Semiannual Progress Report Selection of Remedy – Prairie Creek Generating Station

Prairie Creek Generating Station Cedar Rapids, Iowa

Prepared for:



SCS ENGINEERS

25220084.00 | March 13, 2025

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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 (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. Additional data collection for a second addendum to the ACM was completed during the previous reporting period. Evaluation of soil borings collected through CCR materials and laboratory leachate testing were evaluated during this reporting period.

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 2024 through February 2025.

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/northwest. 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 ranges 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 Selection of Remedy (SOR) update.

2.2 GROUNDWATER AND SURFACE WATER MONITORING

Groundwater samples were collected during the October 2024 event that 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. Results are summarized in a draft Assessment Groundwater Monitoring Results – October 2024 letter finalized in February 2025.

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**.

2.3 STATISTICAL EVALUATION

Statistical evaluation of the October 2024 semiannual sampling results during the period covered by this update were reported in the Assessment Groundwater Monitoring results letter (February 12, 2025). These results will be included in the 2025 Annual Groundwater and Corrective Action Report, due on January 31, 2026.

The results of the statistical evaluation of the October 2024 sampling event indicates the parameters at an SSL above the GPS include arsenic at compliance wells MW-303, MW-304, and MW-308; lithium at compliance well MW-308; and molybdenum at compliance well MW-306. October 2024 was the first sampling event where lithium was determined to be at an SSL above the GPS.

Arsenic was above the GPS at delineation wells MW-309 and MW-310. A lower confidence limit (LCL) evaluation was performed for the delineation wells, and arsenic exceeds the LCL and GPS for 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. A second addendum to the ACM was anticipated for 2024; however, in the previous reporting period, a large-scale pumping test was postponed due to the issue of the revised 40-foot setback distance requirement from the city sewer from the planned aquifer test pumping and observation wells. Once setbacks were resolved, the drilling and aquifer testing activities were postponed again and

throughout this reporting period due to the occurrence of municipal solid waste (MSW) discovered near MW-306 during the drilling activities on June 26, 2024. The MSW is attributed to the former City of Cedar Rapids Landfill at the adjacent Tait Cummins Softball Complex site.

Alliant met with the City of Cedar Rapids to discuss the discovery of MSW near MW-306 and to obtain historical information about the historical extent of MSW at the site. No information on the existing extent of MSW at the Tait Cummins Softball Complex site is available. Due to the risk of pumping potentially MSW-impacted groundwater from historical city landfill operations, evaluation of non-pumping corrective actions was initiated during this reporting period.

SCS revisited a previous desktop review of non-pumping corrective measures with updated research on currently available chemical amendments for in situ groundwater remediation of arsenic, molybdenum, and lithium. Updated research has identified some new potential alternatives and advances to previous amendment alternatives that Alliant will continue to evaluate during the next reporting period.

Activities completed during this reporting period to support evaluation of corrective measure alternatives included continued evaluation of leach test data and geochemical modeling, drafting a corresponding summary technical memo, and evaluating non-pumping corrective action alternatives. The draft technical memorandum was provided to IPL in August 2024 and comments were received in September 2024. A revised draft of the memorandum was provided to IPL in February 2025.

3.0 PLANNED ACTIVITIES

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

- Continue semiannual assessment monitoring in April 2025.
- Complete statistical evaluation and determination of SSLs exceeding the GPS and prepare groundwater monitoring results letters for the April 2025 monitoring event.
- Evaluate potential non-extractive groundwater remedy methods based on the further assessment of the extent of MSW and its potential impact to groundwater.
- Update the assessment of corrective action alternatives, if needed, after evaluating non-extractive groundwater remedy methods.
- Prepare a second ACM addendum, which will include a summary of the ash borings, ash
 leach testing, geochemical modeling, step test data, creek soil borings, and creek
 piezometer data; and evaluation of non-extractive groundwater remedial options. The
 second ACM addendum will also address lithium SSLs above the GPS that have occurred
 since the most recent ACM addendum.
- Hold a public meeting in accordance with 40 CFR 257.96(e).
- Prepare the Selection of Remedy Report following completion of the ACM addendum in accordance with 40 CFR 257.97.



Tables

- 1 Timeline for Completed Work Selection of Remedy
- 2 Groundwater Samples Summary Events Since ACM Submittal

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 Assessment of Corrective Measures (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- November 2021	Prepared 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.										
November 2021	Submitted a Joint Application Permit for monitoring well within a floodplain.										

Date	Activity											
December 2021	Revised sampling and analysis plan.											
December 2021	Received U.S. Army Corps of Engineers approval of joint permit for monitoring well installations within a floodplain.											
December 2021 - January 2022	Evaluated 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-February 2022	Prepared 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 we 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.											
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.											
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.											

Date	Activity										
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 sample 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 (six nests of three 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.										
March 2023	Completed Semiannual Progress Report for the Selection of Remedy.										
April 2023	Conducted semiannual assessment groundwater monitoring event.										
April 2023	Performed data evaluation of results from April 2023 semiannual sampling event.										
April 2023	Drafted corrective action evaluation.										
April-June 2023	Updated site conceptual model.										
May 2023	Evaluated updated survey data and potential drilling scenarios for collection of ash samples and identification of ash/soil interface elevation required for remedial design.										
June 2023	Drafted an alternative plan for building a ramp and pads for vertical drilling for collection of ash samples to identify ash/soil interface elevation.										

Date	Activity										
July 2023	Drafted Investigation summary and recommendations report.										
July 2023	Met with Cascade Drilling on site to evaluate potential angle drilling options to obtain ash samples and identify elevation of ash-soil contact.										
August 2023	Completed the April 2023 Assessment Groundwater Monitoring Results Letter.										
August 2023	Began full-scale pumping test design for pump and treat groundwater corrective action alternative in the vicinity of well MW-306.										
September 2023	Completed a Semiannual Progress Report for the Selection of Remedy.										
September 2023	Designed pumping test in the vicinity of monitoring well MW-306. Designed pumping test well and observation well.										
September 2023	Submitted a notification letter of intent to the Iowa Department of Natural Resources to perform borings and repairs on the impoundment cap.										
October 2023	Conducted a semiannual groundwater sampling event.										
October 2023	Performed pre-drilling and post drilling survey of cap boring locations.										
October 2023	Drilled two angle borings into the closed impoundments to identify the ash and native soil contacts and collect ash samples at the base of the impoundments.										
October 2023	Submitted ash samples from the base of the impoundments to the laboratory for leach testing.										
December 2023	Completed survey work for railroad right-of-way, MW-306 nest, and as-built ground surface elevation survey.										
January 2024 - February 2024	Prepared permit applications for off-site pumping test and observation well, right-of way permit, and floodplain permit.										
January 2024	Completed the 2023 Annual Groundwater Monitoring and Corrective Action Report.										
February 2024	Applied to and received approval from CRWPCF to discharge groundwater.										
February 2024	Discussed with DNR and county installation and purpose of pumping wells.										
March 2024	Received final results for sequential leaching testing from laboratory (Eurofins).										
March 2024	Completed the October 2023 Assessment Groundwater Monitoring results letter.										
March 2024	Completed the Semiannual SOR Progress Report.										
March 2024	Submitted final cap repair documentation to IDNR (3/19/2024).										
March 2024	Submitted well permit applications to Linn County; floodplain permit application was approved; and the right-county permit application was filed with the City for the aquifer pumping test wells.										
May - August 2024	Developed updated cross-sections that includes CCR boring information.										
May-June 2024	Drilling was postponed by the City of Cedar Rapids due to the 40-foot setback distance requirement for the well installation from the sewer. Met with City and obtained a variance for a 15-foot sewer offset. Redesigned pumping test layout design.										
June 2024	Evaluated sequential leaching tests with geochemical modeling software (PHREEQC).										

Date	Activity											
June 2024	Initiated drilling to install one 6-inch pumping well and two 2-inch observation wells; however, municipal solid waste (MSW) was encountered and drilling was stopped. MSW was not encountered on IPL property and not related to any historical IPL activities.											
July-August 2024	Began review of municipal solid waste historical files. Initiated review of remedial options that do not include groundwater removal.											
August 2024	Prepared a draft sequential leaching test memo supported with geochemical modeling and updated cross-sections.											
August 2024	Held a meeting on August 26, 2024 with the City of Cedar Rapids to discuss the municipal solid waste area on City property and its proximity to CCR compliance wells.											
August 2024	Completed statistical evaluation for the April 2024 monitoring event and prepared groundwater monitoring results letter.											
	Work Completed During the Current Reporting Period											
September 2024	Received comments on draft technical memo for evaluation of soil boring data with updated cross-sections, leachate testing and geochemical modeling.											
September 2024	Finalized the Semiannual Selection of Remedy Progress Report.											
September 2024	Reviewed documentation provided by the City of Cedar Rapids relating to geotechnical borings and sample completed in and near the area of municipal solid waste near MW-306/MW-306A.											
September 2024	Used the information provided by the City of Cedar Rapids to improve a GIS map showing the area of municipal solid waste and locations of known soil or groundwater impacts apparently associated with the waste.											
October 2024	Conducted a semiannual groundwater sampling event.											
January 2025	Finalized the 2024 Annual Groundwater Monitoring and Corrective Action Report.											
January 2025	Initiated a review of non-pumping groundwater corrective actions due to the discovery of municipal solid w near MW-306/MW-306A.											
February 2025	Completed a revision to the technical memo for evaluation of soil boring data with updated cross-sections, leachate testing and geochemical modeling.											
February 2025	Finalized the Assessment Groundwater Monitoring results letter for the October 2024 sampling event.											

Notes:

A-R = Resampling event under Assessment Monitoring Program

* = Resampling event completed in 2019 but analytical results will be used for evaluation for the October 2018 sampling event.

 Last revision by:
 NLB
 Date:
 2/5/2025

 Checked by:
 RM
 Date:
 2/12/2025

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

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

Sample Dates	Backgro	und Wells	Downgradient Wells												Supplemental Background Wells	
	MW-301	MW-302	MW-303	MW-304	MW-305	MW-306	MW-306A	MW-307	MW-308	MW-309	MW-309A	MW-310	MW-310A	MW-311	MW-301A	MW-312
10/28-29/2019	Α	Α	Α	Α	Α	Α	NI	Α	Α	A-NE	NI	A-NE	NI	NI	NI	NI
1/9/2020							NI			A-NE	NI	A-NE	NI	NI	NI	NI
4/27 & 5/27 2020	Α	Α	Α	Α	Α	Α	NI	Α	Α	A-NE	NI	A-NE	NI	NI	NI	NI
9/15/2020			-		-		Add.				Add.		Add.	NI	Add.	NI
10/19-21/2020	Α	Α	Α	Α	Α	Α	A-NE	Α	Α	A-NE	A-NE	A-NE	A-NE	NI	Α	NI
4/26-28/2021	Α	Α	Α	Α	Α	Α	A-NE	Α	Α	A-NE	A-NE	A-NE	A-NE	NI	Α	NI
7/14/2021		-	1		-			1	Add.					NI		NI
10/20-22/2021	Α	Α	Α	Α	Α	Α	A-NE	Α	Α	A-NE	A-NE	A-NE	A-NE	NI	Α	NI
2/22/2022		1	1	-				-	Add.	-				NI		NI
4/25-27/2022	Α	Α	Α	Α	Α	Α	A-NE	Α	Α	A-NE	A-NE	A-NE	A-NE	NI	Α	NI
5/25/2022		-	1	-				1		-				N/A		Add.
7/15/2022		-	I	-				1		-				N/A		Add.
10/12-13/2022	Α	Α	Α	Α	Α	Α	A-NE	Α	Α	A-NE	A-NE	A-NE	A-NE	N/A	Α	Α
4/19-20/2023	Α	Α	Α	Α	Α	Α	A-NE	Α	Α	A-NE	A-NE	A-NE	A-NE	N/A	Α	Α
11/6-7/2023	Α	Α	Α	Α	Α	Α	A-NE	Α	Α	A-NE	A-NE	A-NE	A-NE	N/A	Α	Α
4/15-18/2024	Α	Α	Α	Α	Α	Α	A-NE	Α	Α	A-NE	A-NE	A-NE	A-NE	N/A	Α	Α
10/1-3/2024	Α	Α	Α	Α	Α	Α	A-NE	Α	Α	A-NE	A-NE	A-NE	A-NE	N/A	Α	Α
Total Samples	11	11	11	11	11	11	10	11	13	12	10	12	10	N/A	10	7

Abbreviations:

A = Required by Assessment Monitoring Program

Add. = Additional Sampling Event

A-NE = Assessment monitoring for nature and extent, well sampled for select Appendix IV and selection-of-remedy parameters

N/A = Not Applicable. Water Level Only.

NI = Not Installed

-- = Not Sampled

ACM = Assessment of Corrective Measures

 Created by:
 NDK
 Date: 2/19/2020

 Last revision by:
 NLB
 Date: 1/9/2025

 Checked by:
 RM
 Date: 2/12/2025

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 are not included in the statistical evaluations.

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Figures

- 1 Site Location Map
- 2 Site Plan and Monitoring Well Locations



