



**Eighth Semiannual Report on the
Progress of Remedy Selection**

**Bottom Ash Pond, Dry Ash Stack
and Gypsum Storage Area CCR
Units**

**TVA Cumberland Fossil Plant,
Cumberland City, Stewart County,
Tennessee**

July 14, 2023

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1.0 Introduction

In accordance with Title 40 Code of Federal Regulations (40 CFR) § 257.97(a), the Tennessee Valley Authority (TVA) has prepared this semiannual report to document progress toward remedy selection and design at Bottom Ash Pond, Dry Ash Stack, and Gypsum Storage Area (CCR Units) at the Cumberland Fossil Plant (CUF) in Cumberland City, Stewart County, Tennessee.

1.1 Regulatory Background

On April 17, 2015, the United States Environmental Protection Agency published a rule that sets forth national criteria for the management of coal combustion residuals (CCR) produced by electric utilities. The requirements can be found in 40 CFR Part 257, Subpart D (CCR Rule). The CCR Rule includes requirements for monitoring groundwater and assessing corrective measures if constituents listed in Appendix IV to the CCR Rule are detected in groundwater samples collected from downgradient monitoring wells at statistically significant levels (SSLs) greater than established groundwater protection standards (GWPS).

In January 2019, TVA determined that there were SSLs over established GWPS as defined in 40 CFR § 257.95(h) for one or more Appendix IV constituents in accordance with 40 CFR § 257.95(g). At the CCR Units, assessment monitoring detected SSLs greater than the GWPS for cobalt and lithium at monitoring wells CUF-212 and 93-3, respectively. Since this time, TVA has updated the statistical analysis.

- In mid and late 2019, TVA updated the statistical analysis after incorporating results from the 2019 assessment monitoring events. The same SSLs were observed at the same monitoring wells as previously identified; however, a new SSL for cobalt at monitoring well CUF-211¹ was also observed in late 2019.
- In mid and late 2020, TVA updated the statistical analysis after incorporating results from the 2020 assessment monitoring events. The same SSLs were observed at the same monitoring wells as previously identified, including the SSL for cobalt at monitoring well CUF-211. An SSL for molybdenum was observed at monitoring well CUF-209² that was not previously observed in 2018 or 2019.
- In mid and late 2021, TVA updated the statistical analysis after incorporating results from the 2021 assessment monitoring events. The same SSLs were observed at the same monitoring wells as identified in 2020.

¹ Cobalt concentrations at monitoring well CUF-211 are delineated horizontally by monitoring wells 93-2R to the southeast and CUF-209 to the northwest. The potential remedial technologies to address the SSLs observed at monitoring wells CUF-212 and 93-3 presented in the Assessment of Corrective Measures Report (TVA, 2019) also apply to the SSL observed for cobalt at monitoring well CUF-211.

² Molybdenum concentrations at monitoring well CUF-209 are delineated horizontally by monitoring wells CUF-211 to the southeast and CUF-208 to the north. The potential remedial technologies to address the SSLs observed at monitoring wells CUF-212 and 93-3 presented in the Assessment of Corrective Measures Report (TVA, 2019) also apply to the SSL for molybdenum at monitoring well CUF-209.

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- In mid and late 2022, TVA updated the statistical analysis after incorporating results from the 2022 assessment monitoring events. The same SSLs were observed at the same monitoring wells as identified in 2020 and 2021.
- In mid-2023, TVA updated the statistical analysis after incorporating additional groundwater monitoring data from the first assessment monitoring and retest events conducted in 2023. The same SSLs were observed at the same monitoring wells as identified in 2020 through 2022. There are currently SSLs for cobalt at monitoring wells CUF-211 and CUF-212; lithium at monitoring well 93-3; and molybdenum at monitoring well CUF-209.

As of the date of this report, TVA has not demonstrated that a source other than the CCR Units associated with monitoring wells CUF-209, CUF-211, CUF-212 and 93-3 caused the SSLs, as allowed under 40 CFR § 257.95(g)(3)(ii).

In accordance with 40 CFR § 257.96(a), TVA prepared the 2019 Assessment of Corrective Measures (ACM) Report for the CCR Units at CUF, placed it in the facility operating record on July 15, 2019, and uploaded it to the TVA CCR Rule Compliance Data and Information website on August 14, 2019. The ACM Report provided an assessment of the effectiveness of corrective measures in accordance with 40 CFR § 257.96(c). Three primary strategies were evaluated to address groundwater exhibiting concentrations of cobalt, lithium, and molybdenum above the GWPS:

- Hydraulic Containment and Treatment
 - Pumping Systems
 - Physical Barriers
- Enhanced In-Situ Treatment (EIST)
 - Direct Injection
 - Infiltration Galleries
 - Permeable Reactive Barriers (PRB).
- Monitored Natural Attenuation (MNA)

Following preparation of the ACM Report, TVA began the remedy selection process. Semiannual reports are required pursuant to 40 CFR § 257.97(a) to document progress toward remedy selection and design. TVA placed prior Semiannual Reports on the Progress of Remedy Selection into the facility operating record pursuant to 40 CFR § 257.97(a) and § 257.105(h)(12). TVA provided notification of the availability of the semiannual reports describing the progress in selecting and designing the remedy and placed the reports on the TVA CCR Rule Compliance Data and Information website in accordance with 40 CFR § 257.106(h)(9) and § 257.107(h)(9). TVA will continue to review new data as it becomes available and implement changes to the groundwater monitoring and corrective action program as necessary to maintain compliance with 40 CFR § 257.90 through § 257.98.

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At least 30 days prior to final groundwater remedy selection pursuant to the CCR Rule, a public meeting will be held with interested and affected parties to discuss the results of the corrective measures assessment in accordance with 40 CFR § 257.96(e). The selected remedy must meet the requirements of 40 CFR § 257.97(b) and must consider the evaluation factors set forth in 40 CFR § 257.97(c). Once a final remedy is chosen, a final report describing the remedy and how it meets the standards set forth in 40 CFR § 257.97(b) will be prepared. The owner/operator must provide a schedule for implementing the selected remedy that considers the factors set forth in 40 CFR § 257.97(d).

1.2 Summary of State Required Investigation and Remedy Selection Process

With oversight from the Tennessee Department of Environment and Conservation (TDEC), TVA is currently conducting environmental investigations of the CCR units at CUF in accordance with TDEC Commissioner's Order, OGC 15-0177 (TDEC Order). The TDEC Order sets forth the process by which TVA is investigating the CCR Units, will provide an assessment of the data to TDEC, and will present proposed corrective measures and remedies, including for groundwater, to TDEC for approval. TVA has provided TDEC an environmental assessment report (EAR) for CUF, including groundwater results, even though some environmental investigations are ongoing. Once TDEC determines the assessment is complete and approves the EAR, then, as part of the TDEC Order process, TVA will submit a Corrective Action/Risk Assessment (CARA) Plan to TDEC for approval. The CARA Plan will specify actions that TVA plans to take at the CCR Units, including corrective measures for groundwater remediation. TDEC must approve the CARA Plan, including the closure methodology for the CCR Units and corrective measures for groundwater remediation. The TDEC Order process includes a public comment period for the CARA Plan.

1.3 Report Contents

This semiannual progress report provides a summary of CUF site characteristics, the groundwater assessment monitoring program, the findings of the ACM process, and the current progress of selecting and designing a final remedy for SSLs above a GWPS.

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2.0 Site Background and Characteristics

CUF is located in Cumberland City, Stewart County, Tennessee. The facility lies on the south bank of Cumberland River and adjacent to Wells Creek. **Figure 1** shows an overview map of CUF, including the CCR Units. Construction of CUF began in 1968 and power generation commenced in 1973. CUF currently continues to operate as a coal-fired power generation facility. The coal combustion process at CUF has resulted in the production of fly ash, bottom ash, and gypsum.

The current area of the Bottom Ash Pond encompasses approximately 9 acres, the Dry Ash Stack encompasses approximately 113 acres, and the Gypsum Storage Area encompasses approximately 145 acres. These units are surrounded with perimeter dike systems. Prior to April 11, 2021, bottom ash was sluiced to the Bottom Ash Pond, reclaimed, and then spread and compacted within the Dry Ash Stack. The Bottom Ash Pond also received effluent from lined settling channels and a nearby plant that processes gypsum slurry. Effluent from the Bottom Ash Pond was then conveyed to the Stilling Pond (including Retention Pond).

In accordance with CCR Rule requirements and deadlines, waste streams into the Bottom Ash Pond ceased. TVA processes bottom ash and gypsum fines in the newly constructed Bottom Ash Dewatering (BADW) System and flue-gas desulfurization (FGD) wastewater treatment plant. From these new facilities, dry bottom ash is placed in the Dry Ash Stack and dry gypsum is placed in the Gypsum Storage Area. Non-CCR flows are conveyed to the Temporary Lined Basin (TLB) through newly installed high-density polyethylene piping that runs from the Bottom Ash Dewatering Facility to the TLB. The first permanent Process Water Basin was completed in 2023. TVA has lined the perimeter drainage ditch along the eastern and southern sides of the Gypsum Storage Area and placed temporary soil cover on portions of the Dry Ash Stack to reduce stormwater infiltration into the CCR Units. Gypsum material is also being harvested at the Gypsum Storage Area for beneficial use by the wallboard manufacturing plant adjacent to CUF.

2.1 Conceptual Site Model Summary

The hydrogeologic conceptual site model (CSM) is one of the primary tools that can be used to support decisions on corrective measures. This section of the report provides a summary of the hydrogeologic CSM. The geology and hydrogeology of the CUF site have been characterized during implementation of multiple investigations. These investigations provide an understanding of site geology and the presence of water-bearing zones.

CUF is located within the Wells Creek Basin, which is a meteor impact structure. The subsurface geology is characterized by two hydro-stratigraphic units that includes both the alluvium and the bedrock. Where alluvium is absent, residuum derived from the weathering of bedrock overlies bedrock. The alluvium can be further differentiated into alluvial silts and clays and alluvial sands and gravels. The CCR Units overlie bedrock formations that primarily consist of limestone, dolomite and shale. The alluvial sands and gravels are considered the upper-most aquifer, and groundwater from this hydro-stratigraphic unit is monitored in accordance with 40 CFR § 257.91. Where the sands and gravels are absent in the eastern part of the CCR

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FIGURES