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Sent Via Electronic Transmittal

January 29, 2024

Mr. Vojin Janjić (water.permits@tn.gov)
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Dear Mr. Janjić

TENNESSEE VALLEY AUTHORITY (TVA) – KINGSTON FOSSIL PLANT (KIF) – NPDES PERMIT NO. TN0005452 – WASTEWATER TREATMENT UPGRADES TO COMPLY WITH EFFLUENT LIMITATION GUIDELINES (ELG) – 2023 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 and bottom ash transport water ELGs.

If you have questions or need any additional information, please contact Adele Dennison at (865) 717-2157 or by e-mail at amdennison@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,

A handwritten signature in blue ink, appearing to read "Jeffrey A. Kickert".

Jeffrey A. Kickert
Plant Manager
Kingston Fossil Plant

Enclosure

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Wet FGD Wastewater Treatment & Bottom Ash ELG Project Updates

TVA Kingston Fossil Plant – NPDES permit No. TN0005452

2023 Annual Report

Introduction

Effluent Limitations Guidelines NPDES Permit Annual Reporting Requirements

Part I.F. of the NPDES permit for Kingston Fossil (KIF) 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. In 40 CFR 423.19(f), the ELG Rule specifies contents of the annual progress report provide reference the status of milestones referenced in TVA's Notice of Planned Participation (NOPP) in the retirement subcategory of the ELGs.

Regulatory Developments

2020 ELG Rule

On October 13, 2020, the United States Environmental Protection Agency (EPA) published revisions to the ELGs in 40 CFR Part 423. The revised rule modifies technology-based effluent limitations for Flue Gas Desulfurization (FGD) wastewater and Bottom Ash Transport Water (BATW). In setting new effluent limitations, EPA recognized the need to provide flexibility by establishing new subcategories that provide separate compliance pathways based on unit operation and asset operating plans and by allowing transfers between subcategories.

2021 Modified NPDES Permit Request and Supplemental Developments

TVA submitted an NPDES permit modification request for KIF on January 8, 2021, to incorporate revisions to the ELGs. Enclosed with that submission was TVA's justification to modify the permit, including interim milestone dates and applicability date proposals with justifications for coming into compliance with the revised technology-based effluent limitations for the Generally Applicable category for FGD wastewater and BATW.

Subsequently, on May 6, 2021, during the TVA Board of Directors quarterly meeting, TVA's CEO announced TVA's intent to prepare an Environmental Impact Statement (EIS) to assess the impacts associated with the proposed retirement of KIF and the replacement generation alternatives. On June 15, 2021, TVA published a Notice of Intent (NOI) for the EIS in the Federal Register. Preparing an EIS ensures that TVA is considering relevant environmental information, and that the public has been informed about and has an opportunity to comment on TVA's proposed decision. The EIS process is crucial for TVA to appropriately evaluate and prioritize the values and concerns of stakeholders and to formulate, evaluate, and compare alternatives. On June 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 KIF.

2021 Notice of Planned Participation - Cessation of Coal Combustion Activities

On October 6, 2021, TVA submitted a NOPP in the retirement subcategory for FGD wastewater and BATW for the nine coal combustion units at KIF in order to preserve the option of participating in the retirement subcategory if the TVA Board of Directors determines coal combustion at KIF shall cease by 2028. TVA anticipates issuing the final EIS in 2024. Following evaluation of the effects of the proposed retirement of KIF 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 decide on either the continued operation of KIF, or its retirement with replacement generation. On August 3, 2021, EPA published a notice of new rulemaking in the Federal Register that proposes revisions to the 2020 ELG rule. When this new rule is promulgated, TVA will respond according to any new compliance requirements and their corresponding applicability dates, in coordination with state regulators.

2021 Modified NPDES Permit TN0005452

On December 1, 2021, TDEC issued a modified NPDES KIF permit TN005452 for authorized discharges. The modified NPDES permit incorporates alternative compliance pathways with corresponding compliance dates for applicable ELG categories and subcategories.

Retirement Subcategory Milestones

See below for a listing of milestones submitted with TVA's October 6, 2021, Notice of Planned Participation in the retirement subcategory.

Milestone	Activity	Date
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 KIF and the replacement generation alternatives	Final EIS anticipated CY2024
Decision to Retire KIF	TVA Board of Directors vote to make decision on KIF retirement.	To be determined – may proceed after publication of the Final EIS
Cessation of Coal Combustion Activities	If approved, TVA would cease coal combustion at KIF	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 KIF includes primary hydrocyclone(s) with underflow going to vacuum belt filters used to dewater gypsum. Some of the dewatered gypsum is marketed at KIF and some is disposed of in an onsite landfill. Gypsum dewatering operations are currently performed by TVA.

Primary hydrocyclone overflow and filtrate from the vacuum belt filters flows to clarifier(s) with the potential for various chemicals to be injected for pH adjustment, coagulation, and flocculation to achieve enhanced solids settling. Clarifier overflow (i.e., treated flows) are then routed to the gypsum area process water basin that discharges to the condenser cooling water channel via Internal Monitoring Point 01A. KIF is also currently equipped with a temporary organosulfide chemical feed to treat mercury.

AECOM was awarded an engineer, procure, and construct (EPC) contract for wet FGD compliance at KIF in 2019. Initially, the EPC approach was a stand-alone WWT system intended to achieve compliance with the arsenic and mercury effluent limitations prescribed in the final 2015 ELGs in accordance with the current NPDES permit. As the WWT design progressed in early 2020, TVA identified and pursued an alternative approach that included changes in plant operations coupled with upgrades to the existing gypsum dewatering facility, which would eliminate the need to construct a stand-alone physical-chemical treatment system.

The alternative WWT design would involve operational modifications to the FGD scrubber, installation of equalization tanks, and several upgrades to the existing gypsum dewatering system. Operational modifications of the FGD scrubber from an intermittent FGD blowdown and batch WWT to a more continuous flow, would steady the FGD WWT inlet flow rates and characteristics and improve the overall performance of the existing hydrocyclones and clarifiers. The alternative WWT design would include a new controlled reaction tank and the addition of a polymer make down system. A third clarifier would be added in parallel with the existing clarifiers to improve treatment capability. Post clarification media filtration consisting of backwash filters would be added to the backend of the system.

The alternative WWT design approach would allow TVA to utilize/expand existing equipment located in brownfield areas with few equipment additions and a smaller footprint. This system would also reduce equipment operations and maintenance (O&M) and labor costs.

In October 2020, EPA published revisions to the ELGs. The revised rule significantly altered the planning, design, procurement, construction and commissioning of a WWT design to comply with the revised general applicable effluent limitations. The 2020 rule provides for a significantly more stringent mercury monthly average limit of 34 ng/l as compared to the final 2015 rule monthly average mercury limit of 365 ng/l for the general applicable case. The mercury limit in the revised rule is an order magnitude lower and would require a different treatment technology for compliance.

TVA reviewed the final rule and developed supporting documentation for an NPDES permit modification pursuant to the revised ELGs. TVA's is currently evaluating its long-range plan to consider the costs and benefits of the environmental and other major capital investments at its remaining coal-fired plants including KIF.

Wet FGD Projects Activities Update

As a risk mitigation measure for deployment of replacement generation after ELG compliance dates, TVA completed a Phase 1 study in 2022 to evaluate different treatment technologies and started preliminary engineering to develop a design to meet the significantly more stringent mercury requirements in the 2020 rule. This work was supplemented with a limited pilot study of membrane and biologic treatment systems in 2023 to evaluate the efficacy of treatment technologies. The need for the FGD WWT project will be determined in concert with the KIF Retirement EIS and the decisions made by the TVA Board.

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 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.

Bottom Ash Project Activities Update

In 2022, TVA completed a Phase 1 study of the Bottom Ash Recirculation project to meet the 2020 rule. Similar to the FGD WWT system, TVA elected to move forward with the design of a high recirculation rate system for BATW as a risk mitigation measure for deployment of replacement generation after ELG compliance dates. The need for the Bottom Ash Recirculation project will be determined in concert with the KIF Retirement EIS and the decisions made by the TVA Board. As EPA moves forward with their new ELG rulemaking, TVA will monitor any updated and/or new requirements, coordinate with state regulators, and respond accordingly for compliance.