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 12, 2021

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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 (USEPA) 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 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. As discussed in Section 3.0 of this report, an addendum to the ACM is currently in development.

This Semiannual Progress Report summarizes data collected and remedy evaluation progress made since the ACM was completed in September 2019, and outlines planned future activities to complete the selection of remedy process. This is the second semiannual progress report, and covers the 6-month period of September 2020 through February 2021.

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 coal-fired 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. Depth to groundwater varies from 0 to 16 feet below ground surface (bgs) 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.

Significant schedule delays occurred in 2020 due to the COVID-19 Pandemic. Temporary travel bans, social distancing restrictions, and pandemic response planning delayed selection of remedy activities for several months. Semiannual assessment monitoring in spring 2020 was also delayed due to COVID-19-related restrictions.

2.1 MONITORING NETWORK CHANGES

No changes to the monitoring network were made during the period covered by this Semiannual Progress Report. The locations of existing monitoring wells at PCS are shown on **Figure 2**.

2.2 GROUNDWATER MONITORING

Groundwater samples were collected from the monitoring wells installed in 2020 (MW-301A, MW-306A, MW-309A, and MW-310A) on September 15, 2020. Groundwater samples were collected from all assessment monitoring wells on October 19 to 21, 2020. The October 2020 monitoring event was part of the routine semiannual assessment monitoring program. A summary of groundwater samples collected since submittal of the ACM is provided in **Table 2**.

2.3 STATISTICAL EVALUATION

Statistical evaluation of sampling results during the period covered by this update was discussed in the 2020 Annual Groundwater Monitoring and Corrective Action Report, dated January 2021. Based on this evaluation, statistically significant levels (SSLs) above the GPS were identified for the following parameters and wells:

- Arsenic: MW-303, MW-304, MW-308, MW-309, and MW-310
- Molybdenum: MW-306

The SSLs for arsenic at MW-303 and MW-304 and for molybdenum at MW-306 are consistent with previous SSL determinations. The SSLs for arsenic at MW-308, MW-309, and MW-310 are newly identified SSLs, because these wells were installed more recently and have now been sampled four times, which is the minimum required for Lower Confidence Level (LCL) evaluation.

Lithium was detected at a concentration above the GPS at compliance well MW-308 in October 2020; this was the first result above the GPS at this well in four rounds of sampling to date. The significance of the lithium GPS exceedance at this well will be evaluated as additional sampling is completed.

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. **Table 3** summarizes the assessment completed for the ACM. No updates or changes to the assessment have been made based on additional information obtained since the issue of the ACM, but an addendum that includes updates to the assessment is currently in development. Additional groundwater data

collection and analysis is necessary for the evaluation of the monitored natural attenuation (MNA) option. Updates to the assessment, and development of the quantitative evaluation system discussed in the ACM, 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.

3.0 PLANNED ACTIVITIES

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

- Continue semiannual assessment monitoring
- Prepare an ACM Addendum to include the assessment of:
  - In-Situ Treatment with Chemical Amendment
  - Groundwater Collection
  - Groundwater Management with Barrier Wall
- Complete evaluation of MNA feasibility, including additional evaluation of groundwater flow and groundwater quality
- Update conceptual site model based on findings of nature and extent investigation
- Continue evaluation of remedial options
- Conduct public meeting (40 CFR 257.96(e))

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Tables

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

Date	Activity
August 2019	Additional monitoring wells installed to investigate nature and extent (MW-309 and MW-310)
September 2019	Completed ACM
October 2019	Conducted semiannual assessment monitoring event
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

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

Date	Activity
March 2020	Completed Semiannual Progress Report for the Selection of Remedy
April and May 2020	Conducted semiannual* assessment monitoring event
June 2020	Completed groundwater monitoring results letter for January 2020 sampling event
June-July 2020	Additional monitoring wells (piezometers) installed to investigate vertical groundwater flow and groundwater quality
August 2020	Initiated planning for the public ACM meeting
August 2020	Completed results letter for the April and May groundwater monitoring event
September 2020	Completed Semiannual Progress Report for the Selection of Remedy

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

Date	Activity
September 2020	Conducted groundwater sampling at piezometers installed in June-July 2020
October 2020	Conducted semiannual assessment monitoring event
January 2021	Completed 2020 Annual Groundwater Monitoring and Corrective Action Report
January 2021	Completed results letter for the October 2020 groundwater monitoring event

Notes:

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

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Last revision by: SKK Date: 2/26/2021
Checked by: TK Date: 2/26/2021

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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-304A	MW-305	MW-306	MW-306A	MW-307	MW-308	MW-309	MW-309A	MW-310	MW-310A	MW-301	MW-301A	MW-302
10/28-29-2019	A	A	NI	A	A	NI	A	A	A	NI	A	NI	A	NI	A
1/9/2020	--	--	NI	--	--	NI	--	--	A	NI	A	NI	--	NI	--
4/27 & 5/27 2020	A	A	NI	A	A	NI	A	A	A	NI	A	NI	A	NI	A
9/15/2020	--	--	Add.	--	--	Add.	--	--	--	Add.	--	Add.	--	Add.	--
10/19-21/2020	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Total Samples	3	3	2	3	3	2	3	3	4	2	4	2	3	2	3

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

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I:\25220084.00\Deliverables\2021 Semiannual - Remedy Selection\2021 March Semiannual Update\Tables\[Table 2_GW_Samples_Summary_Table_PCS.xlsx]GW Summary

Table 3. Preliminary Evaluation of Corrective Measure Alternatives
Prairie Creek Generating Station / SCS Engineers Project #25220084.00

	Alternative #1 No Further Action	Alternative #2 Monitored Natural Attenuation (MNA)	Alternative #3 Cover Upgrade with MNA	Alternative #4 Gradient Control with MNA	Alternative #5 Excavate and Dispose in Offsite Landfill
CORRECTIVE ACTION ASSESSMENT - 40 CFR 257.97(b)					
257.97(b)(1) Is remedy protective of human health and the environment?	Yes	Yes	Yes	Yes	Yes
257.97(b)(2) Can the remedy attain the groundwater protection standard?	Yes	Yes	Yes	Yes	Yes
257.97(b)(3) Can the remedy control the source(s) of releases so as to reduce or eliminate, to the maximum extent feasible, further releases of constituents in appendix IV to this part into the environment?	Yes	Yes	Yes	Yes	Yes
257.97(b)(4) Can the remedy remove from the environment as much of the contaminated material that was released from the CCR unit as is feasible?	Not Applicable - No release of CCR	Not Applicable - No release of CCR	Not Applicable - No release of CCR	Not Applicable - No release of CCR	Not Applicable - No release of CCR
257.97(b)(5) Can the remedy comply with standards for management of wastes as specified in §257.98(d)?	Yes	Yes	Yes	Yes	Yes
LONG- AND SHORT-TERM EFFECTIVENESS - 40 CFR 257.97(c)(1)					
257.97(c)(1)(i) Magnitude of reduction of existing risks	Existing risk reduced by achieving GPS	Same as Alternative #1	Same as Alternative #1	Same as Alternative #1	Same as Alternative #1
257.97(c)(1)(ii) Magnitude of residual risks in terms of likelihood of further releases due to CCR remaining following implementation of a remedy	No reduction of existing risk for additional releases Residual risk is limited for all alternatives due to limited extent of impacts and lack of receptors	Same as Alternative #1	Same as Alternative #1 with potential further reduction in release risk due to the reduced permeability of the final cover However, limited as no additional overall risk reduction is provided due to lack of current/anticipated future receptors for groundwater impacts	Same as Alternative #1	Same as Alternative #1 with further reduction in release risk due to removal of impounded CCR from site However, limited as no additional overall risk reduction is provided due to lack of current/anticipated future receptors for groundwater impacts
257.97(c)(1)(iii) The type and degree of long-term management required, including monitoring, operation, and maintenance	30-year post-closure groundwater monitoring Groundwater monitoring network maintenance and as-needed repair/replacement Final cover maintenance (e.g., mowing and as-needed repair) Periodic final cover inspections Additional corrective action as required based on post-closure groundwater monitoring	Same as Alternative #1 with increased monitoring for MNA parameters	Same as Alternative #1 with increased monitoring for MNA parameters	Same as Alternative #1 with increased monitoring for MNA parameters and monitoring, operation, and maintenance of the gradient control system and any discharge-related water treatment	No on-site long-term management required Limited on-site post-closure groundwater monitoring until GPSs are achieved Receiving disposal facility will have same/similar long-term monitoring, operation, and maintenance requirements as Alternative #1

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LONG- AND SHORT-TERM EFFECTIVENESS - 40 CFR 257.97(c)(1) (continued)					
257.97(c)(1)(iv) Short-term risks - Implementation					
Excavation	None	None	Increased risk over Alternative #1 due to general construction activities that are not anticipated to expose CCR	None	Increased risk to environment over Alternative #3 due to CCR excavation volumes (~148K cy) required for removal and off-site re-disposal
Transportation	None	None	Increased risk over Alternative #1 from construction traffic due to final cover disturbance and import of cover upgrade materials	None	Highest level of community and environmental risk due to CCR volume export (~148K cy)
Re-Disposal	None	None	None	None	Increased risk to community and environment due to re-disposal of large CCR volume (~148K cy) at another facility Re-disposal risks are managed by the receiving disposal facility
257.97(c)(1)(v) Time until full protection is achieved	To be evaluated further during remedy selection Closure and capping was completed in 2018 Groundwater protection timeframe to reach GPS potentially 5 to 10 years following closure construction, achievable within 30-year post-closure monitoring period	Similar to Alternative #1 with the potential for increased understanding of timeframe based on MNA monitoring results	Similar to Alternative #2 with some potential for decrease in time to reach GPS due to reduced cover permeability.	Similar to Alternative #2 with potential for decrease in time to reach GPS due to groundwater removal	Similar to Alternative #2 Potential for increase in time to reach GPS due to significant source disturbance during construction Potential decrease in time to reach GPS due to CCR source removal
257.97(c)(1)(vi) Potential for exposure of humans and environmental receptors to remaining wastes, considering the potential threat to human health and the environment associated with excavation, transportation, re-disposal, or containment	No change in potential exposure	Same as Alternative #1	Same as Alternative #1	Same as Alternative #1	No potential for on-site exposure to remaining waste since no waste remains on site Risk of potential exposure is transferred to receiving disposal facility and is likely similar to Alternative #2
257.97(c)(1)(vii) Long-term reliability of the engineering and institutional controls	Long-term reliability of existing cap is good Significant industry experience with methods/controls Capping is common practice/industry standard for closure in place for remediation and solid waste management Deed notation in place for closure with CCR left in place	Long-term reliability of existing cap is good Significant industry experience with methods/controls Capping is common practice/industry standard for closure in place for remediation and solid waste management Deed notation in place for closure with CCR left in place	Long-term reliability of enhanced cap is good Significant industry experience with methods/controls Capping is common practice/industry standard for closure in place for remediation and solid waste management Deed notation in place for closure with CCR left in place	Similar to Alternatives 1 through 3 Depending on the gradient control method selected, the long-term reliability can be good There is significant industry experience with some potential gradient control methods used in remediation of groundwater impacts	Success of remedy at PCS does not rely on long-term reliability of engineering or institutional controls Overall success relies on reliability of the engineering and institutional controls at the receiving facility
257.97(c)(1)(viii) Potential need for replacement of the remedy	Limited potential need for replacement of original cap placed in 2018 if maintained	Same as Alternative #1	Same as Alternative #1	Same as Alternative #1	No potential need for remedy replacement
SOURCE CONTROL TO MITIGATE FUTURE RELEASES - 40 CFR 257.97(c)(2)					
257.97(c)(2)(i) The extent to which containment practices will reduce further releases	Cap installed in 2018 will reduce further releases by minimizing infiltration through CCR	Same as Alternative #1	Same as Alternative #1 with possible reduction in further release risk due to lower cap permeability/ reduced infiltration through CCR	Same as Alternative #1	Removal of CCR prevents further releases at PCS Receiving disposal site risk similar to Alternative #3
257.97(c)(2)(ii) The extent to which treatment technologies may be used	Alternative does not rely on treatment technologies for source control	Alternative does not rely on treatment technologies for source control	Alternative does not rely on treatment technologies for source control	Alternative does not rely on treatment technologies for source control	Alternative does not rely on treatment technologies for source control

Table 3. Preliminary Evaluation of Corrective Measure Alternatives
Prairie Creek Generating Station / SCS Engineers Project #25220084.00

	Alternative #1 No Further Action	Alternative #2 Monitored Natural Attenuation (MNA)	Alternative #3 Cover Upgrade with MNA	Alternative #4 Gradient Control with MNA	Alternative #5 Excavate and Dispose in Offsite Landfill
IMPLEMENTATION - 40 CFR 257.97(c)(3)					
257.97(c)(3)(i) Degree of difficulty associated with constructing the technology	No construction involved	No construction involved	Low complexity construction Moderate degree of design and logistical complexity to complete cap upgrade	Moderate complexity construction High degree of logistical complexity due to off-site property owner access	Low complexity construction High degree of logistical complexity including the excavation and off-site transport of ~148K cy of CCR and permitting/development of off-site disposal facility airspace Moderate to high level of dewatering effort - dewatering required for excavation of full CCR volume
257.97(c)(3)(ii) Expected operational reliability of the technologies	Not Applicable	Not Applicable	High reliability based on historic use of capping as corrective measure	Operational reliability depends on method of gradient control required/selected, the level of extracted groundwater treatment required, and the location of groundwater treatment Overall expected reliability is good based on industry experience	Success at PCS does not rely on operational reliability of technologies Overall success relies on off-site disposal facility, which is likely same/similar to Alternative #3
IMPLEMENTATION - 40 CFR 257.97(c)(3) (continued)					
257.97(c)(3)(iii) Need to coordinate with and obtain necessary approvals and permits from other agencies	No further approvals or permits required	Same as Alternative #1	Need is low in comparison to other alternatives State Closure Permit amendment likely required	Need is high in comparison to other alternatives State Closure Permit amendment likely required Approval of downgradient site owner required Approval of facility receiving gradient control discharge for treatment required, or agency approval to construct the necessary treatment facility is required	Need is highest in comparison to other alternatives State Closure Permit amendment likely required Approval of off-site disposal site owner required May require State solid waste comprehensive planning approval Local road use permits likely required
257.97(c)(3)(iv) Availability of necessary equipment and specialists	Not Applicable	Lowest level of demand for MNA implementation	Low level of demand for cap construction material	Moderate level of demand expected Level of demand may vary based on method of gradient control selected	Availability of necessary equipment to develop necessary off-site disposal facility airspace and transport ~148K cy of CCR to new disposal facility will be a limiting factor in the schedule for executing this alternative No liner or cover material demands for on-site implementation of remedy
257.97(c)(3)(v) Available capacity and location of needed treatment, storage, and disposal services	Not Applicable	Not Applicable	Not Applicable	There is no on-site capacity to treat gradient control system discharge If required, on-site capacity will need to be developed Off-site capacity to treat gradient control system discharge may exist, but ability/willingness to accept discharge is currently unknown	Off-site disposal capacity, facility logistical capacity, or the time required to develop the necessary off-site disposal and logistical capacity is a significant limiting factor
COMMUNITY ACCEPTANCE - 40 CFR 257.97(c)(4)					
257.97(c)(4) The degree to which community concerns are addressed by a potential remedy (Anticipated)	To be determined based on input obtained through public meetings/outreach to be completed	To be determined based on input obtained through public meetings/outreach to be completed	To be determined based on input obtained through public meetings/outreach to be completed	To be determined based on input obtained through public meetings/outreach to be completed	To be determined based on input obtained through public meetings/outreach to be completed

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Last revision by: EJN Date: 8/12/2019
Checked by: TK/SC Date: 8/13/2019

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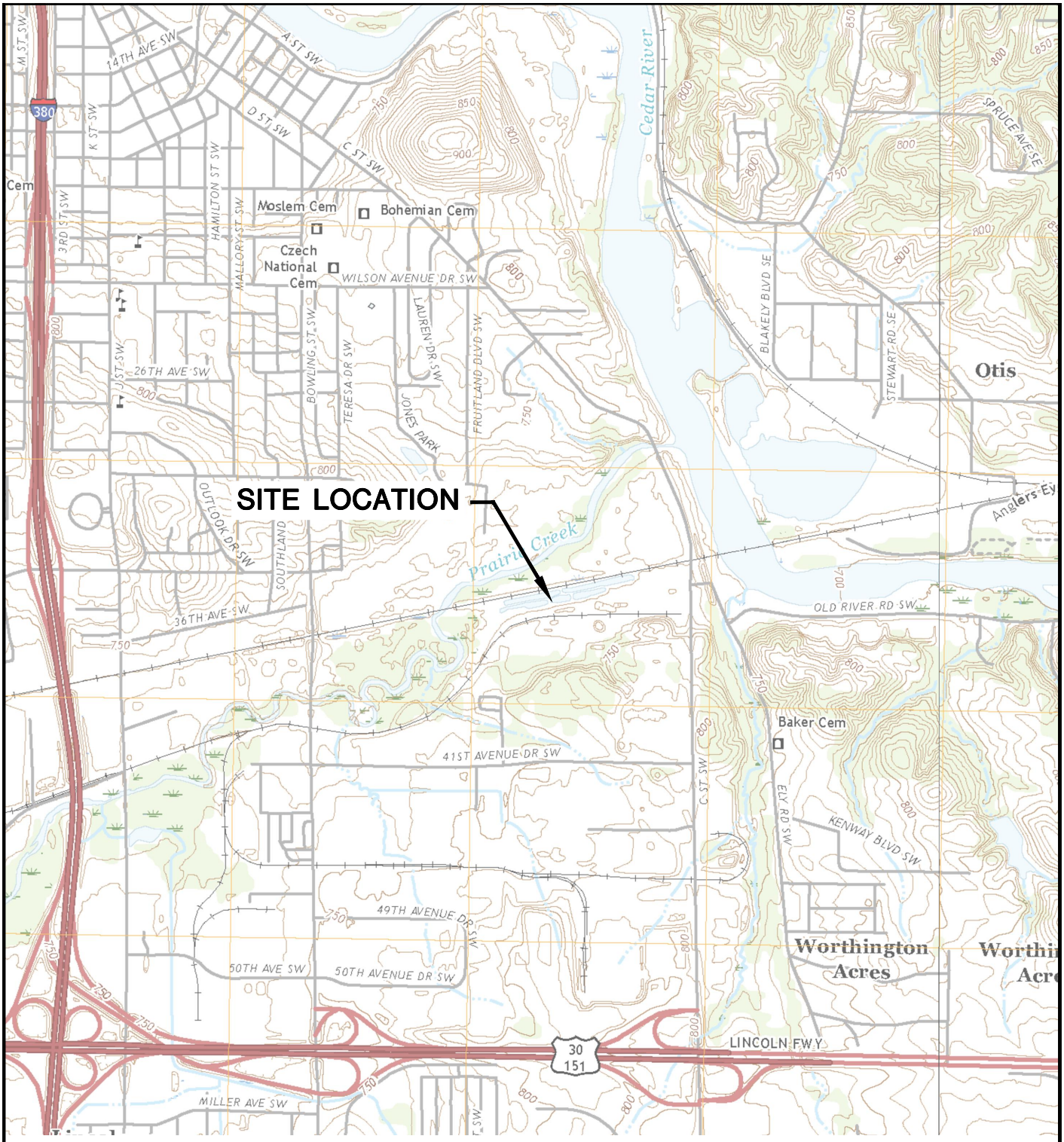
Figures



N

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

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

SITE LOCATION MAP

PROJECT NO.	25219074.00	DRAWN BY:	BSS
DRAWN:	11/18/2019	CHECKED BY:	MDB
REVISED:	01/14/2020	APPROVED BY:	TK 01/30/2020

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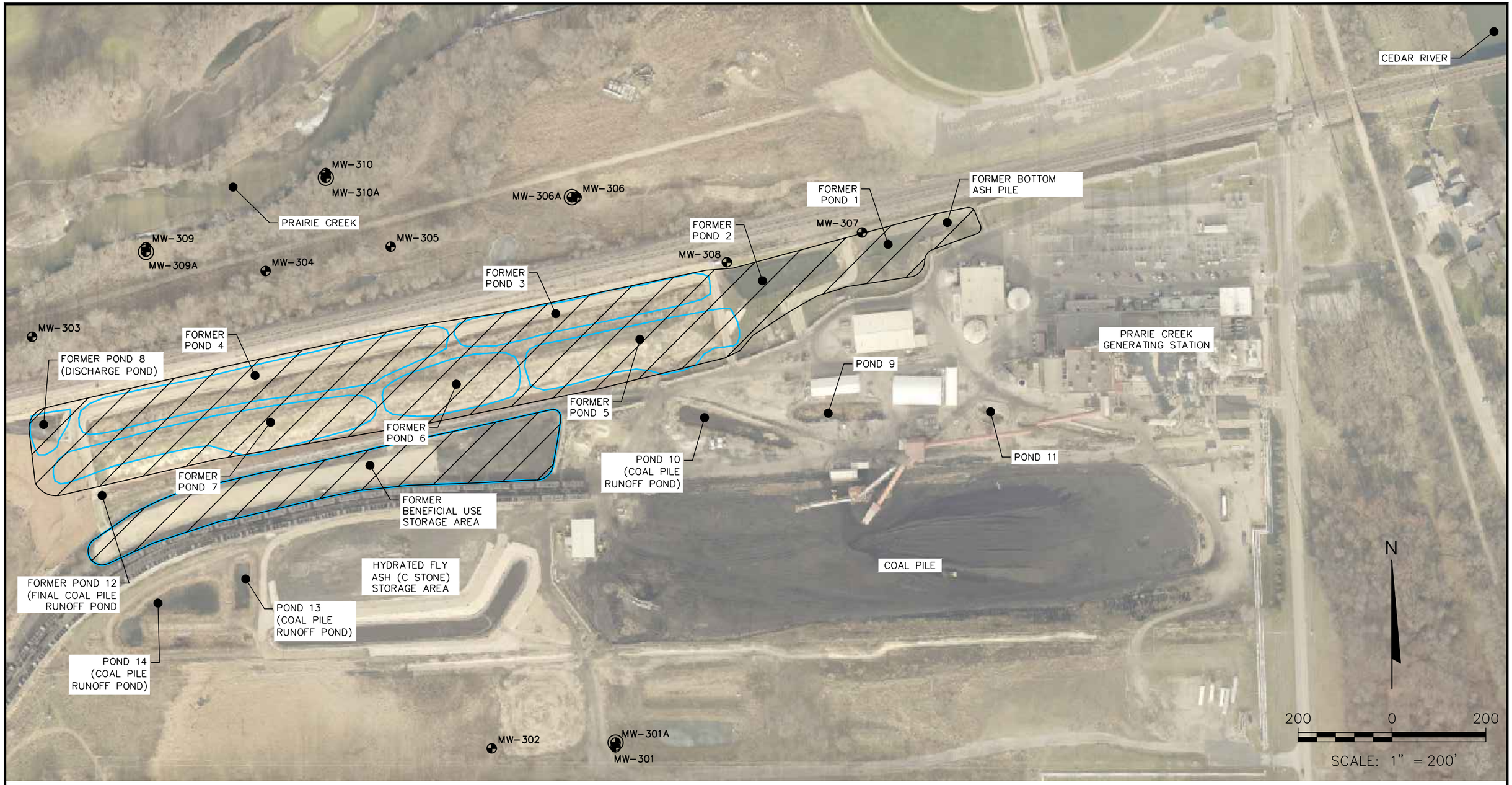
FIGURE
1

I:\25219074.00\Drawings\CCR 2019 Annual Report\Site Location Map.dwg, 1/30/2020 3:28:29 PM



LEGEND

- MONITORING WELL
- PIEZOMETER
- 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, MW–306A, MW–309A, AND MW–310A WERE INSTALLED BY CASCADE DRILLING BETWEEN JUNE 23 AND JULY 23, 2020.

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DRAWN:	11/18/2019	CHECKED BY:	MDB
REVISED:	09/10/2020	APPROVED BY:	TK 2/26/2021

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

SITE PLAN AND MONITORING WELL LOCATIONS

FIGURE 2

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