



Tennessee Valley Authority, 714 Swan Pond Road, Harriman, Tennessee 37748

**Sent Via Electronic Transmittal**

January 24, 2022

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Division of Water Resources  
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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) – 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 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 that reads "Timothy D. Jackson". The signature is written in a cursive style with a large, sweeping initial "T".

Timothy D. Jackson  
Plant Manager

**Kingston Fossil Plant**

**Enclosure**

**Mr. Vojin Janjić**

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# Wet FGD Wastewater Treatment & Bottom Ash ELG Project Updates

TVA Kingston Fossil Plant – NPDES permit No. TN0005452

2021 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

In 40 CFR 122.62(a)(3), EPA's regulations implementing the Clean Water Act require permit modification requests that are based on changes in regulations to be filed within 90 days of the publication of the change in the Federal Register. To meet this requirement, 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. The KIF planning assumptions in the NOI call for the retirement of three KIF units as early as 2026 and the remaining six units as early as 2027. TVA expects to release the draft EIS in summer of 2022 and anticipates issuing the final EIS in spring of 2023. 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 make a decision on either the continued operation of KIF, or its retirement with replacement generation.

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.

<b>Milestone</b>	<b>Activity</b>	<b>Date</b>
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 Spring 2023
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 (decision currently scheduled to be made during the August 2023 TVA Board meeting)
Cessation of Coal Combustion Activities	If approved, TVA would cease coal combustion at KIF	To be determined – must be on or before

## **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. Clarifier underflow (solids) is returned to the gypsum vacuum belt filters which interferes with producing wallboard-grade gypsum. 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, 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. To achieve compliance with the revised mercury effluent limitations, the alternative WWT design would also need incorporate additional technologies (e.g. ultrafiltration).

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.

### **2021/2022 Wet FGD Projects Activities Update/Planning**

The need for the FGD WWT modifications will be determined after completion of the EIS and the board decisions are made.

### **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.

### **2021/2022 Bottom Ash Project Activities Update/Planning**

TVA completed a Phase 1 study of the Bottom Ash Recirculation project in October 2019. 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 Bottom Ash Recirculation project will be determined after completion of the EIS and the decisions made by the TVA Board.