Semiannual Progress Report
Selection of Remedy –
Prairie Creek Generating Station

Prairie Creek Generating Station
Cedar Rapids, Iowa

Prepared for:

Alliant Energy

SCS ENGINEERS

25220084.00 | March 13, 2023

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

Table of Contents

Section Page

Tables

Figures

I:\25220084.00\Deliverables\2023 Semiannual - Remedy Selection\2023 March Semiannual Update\230313_PCS_Semiannual - Remedy Selection_Final.docx

[This page left blank intentionally]

1.0 INTRODUCTION AND PURPOSE

The Semiannual Progress Report for remedy selection at the Interstate Power and Light Company (IPL) Prairie Creek Generating Station (PCS) was prepared to comply with U.S. Environmental Protection Agency (U.S. EPA) regulations regarding the Disposal of Coal Combustion Residuals (CCR) from Electric Utilities [40 CFR 257.50-107], or the "CCR Rule" (Rule). Specifically, the selection of remedy process was initiated to fulfill the requirements of 40 CFR 257.97.

1.1 BACKGROUND

The Assessment of Corrective Measures (ACM) for the PCS Closure Area was completed on September 12, 2019. The ACM was completed in response to the detection of molybdenum and arsenic at a statistically significant level (SSL) above the Groundwater Protection Standards (GPS) in groundwater samples from downgradient monitoring wells. Arsenic concentrations exceeded the GPS at MW-303 and MW-304, and molybdenum concentrations exceeded the GPS at MW-306. An addendum to the ACM was completed on August 9, 2021, to assess additional corrective measures appropriate for these detections.

This Semiannual Progress Report summarizes data collected and remedy evaluation progress made since the September 2019 ACM and August 2021 ACM Addendum No. 1, and outlines planned future activities to complete the selection of remedy process. This semiannual progress report covers the 6-month period of September 2022 through February 2023.

1.2 SITE INFORMATION AND MAPS

PCS is located to the south of Prairie Creek and to the west of the Cedar River, on the south side of the City of Cedar Rapids in Linn County, Iowa (**Figure 1**). The address of the generating station is 3300 C Street Southwest, Cedar Rapids, Iowa. In addition to the generating station, the property also contains a closure area located within the original footprint of the CCR impoundments and a coal stockpile.

The groundwater monitoring system at PCS monitors the Closure Area, which was created when the following CCR units were closed:

- PCS Pond 1
- PCS Pond 2
- PCS Pond 3
- PCS Pond 4
- PCS Pond 5
- PCS Pond 6
- PCS Pond 7
- PCS Discharge Pond (Pond 8)
- PCS Beneficial Use Storage Area
- PCS Bottom Ash Pile

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

Groundwater flow at the site is generally to the north. The approximate depth to the water table for wells located on plant property varies from 10 to 16 feet below ground surface (bgs). The approximate depth to the water table for wells located north of the plant property varies from 0 to 11 feet bgs. These range in depth to groundwater are due to topographic variations across the facility and seasonal fluctuations in the groundwater surface. The downgradient area where MW-303 through MW-306, the MW-309/309A nest, and the MW-310/310A nest are located is prone to flooding when water levels in Prairie Creek and the Cedar River are high.

2.0 SUMMARY OF WORK COMPLETED

Work completed to support remedy selection for the PCS CCR units is summarized in Table 1. Activities completed within the 6-month period covered by this semiannual report are discussed in more detail below.

2.1 MONITORING NETWORK CHANGES

No changes were made to the certified groundwater monitoring system during the reporting period of this semiannual SOR update.

2.2 GROUNDWATER AND SURFACE WATER MONITORING

Since September 2022, groundwater samples were collected during the October 2022 event. The October 2022 monitoring event was part of the routine semiannual assessment monitoring program. The wells sampled included the eight wells in the original monitoring system (MW-301 through MW-308), the six additional delineation wells and piezometers (MW-301A, MW-306A, MW-309, MW-309A, MW-310, and MW-310A), and supplemental background well MW-312.

A summary of groundwater samples collected from wells in the groundwater monitoring system since the completion of the September 2019 ACM is provided in Table 2.

Six triple nests of temporary mini-piezometers (18 total) were installed in Prairie Creek (Figure 2): Each nest consisted of three different length wells, hand driven into the creek bottom. The purpose of the mini-piezometers is to evaluate:

- The hydraulic gradients of groundwater discharging into Prairie Creek.
- The spatial distribution of arsenic and molybdenum within the creek bed sediments below Prairie Creek.
- Variation in the oxidation-reduction potential conditions below the creek bed.

One piezometer was installed in August 2022 as a test to determine if the well could be driven by hand to a target depth of 10 feet below the creek bottom. The test was successful. The full network of 18 piezometers, grouped into six nests of three piezometers each, were installed in October 2022. The piezometers were sampled three times and then abandoned under the oversight of an Iowa-certified well driller in January 2023 to avoid their destruction by the ice or expected spring flooding in the creek.

Groundwater sampling of the temporary creek piezometers was performed in October 2022, November 2022, and January 2023. Surface water samples from Prairie Creek were collected adjacent to the creek piezometer nests during each of the three piezometer sampling events.

A step-drawdown pumping test was performed at monitoring well MW-306 during September 2022 to evaluate local hydraulic properties of the aquifer with potential for groundwater extraction of molybdenum-impacted groundwater. Groundwater samples were obtained from MW-306 to evaluate potential changes in molybdenum during the pumping test.

Sediment cores were obtained during January 2023 at six locations within Prairie Creek. One core was advanced adjacent to each of the six piezometer nest locations within the creek. Submitted samples from the cores for laboratory analysis of total organic carbon and total arsenic. Samples of the cores were also submitted to an analytical laboratory for analysis by XRD.

2.3 STATISTICAL EVALUATION

Statistical evaluation of the sampling results obtained during the period covered by this update will be discussed in the 2023 Annual Groundwater Monitoring and Corrective Action Report, due on August 1, 2024. Based on the October 2022 monitoring results, the parameters at an SSL above the GPS include arsenic at compliance wells MW-303, MW-304, and MW-308 and molybdenum at compliance well MW-306. Arsenic was also at an SSL above the GPS at delineation wells MW-309 and MW-310.

2.4 EVALUATION OF CORRECTIVE MEASURE ALTERNATIVES

A qualitative assessment of potential Corrective Measure Alternatives using the selection criteria in 40 CFR 257.97(b) and (c) was provided in the September 2019 ACM and was revised in the August 2021 ACM Addendum No. 1. Updates to the assessment and development of the evaluation of corrective measure alternatives discussed in the ACM and ACM Addendum No. 1 will be completed in the future based on updates to the conceptual site model, delineation of the nature and extent of impacts, and collection of additional data relevant to remedy selection, as discussed below.

3.0 PLANNED ACTIVITIES

Planned activities related to the remedy selection process include the following:

- Continue semiannual assessment monitoring.
- Complete evaluation of data from additional soil, surface water, and groundwater sampling performed from September 2022 through February 2023.
- Perform leach tests on the soil and sediment samples obtained from the Prairie Creek valley west of the closure area.
- Perform borings on the closed impoundments to obtain ash samples at the base of the impoundments and identify the elevation of the base of ash at each boring location. Analyze the ash samples for arsenic and molybdenum. Also, perform leach tests on the ash samples.
- Update the assessment of corrective action alternatives after evaluating the results of the investigation activities described above. Update conceptual site model based on findings of nature and extent investigation. An additional ACM addendum will be prepared if the current corrective action alternatives need to be updated or revised.
- Conduct public meeting (40 CFR 257.96(e)).
- Prepare the Selection of Remedy Report.

[This page left blank intentionally]

Tables

Table 1. Timeline for Completed Work - Selection of Remedy
Prairie Creek Generating Station / SCS Engineers Project #25220084.00

Date	Activity
Work Completed Prior to the Current Reporting Period	
August 2019	Additional monitoring wells installed to investigate nature and extent (MW-309 and MW-310)
September 2019	Completed ACM
November 2019	Completed the Well Documentation Report for new wells
January 2020	Completed second round of assessment monitoring sampling for the new wells (MW-309 and MW-310)
January 2020	Completed Statistical Evaluation of October 2019 groundwater monitoring results
January 2020	Completed 2019 Annual Groundwater Monitoring and Corrective Action Report
Late winter or early spring 2020	Planning, permitting, and access arrangements for four additional monitoring wells (piezometers) to investigate the vertical extent of impacts
March 2020	Completed Semiannual Progress Report for the Selection of Remedy
June-July 2020	Additional monitoring wells (piezometers) installed to investigate vertical groundwater flow and groundwater quality
September 2020	Completed Semiannual Progress Report for the Selection of Remedy
September 2020	Conducted groundwater sampling at piezometers installed in June-July 2020
January 2021	Completed 2020 Annual Groundwater Monitoring and Corrective Action Report
March 2021	Completed Semiannual Progress Report for the Selection of Remedy
March 2021	Completed Documentation Report for monitoring wells installed in 2020
June - August 2021	Performed research on potential off-site sources of arsenic that may be impacting groundwater
July 2021	Conducted additional assessment monitoring event for select parameters at MW-308
August 2021	Updated Hydrogeochemical Conceptual Model
August 2021	Completed ACM Addendum #1
August 2021	Sampled Prairie Creek for arsenic at locations upstream and downstream of the plant
September 2021 - November 2021	Preparation of Joint Permit application for installation of monitoring wells within a floodplain
October 2021	Completed statistical evaluation of the July 2021 supplemental monitoring result
October 2021	Conducted semiannual assessment monitoring event

Table 1. Timeline for Completed Work - Selection of Remedy
Prairie Creek Generating Station / SCS Engineers Project #25220084.00

Date	Activity
November 2021	Submitted a Joint Application Permit for monitoring well within a floodplain
December 2021	Revised sampling and analysis plan
December 2021	Received US Army Corps of Engineers approval of joint permit for monitoring well installations within a floodplain
December 2021 - January 2022	Evaluation of potential off-site arsenic sources near Prairie Creek
January 2022	Completed 2021 Annual Groundwater Monitoring and Corrective Action Report
January 2022	Received Iowa Department of Natural Resources approval of joint permit for monitoring well installations within a floodplain
January 2022	Scheduled driller for installation of monitoring wells
January 2022 - February 2022	Preparation of City floodplain permit application, City right-of-way permit application, and County monitoring well installation permit applications.
January 2022	Completed statistical evaluation of the October 2021 supplemental monitoring results
February 2022	Conducted additional assessment monitoring event for select parameters at MW-308
March 2022	Completed Semiannual Progress Report for the Selection of Remedy
April 2022	Conducted semiannual 2022 assessment monitoring event
May 2022	Completed the installation of water table observation well MW-311 and additional background monitoring well MW-312.
May 2022	Conducted additional assessment monitoring event for select parameters at MW-312
June 2022	Completed statistical evaluation of the February 2022 supplemental monitoring result
July 2022	Completed statistical evaluation of the April and May 2022 supplemental monitoring result
July 2022	Conducted additional assessment monitoring event for select parameters at MW-312
August 2022	Completed Documentation Report for monitoring wells installed in May 2022 (MW-311 and MW-312)
August 2022	Installed first of 18 creek bed piezometers in Prairie Creek.
August 2022	Negotiated access with railroad company to performed proposed shallow soil and groundwater sampling adjacent to Prairie Creek to the west of the closed impoundments.
Work Completed during the Current Reporting Period	
September 2022	Completed Semiannual Progress Report for the Selection of Remedy.
September 2022	Installed single test piezometer in Prairie Creek. Installation was successful, so parts for an additional 17 creek piezometers were ordered. The creek piezometers will be used to evaluate groundwater flow and geochemistry between the creek and local groundwater.

Table 1. Timeline for Completed Work - Selection of Remedy
Prairie Creek Generating Station / SCS Engineers Project #25220084.00

Date	Activity
September 2022	Alliant Energy contacted the property owner of the rail spur west of the site to negotiate access for soil, surface water, and groundwater sampling. Permission was granted.
September 2022	Preliminary evaluation performed on phytoremediation as a potential groundwater corrective action alternative.
September 2022	Performed step-drawdown pumping test at monitoring well MW-306 to evaluate local hydraulic properties of the aquifer with potential for groundwater extraction of molybdenum-impacted groundwater. Groundwater samples were obtained from MW-306 to evaluate potential changes in molybdenum during the pumping test.
September 2022	Performed soil sampling on and near the banks of Prairie Creek to the west of the impoundments. Soil samples were submitted for metals analysis to evaluate potential background sources of naturally occurring arsenic in the creek valley soils of Prairie Creek. Submitted soil and sediment samples for laboratory analysis by x-ray fluorescence (XRF) and x-ray diffraction (XRD) to assess total arsenic content and potential arsenic-bearing mineral fraction.
September 2022	Completed well installation, development, and hydraulic conductivity testing documentation for water level-only monitoring well MW-311 and supplemental background monitoring well MW-312.
October 2022	Conducted semiannual assessment monitoring event
October 2022	Completed installation of temporary piezometers in Prairie Creek (6 nests of 3 piezometers each) and performed first sampling event of all 18 creek piezometers. Collected a surface water sample adjacent to each nest.
October 2022	Performed data evaluation of results from October 2022 semiannual sampling event, creek piezometer sampling, and MW-306 pumping test.
November 2022	Performed additional soil sampling near the banks of Prairie Creek to the west of the impoundments, including soil sample collection by hand auger and collection of groundwater and surface water samples. Submitted soil samples for XRF and XRD analysis. Also performed a second round of creek piezometer and surface water sampling in Prairie Creek.
January 2023	Completed third and final round of creek piezometers sampling in Prairie Creek. Certified Iowa driller oversaw the abandonment of all 18 creek piezometers.
January 2023	Collected surface water samples from Prairie Creek near each of the six creek piezometer nests.
January 2023	Obtained sediment cores at six locations within Prairie Creek. One core was advanced adjacent to each of the six piezometer nest locations within the creek. Submitted samples from the cores for laboratory analysis of total organic carbon and total arsenic. Also submitted samples for analysis by XRD.
January 2023	Completed the 2022 Annual Groundwater Monitoring and Corrective Action Report.
February 2023	Completed the October 2022 groundwater results report.
February 2023	Received and evaluated the results of the XRF and XRD analysis of soil samples from the Prairie Creek valley located west and sidegradient of the impoundments. Evaluated results of the three creek piezometer and surface water sampling events.

Notes:
*: Spring semiannual sampling events are typically completed in April; spring 2020 sampling of selected wells was delayed due to the COVID-19 pandemic.

Created by: NDK Date: 2/19/2020
Last revision by: TK Date: 2/19/2023
Checked by: MDB Date: 2/22/2023

I:\25220084.00\Deliverables\2023 Semiannual - Remedy Selection\2023 March Semiannual Update\Tables\[Table 1_Timeline_SOR_PCS.xlsx]Timeline

Table 2. Groundwater Samples Summary – Events Since ACM Submittal
Prairie Creek Generating Station / SCS Engineers Project #25220084.00

Sample Dates	Downgradient Wells												Background Wells		
	MW-303	MW-304	MW-305	MW-306	MW-306A	MW-307	MW-308	MW-309	MW-309A	MW-310	MW-310A	MW-312	MW-301	MW-301A	MW-302
10/28-29-2019	A	A	A	A	NI	A	A	A	NI	A	NI	NI	A	NI	A
1/9/2020	--	--	--	--	NI	--	--	A	NI	A	NI	NI	--	NI	--
4/27 & 5/27 2020	A	A	A	A	NI	A	A	A	NI	A	NI	NI	A	NI	A
9/15/2020	--	--	--	--	Add.	--	--	--	Add.	--	Add.	NI	--	Add.	--
10/19-21/2020	A	A	A	A	A	A	A	A	A	A	A	NI	A	A	A
4/26-28/2021	A	A	A	A	A	A	A	A	A	A	A	NI	A	A	A
7/14/2021	--	--	--	--	--	--	Add.	--	--	--	--	NI	--	--	--
10/20-22/2021	A	A	A	A	A	A	A	A	A	A	A	NI	A	A	A
2/22/2022	--	--	--	--	--	--	Add.	--	--	--	--	NI	--	--	--
4/25-27/2022	A	A	A	A	A	A	A	A	A	A	A	NI	A	A	A
5/25/2022	--	--	--	--	--	--	--	--	--	--	--	Add.	--	--	--
7/15/2022	--	--	--	--	--	--	--	--	--	--	--	Add.	--	--	--
10/12-13/2022	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Total Samples	7	7	7	7	6	7	9	8	6	8	6	3	7	6	7

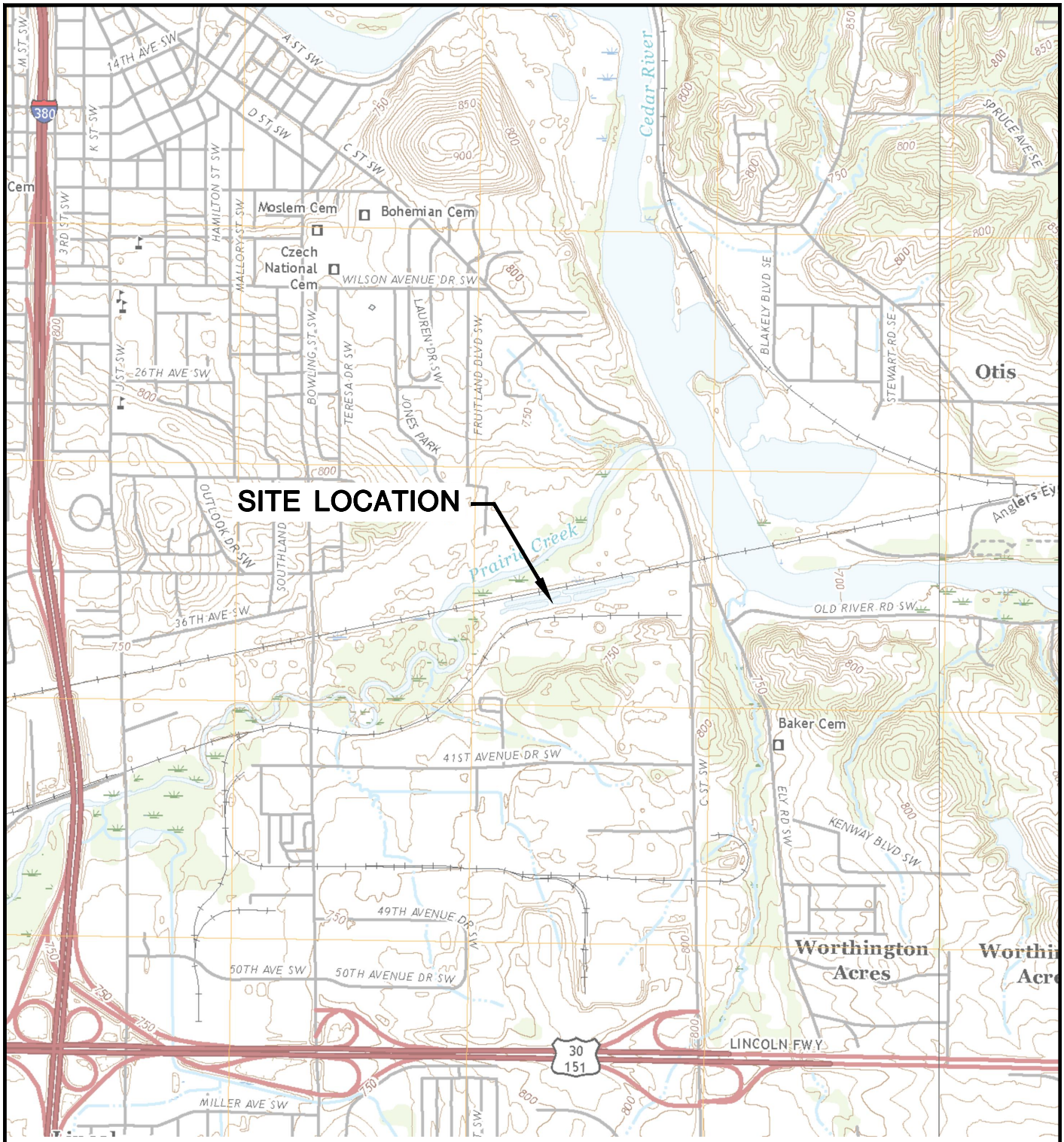
Abbreviations:
A = Required by Assessment Monitoring Program
Add. = Additional Sampling Event
NI = Not Installed
-- = Not Applicable

Notes:
1. MW-311 was installed in May 2022 for groundwater elevation evaluation only.
2. A series of five groundwater samples were collected from monitoring well MW-306 during a January 28, 2022 stepped drawdown test. The samples were analyzed for molybdenum. The sample event is not included in Table 2 because they are not compliance samples and will not be included in the statistical evaluations.

Created by: NDK Date: 2/19/2020
Last revision by: TK Date: 2/19/2023
Checked by: MDB Date: 2/27/2023

I:\25220084.00\Deliverables\2023 Semiannual - Remedy Selection\2023 March Semiannual Update\Tables\[Table 2_GW_Samples_Summary_Table_PCS.xlsx]GW Summary

Figures



N

CEDAR RAPIDS SOUTH QUADRANGLE
IOWA–LINN CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)
2018
SCALE: 1" = 2,000'

CLIENT	INTERSTATE POWER AND LIGHT 4902 N. BILTMORE LANE, #1000 MADISON, WI 53718	SITE	ALLIANT ENERGY PRAIRIE CREEK GENERATING STATION CEDAR RAPIDS, IA

SITE LOCATION MAP

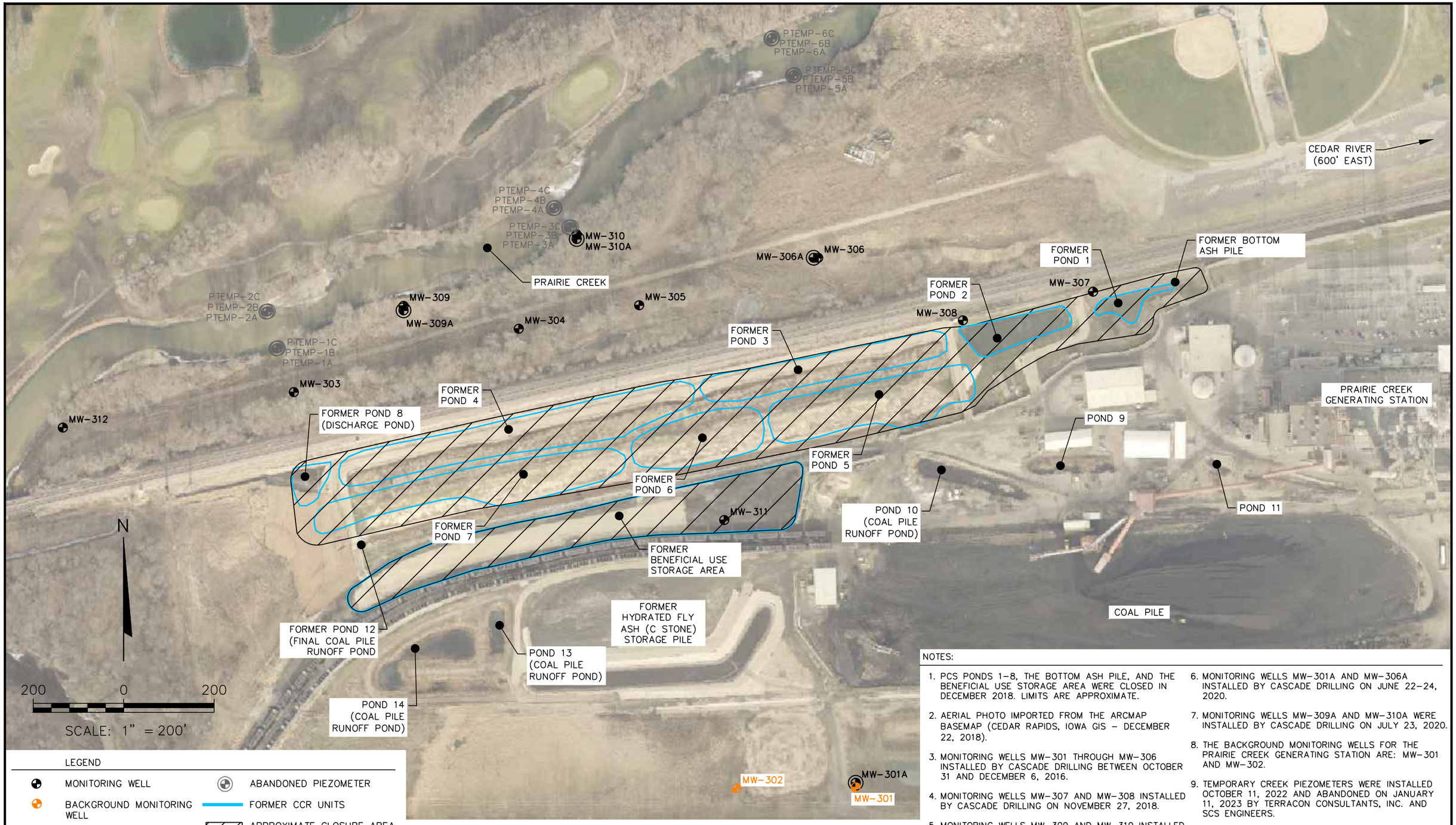
PROJECT NO.	25222074.00	DRAWN BY:	BSS
DRAWN:	11/18/2019	CHECKED BY:	NDK
REVISED:	08/31/2022	APPROVED BY:	TK 9/2/2022

ENGINEER

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

FIGURE 1

I:\25222074.00\Drawings\Site Location Map.dwg, 8/31/2022 3:21:00 PM



LEGEND

- MONITORING WELL
- BACKGROUND MONITORING WELL
- PIEZOMETER
- ABANDONED PIEZOMETER
- FORMER CCR UNITS
- APPROXIMATE CLOSURE AREA (SEE NOTE 1)

NOTES:

1. PCS PONDS 1–8, THE BOTTOM ASH PILE, AND THE BENEFICIAL USE STORAGE AREA WERE CLOSED IN DECEMBER 2018. LIMITS ARE APPROXIMATE.
2. AERIAL PHOTO IMPORTED FROM THE ARCMAP BASEMAP (CEDAR RAPIDS, IOWA GIS – DECEMBER 22, 2018).
3. MONITORING WELLS MW–301 THROUGH MW–306 INSTALLED BY CASCADE DRILLING BETWEEN OCTOBER 31 AND DECEMBER 6, 2016.
4. MONITORING WELLS MW–307 AND MW–308 INSTALLED BY CASCADE DRILLING ON NOVEMBER 27, 2018.
5. MONITORING WELLS MW–309 AND MW–310 INSTALLED BY ROBERTS ENVIRONMENTAL DRILLING ON AUGUST 5–6, 2019.
6. MONITORING WELLS MW–301A AND MW–306A INSTALLED BY CASCADE DRILLING ON JUNE 22–24, 2020.
7. MONITORING WELLS MW–309A AND MW–310A WERE INSTALLED BY CASCADE DRILLING ON JULY 23, 2020.
8. THE BACKGROUND MONITORING WELLS FOR THE PRAIRIE CREEK GENERATING STATION ARE: MW–301 AND MW–302.
9. TEMPORARY CREEK PIEZOMETERS WERE INSTALLED OCTOBER 11, 2022 AND ABANDONED ON JANUARY 11, 2023 BY TERRACON CONSULTANTS, INC. AND SCS ENGINEERS.

PROJECT NO.	25220084.00	DRAWN BY:	BSS/KP
DRAWN:	11/18/2019	CHECKED BY:	RM
REVISED:	03/06/2023	APPROVED BY:	TK 03/07/2023

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

CLIENT: INTERSTATE POWER AND LIGHT
4902 N. BILTMORE LANE, #1000
MADISON, WI 53718

SITE: ALLIANT ENERGY
PRAIRIE CREEK GENERATING STATION
CEDAR RAPIDS, IA

SITE PLAN AND
MONITORING WELL LOCATIONS

FIGURE
2

\\Mad-fs01\data\Projects\25220084.00\Drawings\Site Plan and Monitoring Well Locations.dwg, 3/7/2023 3:23:06 PM