Investigation, Assessment, and Remediation: An Update on the State of Coal Ash in Tennessee

Robert Wilkinson, P.G., CHMM

Environmental Show of the South 2019
Introduction

- Tennessee’s Regulated CCR Units and Location
- Commissioner’s Order OGC15-0177
- Environmental Investigation Plan (EIP) Overview
- Commissioner’s Order Site Updates
Tennessee TVA CCR Facilities

- Watts Bar
- CUMBERLAND
- GALLATIN
- NEW JOHNSONVILLE
- BULL RUN
- KINGSTON
- JOHN SEVIER
- ALLEN

Legend:
- TVA Fossil Plants
- Interstates
- Major Lakes
- Cities
- Counties

Department of Environment & Conservation
Order Has Two Purposes

1. Establish transparent and comprehensive process for the investigation, assessment, and remediation of unacceptable risks, resulting from the management and disposal of coal combustion residuals (CCR) at the TVA’s coal-fired power plants in Tennessee.

2. Implementation of the federal CCR rule to insure coordination and compliance with Tennessee laws and regulations that govern the management and disposal of CCR.
Investigation: The Order requires TVA to develop an EIP for each site that, when implemented, shall provide the information necessary to “fully identify the extent of soil, surface water, and ground water contamination by CCR”

Assessment: Environmental Assessment Report (EAR) is an analysis of the extent of soil, surface water, and ground water contamination by CCR at the site.
  – The process set-out shall be repeated until the Department determines there is sufficient information to adequately characterize the extent of CCR contamination in soil, surface water, and ground water at each site.

Remediation: Corrective Action/Risk Assessment (CARA) Plans that shall specify all actions TVA plans to take at the site and the basis of those actions.
TVA Johnsonville Fossil Plant (JOF)
TVA Johnsonville Fossil Plant (JOF)

- Facility closed 12/31/2017
- Final EIP approved 12/12/2018
- Scheduled completion July 2022
# TVA Johnsonville Fossil Plant (JOF)

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TVA Johnsonville Fossil Plant (JOF)
TVA Cumberland Fossil Plant (CUF)

- Active facility and will continue to be so
- EIP Revision 3 Final June 2018
- Scheduled completion March 2022
- Currently dewatering and excavating Retention/Stilling Pond to construct new process water basins
## TVA Cumberland Fossil Plant (CUF)

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TVA Cumberland Fossil Plant (CUF)
TVA Kingston Fossil Plant (KIF)
TVA Kingston Fossil Plant (KIF)

- Active facility and will continue to be so
- Final EIP Revision 4 approval November 2018
- Scheduled completion February 2022
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TVA Kingston Fossil Plant (KIF)
TVA Bull Run Fossil Plant (BRF)
TVA Bull Run Fossil Plant (BRF)

- Facility to close in 2023
- Final EIP Revision 4 approved December 2018
- Scheduled completion August 2022
- Currently dewatering and excavating a portion of the Stilling Pond to construct an new process water flow basin
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TVA Bull Run Fossil Plant (BRF)
TVA Bull Run Fossil Plant (BRF)
TVA Watts Bar Fossil Plant (WBF)

- Closed facility
- Final EIP Revision 3 approved November 2018
- Scheduled completion May 2022
# TVA Watts Bar Fossil Plant (WBF)

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TVA Watts Bar Fossil Plant (WBF)
TVA John Sevier Fossil Plant (JSF)
TVA John Sevier Fossil Plant (JSF)

- Closed facility, replaced with CC unit
- Final EIP Revision 3 approved November 2018
- Scheduled completion April 2022
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TVA Allen Fossil Plant (ALF)

- Facility Closed April 2018
- Combined Cycle (CC) facility now in operation
- EIP Revision 3 approved March 19, 2019
- EIP field data collection begins May 2019
- Scheduled completion September 2022
The EIP Groundwater Investigation for the East Ash Disposal Area has been accelerated under TDEC Division of Remediation (DOR)

Arsenic, lead, and fluoride concentrations above MCLs in the Alluvial Aquifer and TVA’s initial plan to utilize the Memphis Sands Aquifer (MSA) as a cooling water source for the new combined cycle plant

TVA is not currently using the MSA wells as a cooling water source
To complete the horizontal and vertical delineation of arsenic, lead, and fluoride in the Alluvial aquifer near wells ALF-203 and 202, TVA installed DPT borings and collected groundwater samples from various depths.

TVA installed new shallow, intermediate and deep monitoring wells.
ALF Remedial Investigation (RI)
ALF Remedial Investigation (RI)
• Ash pore water exhibits high pH (average of approximately 10 SUs) and low oxidation-reduction potential (average of approximately -130 mV)

• Concentrations of arsenic in the ash pore water (unfiltered) ranged from 1.4 to 13,700 micrograms per liter (ug/L)
• TVA drilled four deep soil borings into the upper Claiborne confining unit collected groundwater samples from the Memphis aquifer

• TVA found that the upper Claiborne is a low-hydraulic conductivity clayey unit, up to 69 feet thick

• A stratigraphic offset was identified in this unit near the southeast corner of the East Ash Disposal Area
USGS-CAESER inferred that an approximate North 70 degrees East (N70E) trending fault has off-set the sedimentary sequence comprising the Alluvial aquifer, upper Claiborne confining unit, and upper part of the Memphis aquifer in this area by varying amounts.

Erosion of part of the upper Claiborne confining unit, combined with potential faulting, illustrates the complex relationship of hydrogeologic units in this area.
ALF Remedial Investigation (RI)
ALF Remedial Investigation (RI)
• Alluvial Aquifer arsenic concentrations
• Arsenic concentrations in GW
ALF Remedial Investigation (RI)
Groundwater samples from the production wells in the Memphis aquifer were collected.

No constituents were detected above USEPA drinking water standards (MCLs).

USGS-CAESER conducted a pumping test of the Memphis aquifer production wells at TVA’s Allen Combined Cycle (ACC) Plant.

Prior to the pumping test, Tritium (a radioactive isotope unrelated to Allen) was detected in the production well samples collected by USGS.

This indicates “modern” or “young” groundwater in the region had previously entered the Memphis aquifer.
Results of the pumping test indicated that pumping the production wells produced discernible drawdown in the Alluvial aquifer.

This indicates that a hydraulic connection exists locally between the Memphis aquifer and the Alluvial aquifer.

The largest drawdown in the Alluvial aquifer was observed in the southeastern part of the ALF property and along the eastern side of the ACC Plant property.
Quarterly groundwater monitoring initiated April 2019 to continue until remediation is complete

Interim Remedial Measures to capture and remove impacted groundwater at the ALF to be in place by March 2020

TVA is currently preparing a NEPA assessment for closure of the East Ash Disposal area with Closure by Removal as the preferred option, Closure In Place is not being considered. Record of Decision March 2020

Dewatering to begin August 2019
CONSTRUCT DRAINAGE DITCHES TO SUMPS TO MANAGE STORMWATER RUNOFF & MAINTAIN POSITIVE DRAINAGE DURING REMAINING CCR REGRADING

TEMPORARY TREATMENT FACILITY

PUMP SUMPS TO NPDES OUTFALL 002 (UTILIZE TREATMENT PRIOR TO DISCHARGE, IF NEEDED)

INSTALL SUMPS
ALF Remedial Investigation (RI)
ALF Remedial Investigation (RI)
ALF Remedial Investigation (RI)
ALF Remedial Investigation (RI)
ALF Remedial Investigation (RI)
ALF Remedial Investigation (RI)
Questions and Comments?