

Coal Combustion Residual Selection of Remedy Semiannual Report

**Basin Electric Power Cooperative
Laramie River Station**

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Introduction

Basin Electric Power Cooperative (**Basin Electric**) is a not-for-profit regional wholesale electric generation and transmission cooperative owned by over 130 member cooperatives. Basin Electric has a diverse energy portfolio comprised of coal, gas, oil, and renewable energy, including the coal-fired Laramie River Station (**LRS**), located near Wheatland, Wyoming. Basin Electric is part owner, manager and operator of LRS on behalf of the five owners of the Missouri Basin Power Project.

Three ash ponds and the landfill are located west of the generating units and office complex, near the western edge of the site. Due to the presence of Coal Combustion Residuals (**CCRs**), the LRS ash ponds and landfill are regulated under Chapter 40 Code of Federal Regulations (**CFR**) Part 257, Subtitle D (**CCR Rule**) of the Resource Conservation and Recovery Act (**RCRA**). The CCR Rule was promulgated by the U.S. Environmental Protection Agency (**EPA**) in 2015.

Background

The CCR Rule requires initiating a corrective action process if any constituents listed in Appendix IV of 40 CFR Part 257 are detected above background concentrations at levels exceeding groundwater protection standards (**GWPSs**). Groundwater assessment monitoring of Bottom Ash Pond 1 in 2018 identified lithium and molybdenum at statistically significant levels (**SSLs**) above GWPSs downgradient of Bottom Ash Pond 1. Accordingly, additional groundwater characterization activities were conducted per 40 CFR § 257.95(g)(1).

Additional characterization activities were completed by Basin Electric's consultant, AECOM, in 2019 and are documented in the Assessment of Corrective Measures report (**ACM**). The ACM also identifies potentially applicable groundwater corrective measures for Bottom Ash Pond 1 to remediate lithium and molybdenum to concentrations below their respective GWPSs. The identified corrective measures were subjected to a screening process to evaluate their capability of achieving the corrective measures objectives specified in 40 CFR § 257.97(b). The ACM describing these alternatives was posted to the LRS operating record on August 30, 2019.

Purpose

Basin Electric is required to prepare semiannual reports describing the progress made toward the selection and design of the remedy. This semiannual report, prepared in accordance with 40 CFR § 257.97(a), is the sixth report since completion of the ACM in August 2019 and documents Basin Electric's progress in selecting and designing the remedy for the groundwater impacts associated with Bottom Ash Pond 1 at LRS.

Progress

During 2019, Basin Electric completed an Assessment of Corrective Measures (ACM) in accordance with the CCR Rule. Potentially applicable corrective measures were identified based on the nature and extent of groundwater impacts and site-specific geological and hydrogeological characteristics. The following corrective measures, to be used singly or in combination, were identified for screening to achieve the corrective action objectives:

- Natural attenuation
- Groundwater extraction (e.g., using pumping wells), followed by:
 - Surface discharge of extracted groundwater with prior treatment if necessary,
 - Underground injection of extracted groundwater, or
 - On-site reuse or disposal of extracted groundwater
- In-situ treatment
- Long-term monitoring.

Applying the screening criteria of performance, reliability, ease of implementation, potential impacts (of the remedy), time to begin and complete, and institutional requirements to the corrective measures described above eliminated in-situ treatment from further consideration. The effectiveness of in-situ treatment for the target constituents is currently unknown and would have to be verified; the technology may be impractical to construct and maintain. Accordingly, in-situ treatment has been removed from further consideration as a potential corrective action technology.

Natural attenuation, groundwater extraction, and long-term monitoring are proven effective, easily implementable and often appropriate corrective measures, and were retained and

assembled into the following two corrective measures alternatives for further detailed evaluation:

- Natural Attenuation and Long-Term Monitoring
- Groundwater Extraction, Onsite Reuse or Disposal and Long-Term Monitoring

The two remaining corrective measures alternatives were presented at a public meeting held on January 30, 2020 in Wheatland Wyoming. A 30-day public comment period started on January 30, 2020 and ended on February 29, 2020. No comments were received during the 30-day period following the public meeting.

In July 2020, Basin Electric selected Groundwater Extraction, Onsite Reuse or Disposal, and Long-Term Monitoring to meet the remedy requirements of the CCR Rule. This alternative is expected to restore the underlying aquifer faster than relying on natural attenuation to reduce lithium and molybdenum concentrations. Basin Electric procured consulting/engineering services for the design of the groundwater extraction system during 4th quarter 2020.

Basin Electric began retrofitting Bottom Ash Pond 1 in accordance with § 257.102 (criteria for conducting the closure or retrofit of CCR units) during 3rd quarter 2020, with completion in early 1st quarter 2021. AECOM prepared a certification upon the completion of construction verifying that the retrofit activities had been completed in accordance with the retrofit plan; the AECOM certification was subsequently posted to Basin Electric's CCR Rule compliance website in March 2021. AECOM provided detailed plans and specifications for the groundwater extraction system and supporting infrastructure for Basin Electric's review and comment. Basin Electric completed its review in late August 2021.

During the period covered by this sixth semiannual report, AECOM completed a report detailing the installation, testing, and hydrogeologic analysis of the recovery wells. A brief summary of the AECOM report is provided in the following paragraphs.

With observation by an AECOM geologist, Cascade Environmental Services (Cascade) utilized a sonic drilling rig to install two extraction wells (RW-1 and RW-2) between November 3, 2021 and November 5, 2021. Well RW-1 and Well RW-2 were drilled to depths of 80 and 85 feet below ground surface, respectively. Each well has a screened interval of 20 feet at the bottom of the well.

On December 3, 2021, during a second mobilization to the site by AECOM and Cascade, well development and aquifer pumping testing activities were performed. A total of two step drawdown pumping tests (RW-1 and RW-2) and one 24-hour constant rate pumping test (RW-1) were completed between December 3 and December 6, 2021. Grab groundwater samples were also collected from the newly installed extraction wells on December 4, 2021 during step testing of the wells. Hydraulic conductivity obtained from the step drawdown and 24-hour pumping tests ranged from 1.9 to 10.1 feet/day, with an average conductivity of 5.0 feet/day. Overall, these results are consistent with conductivity values obtained from slug tests performed at the site during previous investigations when other site wells were installed.

Over the long term, AECOM assumes that the extraction wells will be pumped to lower the water level by 20 feet, or approximately two thirds of the available water column. This amount of drawdown is considered optimal and should produce 90% of the maximum well yield. Through interpolation of the specific capacity and drawdown results, AECOM predicts that RW-1 and RW-2 can sustain long-term flow rates of approximately 9.9 and 8.8 gallons per minute (**gpm**), respectively.

AECOM also reviewed the original model used to calculate capture zone analysis of the extraction well system at LRS. The pumping rates calculated from field observations and data collected during aquifer pumping testing were input into the capture zone model to compare predicted results of capture (originally using 10 gpm in the extraction wells) to the field calculated pumping results of 9.9 and 8.8 gpm in RW-1 and RW-2, respectively. The results of the model indicated that at these flow rates the system should operate as originally designed and sufficiently capture particles passing through this area.

Planned Work

Basin Electric anticipates the installation of pumps, piping, electrical service and other supporting infrastructure will begin during the fourth quarter of 2022. Following commissioning activities, the groundwater extraction system should be operational in early 2023.

Recordkeeping and Reporting

This report has been placed in Basin Electric's operating record to satisfy the requirements under § 257.105(h)(12), and posted to Basin Electric's CCR Website in accordance with § 257.107(h)(9).