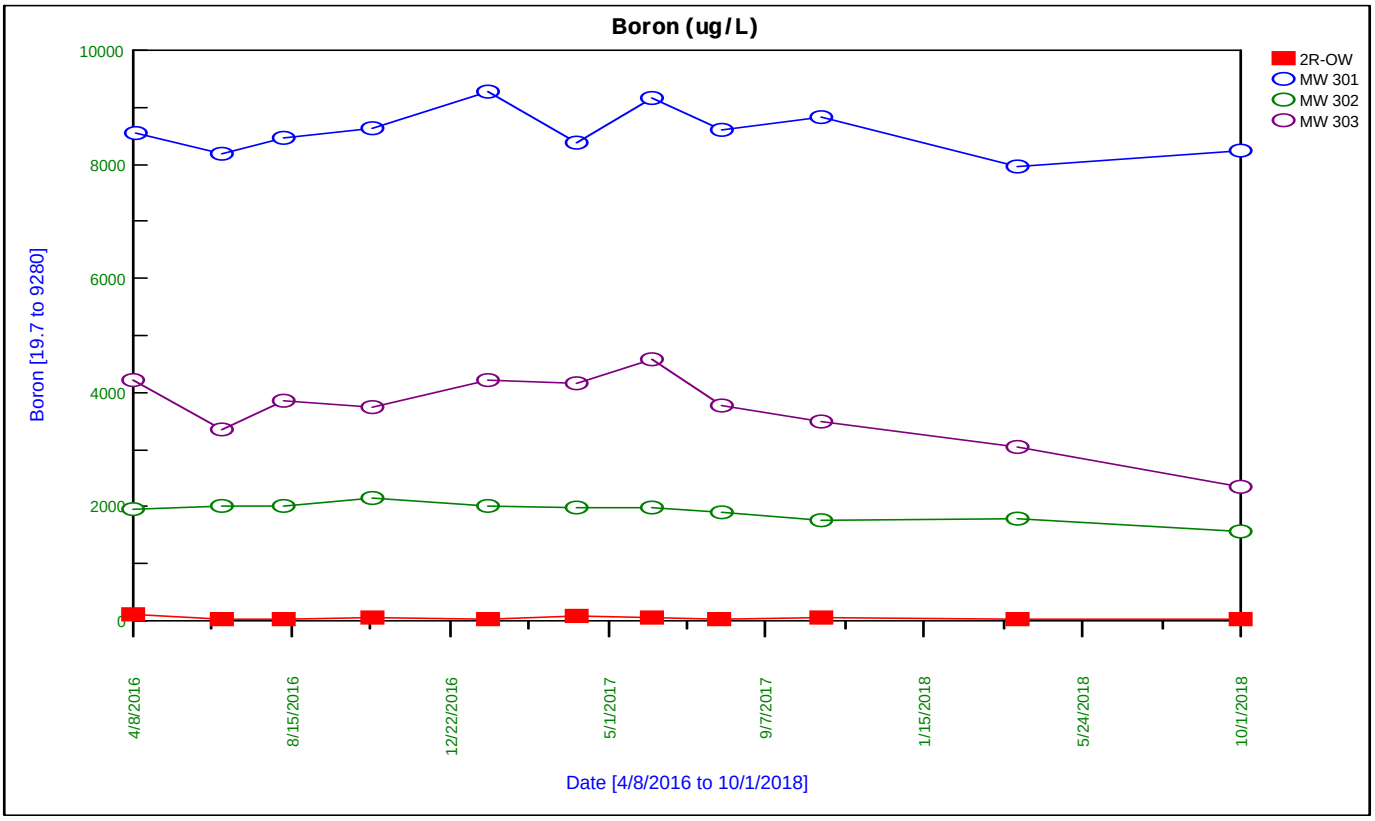
WATER TABLE MAP
OCTOBER 1, 2018

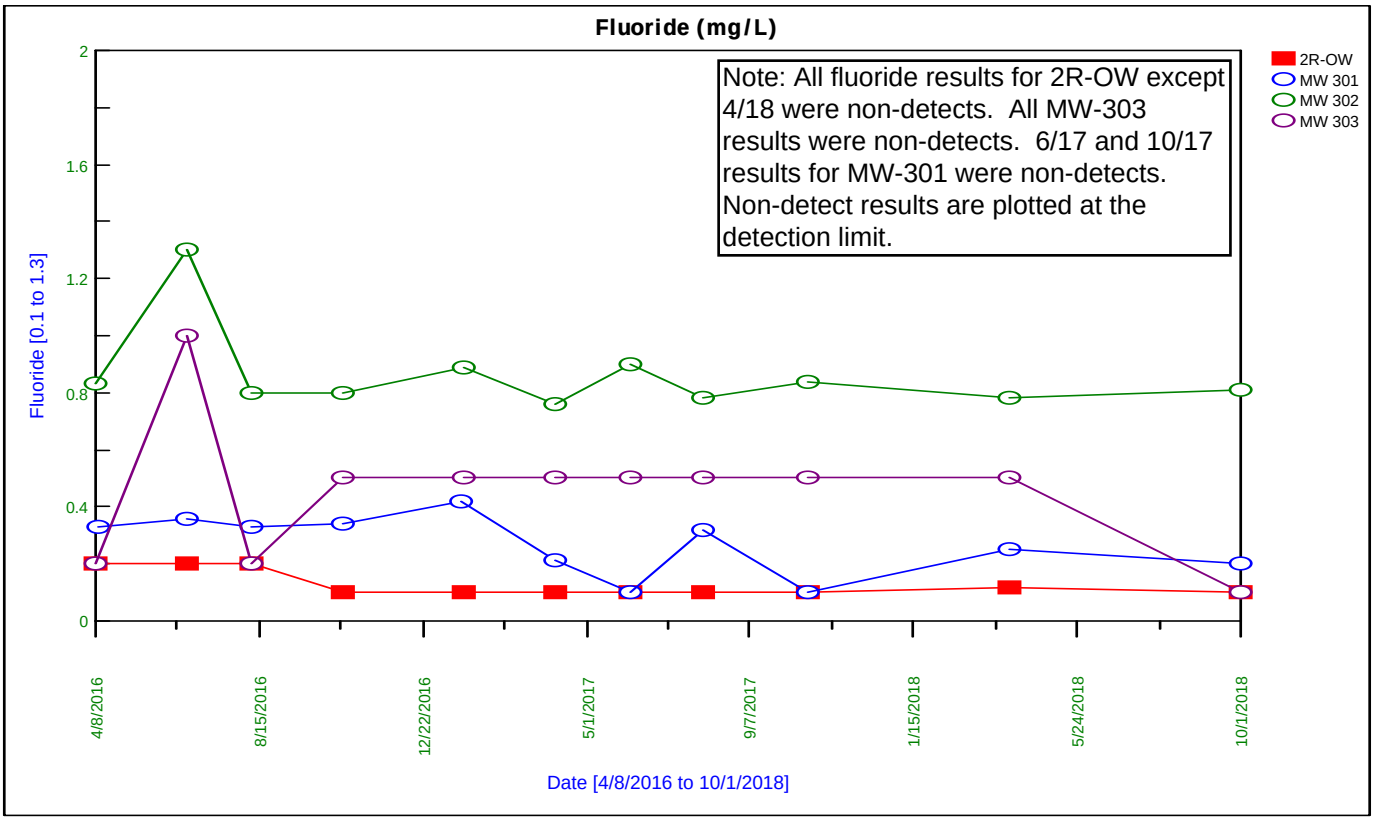
FIGURE
3

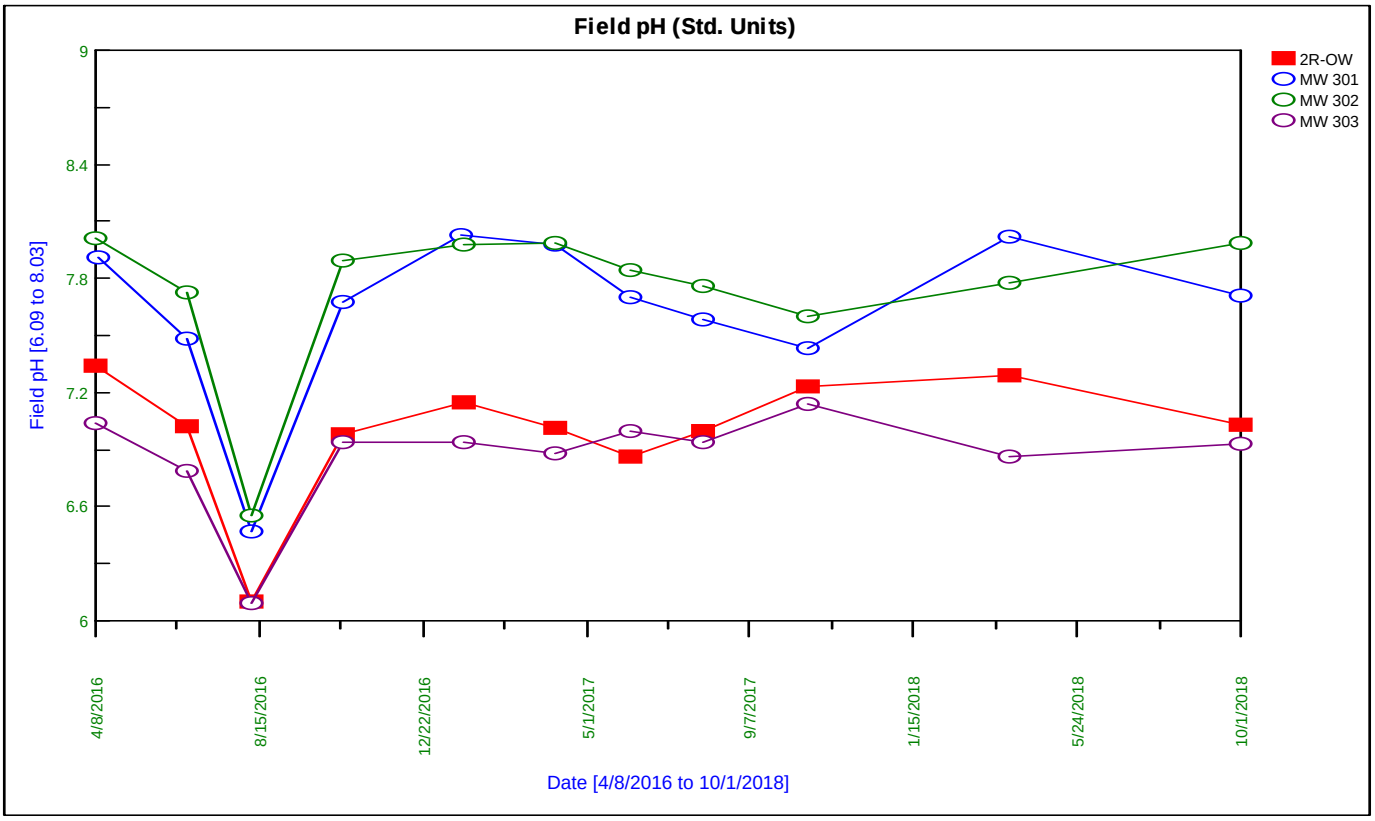
I:\25216068.00\Drawings\Water Tables.dwg, 4/9/2019 10:42:45 AM

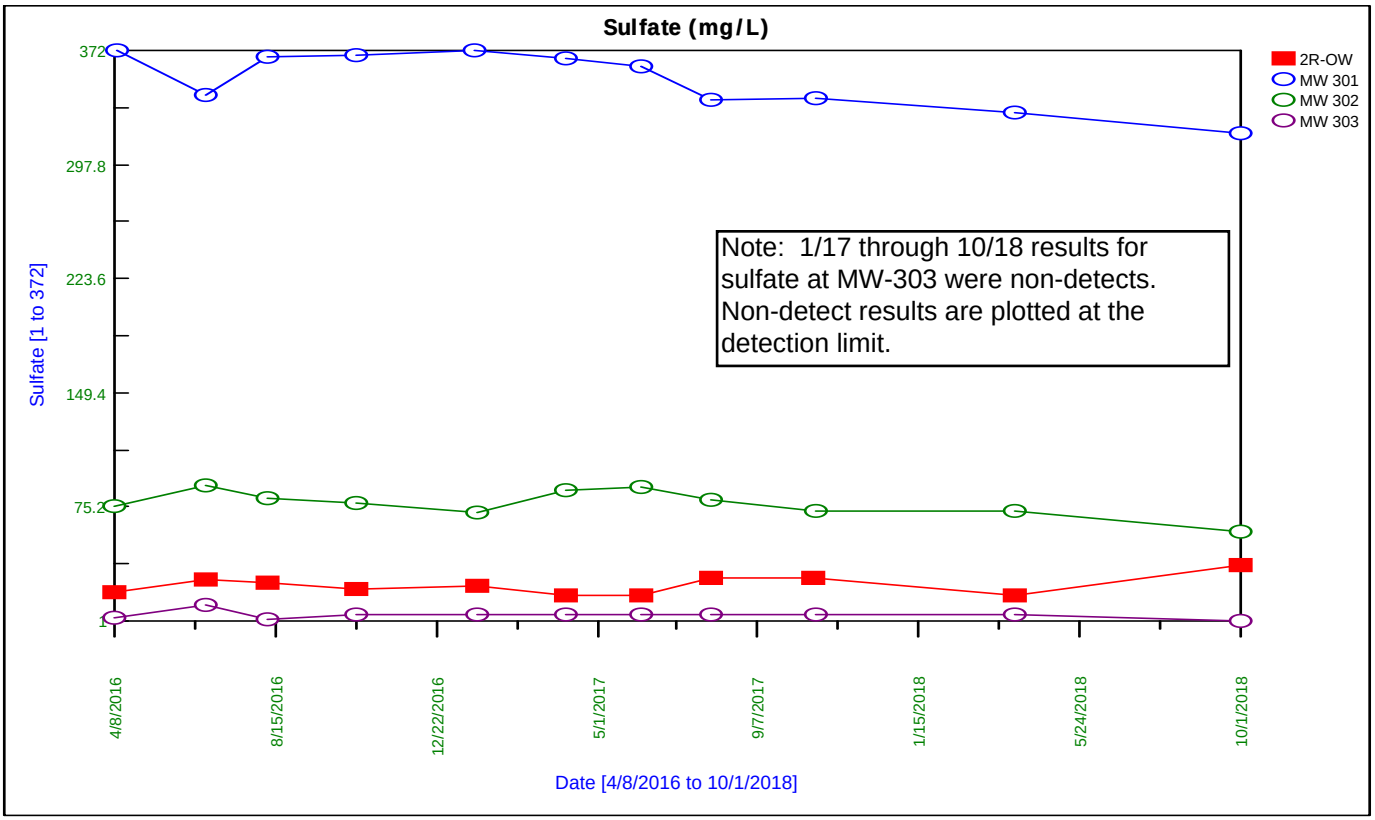
Appendix A

Trend Plots for CCR Wells


Boron (ug/L)
10000
8000
6000
4000
2000
0
Boron [19.7 to 9280]
2R-OW
MW 301
MW 302
MW 303
4/8/2016
8/15/2016
12/22/2016
5/1/2017
9/7/2017
1/15/2018
5/24/2018
10/1/2018
Date [4/8/2016 to 10/1/2018]


Fluoride (mg/L)
2
1.6
1.2
0.8
0.4
0
Fluoride [0.1 to 1.3]
Note: All fluoride results for 2R-OW except 4/18 were non-detects. All MW-303 results were non-detects. 6/17 and 10/17 results for MW-301 were non-detects. Non-detect results are plotted at the detection limit.
2R-OW
MW 301
MW 302
MW 303
4/8/2016
8/15/2016
12/22/2016
5/1/2017
9/7/2017
1/15/2018
5/24/2018
10/1/2018
Date [4/8/2016 to 10/1/2018]


Field pH (Std. Units)
2R-OW
MW 301
MW 302
MW 303
Field pH [6.09 to 8.03]
9
8.4
7.8
7.2
6.6
6
4/8/2016
8/15/2016
12/22/2016
5/1/2017
9/7/2017
1/15/2018
5/24/2018
10/1/2018
Date [4/8/2016 to 10/1/2018]


Sulfate (mg/L)
2R-OW
MW 301
MW 302
MW 303
Sulfate [1 to 372]
372
297.8
223.6
149.4
75.2
1
Note: 1/17 through 10/18 results for sulfate at MW-303 were non-detects. Non-detect results are plotted at the detection limit.
4/8/2016
8/15/2016
12/22/2016
5/1/2017
9/7/2017
1/15/2018
5/24/2018
10/1/2018
Date [4/8/2016 to 10/1/2018]

B2 Alternative Source Demonstration, April 2019 Detection Monitoring

Alternative Source Demonstration
April 2019 Detection Monitoring

Edgewater Generating Station
Sheboygan, Wisconsin

Prepared for:

SCS ENGINEERS

25219068.00 | October 14, 2019

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

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Figure 1. Site Location Map
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Appendix

Appendix A Trend Plots for CCR Wells

I:\25219068.00\Deliverables\2019 April ASD EDG\191014_EDG_No.4_April ASD.docx

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 Edgewater Generating Station Ash Ponds. 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, Edgewater Generating Station, Sheboygan Wisconsin (Entire Document)

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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 Edgewater Generating Station (EDG). 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], 2018b). The October 2017 ASD and subsequent semiannual updates have concluded that several lines of evidence demonstrate that SSIs reported for boron, fluoride, pH, and sulfate concentrations in the downgradient monitoring wells (MW-301, MW-302, and MW 303) were likely due to leachate from the closed landfill, which is not subject to the requirements of 40 CFR 257.50-107.

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

EDG is located at 3739 Lakeshore Drive in Sheboygan, Sheboygan County, Wisconsin (**Figure 1**). EDG is an active coal-burning generating station. The EDG property includes a closed landfill and a series of CCR settling ponds, located on the opposite side of Lakeshore Drive from the plant itself (**Figure 1**). The EDG landfill is closed and no longer receives CCR. The groundwater monitoring system at EDG is a multi-unit system. EDG has four existing CCR Units which are contiguous:

- EDG Slag Pond (existing CCR surface impoundment)
- EDG North A-Pond (existing CCR surface impoundment)
- EDG South A- Pond (existing CCR surface impoundment)
- EDG B-Pond (existing surface CCR impoundment)

A map showing the CCR Units and all background (or upgradient) and downgradient monitoring wells with identification numbers for the groundwater monitoring program is provided as **Figure 2**.

The closed CCR landfill (Wisconsin Department of Natural Resources [WDNR] Permit No. 2524) is located immediately west of the ponds. The landfill contains primarily fly ash with some slag, and was closed in 1987. Because this CCR landfill did not accept CCR after October 19, 2015, the landfill is not subject to the requirements of 40 CFR 257.50-107. The closed landfill is unlined and is known to be impacting groundwater at the site (SCS, 2016). Previous investigations done at the site (BT2, Inc., 1993; RMT, 1997) concluded that the groundwater impacts downgradient of the landfill and ponds were attributable to groundwater interaction with the landfill, rather than leakage from the ponds.

1.3 STATISTICALLY SIGNIFICANT INCREASES IDENTIFIED

SSIs were identified for boron, fluoride, field pH, and sulfate 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 October 2017, April 2018, and October 2018 results are also included for comparison. The constituent concentrations with SSIs above the background concentration are highlighted in the table.

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 boron, field pH, fluoride, and sulfate results from background and compliance sampling 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 previous detection monitoring events were included in the 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
- Groundwater Flow Direction

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

For the purposes of groundwater monitoring, the unconsolidated sand and gravel aquifer is considered to be the uppermost aquifer, as defined under 40 CFR 257.53, at the EDG ponds. The sand and gravel aquifer is present in some parts of Sheboygan County (Skinner and Borman, 1973). Boring logs from monitoring wells at the EDG ponds and for nearby private wells indicate that the unconsolidated material at, and near, the site contains a significant amount of sand. Private well logs from the surrounding area indicate that the sand and gravel aquifer has been used as a water source; however, several older sand wells in the area have been replaced with bedrock water supply wells.

The dolomite aquifer underlies the unconsolidated material at the site. The total thickness of the dolomite aquifer at the site is unknown. The dolomite aquifer is underlain by the Maquoketa shale, which is a confining unit. The Maquoketa shale is underlain by the Cambrian-Ordovician sandstone aquifer. This sequence of sedimentary bedrock units is over 1,500 feet thick in the site vicinity.

The regional groundwater flow in the unconsolidated sand and gravel aquifer in the vicinity of the site, is to the east and slight southeast.

2.2 CCR MONITORING SYSTEM

The groundwater monitoring system established under the CCR Rule consists of one upgradient (background) monitoring well and three downgradient monitoring wells, as shown on **Figure 2**. The upgradient monitoring well is 2R-OW. The downgradient monitoring wells include MW-301, MW-302, and MW-303. The CCR compliance monitoring wells were installed in the unconsolidated sediments with screens in the uppermost soil layer producing appreciable water, which was a sandy silt unit. Well depths range from approximately 14.5 to 40 feet, measured from the top of the well casing.

2.3 OTHER MONITORING WELLS

Sixteen groundwater monitoring wells currently exist at the EDG site as part of the monitoring system developed for the state monitoring program for the closed landfill. The well locations are shown on **Figure 2**. These monitoring wells are used to monitor groundwater conditions at the site under the WDNR state monitoring program.

Monitoring wells for the state monitoring program are installed in the unconsolidated material at the site. This shallow monitoring system includes water table wells and piezometers. Well depths range from approximately 9 to 43 feet, measured from the top of the well casing.

2.4 GROUNDWATER FLOW DIRECTION

Shallow groundwater in the area of the EDG site generally flows to the south-southeast, toward Fish Creek, which discharges into Lake Michigan. There is some localized groundwater mounding associated with the EDG ponds. The water table map shown on **Figure 3** represents the site conditions of the unconsolidated deposits during the April 2019 detection monitoring event. The water table map shows a generally southward flow direction, with localized groundwater mounding in the area of the EDG ponds. The groundwater elevations at the CCR wells during the April 2019 detection monitoring event are in **Table 3**.

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 REVIEW

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.

The field pH trend plots were also reviewed for any anomalous results that might indicate a possible sampling or field analysis error (e.g., calibration error or incorrect sample identification). The time series plots are provided in Appendix A. The field pH results reported for all wells for the August 2016 background monitoring event were anomalously low, which is most likely due to a calibration error or other problem with the field pH meter for that event. During the statistical evaluation of the background data from well 2R-OW to develop the Upper Prediction Limit (UPL) for field pH, the August 2016 field pH result was identified as an outlier and was not used in the UPL calculation. Although the compliance wells also had outlier pH results for August 2016, the anomalous results for those wells were not considered when evaluating SSI determinations for the April 2019 detection monitoring, because an interwell analysis was used for the SSI evaluation, comparing current compliance well results to UPLs based on background well results.

The field pH result for background well 2R-OW was anomalously high in the April 2019 sampling. This result does not affect the statistical evaluation because the current background data set only includes results through October 2017. The result will be evaluated as a possible outlier when the background data set is updated in the future.

Because boron, fluoride, 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 report for the April 2019 detection monitoring was reviewed to evaluate whether any laboratory analysis error or issue may have caused or contributed to the observed SSIs for boron, fluoride, 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. Laboratory reports for the background monitoring events were reviewed for the October 2017 ASD. Laboratory reports for subsequent detection monitoring events were reviewed as part of the ASD preparation for each event.

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

Time series plots of the 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). Time series plots for the parameters with SSIs are provided in Appendix A. No indications of sampling or laboratory errors were noted based on the time series review. The April 2019 boron, pH, fluoride, and sulfate results for MW-301, MW-302, and MW-303 are consistent with the historical data.

3.3 STATISTICAL EVALUATION REVIEW

The review of the statistical results and methods includes 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 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, sulfate, field pH, and fluoride SSIs at MW-301, MW-302, and MW-303; identifies the most likely alternative source(s); and presents the lines of evidence indicating that an alternative source is most likely the cause of the observed SSIs for boron, sulfate, field pH, and fluoride.

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 UPLs calculated based on sampling of the background well (2R-OW). 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 and sulfate SSIs. These parameters were detected at higher concentrations than would likely be present naturally.

Natural variation may have contributed to the SSIs for pH at MW-301 and MW-302. The UPL was calculated based on pH results at background well 2R-OW for the eight CCR Rule background monitoring events and the October 24, 2017, detection monitoring event. Based on these results the calculated UPL was 7.47, and the reported pH at MW-301 was 8.18 and at MW 302 was 7.98. Although the results exceed the UPL, the historical pH results for 2R-OW include pH values up to 7.98, indicating variability in the background, and the April 2019 pH result for 2R-OW was 8.57. This suggests that the SSIs for pH may be partially or completely due to natural variation.

Natural variation may also have caused or contributed to the SSI for fluoride at MW-302. Elevated natural fluoride concentrations significantly higher than those reported for the downgradient wells (above 2 milligrams per liter [mg/L]) have been observed in a region in eastern Wisconsin extending along the Lake Michigan shoreline from Kewaunee County in the north to the Illinois border in the south, as described Luczaj, J., and Masarik, K, 2015, *Groundwater Quantity and Quality Issues in a Water-Rich Region: Examples from Wisconsin, USA*. The authors note that most of the wells with elevated fluoride appear to be drawing from the Pleistocene glacial sediments and Silurian dolomite units. Skinner and Borman (1973) and Kammerer (1995) also identify the Lake Michigan shoreline area of eastern Wisconsin as having somewhat elevated fluoride concentrations in groundwater.

The fluoride concentrations reported for MW-302 for October 2017 through April 2019 were just above the laboratory's limit of quantitation (LOQ), at 0.84 mg/L in October 2017, 0.78 mg/L in April 2018, 0.81 mg/L in October 2018, and 0.87 mg/L in April 2019. These results are within the range of reported natural concentrations, indicating that the fluoride concentration observed in this well is likely due to natural variability in the glacial sediments and shallow groundwater. As discussed below, there is also a potential that fluoride in MW-302 is associated with impacts from the closed CCR landfill.

4.1.2 Man-Made Alternative Sources

Man-made alternative sources that could potentially contribute to the boron, fluoride, pH, and sulfate SSIs could include the closed CCR landfill, the coal storage area, or other plant operations. Based on the groundwater flow directions and on previous investigations at the site, the closed landfill appears to be the most likely cause of the SSIs for wells MW-301, MW-302, and MW-303.

4.2 LINES OF EVIDENCES

The lines of evidence indicating that the SSIs for boron, sulfate, fluoride, and pH in compliance wells MW-301, MW-302, and MW-303, relative to the background well, are due to an alternative source include:

1. A previous study of the CCR ponds and the closed CCR landfill determined that the landfill was the primary source of groundwater impacts in the area, based on multiple lines of evidence.

2. Past and current monitoring performed under the state monitoring program shows that boron, sulfate, fluoride, and elevated pH are all present in the CCR landfill leachate.

3. Past and current monitoring performed under the state monitoring program shows that the highest boron and sulfate concentrations are in the monitoring wells near and downgradient from the CCR landfill.

Lines of evidence regarding natural variability as an additional alternative source of the fluoride and pH SSIs are discussed above in **Section 4.1.1**.

Each of these lines of evidence and the supporting data were discussed in detail in the ASD for the April 2019 detection monitoring event (SCS, 2018b). The lines of evidence are discussed briefly below, focusing on any updated information collected since the previous ASDs.

4.2.1 Previous CCR Pond and Landfill Study

A previous investigation titled *Field Investigation Report: Edgewater Closed Ash Disposal Facility*, completed by BT[2] in 1993, found that groundwater impacts were likely due to the closed landfill (**Figure 2**) located immediately west of the ponds (BT[2], 1993). The purpose of the 1993 investigation was to investigate the likely impact on groundwater quality of lining or abandoning the CCR impoundments (referred to in the report as the Wisconsin Pollutant Discharge Elimination System [WPDES] lagoons). The results from the investigation indicated that the CCR impoundments were not the primary source of downgradient groundwater impacts, and that closure or lining was not warranted. The WDNR concurred with that finding in a letter dated April 20, 1994.

The primary lines of evidence from the 1993 report that supported this finding, and support the ASD for boron, sulfate, fluoride, and pH, included:

- Water samples collected from each of the ponds met the Wisconsin groundwater enforcement standards established under NR 140, Wisconsin Administrative Code.

- Soil borings installed in the material below the larger ash pond, where the slag pond and the WDPES lagoons (North Pond A and South Pond A) were constructed is almost entirely slag material. Water leaking out of the lagoons and moving downward would encounter primarily slag, which is relatively inert, and not fly ash. Additionally, results for water leach testing of site-wide composite samples of fly ash and slag confirmed that the fly ash had a higher potential than slag to impact groundwater. Water leach test results for the fly ash composite sample were higher for boron, sulfate, fluoride, and pH in comparison to the slag composite sample.

- Water leach testing for individual boring samples of fly ash and/or slag also confirmed that fly ash leachate had significantly higher concentrations of boron and sulfate than slag leachate. Boron leach test results for nine samples from borings around and between the ponds, consisting mainly of slag, ranged from less than 16 to 206 µg/L.

- Water sampling within the landfill and pond area, in CCR above the native soil, documented that groundwater/leachate within the landfill had significantly higher concentrations of boron than the groundwater/leachate within the slag berms immediately adjacent to and between the Slag Pond, North/South Pond A, and Pond B.

- Groundwater monitoring results indicated that the highest concentrations of boron and sulfate were in monitoring wells downgradient from the landfill, including 18-OW and 29-OW. Elevated boron and sulfate were also reported for samples from wells 4-OW and 5-OW, located near the southwest and northwest corners of the landfill. Monitoring wells 6-OW and 7-OW, located east and southeast of the ponds, had much lower concentrations of boron and sulfate.

In the April 1994 approval letter, the WDNR approved the 1993 investigation of the WPDES lagoons/CCR impoundments and concurred with the findings of the report. The WDNR requested additional monitoring from the four new monitoring wells installed within the CCR (36-OW, 37-OW, 38R-OW, and 39R-OW) and requested the addition of fluoride and arsenic to the monitoring program for these groundwater/leachate head wells.

The results of the additional monitoring were reported to the WDNR in a Groundwater Assessment Report dated September 30, 1997. The WDNR responded to the 1997 report in a letter dated April 16, 1998, which stated, "We agree with the report's finding that the WPDES ponds [Slag Pond, North Pond A, and South Pond A] do not appear to be significantly contributing to the contaminant plume downgradient of the facility. No further remedial action concerning the influence of the ponds on the landfill is warranted at this time." The WDNR also noted that the leachable constituents migrating from the saturated portion of the closed landfill have stabilized or also decreased since the landfill's closure and capping.

4.2.2 CCR Constituents in Landfill Leachate

Past and current monitoring performed under the state monitoring program shows that boron, sulfate, fluoride, and elevated pH are all present in the CCR landfill leachate. Recent groundwater and leachate monitoring results for boron, sulfate, and pH in samples from the state monitoring program wells are summarized in **Table 4** (April 2016 through April 2019). The leachate head wells monitoring conditions within the CCR landfill are 37-OW, 38R-OW, and 39R-OW, listed near the end of the table.

Boron: Boron concentrations in samples from leachate head wells 37-OW, 38R-OW, and 39R-OW have generally exceeded those reported for the CCR monitoring wells.

Sulfate: Sulfate concentrations in samples from, leachate head wells 37-OW, 38R-OW, and 39R-OW have generally exceeded those reported for the CCR monitoring wells.

Field pH: Field pH results for the three leachate head wells continue to have pH measurements that are slightly higher than the pH UPL calculated from the well 2R-OW background data. Thirteen of the 21 leachate field pH readings for April 2016 through April 2019 were higher than the calculated UPL. While slightly higher pH values were reported for the CCR well samples in April 2019, the range of pH values for the CCR compliance wells has generally been similar to recent pH results for leachate wells 37-OW and 38R-OW. Historically pH values at leachate head well 39R-OW were in the range of 8 to 9, but pH has followed a gradual decreasing trend at this well since routine monitoring began in 1994.

Fluoride: Fluoride is not part of the routine state monitoring program for the closed CCR landfill, but was sampled from the leachate wells (37-OW, 38R-OW, and 39R-OW) and the pond berm well (36-OW) from 1994 to 1997, as requested by the WDNR. The fluoride concentrations ranged from 0.25 to 0.97 mg/L (**Table 5**). Three of the four historic fluoride results from leachate head well 39R-OW equal or exceed the April 2019 fluoride concentration for MW-302.

Based on these results, fly ash disposal in the closed CCR landfill is a likely historical source of elevated boron, sulfate, pH, and fluoride.

4.2.3 State Program Groundwater Monitoring Results

Current monitoring performed under the state monitoring program continues to show that the highest boron and sulfate concentrations are in the monitoring wells near and downgradient from the CCR landfill. State program monitoring results for the CCR Rule detection monitoring parameters that overlap with the state program are summarized in **Table 4**, and well locations are on **Figure 2**.

Consistent with the conditions observed at the time of the 1993 report, the recent groundwater monitoring results indicate that the highest concentrations of boron and sulfate are in monitoring

wells downgradient from the landfill, including 18-OW (recently replaced by 40-OW) and 29-OW. Elevated boron and sulfate also continue to be reported for samples from wells 4-OW and 5-OW, located near the southwest and northwest corners of the landfill.

5.0 ALTERNATIVE SOURCE DEMONSTRATION CONCLUSIONS

The lines of evidence discussed above regarding the SSIs reported for boron, fluoride, field pH, and sulfate concentrations in downgradient monitoring wells MW-301, MW-302, and/or MW 303 demonstrate that the SSIs are likely primarily due to leachate from the closed landfill, which is not subject to the requirements of 40 CFR 257.50-107. The landfill is regulated by the WDNR under the solid waste program. The SSIs for fluoride and field pH at MW-301 and MW 302 may also be partially due to natural variability within the glacial sediment aquifer.

6.0 SITE GROUNDWATER MONITORING RECOMMENDATIONS

In accordance with section 257.94(e)(2) of the CCR Rule, the EDG pond 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

7.0 REFERENCES

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2 Analytical Results – CCR Ponds Detection Monitoring Program
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Table 1. Detection Monitoring Results Summary - October 2017 - April 2019
Edgewater Generating Station, Sheboygan, Wisconsin / SCS Engineers Project #25219068.00

Parameter Name	Units	Interwell Upper Prediction Limit (UPL)	Background Well				Compliance Wells											
			2R-OW				MW-301				MW-302				MW-303			
			10/24/2017	4/2/2018	10/1/2018	4/8/2019	10/24/2017	4/2/2018	10/1/2018	4/8/2019	10/24/2017	4/2/2018	10/1/2018	4/8/2019	10/24/2017	4/2/2018	10/1/2018	4/8/2019
Boron	ug/L	107	55.9	19.7	34.7	35.8	**8,820**	**7,950**	**8,230**	**7,310**	**1,760**	**1,800**	**1,570**	**1,670**	**3,480**	**3,040**	**2,360**	**2,930**
Calcium	mg/L	206,247	170,000	121,000	190,000	121,000	87,200	78,900	88,800	77,500	68,100	68,000	64,700	64,800	173,000	146,000	139,000	135,000
Chloride	mg/L	378	305	108	462	55.3	11.9	11.2	11.5	11.4	18.9	18.5	18.6	18.4	20.4	19.7	4.3	20
Fluoride	mg/L	LOQ (varies by well)	<0.1 U	0.12 J	<0.10	<0.10	<0.1 U	0.25 J	0.2 J	0.29	**0.84**	**0.78**	**0.81**	**0.87**	<0.5 U	<0.5 U	<0.10	<0.50
Field pH	Std. Units	7.47	7.23	7.29	7.03	8.57	7.43	**8.02**	**7.71**	**8.18**	**7.6**	**7.78**	**7.99**	**7.98**	7.14	6.86	6.93	7.15
Sulfate	mg/L	35	29.3	17.2	37.2	10.6	**341**	**332**	**318**	**322**	**72.2**	**72.7**	**59.2**	**71.7**	<5 U	<5.0 U	<0.10	<5.0
Total Dissolved	mg/L	1,145	1010	680	1,260	610	772	752	722	724	316	314	306	324	566	630	620	668

149 Statistically significant increase at compliance well

Updated: NDK Date: 8/16/2019
Checked By: AJR Date: 8/19/2019

Notes:
1. UPL based on parametric prediction limit based on 1-of-2 resampling methodology for all parameters except calcium and fluoride.
2. UPL for fluoride is non-parametric based on quantitation limit. UPL for calcium based on non-parametric prediction limit (highest background value).
3. UPLs calculated from background well results for April 2016 through October 2017.

I:\25219068.00\Deliverables\2019 April ASD EDG\Tables\[EDG-closed-Tables 1,2,3,4,5.xlsx]Table 1

Table 2. Analytical Results - CCR Ponds Detection Monitoring Program
Edgewater Generating Station, Sheboygan, Wisconsin / SCS Engineers Project #25219068.00

Well Group	Well	Collection Date	Boron (µg/L)	Field pH (Std. Units)	Fluoride (mg/L)	Sulfate (mg/L)
Background	2R-OW	4/8/2016	100	7.34	<0.2 U	19.5
		6/20/2016	22.4	7.02	<0.2 U	28.0
		8/9/2016	32.6	6.10	<0.2 U	25.4
		10/20/2016	43.1	6.98	<0.1 U	21.6
		1/24/2017	31.2	7.15	<0.1 U	23.9
		4/6/2017	70.6	7.01	<0.1 U	17.6
		6/6/2017	45.2	6.86	<0.1 U	17.8
		8/1/2017	35.7	7.00	<0.1 U	28.8
		10/23/2017	55.9	7.23	<0.1 U	29.3
		4/2/2018	19.7	7.29	0.12 J	17.2
		10/1/2018	34.7	7.03	<0.1 U	37.2
		4/8/2019	35.8	8.57	<0.1 U	10.6
Compliance	MW-301	4/11/2016	8,550	7.91	0.33 J	372
		6/20/2016	8,190	7.48	0.36 J	343
		8/9/2016	8,450	6.47	0.33 J	368
		10/20/2016	8,620	7.68	0.34	369
		1/23/2017	9,280	8.03	0.42	372
		4/6/2017	8,370	7.98	0.21 J	367
		6/6/2017	9,160	7.70	<0.1 U	362
		8/2/2017	8,610	7.58	0.32	340
		10/24/2017	8,820	7.43	<0.1 U	341
		4/2/2018	7,950	8.02	0.25 J	332
		10/1/2018	8,230	7.71	0.2 J	318
		4/8/2019	7,310	8.18	0.29 J	322
	MW-302	4/8/2016	1,950	8.01	0.83	75.1
		6/20/2016	2,010	7.73	1.3 J	89.6
		8/9/2016	2,000	6.55	0.8	80.7
		10/20/2016	2,150	7.89	0.8	77.2
		1/24/2017	2,000	7.98	0.89 J	71.1
		4/6/2017	1,970	7.99	0.76	85.8
		6/6/2017	1,970	7.84	0.9	88.5
		8/2/2017	1,890	7.76	0.78	80.2
		10/24/2017	1,760	7.60	0.84	72.2
		4/2/2018	1,800	7.78	0.78	72.7
		10/1/2018	1,570	7.99	0.81	59.2
		4/8/2019	1,670	7.98	0.87	71.7
	MW-303	4/8/2016	4,210	7.04	<0.2 U	3 J
		6/20/2016	3,360	6.79	<1 U	11.4 J
		8/9/2016	3,860	6.09	<0.2 U	2.4 J
		10/20/2016	3,740	6.94	<0.5 U	5.6 J
		1/24/2017	4,210	6.94	<0.5 U	<5 U
		4/6/2017	4,170	6.88	<0.5 U	<5 U
		6/6/2017	4,570	7.00	<0.5 U	<5 U
		8/2/2017	3,780	6.94	<0.5 U	<5 U
		10/24/2017	3,480	7.14	<0.5 U	<5 U
		4/2/2018	3,040	6.86	<0.5 U	<5 U
		10/1/2018	2,360	6.93	<0.10 U	<1.0 U
		4/8/2019	2,930	7.15	<0.5 U	<5.0 U

Table 2. Analytical Results - CCR Ponds Detection Monitoring Program
Edgewater Generating Station, Sheboygan, Wisconsin / SCS Engineers Project #25219068.00

Abbreviations:
µg/L = micrograms per liter or parts per billion (ppb)
mg/L = milligrams per liter or parts per million (ppm)
-- = not analyzed

U = Not detected
J = Estimated value below laboratory's limit of quantitation (LOQ)

Notes:
1. Complete laboratory reports included in 2017 Annual Groundwater Monitoring and Corrective Action Report, Edgewater Generating Station.

Created by:	NDK	Date:	3/2/2018
Last revision by:	NDK	Date:	8/16/2019
Checked by:	AJR	Date:	8/19/2019

I:\25219068.00\Deliverables\2019 April ASD EDG\Tables\[EDG-closed-Tables 1,2,3,4,5.xlsx]Table 2. CCR Analytical

Table 3. Groundwater Elevations - CCR Rule Monitoring Wells
Edgewater Generating Station, Sheboygan, Wisconsin
SCS Engineers Project #25219068.00

Ground Water Elevation in feet above mean sea level (amsl)				
Well Number	**MW-301**	**MW-302**	**MW-303**	**2R-OW**
Top of Casing Elevation (feet amsl)	604.42	615.15	611.99	612.72
Screen Length (ft)	5.00	5.00	5.00	10.00
Total Depth (ft from top of casing)	27.47	40.00	33.26	14.50
Top of Well Screen Elevation (ft)	581.95	580.15	579.60	--
Measurement Date				
April 8, 2016	599.75	596.19	589.04	609.68
June 20, 2016	598.30	595.68	587.22	606.70
August 9, 2016	598.00	595.53	587.72	605.74
October 20, 2016	598.50	595.46	588.37	607.27
January 23-24, 2017	597.10	596.30	588.84	609.64
April 6, 2017	600.04	593.57	589.04	609.72
June 6, 2017	598.77	595.86	588.44	607.63
August 1, 2017	597.40	595.22	587.36	604.59
October 24, 2017	597.20	595.25	587.97	601.74
April 2, 2018	598.54	595.71	588.77	607.87
October 1, 2018	597.60	595.28	588.17	604.61
April 8, 2019	598.92	595.68	588.88	609.50
Bottom of Well Elevation (ft)	576.95	575.15	578.73	598.22

Notes:
Groundwater elevations compiled from field notes during sampling events.
-- = not measured

Created by:	NDK	Date:	2/28/2018
Last rev. by:	NDk	Date:	8/16/2019
Checked by:	AJR	Date:	8/19/2019

I:\25219068.00\Deliverables\2019 April ASD EDG\Tables\[EDG-closed-Tables 1,2,3,4,5.xlsx]Table 3. GW elev - CCR

Table 4. 2016 - 2019 Groundwater Analytical Results -
Closed Landfill State Monitoring Program Wells
WPL - Edgewater Generating Station / SCS Project #25219068
Sheboygan, Wisconsin

Point Name	Reporting Period	ph-Field (standard units)	Boron, dissolved (µg/L as B)	Sulfate, dissolved (mg/L as SO_4)
Monitoring Wells				
2R-OW	2016-Apr	7.45	26.6	30.9
2R-OW	2016-Oct	6.98	40.4	22.9
2R-OW	2017-Apr	7.30	69.3 J	28.6
2R-OW	2017-Oct	7.66	35.2	32.9
2R-OW	2018-Apr	7.29	23.3	18.2
2R-OW	2018-Oct	7.03	41.8	35.5
2R-OW	2019-Apr	8.57	40.6	12.2
3R-OW	2016-Apr	7.41	392	533
3R-OW	2016-Oct	7.32	468	372
3R-OW	2017-Apr	7.35	400	409
3R-OW	2017-Oct	7.39	389	637
3R-OW	2018-Apr	7.24	351	498
3R-OW	2018-Oct	7.03	462	495
3R-OW	2019-Apr	7.70	337	279
4R-OW	2016-Apr	7.69	7,710	120
4R-OW	2016-Oct	7.71	17,300	252
4R-OW	2017-Apr	7.44	12,600	180
4R-OW	2017-Oct	7.31	15,700	178
4R-OW	2018-Apr	7.51	12,700	164
4R-OW	2018-Oct	7.22	8,630	129
4R-OW	2019-Apr	6.67	10,200	158
5-OW	2016-Apr	7.64	4,330	215
5-OW	2016-Oct	7.75	5,970	210
5-OW	2017-Apr	7.51	5,490	258
5-OW	2017-Oct	7.54	6,040	230
5-OW	2018-Apr	7.90	3,900	143
5-OW	2018-Oct	7.43	6,180	226
5-OW	2019-Apr	6.74	4,140	197
7-OW	2016-Apr	8.14	610	255
7-OW	2016-Oct	7.59	964	251
7-OW	2017-Apr	8.10	761	259
7-OW	2017-Oct	7.73	1,130	246
7-OW	2018-Apr	8.08	818	243
7-OW	2018-Oct	7.69	1150	218
7-OW	2019-Apr	7.85	914	254
29-A	2016-Apr	9.07	357	40.9
29-A	2016-Oct	8.54	264	39.6
29-A	2017-Apr	9.09	365	41.5
29-A	2017-Oct	8.97	278	42.1
29-A	2018-Apr	8.72	264	39.4
29-A	2018-Oct	8.38	268	39.2
29-A	2019-Apr	8.10	292	44.2

Table 4. 2016 - 2019 Groundwater Analytical Results -
Closed Landfill State Monitoring Program Wells
WPL - Edgewater Generating Station / SCS Project #25219068
Sheboygan, Wisconsin

Point Name	Reporting Period	ph-Field (standard units)	Boron, dissolved (µg/L as B)	Sulfate, dissolved (mg/L as SO_4)
Monitoring Wells (continued)				
29-OW	2016-Apr	8.03	10,600	120
29-OW	2016-Oct	7.69	10,900	85.7
29-OW	2017-Apr	8.49	9,500	77
29-OW	2017-Oct	8.15	9,060	62
29-OW	2018-Apr	7.97	8,640	102
29-OW	2018-Oct	7.84	11,000	109
29-OW	2019-Apr	7.89	10,600	190
30-OW	2016-Apr	8.26	79	4.8
30-OW	2016-Oct	7.56	113	4.6
30-OW	2017-Apr	8.47	176	7.5
30-OW	2017-Oct	7.44	135	16.7
30-OW	2018-Apr	7.96	94.5	21.5
30-OW	2018-Oct	7.47	115	11.4
30-OW	2019-Apr	8.07	52.1	2.4 J
31-OW	2016-Apr	7.63	114	91.2
31-OW	2016-Oct	7.68	35	63.3
31-OW	2017-Apr	7.99	77	82.4
31-OW	2017-Oct	7.79	190	70.3
31-OW	2018-Apr	7.71	30.8	51.5
31-OW	2018-Oct	7.64	36.7	62.7
31-OW	2019-Apr	7.95	18.5	68.6
40-OW	2016-Apr	8.04	8,030	731
40-OW	2016-Oct	7.91	29,400	768
40-OW	2017-Apr	7.97	8,680	849
40-OW	2017-Oct	7.91	8,800	873
40-OW	2018-Apr	7.93	9,790	771
40-OW	2018-Oct	7.51	11,300	797
40-OW	2019-Apr	6.80	8,620	636
Leachate Monitoring Wells				
37-OW	2016-Apr	7.49	19,100	759
37-OW	2016-Oct	7.31	12,500	439
37-OW	2017-Apr	8.01	15,900	633
37-OW	2017-Oct	7.24	9,440	264
37-OW	2018-Apr	7.68	5,890	159
37-OW	2018-Oct	7.42	16,600	555
37-OW	2019-Apr	7.57	15,800	492
38R-OW	2016-Apr	8.00	33,800	1,000
38R-OW	2016-Oct	7.71	17,100	514
38R-OW	2017-Apr	7.86	21,100	932
38R-OW	2017-Oct	7.72	10,800	364
38R-OW	2018-Apr	7.72	4,250	123
38R-OW	2018-Oct	7.98	32,400	956
38R-OW	2019-Apr	7.64	9,720	330

Table 4. 2016 - 2019 Groundwater Analytical Results -
Closed Landfill State Monitoring Program Wells
WPL - Edgewater Generating Station / SCS Project #25219068
Sheboygan, Wisconsin

Point Name	Reporting Period	ph-Field (standard units)	Boron, dissolved (µg/L as B)	Sulfate, dissolved (mg/L as SO_4)
Leachate Monitoring Wells (continued)				
39R-OW	2016-Apr	7.26	10,100	534
39R-OW	2016-Oct	7.32	29,900	1,390
39R-OW	2017-Apr	7.44	22,400	1,150
39R-OW	2017-Oct	7.52	32,800	1,400
39R-OW	2018-Apr	7.76	28,800	772
39R-OW	2018-Oct	7.40	24,700	1,160
39R-OW	2019-Apr	7.14	26,000	1,520

Abbreviations:
µg/L = micrograms per liter or parts per billion (ppb)
mg/L = milligrams per liter or parts per million (ppm)

Laboratory Notes:
J: Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

Created by:	SCC	Date:	2/24/2014
Last revision by:	NDK	Date:	8/16/2019
Checked by:	AJR	Date:	8/19/2019

I:\25219068.00\Deliverables\2019 April ASD EDG\Tables\[EDG-closed-Tables 1,2,3,4,5.xlsx]Table 4. GW quality Data

Table 5. Analytical Results - Closed Landfill Leachate Fluoride Monitoring
Edgewater Generating Station, Sheboygan, Wisconsin
SCS Engineers Project #25219068.00

Collection Date	Fluoride (mg/L)			
	36-OW	37-OW	38R-OW	39R-OW
9/8/1994	0.25	0.62	0.57	0.79
9/14/1995	0.38	0.51	0.71	0.87
9/17/1996	0.56	0.42	0.71	0.97
9/16/1997	0.60	0.44	0.73	0.97

Abbreviations:
mg/L = milligrams per liter or parts per million (ppm)

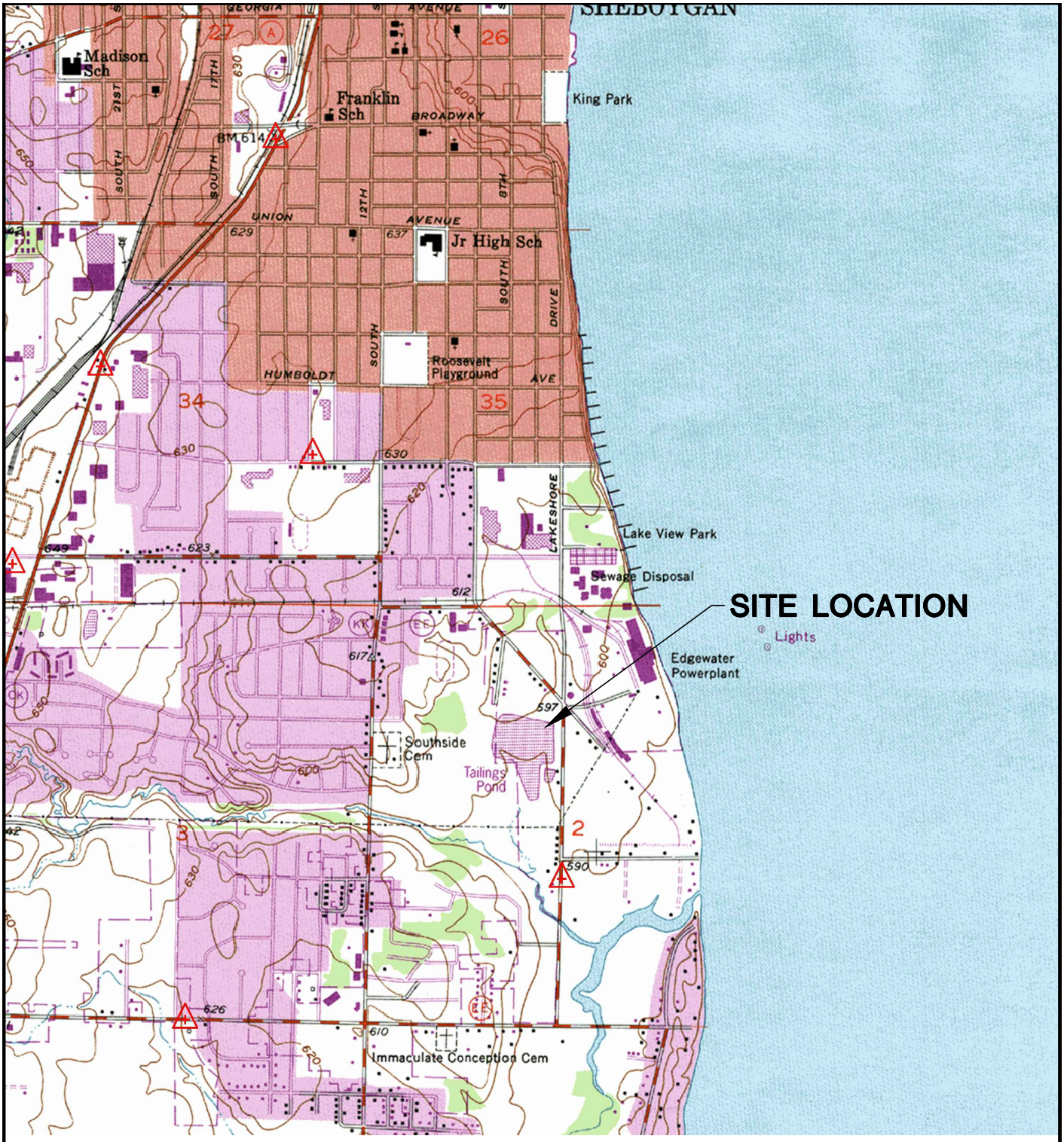
Notes:
1. Data compiled from WDNR Groundwater Environmental Monitoring System (GEMS) website.

Created by:	NDK	Date:	3/5/2018
Last revision by:	NDK	Date:	3/5/2018
Checked by:	AJR	Date:	4/5/2018

I:\25219068.00\Deliverables\2019 April ASD EDG\Tables\[EDG-closed-Tables 1,2,3,4,5.xlsx]Table 5- Fl results

Figures

1 Site Location Map
2 Monitoring Well Location Map
3 Water Table Map – April 2019



N

SHEBOYGAN SOUTH QUADRANGLE
WISCONSIN–SHEBOYGAN CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)
NW/4 SHEBOYGAN SOUTH 15' QUADRANGLE
1994
SCALE: 1" = 2,000'

CLIENT	WISCONSIN POWER AND LIGHT EDGEWATER GENERATING STATION 3739 LAKESHORE DRIVE SHEBOYGAN, WI 53081	SITE	EDGEWATER 1–4 (CLOSED) ASH DISPOSAL FACILITY

SITE LOCATION MAP

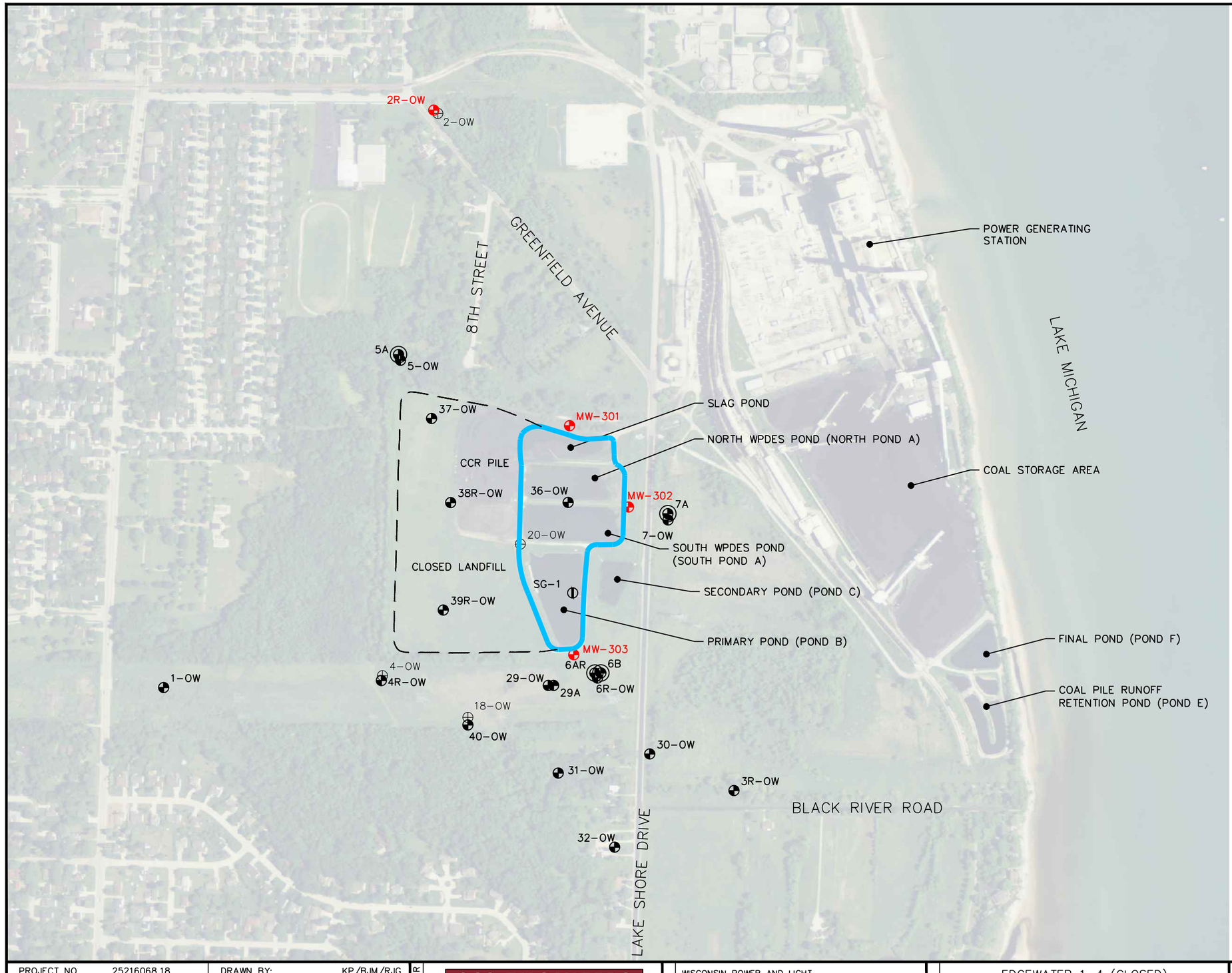
PROJECT NO.	25216068.18	DRAWN BY:	KP
DRAWN:	02/28/14	CHECKED BY:	MB
REVISED:	02/28/14	APPROVED BY:	SC 04/16/18

ENGINEER

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

FIGURE
1

I:\25216068.00\Drawings\Site Loc.dwg, 4/9/2019 11:19:08 AM



LEGEND

- ABANDONED MONITORING WELL
- MONITORING WELL
- PIEZOMETER
- CCR RULE MONITORING WELL
- CCR RULE LIMITS
- CLOSED LANDFILL LIMITS

NOTES:

1. AERIAL PHOTOGRAPH FROM THE NATIONAL AGRICULTURE IMAGERY PROGRAM AND PUBLISHED BY THE USDA FSA AERIAL PHOTOGRAPHY FIELD OFFICE. DATE OF IMAGE IS OCTOBER 1, 2013.
2. EXISTING WELL LOCATIONS ARE APPROXIMATE AND ARE BASED ON OCTOBER 2011 WATER TABLE MAP PREPARED BY TRC.
3. CCR RULE LIMITS AND CLOSED LANDFILL LOCATION ARE APPROXIMATE.
4. NEW MONITORING WELL LOCATIONS WERE SURVEYED BY CQM, INC. ON FEBRUARY 12, 2016.

500 0 500

SCALE: 1" = 500'

PROJECT NO.	25216068.18	DRAWN BY:	KP/BJM/RJG
DRAWN:	02/28/14	CHECKED BY:	KAK
REVISED:	10/09/18	APPROVED BY:	TK 10/10/19

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

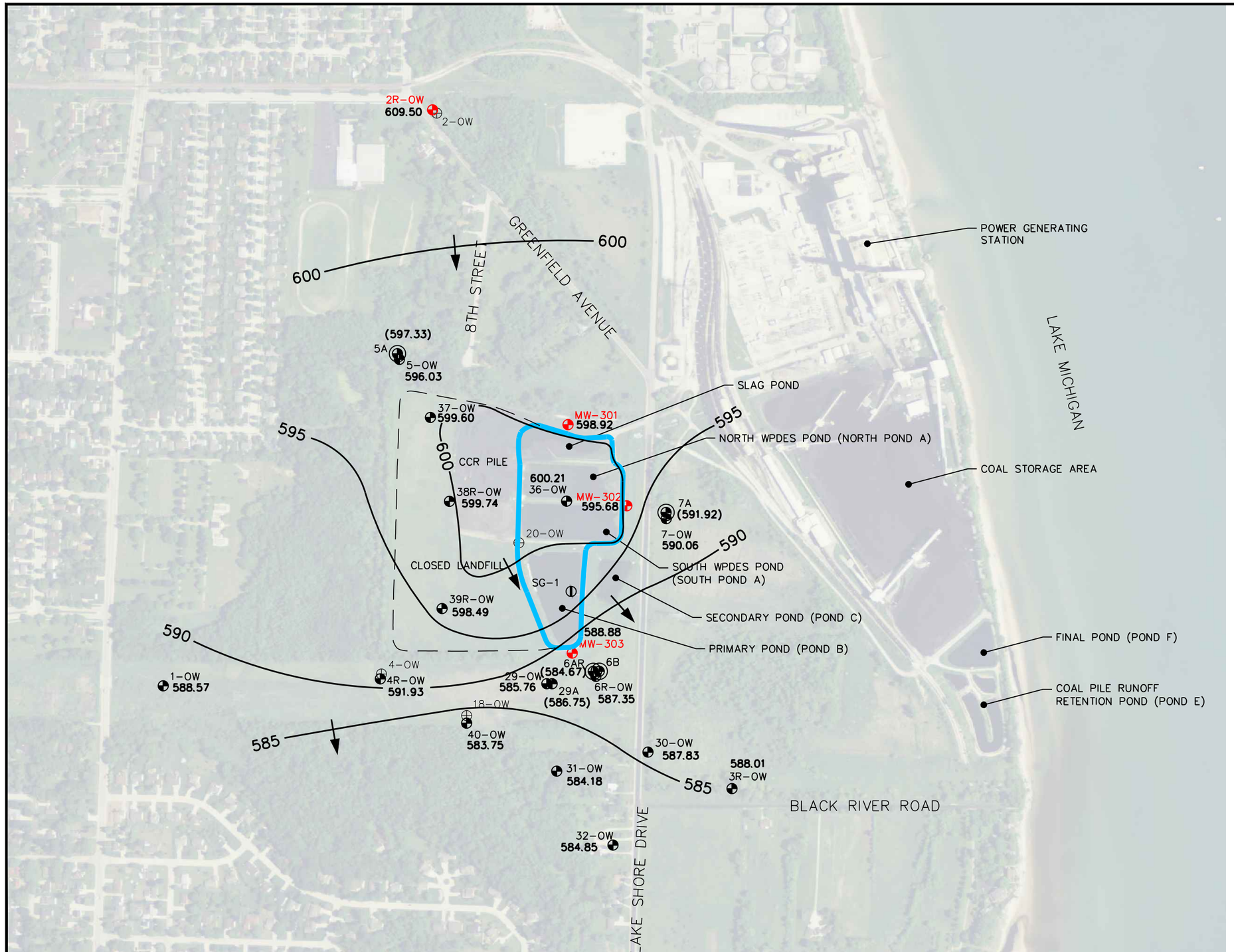
CLIENT: WISCONSIN POWER AND LIGHT
EDGEWATER GENERATING STATION
3739 LAKESHORE DRIVE
SHEBOYGAN, WI 53081

SITE: EDGEWATER 1-4 (CLOSED)
ASH DISPOSAL FACILITY
SHEBOYGAN, WISCONSIN

MONITORING WELL LOCATION MAP

FIGURE 2

I:\25216068.00\Drawings\2. Monitoring Well Location Map.dwg, 10/9/2019 9:43:49 PM



N

LEGEND

⊕	ABANDONED MONITORING WELL
◒	MONITORING WELL
◎	PIEZOMETER
◒	CCR RULE MONITORING WELL
▬▬	CCR RULE LIMITS
— — —	CLOSED LANDFILL LIMITS
598.54	WATER TABLE ELEVATION (APRIL 8, 2019)
(591.92)	PIEZOMETRIC SURFACE ELEVATION (APRIL 8, 2019)
———	WATER TABLE CONTOUR (5' INTERVAL)
→	APPROXIMATE GROUNDWATER FLOW DIRECTION

NOTES:

1. AERIAL PHOTOGRAPH FROM THE NATIONAL AGRICULTURE IMAGERY PROGRAM AND PUBLISHED BY THE USDA FSA AERIAL PHOTOGRAPHY FIELD OFFICE. DATE OF IMAGE IS OCTOBER 1, 2013.
2. EXISTING WELL LOCATIONS ARE APPROXIMATE AND ARE BASED ON OCTOBER 2011 WATER TABLE MAP PREPARED BY TRC.
3. DESIGN MANAGEMENT ZONE LOCATION IS APPROXIMATE.
4. NEW MONITORING WELL LOCATIONS WERE SURVEYED BY CQM, INC. ON FEBRUARY 12, 2016.

500 0 500

SCALE: 1" = 500'

PROJECT NO.	25219068.00	DRAWN BY:	BSS/KP
DRAWN:	08/19/19	CHECKED BY:	NDK
REVISED:	09/10/19	APPROVED BY:	TK 10/10/19

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

CLIENT: WISCONSIN POWER AND LIGHT
EDGEWATER GENERATING STATION
3739 LAKESHORE DRIVE
SHEBOYGAN, WI 53081

SITE: EDGEWATER 1-4 (CLOSED)
ASH DISPOSAL FACILITY
SHEBOYGAN, WISCONSIN

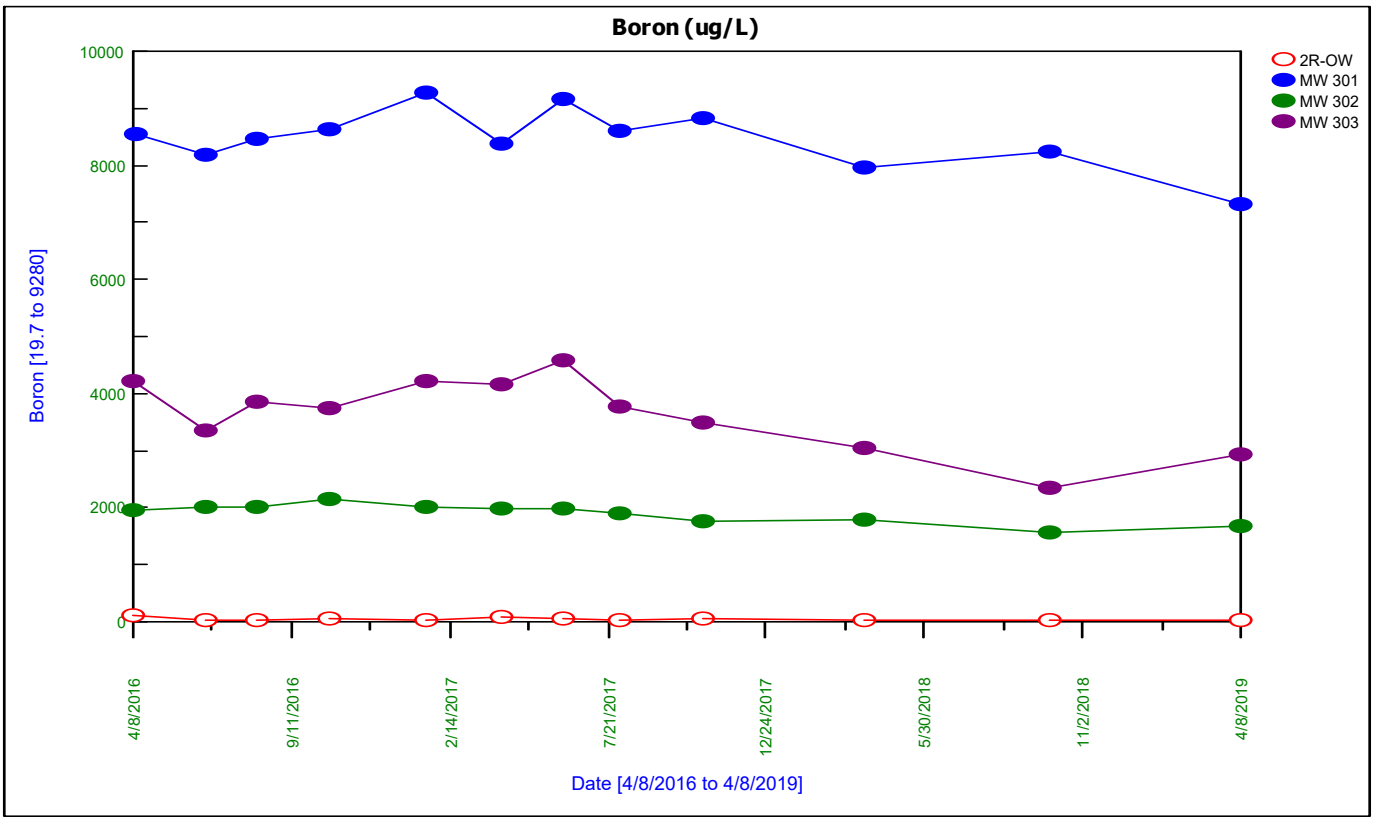
WATER TABLE MAP
APRIL 8, 2019

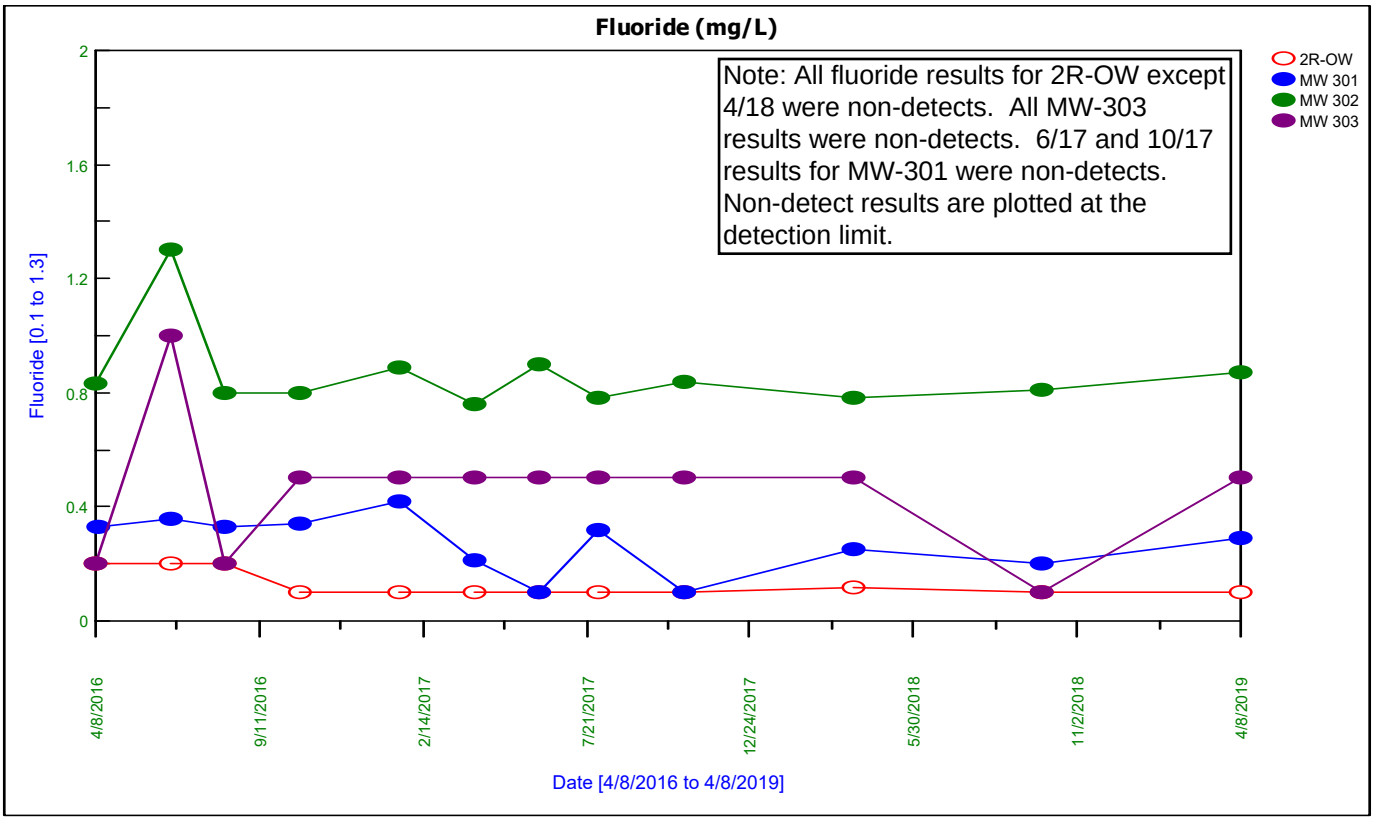
FIGURE
3

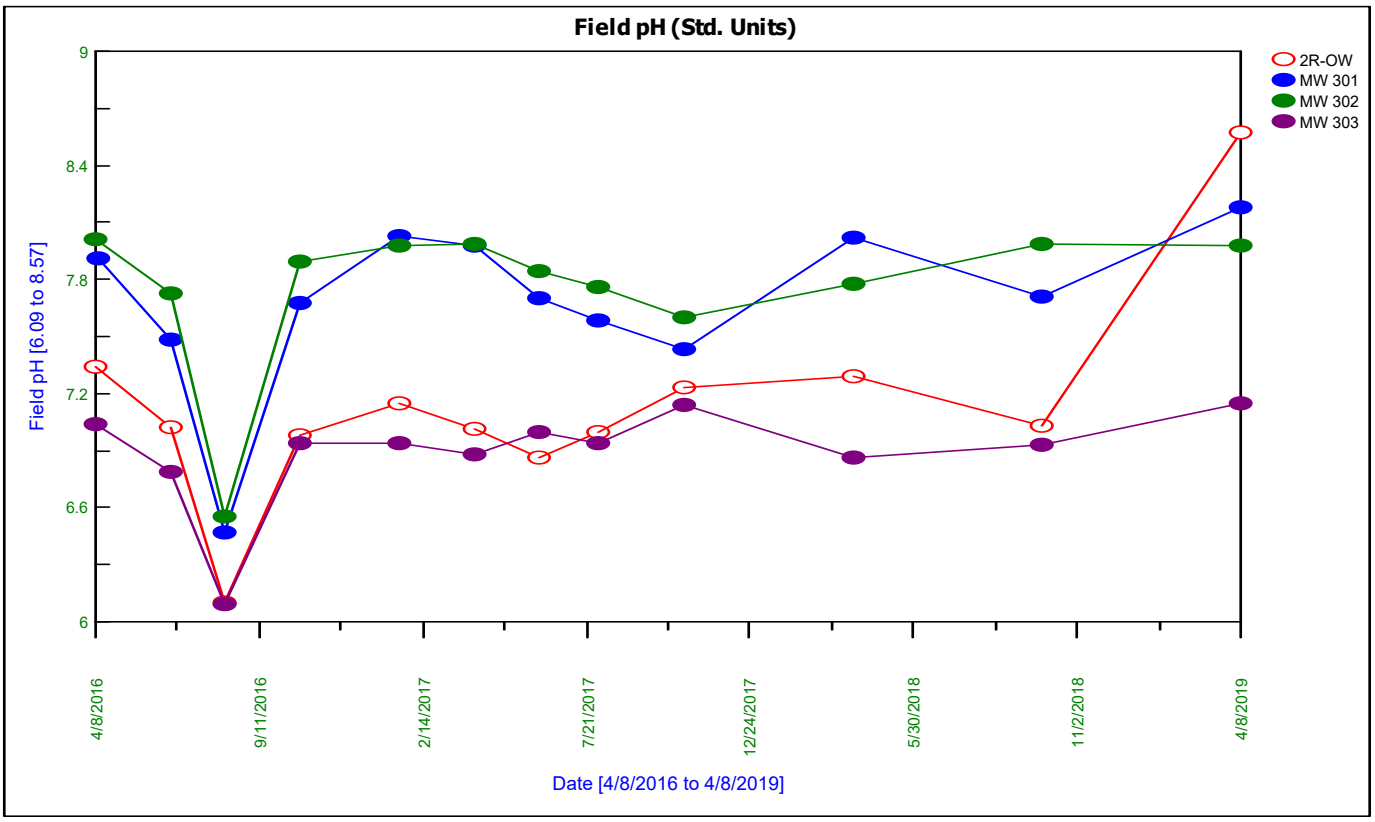
I:\25219068.00\Drawings\Water Table\wtles.dwg, 10/9/2019 9:35:18 PM

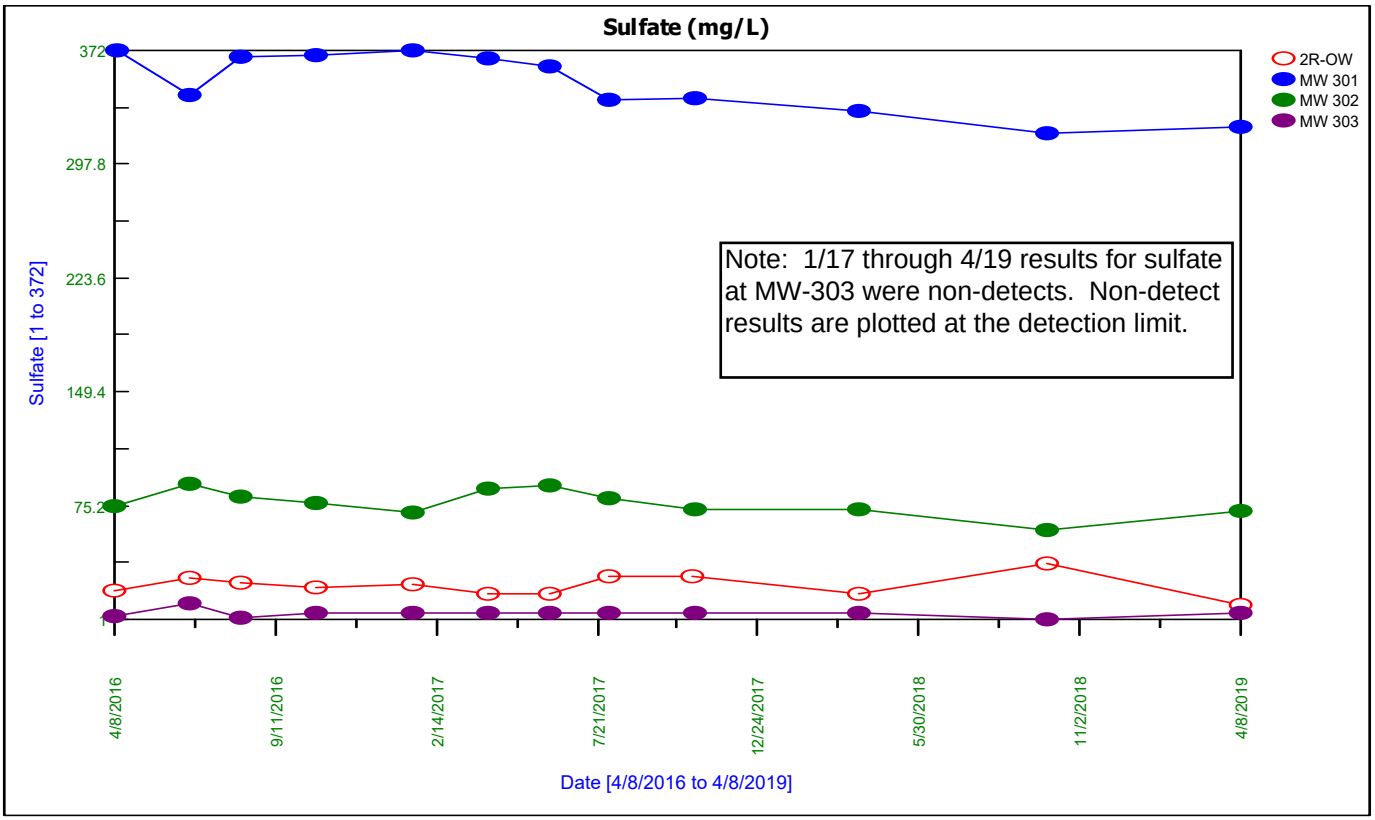
Appendix A

Trend Plots for CCR Wells


Boron (ug/L)
10000
8000
6000
4000
2000
0
Boron [19.7 to 9280]
2R-OW
MW 301
MW 302
MW 303
4/8/2016
9/11/2016
2/14/2017
7/21/2017
12/24/2017
5/30/2018
11/2/2018
4/8/2019
Date [4/8/2016 to 4/8/2019]


Fluoride (mg/L)
2
1.6
1.2
0.8
0.4
0
Fluoride [0.1 to 1.3]
Note: All fluoride results for 2R-OW except 4/18 were non-detects. All MW-303 results were non-detects. 6/17 and 10/17 results for MW-301 were non-detects. Non-detect results are plotted at the detection limit.
2R-OW
MW 301
MW 302
MW 303
4/8/2016
9/11/2016
2/14/2017
7/21/2017
12/24/2017
5/30/2018
11/2/2018
4/8/2019
Date [4/8/2016 to 4/8/2019]


Field pH (Std. Units)
9
8.4
7.8
7.2
6.6
6
Field pH [6.09 to 8.57]
2R-OW
MW 301
MW 302
MW 303
4/8/2016
9/11/2016
2/14/2017
7/21/2017
12/24/2017
5/30/2018
11/2/2018
4/8/2019
Date [4/8/2016 to 4/8/2019]


Sulfate (mg/L)
372
297.8
223.6
149.4
75.2
1
Sulfate [1 to 372]
2R-OW
MW 301
MW 302
MW 303
Note: 1/17 through 4/19 results for sulfate at MW-303 were non-detects. Non-detect results are plotted at the detection limit.
4/8/2016
9/11/2016
2/14/2017
7/21/2017
12/24/2017
5/30/2018
11/2/2018
4/8/2019
Date [4/8/2016 to 4/8/2019]