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**FINAL
ASH IMPOUNDMENT CLOSURE
ENVIRONMENTAL IMPACT STATEMENT**

PART I – PROGRAMMATIC NEPA REVIEW

Prepared by:
TENNESSEE VALLEY AUTHORITY
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Executive Summary

This Environmental Impact Statement (EIS) addresses the closure of coal combustion residual (CCR) impoundments at the Tennessee Valley Authority's coal plants. The purpose of this review is to support TVA's goal to eliminate all wet CCR storage at its coal plants by closing CCR impoundments across the TVA system, and to assist TVA in complying with EPA's CCR Rule. The EPA rule establishes national criteria and schedules for the management and closure of CCR facilities

CCRs are byproducts produced from burning coal and include fly ash, bottom ash, boiler slag and flue gas desulfurization materials. Historically, TVA has managed storage of CCR materials in ash impoundments or dry landfills. After the dike failure and ash spill at the Kingston Fossil Plant in 2008, TVA's Board of Directors directed TVA staff to review and address systems, controls and standards related to CCRs.

The outcome of that review was the goal to convert wet storage of CCRs to dry storage and close ash impoundments. This is being done on a project by project basis, subject to technical feasibility, availability of resources and environmental review. The ash impoundments within TVA's system vary in size from less than 10 acres (ac) to those that are nearly 400 ac. Many of the existing ash impoundments are decades old, and the larger impoundments contain millions of cubic yards (yd³) of CCR material.

Part I of the EIS considers all TVA ash impoundments and the environmental effects of two primary ash impoundment closure methods at a programmatic or generic level. These methods are: (1) Closure-in-Place and (2) Closure-by-Removal. Part II of the EIS consists of site-specific reviews of 10 CCR facilities that TVA proposes to close quickly.

From its analyses and available data, TVA concludes that CCR management activities at its plants do not pose any real risk to human health or the environment. Closure-in-Place or Closure-by-Removal would further lessen risks. At most locations, Closure-in-Place is more environmental beneficial than Closure-by-Removal, largely because Closure-by-Removal has significantly greater transportation-related impacts and takes longer than Closure-in-Place. Both reduce groundwater contamination. While Closure-by-Removal would reduce groundwater contamination more than Closure-in-Place over the long-term when CCR intersects groundwater (is in the groundwater), Closure-in-Place still reduces contamination in such situations. Closure-by-Removal always is more costly, and depending on the volume of CCR material to be moved significantly more costly, compared to Closure-in-Place.

EPA's CCR Rule, an administrative order issued by the Tennessee Department of Environment and Conservation, and other regulatory processes will help ensure that TVA CCR management activities, including the closure of its impoundments, will continue to be protective of human health and the environment. If TVA data and analyses indicated that its CCR activities were not protective of people's health and the environment, it would have acted to remedy this already. TVA is committed to doing so in the future.

Alternatives Considered

In addition to a No-Action Alternative which served as a baseline, TVA considered both Closure-in-Place and Closure-by-Removal Alternatives for CCR impoundments.

Based on its technical studies to support the CCR Rule, EPA determined that either Closure-in-Place or Closure-by-Removal would be equally protective of human health and the environment provided they are completed properly. EPA also observed that most facilities would be closed in place because of the difficulty of removing CCRs and notably higher costs and it assumed in its regulatory impact analysis that all facilities would be closed in place.

Closure-in-Place involves dewatering the impoundment, stabilizing the CCR, and installing a cover system. This keeps new sources of water from mixing with the CCR material which reduces risks of structural instability and groundwater contamination.

Closure-by-Removal involves dewatering and excavating the CCR material, transporting it to a lined landfill, reshaping the site and filling it with borrow material. Duration of Closure-by-Removal projects will depend on a number of factors including, primarily, the amount of CCR material to be removed from the impoundment, logistics associated with drying out the CCR and loading it into trucks or rail cars, and the amount of borrow material that must be transported to the site to fill in the excavated hole.

Public and Agency Involvement

On August 27, 2015, TVA published a Notice of Intent (NOI) in the Federal Register announcing that it planned to prepare an EIS to address the closure of CCR impoundments at its coal-fired power plants. The NOI initiated a 30-day public scoping period, which concluded on September 30, 2015. In addition to the NOI in the Federal Register, TVA published notices regarding this effort in regional and local newspapers; issued a news release to media; and posted the news release on the TVA Web site to solicit public input.

TVA developed a robust public involvement campaign for the release of the Draft EIS to ensure maximum awareness and opportunity to learn about and comment on the document. The notice of its availability was published in the Federal Register on January 8, 2016, with public notices running in major newspapers in the Tennessee Valley region. The formal public and agency comment period began January 11, 2016, and was scheduled to close 45 days later. (The Draft EIS actually was posted on the TVA Web site and available for public review on December 30, 2015.) The comment period was extended another 14 days until March 9, in response to several requests.

During the public comment period, TVA conducted 10 public meetings at fossil plant communities across the Valley. Notification of those townhall meetings entailed ads in each of the local newspapers and extensive media outreach. A 5-minute project and NEPA process overview video was created and played at each gathering and posted on the Web site. The public had the opportunity to submit comments at the meetings on response cards or by computer directly to our Web site.

TVA also provided information about the EIS to its Federal Advisory Committee Act (FACA) groups, the Regional Energy Resource Council (RERC) and the Regional Resource Stewardship Council (RRSC). Local, state and federal elected officials were briefed on the EIS too.

TVA received approximately 70 comment submissions which included letters, e-mails, petition-style submissions, comment forms, and submissions through the project website. The comment submissions were signed by more than 650 individuals. Comments and TVA's responses can be found in Appendix A of this document.

Part I Programmatic NEPA Review

The EIS describes the setting and existing conditions for natural and socioeconomic resource areas that could be affected by each alternative. From this baseline information, TVA analyzed potential impacts on 21 resource areas:

- Air Quality
- Climate Change
- Land Use
- Prime Farmland
- Geology and Seismology
- Groundwater
- Surface Water
- Floodplains
- Vegetation
- Wildlife
- Aquatic Ecology
- Solid Waste and Hazardous Waste and Hazardous Materials
- Threatened and Endangered Species
- Wetlands
- Socioeconomics and Environmental Justice
- Natural Areas, Parks, and Recreation
- Transportation
- Visual Resources
- Cultural and Historic Resources
- Noise
- Public Health and Safety

Both CCR impoundment closure alternatives have several common features that affect anticipated environmental impacts. These include temporary construction-related impacts (e.g., dewatering of impoundments) and those associated with the transport of borrow material needed to close the CCR impoundment.

For Closure-in-Place, TVA's analyses confirm EPA's determination that dewatering and capping impoundments would reduce groundwater contamination and structural stability risks because the hydraulic head (water pressure) would be reduced. Compared to Closure-by-Removal, this alternative would have significantly less risks to workforce health and safety and those related to off-site transportation of CCR (crashes, derailments, road damage and other transportation-related effects).

Closure-by-Removal would reduce groundwater contamination risks more than Closure-in-Place over the long term when CCR intersects with groundwater because CCR material would be excavated and moved to a permitted landfill. However, this alternative would result in notably greater impacts associated with other environmental factors and would increase the potential for impacts on worker-related and transportation related health and safety.

Mitigation Measures

The reduction of environmental impacts was an important goal in TVA's process for identifying CCR impoundment closure methods. EPA's CCR Rule and state regulatory programs require actions that will avoid, eliminate, or reduce potential CCR impacts and these overlay all of TVA's proposed and future CCR-related closure activities. Mitigation measures identified in the

programmatic review were identified to minimize potential adverse impacts associated with CCR impoundment closure at all TVA fossil-fuel plants. These measures include:

- Implementation of fugitive dust control systems;
- Erosion and sediment control best management practices (BMPs) to ensure that surface waters are protected from construction impacts
- Other construction BMPs to minimize and restore areas disturbed during construction such as revegetation with native species; and
- Other more specific mitigation measures are identified in Part II reviews as appropriate

A comparison of effects on various resources for each alternative is presented in Table ES-1.

Table ES-1. Summary and Comparison of Alternatives by Resource Area

Issue Area	Alternative A – No Action	Alternative B – Closure-in-Place	Alternative C – Closure-by-Removal
Closure Cost	\$0	<\$3.5 to \$200 million	<\$20 million to \$2.3 billion (Truck) <\$23 million to \$2.1 billion (Train)
Air Quality	No impact	Temporary minor impacts from fugitive dust and emissions from equipment and vehicles during construction and transport of borrow material.	Notably greater emissions (relative to Alternative B) from fugitive dust and emissions from equipment and vehicles during construction and transport of borrow and CCR material. For sites with large volumes of CCR magnitude of impact would be greater due to increased operation of on-site equipment and increased duration and frequency of off-site trucking. No exceedances of NAAQS expected for sites in attainment areas. No further deterioration of air quality is anticipated in the non-attainment areas for particulates and ozone.
Climate Change and Greenhouse Gases (GHG)	No impact	Construction and trucking operations of borrow material contributes to emissions of GHG.	Construction and trucking operations of CCR removal and borrow material contributes to emissions of GHG. For sites with large volumes of CCR, magnitude of impact would be greater due to increased operation of on-site equipment and increased duration and frequency of off-site trucking.
Land Use	No impact as no change in industrial land use	No impact as no change in industrial land use. Temporary impacts associated with the conversion of some vacant areas to laydown areas.	No impact as no change in industrial land use. Impacts associated with the conversion of some vacant areas to laydown areas. Minor beneficial impact as land could be reused for an alternative use following closure.
Prime Farmland	No impact	No impact	No impact
Geology and Seismology	Marginal improvement to static and seismic factor of safety of the impoundment.	Stable under static conditions. Stability increased by removal of hydraulic head. Seismic stability under evaluation and mitigable.	No impacts or risks of failure.
Groundwater	Risk to groundwater is not reduced.	Eliminating rain access reduces risk of migration of constituents to groundwater.	Reduces risk to groundwater by removing CCR from impoundment. Less short-term benefit for sites having high volume of CCR materials.
Surface Water	Risk to surface water is not reduced.	Risk to surface water would be reduced. Construction-related impacts would be negligible.	Risks to surface water would be reduced. Construction-related impacts would be negligible.

Table ES-1. Summary and Comparison of Alternatives by Resource Area

Issue Area	Alternative A – No Action	Alternative B – Closure-in-Place	Alternative C – Closure-by-Removal
Floodplains	Impacts to floodplains unchanged.	Reduces risk and extent of CCR migration into surface water during potential flooding event.	Removes risk of CCR migration into surface water during potential flooding event. Potential to incrementally increase floodplain storage.
Vegetation	No impact	Limited to construction-phase disturbance of largely industrialized settings that lack notable plant communities. Minor and adverse in the short term, but minor and positive in the long term.	Limited to construction-phase disturbance of largely industrialized settings that lack notable plant communities. Minor and adverse in the short term, but minor and positive in the long term.
Wildlife	No impact	Minor impact to predominantly previously disturbed low quality habitats during the construction phase.	Minor impact to predominantly previously disturbed low quality habitats during the construction phase.
Aquatic Ecology	No impact	No adverse impact	No adverse impact
Threatened and Endangered Species	No impact to threatened or endangered species.	No impact to threatened or endangered species. For sites that require limited tree removal potential impacts to threatened and endangered species would be minor.	No impact to threatened or endangered species. For sites that require limited tree removal potential impacts to threatened and endangered species would be minor.
Wetlands	No impact	No direct impact. Potential minor indirect impact may occur during construction. These would be minimized through BMPs.	No direct impact. Potential minor indirect impact may occur during construction. These would be minimized through BMPs.
Socioeconomic Resources	No impact	Short-term beneficial increases in employment and income during construction.	Short-term beneficial increases in employment and income. The larger the CCR volume the longer the benefits would last due to increased construction periods. Potential impacts to community services due to increased demand on workforce and equipment.
Environmental Justice	No impacts to EJ communities.	Impacts associated with the transport of borrow material (construction related noise, exposure to fugitive dust and exhaust emissions) to identified EJ communities. These impacts would be short term and generally minor.	Impacts associated with the transport of borrow and CCR material (construction related noise, exposure to fugitive dust and exhaust emissions) to identified EJ communities. For sites with large volumes of CCR, magnitude of impact would be greater due to increased duration and frequency of off-site truck or rail transport.

Table ES-1. Summary and Comparison of Alternatives by Resource Area

Issue Area	Alternative A – No Action	Alternative B – Closure-in-Place	Alternative C – Closure-by-Removal
Natural Areas, Parks and Recreation	No impacts	Potential long-term impact if recreational sites are closed as a result of impoundment closure activities.	Potential long-term impact if recreational sites are closed as a result of impoundment closure activities.
Transportation	No impacts	Temporary minor impacts from transport of borrow material.	Impact magnitude dependent upon CCR volume and removal duration. For sites with large volumes of CCR, magnitude of impact would be greater due to increased duration and frequency of off-site trucking resulting in additional impacts to local traffic and increase need for roadway maintenance. Impacts on level of service of roadway network notably greater for sites having large CCR volumes and short removal durations, resulting in increased risk of injuries and deaths.
Visual Resources	No impacts	Minor impacts during construction. Beneficial in long term.	Minor impacts during construction. Beneficial in long term.
Cultural Resources	No impacts	No impacts due to use of previously disturbed lands.	No impacts due to use of previously disturbed lands.
Noise	No impacts	Temporary minor construction noise impacts from equipment and vehicles.	Minor construction noise impacts from equipment and vehicles. For sites with large volumes of CCR, magnitude of impact would be greater due to increased duration and frequency of off-site truck and rail transport.
Solid and Hazardous Waste	No impacts	Minimal amounts generated during construction activities and managed in permitted facilities.	Minimal amounts generated during construction activities and managed in permitted facilities.
Public Health and Safety	No reduction in public health and safety risks to groundwater and surface water.	Temporary potential for impacts during construction activities and transportation of borrow material.	Potential for impacts during construction activities and transportation of borrow material and CCR. Increased risk associated with deep excavation of CCR impoundments. Notably greater risk to worker safety and traffic related safety associated with sites having high CCR volumes

Table ES-1. Summary and Comparison of Alternatives by Resource Area

Issue Area	Alternative A – No Action	Alternative B – Closure-in-Place	Alternative C – Closure-by-Removal
Cumulative Effects	No impacts	Beneficial cumulative impact to groundwater quality associated with TVA plant sites from closure of CCR impoundments.	Beneficial cumulative impact to groundwater quality associated with TVA plant sites from removal of CCR from impoundments. Adverse cumulative impact to traffic operations within the TVA region. Cumulative impacts to air quality, noise, land use, natural resources socioeconomics, EJ communities and public health and safety would be expected and greater than Alternative B due to greater trucking and secondary effects on regional landfill capacity.