TENNESSEE VALLEY AUTHORITY

1101 Market Street, Chattanooga, Tennessee 37402

Sent Via Electronic Transmittal

January 26, 2022

Mr. Vojin Janjić
Division of Water Resources
Tennessee Department of Environment
and Conservation
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 11th Floor
Nashville, TN 37243

Dear Mr. Janjić

TENNESSEE VALLEY AUTHORITY (TVA) – CUMBERLAND FOSSIL PLANT (BRF) – NPDES PERMIT NO. TN0005789 – WASTEWATER TREATMENT UPGRADES TO COMPLY WITH EFFLUENT LIMITATION GUIDELINES (ELG) – 2021 ANNUAL REPORT

In accordance with Part I.F. of the subject permit, please find enclosed an annual report detailing TVA's progress toward installing the necessary equipment to meet the wet flue gas desulfurization wastewater and bottom ash transport water ELGS.

If you have questions or need any additional information, please contact Carrie McCarty at (931) 827-6278 or by e-mail at csmccart@tva.gov.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Sincerely,

William T Patterson
Plant Manager
Cumberland Fossil Plant

Enclosure
Mr. Vojin Janjić

(Electronic Distribution w/ Enclosure):

Ms. Angela Adams (Angela.Adams@tn.gov)
Coal Combustion Residuals
Environmental Consultant
Tennessee Department of Environment
and Conservation
Division of Water Resources
761 Emory Valley Road
Oak Ridge, Tennessee 37830

Mr. Rob Burnette (Rob.Burnette@tn.gov)
Solid Waste Program Manager
Tennessee Department of Environment
and Conservation
1301 Riverfront Parkway, Suite 206
Chattanooga, Tennessee 37402

Mr. James Clark (James.Clark@tn.gov)
Chief Geologist
Tennessee Department of Environment
and Conservation
Columbia Field Office
1421 Hampshire Road
Columbia, Tennessee 38401

Mr. Britton Dotson (Britton.Dotson@tn.gov)
Environmental Fellow
Tennessee Department of Environment
and Conservation
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 11th Floor
Nashville, Tennessee 37243-1548

Mr. Pat Flood (Pat.Flood@tn.gov)
Senior Advisor for Technical Assistance
and Special Projects within the Bureau of
Environment
Tennessee Department of Environment
and Conservation
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 11th Floor
Nashville, Tennessee 37243-1548

Mr. Caleb Nelson (Caleb.Nelson@tn.gov)
Environmental Protections Specialist
Tennessee Department of Environment
and Conservation
Columbia Field Office
1421 Hampshire Road
Columbia, Tennessee 38401

Mr. Jim Ozment (James.Ozment@tn.gov)
Coal Combustion Residual
Environmental Consultant
Tennessee Department of Environment
and Conservation
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 2nd Floor
Nashville, Tennessee 37243-1548

Ms. Beth Rowan (Beth.Rowan@tn.gov)
Environmental Consultant
Tennessee Division of Remediation
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 11th Floor
Nashville, Tennessee 37243-1548

Mr. Ron Vail (Ron.Vail@tn.gov)
Coal Combustion Residual
Program Manager
Tennessee Department of Environment
and Conservation
1301 Riverfront Parkway, Suite 206
Chattanooga, Tennessee 37402

Mr. Robert S. Wilkinson (Robert.S.Wilkinson@tn.gov)
Coal Combustion Residual Technical Manager
Tennessee Department of Environment
and Conservation (TDEC)
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 2nd Floor
Nashville, Tennessee 37243-1548

cc (electronic distribution):
C. L. Bishop, BR 2C-C
R. B. Combs, LP 5E-C
C. B. Foley, MCT 1A-CCK
B. P. Lees, WT 11C-K
C. S. McCarty, CUF 1A-CCT
P. J. Pearman, BR 2C-C
William T Patterson CUF1A-CCT
ECM, ENV Records

Wet FGD Wastewater Treatment & Bottom Ash ELG Project Updates
TVA Cumberland Fossil Plant – NPDES permit No. TN0005789
2021 Annual Report

Introduction

Effluent Limitations Guidelines NPDES Permit Requirement and Regulations

Part I.F. of the NPDES permit for Cumberland Fossil (CUF) requires the Tennessee Valley Authority (TVA) to provide the Tennessee Department of Environment and Conservation (TDEC) with an annual report detailing progress achieved during the preceding calendar year as well as identification of upcoming projects needed to attain compliance with EPA's Effluent Limitations Guidelines (ELGs). These update reports are due by January 31 of the following year.

TVA presented information in early 2016 to support a fundamentally different factors (FDF) limits variance for selenium and the monthly average nitrate-nitrite wet flue gas desulfurization (FGD) ELGs to be based on physical-chemical (P-C) treatment alone (i.e., without installing biological equipment). This request was made because TVA believes CUF is fundamentally different from that which EPA considered when establishing the wet FGD ELGs because of the process employed and costs that were substantially higher than what EPA predicted. In support of the FDF, TVA prepared a schedule that showed P-C treatment equipment installed and operational by September 1, 2021, in order to begin gathering data on how effective P-C could be in removing selenium. The CUF NPDES permit incorporated the September 1, 2021, date as the ELG applicability date for arsenic and mercury. The wet FGD selenium (Se) and nitrate-nitrite (N-N) limits are shown in the permit as the same limits as the ELG rule with an applicability date of December 1, 2023. TVA requested an ELG applicability date for no discharge of bottom ash transport water (BATVV) of December 1, 2023; TDEC granted that timetable in the NPDES permit issued in 2018.
On October 13, 2020, the United States Environmental Protection Agency published revisions to the ELGs in 40 CFR Part 423. The revised rule modifies technology-based effluent limitations for FGD wastewater and BATW. The rule also establishes several new subcategories that provide separate compliance pathways based on unit operation and asset operating plans.

TVA applied for an NPDES permit modification on January 8, 2021, pursuant to the revised ELGs, to incorporate revised limitations based on multiple asset operating scenarios.
On May 6, 2021, the TVA Board of Directors held its quarterly meeting during which TVA's Chief Executive Officer discussed planning assumptions for the retirement of TVA's coal fleet by 2035 and announced TVA's intent to prepare an Environmental Impact Statement (EIS) to assess the impacts associated with the proposed retirement of CUF and the replacement generation alternatives. On May 11, 2021, TVA published a Notice of Intent (NOI) for the EIS in the Federal Register. TVA expects to release the draft EIS in spring of 2022 and anticipates issuing the final EIS in fall of 2022. Following evaluation of the effects of the proposed retirement of CUF and the potential replacement generation as well as consideration of the comments received during the EIS process, the TVA
Board of Directors will then be able to make a decision on either the continued operation of CUF, or its retirement with replacement generation.

On May 21, 2021, TVA submitted to TDEC supplemental relevant information for review and consideration in the modified NPDES permit request relevant to the Board's decision to assess closure alternatives for CUF.

On October 6, 2021, TVA submitted a NOPP in the retirement subcategory for FGD wastewater and BATW for the two coal combustion units at CUF. TVA's 2019 Integrated Resource Plan includes the recommendation to evaluate retirements of additional coal capacity which will be completed for CUF in the aforementioned EIS. Milestones that either have been completed or would need to be completed to achieve retirement are listed in the table below:

Milestone	Activity	Date Completed
Integrated Resource Plan	TVA posted the final Record of Decision for the 2019 IRP.	September 17, 2019
National Environmental Policy Act (NEPA) Review	TVA will publish an Environmental Impact Statement (EIS) to assess the impacts associated with the proposed retirement of CUF and the replacement generation alternatives	Final EIS anticipated Fall 2022
Decision to Retire CUF	TVA Board of Directors vote to make decision on CUF retirement	To be determined – may proceed after publication of the Final EIS (decision currently scheduled to be made during the November 2022 TVA Board meeting)
Cessation of Coal Combustion Activities	If approved, TVA would cease coal combustion at CUF	To be determined – must be on or before December 31, 2028

Wet FGD Wastewater Treatment/Related Projects

Historical Equipment/Systems Description

The existing system for handling wet FGD (gypsum) blowdown at Cumberland Fossil (CUF) includes primary hydrocyclone(s) with underflow going to vacuum belt filters used to dewater gypsum. Dewatered gypsum is marketed for wallboard production at a Georgia Pacific facility adjacent to CUF. Onsite landfill disposal may occur if CUF's gypsum does not meet specifications for wallboard. Gypsum dewatering operations are currently performed by SynMat^{R} with the fines going to the fines dewatering basin with overflow going to the CUF ash pond for treatment, eventually discharging via Internal Monitoring Point 001. CUF has completed construction of a WWT facility including both Stage A (fines dewatering) and physical-chemical treatment for wet FGD blowdown from the SynMat^{R} facility.

There are several projects related to the Wet FGD wastewater treatment (WWT) upgrades at Cumberland Fossil Plant (CUF). These projects include:

- Upgrades to the gypsum wallboard processing plant (i.e., gypsum dewatering) (currently operated by SynMat^{R}) to provide enhanced redundancy and control of the overall process for wet FGD WWT,
- Upgrades to the effluent tanks where gypsum is pumped to the gypsum dewatering facility to reduce the volume of wet FGD wastewater to be treated

and construction of gypsum slurry storage tank to allow storage of gypsum (if needed) before being sent to gypsum dewatering,
- Design and construction of the wet FGD wastewater treatment system.

Another FGD WWT-related project at CUF is the installation of SulfiTrak™ sulfite analyzers and FGD oxidation air control on the scrubber absorbers to enhance chemical process control of the scrubbers to reduce or eliminate the amount of mercury air re-emission scrubber additive as well as the potential benefits to wet FGD WWT. The expected benefits to the wet FGD WWT system is to reduce variability in the influent as well as reduce the amount of selenium that is oxidized in the FGD to selenate which is the more difficult species to remove compared to selenite.

2021 Wet FGD Activities Summary

SynMat® facility upgrades: Additional upgrades to incorporate automation with the effluent slurry tanks (ESTs) and gypsum slurry storage tank (SST) was completed in April 2021.

Construction of wet FGD Wastewater Treatment Facility: Stage A commissioning was completed in March 2021 to dewater gypsum fines. Stage B commissioning was completed in May 2021 which will manage total dissolved solids such as arsenic and mercury.

2022 Wet FGD Projects Activities Planning

TVA will continue addressing some warranty and O&M issues with the WWT facility such as replacement of electrical cables due to premature failure, repairs needed to the effluent tank, and adding a flushing system that will address pipe plugging issues.

Bottom Ash Transport Water Related Projects

TVA anticipated issues complying with the no-discharge of BATW ELG that was included in EPA's 2015 ELG rule. Based on TVA's experiences at Bull Run in operating a recirculating system, some amount of blowdown discharge needs to be allowed in order to maintain system chemistry and balance flow volumes in a closed loop. Certain constituents (e.g., chlorides) present in BATW that are not removed by the planned physical-chemical treatment for BATW may "cycle up" or become more concentrated leading to a degradation or failure of the materials of construction. While EPA allows for use of BATW in FGDs or for no discharge uses, flows may still not "balance", depending upon how much flow can be used without impacting scrubber performance. In the 2020 ELGs, EPA replaced the 2015 BATW no-discharge requirement with a requirement that allows the discharge of up to ten percent of the wetted system by volume in certain prescribed situations. TVA is currently evaluating its long-range plan on the remaining coal-fired plants and has applied for an NPDES permit modification to incorporate the revised effluent limitations based on multiple operating scenarios.

2021 Bottom Ash Activities Summary & Projected 2022 Activities

Bottom Ash Dewatering commissioning was completed in February 2021. A bottom ash transport water recirculation Phase 1 study was completed in August 2020. The Phase 1 study focused on the 2015 ELGs no-discharge rule by returning the treated bottom ash transport water to the powerhouse for reuse. The need for the recirculation system will be determined after completion of the EIS and the decisions made by the TVA Board.