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TVA CONSTRUCTION AND OPERATION OF BENEFICIATION PROCESSING FACILITIES PROGRAMMATIC ENVIRONMENTAL ASSESSMENT

Alabama, Kentucky, and Tennessee

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CHAPTER 1 – PURPOSE AND NEED FOR ACTION

1.1 Introduction

The Tennessee Valley Authority (TVA) is considering constructing coal combustion residual (CCR) beneficiation processing facilities (BPF) at former and existing TVA coal-fired power plant sites (coal plants) within the TVA Power Service Area (PSA). TVA is initiating the preparation of a Programmatic Environmental Assessment (PEA), pursuant to the National Environmental Policy Act (NEPA), to programmatically assess the effects of construction and operation of BPFs at one or more TVA coal plants. As part of this programmatic assessment, TVA has developed new guidance, including an Environmental Screening Checklist and a bounding analysis, that complies with NEPA's procedural requirements, up to and including potential site-specific considerations of BPFs at one or more of these coal plants.

CCRs are by-products produced from burning coal and include fly ash, bottom ash, boiler slag, and flue gas desulfurization (FGD) materials (EPA 2024a). These by-products have historically been stored or disposed of in surface impoundments, landfills, and other CCR units.

TVA's PSA covers 80,000 square miles in the southeastern United States, including almost all of Tennessee and parts of Mississippi, Kentucky, Alabama, Georgia, North Carolina, and Virginia (Figure 1-1). TVA has 12 coal plants and associated on-site CCR storage or disposal areas in Alabama, Kentucky, and Tennessee (Figure 1-1).

Ten of the 12 TVA coal plants are considered in this PEA: Bull Run Fossil Plant, Colbert Fossil Plant, Cumberland Fossil Plant, Gallatin Fossil Plant, John Sevier Fossil Plant, Johnsonville Fossil Plant, Kingston Fossil Plant, Paradise Fossil Plant, Shawnee Fossil Plant, and Widows Creek Fossil Plant (Figure 1-1). Not included in this PEA are Allen Fossil Plant, where CCR is being removed to a landfill, and Watts Bar Fossil Plant, where quantities of CCR are insufficient to support a BPF. Currently, only four of the 12 TVA coal plants (the Cumberland, Gallatin, Kingston, and Shawnee coal plants) are generating power (Table 1-1).

1.2 Background

Depending on its physical characteristics and known commercial-use applications, some CCR can be beneficially reused instead of disposed. The main beneficial reuse known commercial-use applications of CCR are in the manufacturing of concrete, drywall, roofing shingles, blasting abrasive, and other products (TVA 2024a). TVA began reusing CCR in its own construction program in 1956, using dry fly ash collected from the Johnsonville Fossil Plant to construct additional units at that location (TVA 1987); fly ash was used as an additive (i.e., pozzolan) to improve the durability of the concrete. In addition to its own uses, TVA started commercial marketing of CCR in 1976.

In 1987, TVA completed the Coal Combustion By-Product Marketing/Utilization and Listing of Approved Uses Environmental Assessment (EA) (TVA 1987). This EA analyzed the impacts of marketing/utilizing coal combustion by-products for specific purposes to offset or maintain CCR storage cost and to extend storage capacity. In 1995, TVA amended this EA to add beneficial use of coal combustion by-products from air pollution control facilities (i.e., FGD gypsum) for land application as soil amendments. TVA determined the reuse of CCR evaluated in these documents would not have a significant impact on the quality of the human environment.

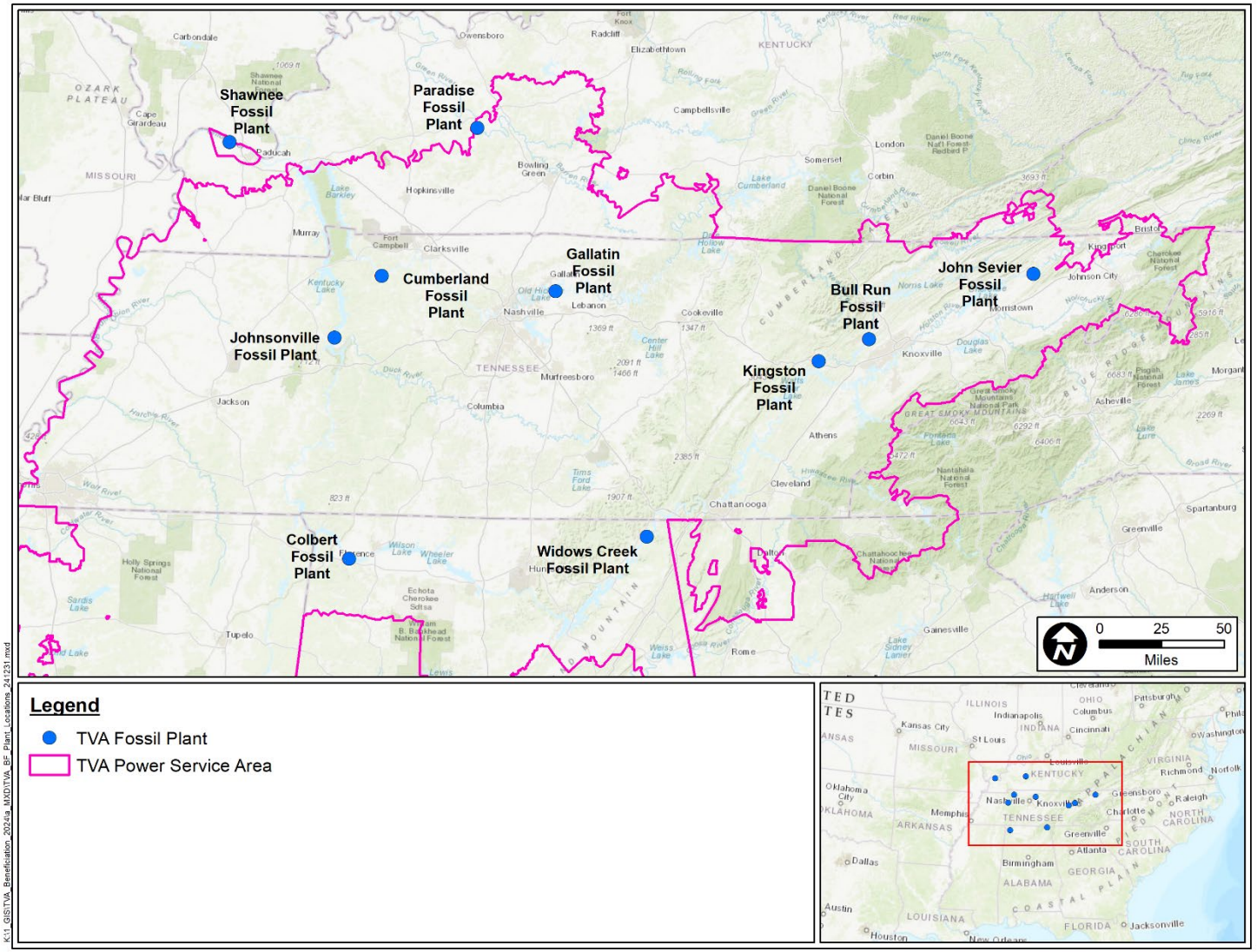

Figure 1-1. TVA Coal-Fired Power Plants being Considered for Beneficiation Processing Facilities

Table 1-1. Characteristics of TVA Coal Plants Considered in the PEA

Coal Plant Name	Location	Status	Est. CCR Stored (million tons)	Current CCR Reuse
Bull Run Fossil Plant	Anderson County, TN	Closed	14.0	Yes, as of 2023
Colbert Fossil Plant	Colbert County, AL	Closed	17.4	
Cumberland Fossil Plant	Stewart County, TN	Operating	25.4	Yes
Gallatin Fossil Plant	Sumner County, TN	Operating	20.3	
John Sevier Fossil Plant	Hawkins County, TN	Closed	11.9	
Johnsonville Fossil Plant	Humphreys County, TN	Closed	13.3	
Kingston Fossil Plant	Roane County, TN	Operating	25.8	Yes
Paradise Fossil Plant	Muhlenberg County, KY	Closed	39.9	
Shawnee Fossil Plant	McCracken County, KY	Operating	34.2	Yes
Widows Creek Fossil Plant	Jackson County, AL	Closed	43.6	

Rates of CCR beneficial reuse in the TVA PSA are increasing even as TVA moves away from coal power generation. Over the past five years, TVA generated an average of 1.76 million tons of CCR per year, of which 69 percent (1.21 million tons) is marketed by TVA for beneficial reuse by others. For example, each year companies use about 881,000 tons of TVA gypsum to manufacture drywall, and approximately 200 ready-mix concrete companies across seven states use TVA fly ash to manufacture cement (TVA 2024a). In 2023, the reuse rate increased to 87 percent (1.44 million tons). Most reused CCR is acquired directly from the plant to meet commercial or industry specifications without prior processing. As of 2023, within the TVA fleet, only the Bull Run, Cumberland, Kingston, and Shawnee coal plants marketed CCR for reuse; only three of the coal plants that previously marketed CCR (Cumberland, Kingston, and Shawnee coal plants) are still operating (Table 1-1).

Approximately 236 million tons of CCR are currently stored at TVA coal plants and are potentially available for reuse (Table 1-1). Historic CCR stored on-site at TVA coal plants, in addition to unsold CCR that do not meet known commercial or industry specifications for reuse (e.g., fly ash with high residual carbon content), have potential to be marketed by TVA for beneficial reuse under known commercial use applications, if appropriately processed. This additional source of marketable CCR would allow TVA to continue supplying beneficiation vendors with raw materials while reducing the required storage in on-site landfills and continuing to support the manufacturing of construction materials across the region.

1.3 Programmatic Analysis and Tiering

The purpose of this PEA is to programmatically analyze anticipated impacts of construction and operation of a CCR BPF at one or more TVA coal plants across the TVA PSA. TVA conducted this Programmatic NEPA review in accordance with TVA's NEPA regulations (18 Code of Federal Regulations [CFR] 1318 *et seq.*) (TVA 2020a). Programmatic NEPA reviews address the general environmental issues relating to broad decisions, such as

those establishing policies, plans, programs, or a suite of projects, and can effectively frame the scope of subsequent site- and project-specific federal actions. This PEA is intended to reduce the cost of duplicative, site-specific analyses of environmental impacts of construction and operation of BPFs. Because these impacts are likely to be similar within typical environmental contexts, they can be effectively evaluated at a broad scale for all existing coal plants.

Following the completion of this PEA and the Finding of No Significant Impact (FONSI), if appropriate, any decisions regarding proposed construction and operation of on-site BPFs would tier from this PEA. This document identifies potential environmental impacts of the proposed action and establishes mitigation measures to reduce adverse impacts from a programmatic perspective. If needed, future site-specific reviews would integrate the processes, findings, and conclusions from this PEA. The site-specific reviews may also provide opportunities for additional public review and comment to ensure broad stakeholder input.

1.4 Purpose and Need

The purpose of TVA's proposed action is to optimize the reuse of CCR currently produced and stored at TVA coal plants through programmatically evaluating the construction and operation of on-site BPFs at potentially several TVA coal plants. These facilities could support optimized management of CCR and support TVA's efforts to market CCR. If constructed, any of these facilities would likely be constructed by TVA and operated by a selected marketer to improve the quality of the ash to meet commercial and industry specifications for beneficial use. By programmatically evaluating the bounded potential effects of considered BPFs at coal plants, TVA intends to streamline the review of site-specific BPFs at coal plants across the TVA PSA. This bounding analysis would establish the analytical framework for the development of an Environmental Screening Checklist, such that future evaluation of site-specific potential environmental effects is within the bounded parameters considered in the PEA, prior to TVA making any decision to construct and operate an individual CCR BPF at a specific TVA coal plant.

1.5 Environmental Screening Checklist

TVA would consider the conditions of each coal plant site when reviewing the construction and operation of any potential BPF to determine whether it is appropriate to tier from this PEA. TVA would use the Environmental Screening Checklist in Appendix A to evaluate the proposed project and document potential effects. This information would describe the physical characteristics of the proposed BPF site and any applicable permits that would be required to construct and operate the facility. Criteria reviewed in the Environmental Screening Checklist are based on the bounding values developed in this PEA as described in Section 2.2.2.2.

During the screening process, if TVA determines no sensitive resources are present at the proposed BPF site or there is no potential for significant effects to sensitive resources, the findings of this PEA with respect to NEPA compliance would apply to the proposed project. Conversely, if TVA determines that the proposed project impacts sensitive resources beyond the bounded values assessed in this PEA, the proposed project would be subject to a site-specific environmental review consistent with TVA NEPA procedures. Relevant portions of this PEA could be incorporated into that site-specific environmental review.

The Environmental Screening Checklist would help TVA maintain compliance with bounding thresholds, maintain consistency of review, and streamline environmental assessments of multiple sites.

1.6 Decision to be Made

TVA must decide whether evaluating the bounded potential environmental effects of construction and operation of on-site BPFs at potentially several TVA coal plants could have a significant environmental effect or could adequately support a programmatic finding of no significant effect. This PEA is being prepared to inform TVA decision makers and the public about the environmental consequences of the proposed action at a programmatic level. TVA's decision will consider factors such as potential environmental impacts, economic issues, and TVA's long-term goals as provided in the bounding analysis.

1.7 Related Environmental Reviews

Related environmental documents and materials were reviewed concerning this assessment and are listed below. The contents of these documents help describe the affected environment and are incorporated by reference as appropriate.

- *Coal Combustion By-Product Marketing/Utilization and Listing of Approved Uses - Beneficial Reuse of Flue Gas Desulfurization Gypsum Determination of NEPA Adequacy* (DNA) (TVA 2023a). This DNA documented that beneficial reuse of FGD gypsum in agricultural applications was adequately covered by the *Coal Combustion By-Product Marketing/Utilization and Listing of Approved Uses EA*.
- *Final Ash Impoundment Closure Environmental Impact Statement Part I - Programmatic NEPA Review* (TVA 2016). On July 28, 2016, TVA issued a Record of Decision (ROD) for a programmatic NEPA review entitled *Ash Impoundment Closure Environmental Impact Statement* (CCR PEIS). TVA programmatically considered closure of CCR surface impoundments across TVA's system. TVA concluded that CCR management activities at its plants do not pose any real risk to human health or the environment and closure, either in-place or by-removal, would further lessen risks.
- *Final Ash Impoundment Closure Environmental Impact Statement Part II – Site-Specific NEPA Review* (TVA 2016). TVA identified 10 CCR facilities at six plants that it could close quickly. These were facilities at Allen, Bull Run, Kingston, and John Sevier coal plants in Tennessee and at Widows Creek and Colbert coal plants in Alabama. TVA conducted a site-specific NEPA review for each of these facilities that tiered from the programmatic level review in Part I of the PEIS. Based on the programmatic and site-specific analyses, TVA identified closure-in-place as its preferred alternative for all 10 facilities.
- *Amendment to Coal Combustion By-Product Marketing/Utilization and Listing of Approved Uses EA* (TVA 1995). This amendment documented the use of CCR by-products as soil amendments for land application and land reclamation.
- *Coal Combustion By-Product Marketing/Utilization and Listing of Approved Uses EA* (TVA 1987). This EA evaluated the level of environmental impact associated with current and proposed TVA coal combustion by-product uses.

1.8 Scope of the PEA and Summary of the Proposed Action

This PEA provides a bounding analysis of the potential environmental impacts of the construction and operation of CCR BPFs at TVA coal plants in Alabama, Kentucky, and

Tennessee. This document does not address any specific project site; rather, it is intended to cover potential facilities in the TVA PSA as described in Section 2.2.2. A detailed description of the proposed action and alternatives considered are provided in Chapter 2.

TVA prepared this PEA to comply with the NEPA statute, TVA regulations, and related procedures from various agencies for implementing NEPA. TVA considered the possible environmental effects of the bounding parameters of the proposed action and determined that potential effects to the environmental resources listed below were relevant to the decisions to be made, and therefore, assessed the potential impacts on these resources in detail in this PEA.

- Air Quality
- Climate Change and Greenhouse Gases
- Geology, Soils, & Prime Farmland
- Groundwater
- Surface Water
- Floodplains
- Land Use
- Vegetation
- Wildlife
- Aquatic Ecology
- Threatened and Endangered Species
- Wetlands
- Cultural and Historic Resources
- Visual Impacts
- Recreation and Managed Areas
- Transportation
- Noise
- Socioeconomics
- Public Health and Safety
- Solid and Hazardous Waste

1.9 Public and Agency Involvement

1.9.1 Public and Agency Review of the Draft PEA

TVA's public and agency involvement for the Draft PEA includes publication of a public notice and a 30-day public review of this Draft PEA. To solicit public input, the availability of this Draft PEA was announced in regional and local newspapers and shared by TVA regional communicators on social media accounts. A media advisory was issued. The Draft PEA was posted on TVA's website, and hard copies were made available by request.

TVA's agency involvement includes sending notices to local, state, and federal agencies and federally recognized tribes to inform them of the availability of the Draft PEA. Chapter 5 details the agencies and tribes notified of the availability of the Draft PEA.

1.10 Necessary Permits or Licenses

After completion of the PEA process and during reviews of the site-specific potential environmental effects of the construction and operation of CCR BPFs, TVA would determine if any necessary permits, licenses, and approvals are required. TVA anticipates implementation of the proposed action could require the following permits:

- A National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated with Construction Activities or an Individual Construction Storm Water permit may be required for the proposed project. A Storm Water Pollution Prevention Plan (SWPPP) would be required to detail sediment and erosion control best management practices (BMPs). In conjunction with erosion and sediment control plans that are required for the Construction General Permit, a Construction Best Management Practices Plan (CBMPP) is required by ADEM.
- Actions involving impacts to Waters of the U.S. would be subject to federal CWA Section 404 permit requirements.

- A Section 401 Water Quality Certification/Aquatic Resource Alteration Permit (ARAP) may be required from the appropriate state permitting agencies (Tennessee Department of Environment and Conservation [TDEC], Kentucky Department for Environmental Protection [DEP], and/or Alabama Department of Environmental Management [ADEM]) for actions that involve or affect streams and wetlands.
- Any new outfalls would require a notification or permit modification request to the TDEC, Kentucky DEP, and/or ADEM for a NPDES process wastewater permit.
- Air permitting regulations under the Clean Air Act (CAA) require TVA to secure an Air Pollution Control Permit to Construct prior to the commencement of the proposed construction. The project would likely require a new Title V Permit under the CAA for operations or revisions to an existing permit, as applicable.
- Entrance and right-of-way (ROW) permits from the Tennessee Department of Transportation, the Kentucky Transportation Cabinet, and/or Alabama Department of Transportation for roads, ramps, driveways, and other access points and installation of utilities within highway ROWs.
- Hazardous and Solid Waste Permits from the TDEC Division of Solid Waste Management (DSWM), Kentucky DEP, and/or ADEM.

Any other necessary permits would be evaluated based on site-specific conditions. Details of permitting requirements would be determined using the Environmental Screening Checklist based upon final design.

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CHAPTER 2 – ALTERNATIVES

2.1 Introduction

To support TVA's need to optimize management and marketing of CCR in an environmentally acceptable manner, TVA is considering two alternatives as described below.

2.2 Alternatives Evaluated in this Programmatic Environmental Assessment

TVA has determined two alternatives are available for consideration: Alternative A – No Action Alternative and Alternative B – Action Alternative – Construction and Operation of CCR BPFs.

2.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, TVA would not establish a program to programmatically review, construct, and operate CCR BPFs at TVA coal plants. TVA would continue to market CCR that meets commercial and industry specifications for beneficial reuse without processing and would continue to store remaining CCR in an environmentally acceptable manner consistent with all applicable regulations and permit requirements.

This alternative would not meet the Purpose and Need for the proposed action. It does, however, provide a benchmark for comparing the environmental impacts of implementation of Alternative B.

2.2.2 Alternative B – Construction and Operation of CCR Beneficiation Processing Facilities

Under Alternative B, TVA would establish a program to programmatically review the construction and operation of CCR BPFs using implementation of an Environmental Screening Checklist (Appendix A). The Environmental Screening Checklist would be used to evaluate the location and physical characteristics of the proposed project, document potential environmental and social impacts, determine applicable permits required, and consider whether construction and operation of the facility could support a FONSI.

During the screening process, if TVA determines that no sensitive resources are present at the proposed BPF site or there is no potential for significant effects to sensitive resources, the findings of this PEA, with respect to NEPA compliance, would apply to the proposed project. Conversely, if TVA determines that the proposed project would affect sensitive resources beyond the bounded values assessed in this PEA, it would be subject to a site-specific environmental review consistent with TVA NEPA procedures. Relevant portions of this PEA could be incorporated into that site-specific environmental review.

CCR BPFs would be constructed at one or more TVA properties across the TVA PSA to improve the quality of the CCR to meet commercial and industry specifications for beneficial reuse. In most cases, these facilities would be constructed by TVA and operated by a selected vendor. The general characteristics of CCR BPFs are described below and shown in Figure 2-1.

Figure 2-1. Representation of a Typical Thermal CCR Beneficiation Processing Facility

2.2.2.1 Description of Beneficiation Processing Facilities

Two types of CCR BPFs are being considered in the programmatic Environmental Screening Checklist: thermal and nonthermal. The facilities would consist of three primary areas including: raw CCR material storage; a process island; and product storage and load out. Main processing steps for both facilities include: (1) initial collection of raw CCR material; (2) drying; (3) size separation; (4) grinding; and (5) post processing storage. The thermal BPFs also include a combustion step prior to post processing.

Either facility would require approximately 15 acres of land for construction and operation. Major facility elements include a control room, small lab, maintenance area, employee parking, storage domes, storage silos, and any required office space. Electrical transmission upgrades and addition of gas-supply lines would likely be needed at each facility. Only one facility type would be constructed at selected sites, depending on need.

2.2.2.1.1 Thermal Beneficiation Processing Facilities

Thermal beneficiation is a commercial technology that has been developed to recondition CCR—specifically fly ash and/or blends of fly ash and bottom ash—to make it suitable as a marketable commodity. A common problem that limits CCR for beneficial reuse is high concentrations of residual carbon. Unburned carbon is typically measured as loss on ignition (LOI) and interferes with air entrainment in the concrete—important for freeze-thaw

resistance. The American Society for Testing and Materials (ASTM) C618 standard for use of fly ash in concrete requires a (LOI) of no more than 6 percent. Thermal beneficiation uses combustion to reduce carbon levels in CCR.

Thermal beneficiation is a multistep process that would begin with collection of raw CCR in a receiving area. This material storage area would include a covered concrete pad and space for up to four days' worth of unprocessed CCR material. Raw CCR material would then be fed with a front-end loader onto a conveyor belt and transported into a dryer. In a thermal facility, the drying process uses excess heat from the carbon reduction process. This is done with two fluid bed type external heat exchanger dryers, each capable of operating up to 50 tons per hour—eliminating the need for external firing of natural gas or propane for drying. Once dried, the material is classified by size. The larger fraction is sent to a ball mill grinding circuit to ensure the blended product would meet the relevant fineness specification for CCR in concrete. CCR would then be pneumatically conveyed to the proprietary thermal process where carbon reduction occurs. The carbon reduction process uses natural gas or propane for start-up but becomes self-sustaining by using the residual carbon (i.e., available fuel) in the CCR. Based on assumed sulfur content of the raw CCR, the exhaust gases from the thermal process would be sent to a sulfur dioxide (SO_2) scrubber to meet air permit limitations. The scrubber would use hydrated lime as a reagent producing a small stream of dry scrubber waste. After passing through the carbon reduction process, the low LOI product would be captured in a baghouse and pneumatically transported to the product storage and load out area.

Each thermal BPF would require approximately 2,250,000 kilowatt-hours per month of power, 500 thousand cubic feet (MCF) per month of natural gas, and 50,000 gallons per day of water. On average, approximately 1,500 tons per year of dry scrubber material would be produced at each facility and sent to an existing off-site landfill.

2.2.2.1.2 Nonthermal Beneficiation Processing Facilities

CCR already meeting commercial or industry specifications would not need thermal treatment to reduce or passivate (i.e., make unreactive) residual carbon and would be processed through a nonthermal CCR BPF. To meet ASTM moisture and fineness specifications, the low-carbon CCR material would still need to be dried, classified, and ground into a marketable product.

Nonthermal beneficiation is a multistep process that would be similar to the thermal BPF described in Section 2.2.2.1.1 except for removal of the carbon treatment step. The raw CCR material receiving and storage area would be the same as described above—a covered concrete pad and space for up to four (4) days' worth of unprocessed CCR material. Raw CCR material would then be fed with a front-end loader onto a conveyor belt and transported into a dryer. No waste heat would be available for drying in a nonthermal facility; therefore, an externally fired rotary dryer designed to process up to 70 tons per hour of material would be required. Once dried, the material would be classified by size. The larger fraction would be sent to a ball mill grinding circuit to ensure the blended product would meet the relevant fineness specification for CCR in concrete. After grinding, the CCR would be pneumatically transported to the product storage and load out area.

Nonthermal BPFs would require approximately 750,000 kilowatt-hours per month of power, 40,000 MCF per month gas due to the gas dryer, and 5,000 gallons per day of water. Nonthermal BPFs would not require a scrubber and do not produce a waste stream.

2.2.2.1.3 Post-Processing Storage

Once the CCR material is processed through either the thermal or nonthermal BPF, the processed material would be stored on-site in silos or storage domes. Once purchased, the processed material would be loaded into customer bulk pneumatic tanker trucks for transport to market. At this point, TVA would no longer maintain ownership and control of the processed CCR. Potential uses of processed and sold CCR that pass through a given BPF are not part of TVA's action and are not considered in this PEA.

2.2.2.1.4 Chemical Passivation

Chemical passivation of carbon could potentially be used at a site with nonthermal beneficiation processing. Chemical passivation uses chemicals to reduce the activity of the carbon in the ash. This reduces the need to add large or variable amounts of air entraining agents to the concrete mix. Several passivation methods have been developed and a few are commercially available from large concrete marketers. One approach has been to add low dosages of a "sacrificial chemical" to the ash which reacts with the active sites on the carbon thereby neutralizing them.

To use this technology, the carbon in the ash must be within the ASTM specification, but is negatively affecting air entrainment. In this case, the chemical would be sprayed onto the ash inside the air slide as the ash is transferred from the silo into the truck to passivate the carbon adsorptive properties. The chemical is proprietary and would depend on the ash characteristics. The application rate is generally very low and would likely not be used all the time, but only to treat quality excursions. It would not be exposed to the air and application would be contained in the loading chute.

2.2.2.2 Bounding Analysis

The purpose of the bounding analysis captured in the programmatic Environmental Screening Checklist is to identify a range of potential impacts and to provide conservative estimates of the magnitude of impacts that could result from the construction and operation of any one BPF at any evaluated TVA coal plant. The bounding analysis presents scenarios with the most significant potential impacts. Ultimately, any selected BPF may result in lesser impacts than those bounded potential impacts that were programmatically analyzed.

TVA solicited information from vendors on facility siting, construction, and operation requirements to best understand and assess potential direct and indirect effects associated with the construction and operation of the BPFs at one or more existing TVA coal plants. This information was compiled and summarized as bounding attributes to support the analysis of potential impacts by resource categories in Chapter 3.

Table 2-1 provides a bounding summary of attributes of a potential BPF and characteristics of activities associated with potential facility construction and operations. Table 2-2 provides a summary of the bounding values associated with various environmental attributes of each potential facility. Bounding values act as thresholds that a BPF should meet to fall within the analysis of this PEA. Following completion of this PEA and future completion of an Environmental Screening Checklist, if a site identified for a BPF does not meet the listed threshold conditions, a supplemental NEPA document would be required.

2.3 Alternatives Considered but Eliminated from Detailed Analysis

TVA considered options for reuse of CCR without processing. However, TVA has characterized the material in the impoundments and landfills at TVA coal plants and has determined that there are currently no commercial uses for the unprocessed CCR materials in their existing states. Because TVA has not identified a viable commercial use for the CCR stored at TVA coal plants without processing, using CCR without processing would not meet the purpose and need to optimize the reuse of CCR currently produced and stored at TVA coal plants through programmatic evaluation of on-site BPFs.

Further, TVA considered options for additional reuse of newly generated CCR at TVA coal plants. Only two TVA plants generate quantities of commercially available fly ash byproducts without further processing; both these TVA coal plants are currently forecasted to shutter in less than a decade. The small volumes of material produced and the forecasted durations for each plant's operation do not economically justify further considering building additional processing facilities at those locations only for newly generated CCR materials, therefore this option does not meet the project's purpose and need.

Another option that was considered was to construct and operate a centralized off-site CCR BPF. This alternative was dismissed for several reasons, including that harvested CCR would still require screening at the impoundment or landfill site to evaluate its commercial viability for beneficial reuse. Also, harvested ash may include up of 15 to 20 percent moisture, significantly increasing its weight and making transportation costs too expensive to further consider, as it would not meet the project's purpose and need of economically pursuing viable alternatives. Further, transport to an off-site CCR BPF would result in significant negative environmental and socioeconomic impacts on the communities along potential haul routes. If TVA pursued a centralized off-site CCR BPF, this would likely occur in open dump trucks, which would include additional, significant impacts to communities along the transportation routes. If CCR material was dried on-site (to less than one percent moisture content), it could be hauled in enclosed pneumatic tanker trucks, similar to how processed material would be hauled. However, this would require installation and operation of a gas dryer at the site, which defeats the purpose of having a centralized processing facility. Conversely, with an on-site facility (Alternative B), all screening, hauling of raw, wet CCR materials, and drying would occur onsite. Finally, due to these limitations, this alternative would also not meet the purpose and need to optimize the reuse of CCR currently produced and stored at TVA coal plants through programmatic evaluation of on-site BPFs.

Table 2-1. Beneficiation Processing Facility – Table of Facility Attributes

Feature	Characteristic	Bounding Parameters for Potential On-site Facility
Facility Attributes		
Facility Elements	General arrangements	Could include three primary facility areas on site: • Raw material storage • Process island (may include chemical treatment) • Product storage and load out
	Land requirements	Site area up to 15 acres (10-acre site and 5-acre laydown).
	Stormwater management	Could include on-site stormwater basins or storm sewers.
Electric Use	Electric requirements	Up to 3 to 7 megawatt (MW) constant load power required. Would be obtained from existing transmission facilities.
Water Use	Process water	Up to 10 to 150 gallons per minute (GPM) (obtained from local publicly owned treatment works [POTW] or wells). No surface water intake. Can use gray water, if available.
	Potable water	Up to 25 GPM (obtained from local publicly owned source or wells). No surface water intake.
	Cooling system	If needed, closed loop system-heat is reused to dry ash.
Wastewater Management	Treatment and discharge	Up to 10 to 50 GPM. Processed on site and discharged to publicly owned treatment works (POTWs) or discharge covered under NPDES permit. NPDES permit and limits subject to State requirements.
Capacity	Total output capacity	Up to 250,000 to 1,000,000 tons of CCR per year.
Material Storage	Raw material on-site storage	Up to 15,000 cubic yards (yd^3) (up to four days) of pre-processed material stored in a covered on-site structure prior to processing.
	Product on-site storage	Processed material stored on site in silo or dome or equivalent structure that provides protection from elements. On-site storage (up to 45,000 yd^3).
Construction-Phase Attributes		
Construction	Duration	Up to 18 months.
	Construction laydown areas	Up to 5-acre laydown area.

Feature	Characteristic	Bounding Parameters for Potential On-site Facility
Excavation	Process island; occupied buildings; and pipelines	Deep foundations up to 40-foot piers. No basement or deep foundations for occupied buildings. Potential for minor on-site trenching for new gas pipeline.
Borrow	Amount of borrow needed to support construction	None anticipated.
Operational Characteristics		
Schedule	Hours of operation	Up to 24 hours per day, 7 days per week.
Operation	Duration	Up to 50 weeks per year; 350 operating days per year.
Fuel	Operational fuel requirement	Natural gas/propane may be supplied by pipeline. If no pipeline exists, maximum capacity stored in a tank on site would be up to 100,000 gallons.
	Start-up operations	Natural gas/propane. Total quantity stored on site would support up to two (2) cold system start-up per month (8,000 gallons maximum capacity).
Trucking from Ash Impoundment to CCR Beneficiation Processing Facility (by TVA or Vendor)	Truck type and capacity	Reclaimed material is transported in off-road, heavy-haul trucks. Capacity of up to 25 yd^3 per truck.
Trucking from CCR Beneficiation Processing Facility (processed CCR product)	Peak truck volume; and average truck volume	Processed CCR product is transported in pneumatic trucks, up to 27 tons (25 yd^3) per truck; up to 125 truckloads per day (250 truck trips). Up to 90 to 100 truckloads per day (180 to 200 truck trips).
	Trucking schedule	Up to 300 days per year. Monday-Friday during operating hours. Occasional weekends.
	Shipping distance	No further than 20 miles to the nearest 4-lane highway. Rail and barge transport would not be used.

Table 2-2. Beneficiation Processing Facility – Table of Environmental Characteristics and Bounding Values

Resource	Parameter	Bounding Value/Characteristic for Potential On-site Facility
Air Quality	Emissions	Sulfur dioxide (SO_2): up to 250 tons per year (process and ash chemistry dependent). Nitrogen oxides (NO_X) and carbon monoxide (CO): up to 105 to 225 tons per year. Particulate matter: up to 90 to 199 tons per year. Hazardous air pollutants (HAPs): Emissions would stay less than major source thresholds. Major source thresholds for HAPs are up to 10 tons/year for a single HAP or up to 25 tons per year for any combination of HAPs.
Greenhouse Gases	Emissions	Carbon dioxide (CO_2): up to 160,872 tons per year. Methane (CH_4): up to 0.07 tons per year. Nitrous oxide (N_2O): up to 0.01 tons per year. Carbon dioxide equivalent (CO_2e): up to 161,000 tons per year.
Land Use	Land use	Facility assumed to be in previously disturbed area on a TVA coal plant site (i.e., an industrial site with typical industrial uses).
Water Quality	Potential impacts to receiving streams	Sanitary wastewater sent to POTW. Stormwater and process water discharged to receiving waterbody would be within NPDES permit limits. Implement BMPs during construction to minimize soil erosion to receiving waterbodies.
Floodplains	100-year floodplain	Avoidance of Federal Emergency Management Agency (FEMA) 100-year floodplain. Avoidance also includes the area below the 100-year flood elevation.
Vegetation/Land Cover	Forested lands, rare/sensitive vegetation communities and habitats	Facility assumed to be located on a previously disturbed site within a TVA coal plant site. Minimal impacts to vegetation and forested lands.
Species of Concern	Listed species, heronry, osprey, eagles, etc.	Avoidance of impacts to listed species and other species of concern. Activities must comply with the Migratory Bird Treaty Act (MBTA) and Bald and Golden Eagle Protection Act (BGEPA). Construction activities would be at least 660 feet away from any known protected species nests. Avoid potential impacts to bats by observing seasonal restrictions on tree clearing and avoiding impacts to roost trees, caves, water bodies, sinkholes, buildings, and bridges.
Surface Waters and Wetlands	Streams, wetlands, lakes, etc.	Facility assumed to be located on a previously disturbed site within the plant boundary. Facility would be designed to avoid/minimize stream or wetland impacts. Any impacts would be minimized or permitted and mitigated as applicable through the appropriate federal and state agencies.
Historic Properties	National Register of Historic Places (NRHP) listed and eligible properties	Facility assumed to be located on a previously disturbed site within a TVA coal plant site where no NRHP-listed or -eligible archaeological sites are present and outside the viewshed of any NRHP-listed or -eligible historic architectural property.

Resource	Parameter	Bounding Value/Characteristic for Potential On-site Facility
Hazardous Waste	Avoid hazardous waste impacts	Generation of regulated hazardous substances/wastes not expected. However, any regulated hazardous waste would be managed in accordance with Resource Conservation and Recovery Act (RCRA) requirements.
Solid Waste	Management of solid waste	Solid wastes from production process expected to be minor (dependent on specific emission controls system employed). Solid waste generated during outages/maintenance activities varies. Estimated up to 1,500 tons per year generated equal to up to two (2) trucks per month to landfill. Solid wastes to be disposed of in appropriate existing licensed landfill. All solid waste and hazardous wastes generated from construction/operation activities in accordance with standard procedures for spill prevention and cleanup and waste management protocols in accordance with pertinent federal, state and local requirements.
Aquatic Ecology	Habitats provided by surface waters and wetlands	Facility assumed to be located on a previously disturbed site within the plant boundary. Facility would be designed to avoid/minimize impacts to aquatic habitats. Any disturbances would be minimized or permitted through the appropriate federal and state agencies.
Managed and Natural Areas	Managed/natural areas within 0.1 miles	Minor and temporary impacts from noise and traffic during construction.
Recreation	Recreational areas within 0.1 miles	Minor and temporary impacts from noise and traffic during construction.
Noise	Noise emissions	Not to exceed 65 decibels at property boundary per Occupational Safety and Health Administration (OSHA) standards.
Socioeconomics	Employment	Construction Phase: Up to 250 people. Operational Phase: Up to 25 people. Workforce distribution: at least 90 percent from surrounding area, up to 10 percent from outside local area.
	Minority/low-income populations	No direct impacts to minority/low-income populations.
Visual/Aesthetics	Maximum height of facility components	140 feet maximum stack height.
	Appearance	Industrial facility.

2.4 Comparison of Alternatives

Impacts evaluated may be beneficial or adverse and may apply to the full range of natural, aesthetic, historic, cultural, and socioeconomic resources within the project areas of each alternative and within the surrounding areas. Impact severity is dependent upon their relative magnitude and intensity and resource sensitivity. In this document, four descriptors are used to characterize the level of impacts in a manner that is consistent with TVA's current practice. In order of degree of impact, the descriptors are as follows:

- No Impact (or "absent") – Resource not present or, if present, not affected by project alternatives under consideration.
- Minor – Environmental effects are not detectable or are so minor that they would not noticeably alter any important attribute of the resource.
- Moderate – Environmental effects are sufficient to alter noticeably, but not to destabilize important attributes of the resource.
- Significant – Environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

The environmental impacts of each of the alternatives under consideration are summarized in Table 2-3. These summaries are derived from the information and analyses provided in the Affected Environment and Environmental Consequences sections of each resource in Chapter 3.

Table 2-3. Summary and Comparison of Alternatives by Resource Area

Resource	Alternative A: No Action Alternative	Alternative B: Construction and Operation of CCR Beneficiation Processing Facilities
Air Quality	No impact	Impacts from construction would be minor, temporary, localized, and would not affect regional air quality standards. Impacts from operation would be localized and permitted, as necessary, to ensure impacts would be minor. No exceedances of NAAQS expected for sites in attainment areas.
Climate Change and Greenhouse Gases (GHG)	No impact	Temporary minor increase in construction emissions. Operation emissions would be permitted, minor in comparison to regional emissions. Beneficial reuse of CCR can reduce carbon emissions associated with concrete production, and adverse impacts to climate change would be minor.
Geology and Soils	No impact	Minor impacts from construction to site soils and subsurface conditions. No impact to prime farmland.
Groundwater	No impact	Potential minor impacts to groundwater from pier foundations.
Surface Water	No impact	No direct impacts to large waterbodies (e.g., rivers and reservoirs). Potential direct impacts to small tributaries and ephemeral drainages permitted and mitigated. Minor indirect impact from construction minimized through use of BMPs.
Aquatic Ecology	No impact	No direct impacts to aquatic habitat in large waterbodies. Potential direct impacts to aquatic habitat in smaller tributaries and ephemeral drainages would be permitted and mitigated. Minor indirect impact from construction minimized through use of BMPs.

Resource	Alternative A: No Action Alternative	Alternative B: Construction and Operation of CCR Beneficiation Processing Facilities
Vegetation	No impact	Construction and operations disturbance to largely industrialized environmental settings that lack notable plant communities. Impacts to vegetation would be minor.
Wildlife	No impact	Minor impact to predominantly previously disturbed low-quality habitats during the construction phase.
Threatened and Endangered Species	No impact	No adverse impact to threatened or endangered species. For sites that require limited tree removal potential impacts to threatened and endangered species would be minor.
Floodplains	No impact	No direct or indirect impacts.
Wetlands	No impact	Potential minor indirect impact may occur during construction minimized through use of BMPs. Any wetland alteration would be minimized or permitted and mitigated as applicable through the appropriate federal and state agencies. No significant impacts expected.
Visual Resources	No impact	Minor impacts during construction. Visual alterations for viewers in the foreground (within approximately 0.5 miles); however, consistent with the existing industrial facilities. Minor impacts on roadways from truck traffic.
Cultural and Historic Resources	No impact	TVA would consult with the Alabama, Kentucky, and Tennessee SHPOs, and any federally recognized Indian tribe wishing to participate, for TVA's compliance with Section 106 of the NHPA regarding the proposed action. Therefore, no significant impacts to any historic properties are anticipated.
Land Use	No impact	No impact as no change in industrial land use.
Natural Areas, Parks and Recreation	No impact	Potential temporary minor impacts to recreational facilities on TVA properties if closed during construction. Potential for minor construction and traffic-related impacts to nearby parks and managed and natural areas.
Transportation	No impact	Temporary minor impacts from construction traffic. Minor impacts from transport of materials and product during operation.
Noise	No impact	Minor noise impacts from on-site construction equipment and facility operations. Minor traffic-related noise on local roadways.
Socioeconomics	No impact	Short-term beneficial increases in employment and income during construction.
Solid and Hazardous Waste	Unmarketable CCR would continue to be disposed on-site and not beneficially reused.	Minimal amounts generated during construction activities and managed in permitted facilities. Amounts generated during operation disposed of in permitted facilities. Long-term beneficial impact associated with solid wastes going to a CCR beneficiation processing facility, rather than disposal to a landfill.
Public Health and Safety	No impact	Temporary potential for impacts during construction activities and transportation of CCR material.
Cumulative Impacts	No impact	Beneficial cumulative impact to groundwater quality associated with TVA plant sites from removal of stored CCR.

2.5 Environmentally Preferable Alternative

In the short term, Alternative A – No Action causes the least damage to the biological and physical environment and best protects, preserves, and enhances historical, cultural, and natural resources at the potential project site(s). However, the No Action Alternative does not meet the purpose and need for TVA to optimize the reuse of CCR currently produced and stored at TVA coal plants. Alternative B – Construction and Operation of CCR BPFs would allow for development of capabilities to beneficially reuse a majority of CCR currently stored at coal plant sites. Under this alternative, there would be a long-term beneficial impact associated with CCR going to a beneficial reuse processing facility as compared to being stored in an on-site impoundment or landfill. This would allow for the transformation of up to 236 million tons of CCR into reusable, beneficiated products, such as concrete and other building materials. In addition, beneficial use of CCR can produce positive environmental benefits such as reduced use of virgin resources and lower greenhouse gas emissions. Therefore, over the long term, Alternative B would be the environmentally preferable alternative.

2.6 TVA's Preferred Alternative

Alternative B is TVA's preferred alternative. Alternative B is consistent with the established Purpose and Need to programmatically evaluate the bounded potential environmental effects of construction and operation of an on-site CCR BPF at potentially several TVA coal plants. By pursuing a programmatic Environmental Screening Checklist, TVA can efficiently pursue programmatic review of these similarly situated environmental effects, continue to optimize management of CCR, and support TVA's effort to market CCR in an environmentally acceptable manner.

2.7 Summary of Bounded Best Management Practices, Environmental Commitments, and Mitigation Measures

This section provides a summary of bounded BMPs, environmental commitments, and mitigation measures that TVA would employ to avoid or reduce adverse impacts from the alternatives analyzed. TVA's analysis of potential impacts considers implementation of these measures as required to reduce or avoid adverse effects. BMPs, environmental commitments, and mitigation measures proposed for the BPFs are summarized below and further discussed in Chapter 3. Additionally, based on the completion of site-specific designs, TVA would review each project location to ensure that the bounding attributes and resource characteristics at each location are consistent with the values contained in Table 2-1 and Table 2-2. Should site-specific conditions and potential effects exceed the bounding values, TVA would perform a site-specific NEPA review as needed to encompass the additional scope.

2.7.1 Best Management Practices and Routine Measures

TVA has identified the following BMPs that could be used to minimize impacts and restore areas disturbed during proposed project activities; these are bounding BMPs, and would be employed on an as needed basis at any given site:

- Fugitive dust emissions from site preparation and construction would be controlled by wet suppression and other BMPs (CAA Title V operating permit incorporates fugitive dust management conditions).
- Erosion and sedimentation control BMPs (e.g., silt fences, truck washes) would be used to ensure surface waters and wetlands are protected from construction impacts.

- Consistent with EO 13112, disturbed areas would be revegetated with native or non-native, non-invasive plant species to avoid the introduction or spread of invasive species.
- BMPs in accordance with TVA's *A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Construction and Maintenance Activities* (TVA 2022) would be used during construction activities to minimize and restore areas disturbed during construction.
- BMPs that may be implemented to help minimize impacts to bat species would include standards for noise during construction, human presence guidance, tree removal, sedimentation, spills, pollutants, and contaminants, lighting, and bat species monitoring.
- TVA would manage all solid wastes generated in accordance with applicable state regulations and following procedures outlined in TVA's current Environmental Procedures and applicable BMPs.
- Construction and laydown areas would be located outside 100-year floodplains as delineated on Federal Emergency Management Agency (FEMA) flood insurance rate maps and/or on contour maps showing known 100-year flood elevations.
- Appropriate spill prevention, containment, and disposal requirements for hazardous wastes would be implemented to protect construction workers, the public, and the environment in accordance with applicable state and federal regulations.
- Equipment refueling and maintenance operations would be conducted at designated locations using applicable BMPs.
- Construction would include customary industrial safety standards, applicable BMPs, and jobsite safety plans to maintain worker and public safety.

2.7.2 Mitigation Measures

As part of its site-specific screening process using the Environmental Review Screening Checklist, TVA would employ the following mitigation measures on an as needed basis at any given site:

- TVA would determine if a proposed facility would have wetlands present and if there would be potential adverse effects to jurisdictional and non-jurisdictional wetlands. Wetlands would be preferentially avoided during construction. Any potential unavoidable wetland impacts would be mitigated under regulations implementing Sections 401 and 404 of the CWA, applicable state regulations, and EO 11990.
- If forest is present at a proposed site, surveys would be conducted to determine suitability of summer roosting habitat for federally listed bats. Although disturbance of existing buildings or bridges would be avoided as possible, surveys of these structures also would be conducted to ensure that bats are not using them for roosting prior to disturbance. Sites with presence of suitable summer roosting habitat, and for which the removal of such habitat would not be avoidable, may be subject to seasonal surveys to determine bat presence prior to construction actions.
- Potential impacts to bats and other sensitive species would be avoided by observing seasonal restrictions on clearing of suitable roost trees and avoiding impacts to caves, water bodies, sinkholes, buildings, and bridges.

- Under the bounding condition, project activities would comply with the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA), as construction activities would be at least 660 feet away from any known protected species nests.
- TVA would initiate consultation with the State Historic Preservation Office (SHPO) and tribes to determine the area of potential effect (APE), identify historic properties in the APE, and assess the potential effects of the proposed action on any National Register of Historic Places (NRHP)-listed or -eligible properties in the APE. TVA would complete any needed surveys for historic architectural surveys, assess potential adverse effects to any identified NRHP-listed or -eligible historic architectural properties, and seek ways to avoid such adverse effects, in consultation with the appropriate SHPO and tribes as project plans are developed. Should avoidance of adverse effects on historic properties prove to be infeasible, TVA would work with the appropriate consulting parties to develop a Memorandum of Agreement (MOA) for the resolution of the adverse effects, pursuant to § 800.6(b)(1).

CHAPTER 3 – AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This chapter describes the baseline environmental conditions (affected environment) of environmental resources in the project area and the anticipated environmental consequences (or impacts) that would occur from implementation of the alternatives described in Chapter 2. The affected environment descriptions below are based on surveys conducted by TVA, published and unpublished reports, and personnel communications with resource experts.

TVA would consider the conditions of each coal plant site when reviewing the construction and operation of any potential BPF to determine whether it is appropriate to tier from this PEA. TVA would evaluate each proposed project during the Environmental Review Checklist screening process. If TVA determines that no sensitive resources are present at the proposed BPF site or there is no potential for significant effects to sensitive resources, the findings of this PEA with respect to NEPA compliance would apply. Conversely, if TVA determines that the proposed BPF project impacts sensitive resources beyond the bounded values assessed in this PEA, the proposed project would be subject to a site-specific environmental review consistent with TVA NEPA procedures.

3.1 Air Quality

3.1.1 Affected Environment

The U.S. Environmental Protection Agency (EPA) regulates pollutants and airborne emissions in the United States. The CAA (42 U.S. Code [USC] § 7401 *et seq.*) is the comprehensive law that protects air quality by regulating emissions of air pollutants from stationary sources (e.g., power plants) and mobile sources (e.g., automobiles). It requires the EPA to establish National Ambient Air Quality Standards (NAAQS) and directs the states to develop State Implementation Plans to achieve these standards. This is primarily accomplished through permitting programs that establish limits for emissions of air pollutants. The CAA also requires EPA to set standards for emissions of hazardous air pollutants (HAPs).

NAAQS have been established to protect the public health and welfare with respect to six criteria air pollutants: carbon monoxide (CO), nitrogen dioxide (NO_2), ozone, particulate matter (PM), sulfur dioxide (SO_2), and lead (Pb). Primary standards protect public health, while secondary standards protect public welfare (e.g., visibility, crops, forests, soils, and materials) (EPA 2024b). The CAA also identifies 188 pollutants as HAPs (EPA 2024c). Most HAPs are emitted by human activities, including mobile sources (motor vehicles), stationary sources (factories, refineries, and power plants), and indoor sources (building materials and activities such as dry cleaning).

In accordance with the CAA Amendments of 1990, all counties are designated with respect to compliance, or degree of noncompliance, with NAAQS. These designations include:

- Attainment – any area where air quality achieves the NAAQS.
- Nonattainment – any area with air quality worse than the NAAQS.
- Maintenance – an area that was formerly in nonattainment but has monitored attainment and is currently under a maintenance plan.

- Unclassified – not enough data to determine attainment status. However, the unclassifiable or attainment/unclassifiable status areas are treated as in attainment with NAAQS, for the purposes of CAA planning and permitting requirements.

The 10 TVA coal plants evaluated in this PEA are all located in counties for which the NAAQS attainment status is either in attainment or unclassified. Therefore, as described above, for this analysis, all 10 coal plants are treated as being in areas that are in attainment with NAAQS.

States are required to establish an air operating program under Title V of the CAA. Regulations to implement this operating program, Title 40 CFR Part 70, require that any facility with the potential to emit pollutants above certain thresholds obtain an air operating permit (also known as a Title V permit). This permit, typically issued by the state environmental agency, consolidates all of the air pollution control requirements for the operation of a major source of air pollution into a single, comprehensive document. In attainment/unclassified areas, Title V major source thresholds, which are the levels of potential emissions that require sources to obtain a Title V permit, are 100 tons per year (tpy) for each criteria pollutant, 10 tpy for each individual HAP, and 25 tpy for total HAPs.

3.1.2 Environmental Consequences

3.1.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, there would be no change to regional air quality or emissions from coal plant sites within the TVA PSA.

3.1.2.2 Alternative B – Construction and Operation of CCR Beneficiation Processing Facilities

During construction, ground-disturbing activities, including grading and excavation, may result in fugitive dust emissions. Fugitive dust may also result if vehicles supporting construction travel on unpaved roads. Fugitive dust produced from construction activities can be controlled using standard construction practices, such as watering of exposed surfaces and covering of disturbed areas. Dust emissions from construction traffic can be controlled by limiting speed limits. In addition, when there are periods of high wind during excavation and grading, temporary suspension of those activities would reduce the volume of fugitive dust experienced during high winds.

Equipment used during the construction phase would include trucks, truck-mounted augers and drills, excavators, as well as tracked cranes and bulldozers. Low ground-pressure-type equipment (e.g., tracked vehicles) would be used in specified locations (e.g., areas with soft ground) to reduce the potential for environmental impacts, per TVA BMPs. Combustion of gasoline and diesel fuels by internal combustion engines (e.g., vehicles, generators, and construction equipment) would generate local emissions of CO, carbon dioxide (CO_2), ozone, nitrogen oxides (NO_x), PM, SO_2, and volatile organic compounds (VOCs). Proposed construction activities would be subject to both federal and state regulations. These regulations impose permitting requirements and specific standards for expected air emissions. Air quality impacts from construction would be temporary (up to 18 months) and would be minimized through use of BMPs (e.g., dust control measures) as required to reduce off-site emissions. Overall, impacts to air quality from construction-associated activities would be minor, temporary, and localized and would not affect regional air quality standards.

TVA has identified two different beneficiation processes; the thermal BPF reconditions fly ash by burning excess carbon from the CCR material. The carbon reduction process uses fuel for startup but becomes self-sustaining by using the residual carbon in the CCR. Exhaust gases from the thermal process would be sent to a SO_2 scrubber to meet air permit limitations, as applicable. The nonthermal BPF does not recondition CCR and there is no process for carbon or SO_2 waste generation or storage.

Emissions associated with the operation of the BPFs include NO_X, CO, SO_2, and PM. Under the bounding condition (Table 2-2), emissions from the CCR BPF may exceed 100 tpy. If so, the facility would be subject to permitting programs that regulate the construction of new stationary sources of air pollutants, typically referred to as New Source Review (NSR). Major NSR is applicable to sources under Prevention of Significant Deterioration (PSD) for major new sources or major modifications at existing major sources. Major new source is one which has 100 tpy (listed source categories) or 250 tpy (non-listed source categories) of potential emissions of any regulated NSR pollutants under the CAA. A modification is called major modification at an existing major source if the emissions from the project exceed PSD significant emission rates listed under PSD regulation (40 TPY for SO_2 and NOx, 100 TPY for CO and 25/15/10 TPY for $PM/PM_{10}/PM_{2.5}$). As noted above, unclassifiable or attainment/unclassifiable status areas are treated as in attainment with NAAQS for the purposes of CAA planning and permitting requirements. All of the counties with coal plants considered in this analysis are in unclassified/attainment areas, any significant emission increases from the proposed action would be subject to PSD pre-construction review to ensure air quality in the area is protected and attainment status is maintained. If operation of a CCR BPF could result in emission of 100 tpy of any criteria pollutant, the facility would obtain a Title V permit, and emissions would conform to the terms and conditions of that permit. Therefore, adherence to permit conditions would ensure that the impact to air quality would be minimal.

Operation of the facility would result in emissions from mobile sources that include workforce commuting and delivery of processed CCR product to customers. Once purchased, the processed CCR material would be loaded into customer bulk pneumatic tanker trucks for transport to market. At such point, TVA no longer maintains ownership and control of the processed CCR. Up to 125 truckloads per day of processed CCR product would be transported off-site in bulk pneumatic tanker trucks, resulting in additional vehicle and dust emissions (see Table 2-1). Sensitive receptors located along the maximum of 20 miles of local roads used for transport of processed CCR to nearest highways could be exposed to increased fugitive dust and exhaust emissions. These impacts would be minimized by using enclosed, pneumatic trucks that are properly maintained; therefore, the volume of off-site trucking would be expected to result in only minor increases in local pollutant emissions and would not be expected to adversely affect regional air quality.

3.2 Climate Change and Greenhouse Gases

3.2.1 Affected Environment

The Earth's natural warming process is known as the "greenhouse effect." The Earth's atmosphere consists of a variety of gases that regulate the Earth's temperature by trapping solar energy. These gases—including CO_2, methane, NO_x, hydrofluorocarbons, perfluorocarbons, nitrogen trifluoride, and sulfur hexafluoride—are cumulatively referred to as greenhouse gases (GHGs) because they trap heat like the glass of a greenhouse. Relying on decades of research, the overwhelming majority of the scientific community agrees that since the Industrial Revolution, anthropogenic (i.e., human-related) activities,

which include the burning of fossil fuels to produce energy and deforestation, have contributed to elevated concentration of GHGs in the atmosphere. The human production and release of GHGs to the atmosphere have caused an increase in the average global temperature. While the increase in global temperature is known as g*lobal warming*, the resulting change in a range of global weather patterns is known as *global climate change*.

The EPA defines climate change as *"*significant changes in average conditions—such as temperature, precipitation, wind patterns, and other aspects of climate—that occur over years, decades, centuries, or longer*"* (EPA 2024d). In other words, climate change includes major changes in temperature, precipitation, or wind patterns, among others, which occur over several decades or longer. These changes are caused by numerous natural factors, including oceanic processes, variations in solar radiation received by Earth, plate tectonics and volcanic eruptions, and anthropogenic activities.

On January 20, 2025, EO 14154 was published, which dictates that agencies shall ensure estimates to assess the value of changes in greenhouse gas emissions resulting from the agency actions, are, to the extent permitted by law, consistent with the guidance in OMB Circular A-4 of September 17, 2003 (EO 14154).

3.2.2 Environmental Consequences

3.2.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, there would be no impact to climate change or GHG emissions.

3.2.2.2 Alternative B – Construction and Operation of CCR Beneficiation Processing Facilities

Under Alternative B, construction activities are expected to result in a temporary, minor increase in construction-related emissions from internal combustion engines. As the construction period is temporary and short term, GHG emissions and associated impacts to climate change are de minimis. Per the bounding analysis (Table 2-1), the CCR BPFs would be located on previously disturbed areas with minimal impacts to forested lands. Therefore, there would be no notable loss of carbon sequestration.

Operation of the facility would result in emissions from mobile sources that include workforce commuting, on-site transport of raw CCR material, and daily delivery of up to 125 truckloads (250 truck trips) of processed CCR loaded into customer bulk pneumatic tanker trucks for transport to market (Table 2-1). However, these emissions would be minor in comparison to regional emissions and would not impact climate change.

TVA identified two different CCR beneficiation processes that would result in emissions during operation. The thermal BPF would recondition fly ash by burning excess carbon from the CCR material. It would require more power (2,250,000 kilowatt-hours per month) and lower quantities of natural gas (500 MCF per month) than the nonthermal BPF. The nonthermal CCR BPF would require less power (750,000 kilowatt-hours per month) and higher quantities of natural gas (40,000 MCF per month gas). Maximum annual GHG emissions associated with the operation of a BPF for CO_2, methane, nitrous oxide (N_2O), and carbon dioxide equivalent (CO_2e) are shown in Table 2-2. Under these bounding conditions, annual GHG contributions would be negligible relative to regional GHG levels and potential effects on climate change. Co2e emissions are estimated to be up to 161,000 tons per year under Alternative B (Table 2-2), and, by comparison, the TVA region

generated an estimated 200 million metric tons of CO_2e across all sectors of the economy in 2019 (TVA 2024b).

Therefore, operation of the thermal or nonthermal BPFs would not be anticipated to result in significant GHG emissions or climate change due to the small footprint of the facilities, use of appropriate BMPs such as SO_2 scrubber, and disposal of dry scrubber waste. In addition, beneficial reuse of CCR has been shown to reduce carbon emissions associated with concrete production (CTCN 2016; EPA 2019). As such, impacts from Alternative B on climate change and GHG emissions would be minor.

3.3 Geology and Soils

3.3.1 Affected Environment

3.3.1.1 Geologic Setting

Physiographic provinces are areas of similar land surfaces resulting from similar geologic history. The TVA PSA encompasses portions of five major physiographic provinces, which are shown in Figure 3-1 (TVA 2024b). Due to the uniformity of properties within each physiographic province, the study area for this PEA is best identified by the applicable physiographic provinces overlain by the TVA coal plants considered in this PEA. This includes the following physiographic provinces that are further described in Appendix C:

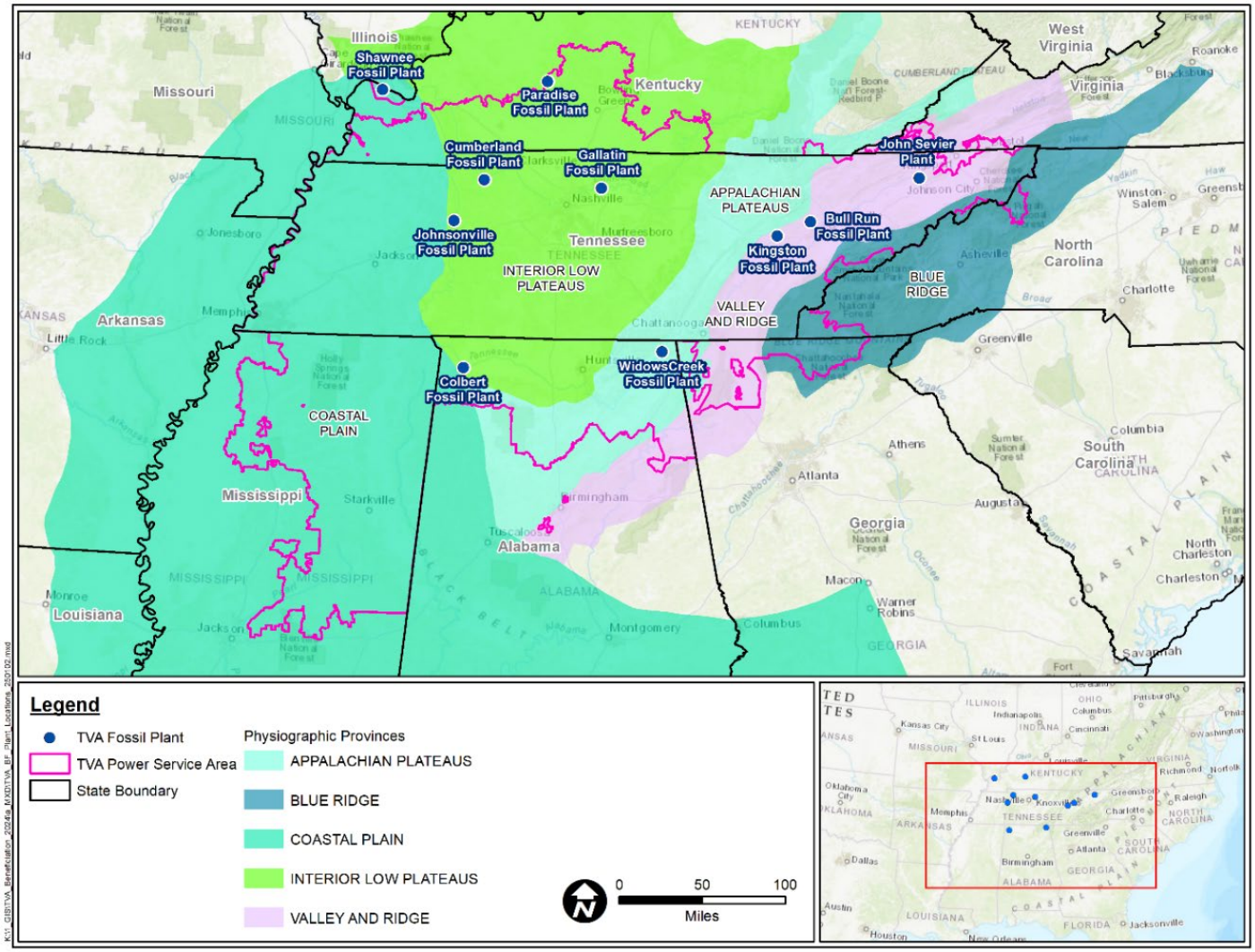
- Valley and Ridge
- Interior Low Plateaus
- Appalachian Plateaus
- Coastal Plains

3.3.1.2 Soils

Soil types are categorized locally based on a wide array of unique properties caused by weathering, physical and chemical influences, and differences in parent material. Dominant soil types at each of the TVA coal plants considered in this PEA are described in Table C-1 of Appendix C. Overall, soils at these plants are heavily disturbed as a result of industrial development.

3.3.1.3 Prime Farmland

Soils that have the best combination of physical and chemical characteristics from which the highest yields of food, feed, forage, fiber, and oilseed crops can be produced with minimal expenditure of energy and economic resources are considered prime farmland by the Natural Resources Conservation Service (NRCS). The Farmland Protection Policy Act (7 CFR Part 658) was enacted to ensure that all federal agencies evaluate impacts to prime farmland prior to permanently converting land uses to those incompatible with agriculture. Prime farmland is designated independently of land use and is based on soil properties; therefore, areas of water or developed land cannot be considered prime farmland. Prime farmland is present to varying degrees within the boundaries of the coal plant sites proposed for CCR BPFs (NRCS 2024). In compliance with the Farmland Protection Policy Act, TVA would determine on a site-specific basis if prospective CCR BPF sites contain prime farmland and would subsequently complete Form AD-1066 (Farmland Conversion Impact Rating), as necessary.



Source: USGS 2023

Figure 3-1. Physiographic Provinces within the TVA PSA

3.3.1.4 Geologic Hazards

3.3.1.4.1 Karst Topography

Karst is a type of topography formed when rocks with a high carbonate content, such as limestone and dolomite, are dissolved by groundwater to form sinkholes, caves, springs, and underground drainage systems. Karst features, such as sinkholes and springs, are common in the Valley and Ridge Province and the Interior Low Plateaus Province due to the prevalence of limestone and/or dolomite. Many of the existing coal plants are located in areas known to contain karst; however, the site-specific presence of karst within the proposed boundaries of the CCR BPFs would be determined from geotechnical investigations during site-specific site planning.

3.3.1.4.2 Seismicity

A common earthquake measurement is referred to as the Peak Ground Acceleration (PGA). The PGA is a measurement of the intensity of ground shaking at a specific location and is typically expressed in terms of gravity. As summarized in Table 3-1, each of TVA's coal plants considered in this PEA are in areas where the expected PGA is of 0.1 gravitational pull (g) or greater. For sites that lie within zones that exceed 0.1 g, or sites for which adjusted values based its conditions exceed 0.1 g, additional analysis is required to demonstrate that all structural components are designed to withstand seismic events.

A seismic zone is used to describe an area where earthquakes tend to focus. As shown in Table 3-1, the Colbert Fossil Plant, Cumberland Fossil Plant, Johnsonville Fossil Plant, Shawnee Fossil Plant, and Paradise Fossil Plant fall within the influence of the New Madrid Seismic Zone (NMSZ) and are expected to experience from 0.14 g to 0.8 g PGA. The Gallatin Fossil Plant is located in a comparatively quiet seismic zone between the NMSZ and the East Tennessee Seismic Zone (ETSZ) but is nevertheless expected to undergo from 0.1 g to 0.14 g PGA, as projected by USGS data. Bull Run Fossil Plant, Kingston Fossil Plant, John Sevier Fossil Plant, and Widows Creek Fossil Plant are situated in an area influenced by the ETSZ, with projections of potential PGA values ranging from 0.2 g to 0.4 g.

Table 3-1. PGA Values at TVA Coal Plant Sites Evaluated in this PEA

Plant	Peak Ground Acceleration (PGA)[1]	Seismic Zone
Bull Run Fossil Plant	0.3 to 0.4	NMSZ, ETSZ
Colbert Fossil Plant	0.16 to 0.18	NMSZ
Cumberland Fossil Plant	0.2 to 0.3	NMSZ
Gallatin Fossil Plant	0.1 to 0.12	NMSZ, ETSZ
Johnsonville Fossil Plant	0.2 to 0.3	NMSZ
John Sevier Fossil Plant	0.2 to 0.3	NMSZ, ETSZ
Kingston Fossil Plant	0.3 to 0.4	NMSZ, ETSZ
Paradise Fossil Plant	0.16 to 0.18	NMSZ
Shawnee Fossil Plant	0.6 to 0.8	NMSZ
Widows Creek Fossil Plant	0.2 to 0.3	NMSZ, ETSZ

Source: TVA 2016, USGS 2015

[1] Expressed as a fraction of standard gravity (g). The PGA values for are adjusted based on site classification (hard rock, rock, dense soil/hard rock, etc.).

ETSZ = East Tennessee Seismic Zone

NMSZ = New Madrid Seismic Zone

3.3.1.4.3 Faulting

A fault means “a fracture or a zone of fractures in any material along which strata on one side have been displaced with respect to that on the other side.” A review of the USGS interactive fault map website, which contains information on faults and associated folds in the United States that are believed to be sources of earthquakes of 6.0 magnitude or above during the Quaternary Period (the past 1,600,000 years), indicates there are no known faults of this age located under the locations proposed for CCR BPFs (USGS 2019b).

3.3.2 Environmental Consequences

3.3.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, geological resources would remain consistent with existing conditions; therefore, there would be no impacts to geology and soils associated with this alternative.

Alternative B – Construction and Operation of CCR Beneficiation Processing Facilities

Construction of the CCR BPFs would involve ground-disturbing activities that would include grubbing, grading, and excavation. Depending on the site-specific details, TVA would complete Form AD-1066 (Farmland Conversion Impact Rating) if applicable, and sites with a score exceeding 160 would receive further examination. However, as identified in Table 2-1, CCR beneficiation processing facilities would be constructed in industrial areas that have been previously disturbed and therefore prime farmland is not expected to be present and thus in most cases would not be impacted. Potential karst features that may be found within the proposed sites would be determined following a site-specific geotechnical investigation and avoided. Site preparation activities would still have potential to disturb soil stability and increase erosion. To minimize potential erosion, BMPs described in the project-specific SWPPP would be implemented during site preparation and maintained through construction; therefore, impacts to soils during construction activities would be minor.

Construction of a portion of the facility may require excavation below the ground surface for foundations with up to 40-foot piers. Foundations would be designed based on local geologic conditions; therefore, impacts to geology associated with construction activities would be minor.

Operational impacts to geology would be associated with the potential impact of earthquakes on the proposed facility operations. The actual conditions at the project area would be investigated during detailed design and, if warranted, seismic considerations may be incorporated into the final design of the facility which could include siting the facility to avoid known fault locations.

Although construction and operation of the CCR BPF may result in minor potential localized alteration of site soils and geologic conditions, these effects are not expected to result in notable alteration or degradation of these resources. Therefore, impacts to geology and soils resulting from the development and operation of the proposed CCR BPFs would be minor.

3.4 Groundwater

3.4.1 Affected Environment

3.4.1.1 Regulatory Framework

The Safe Drinking Water Act of 1974 (SDWA) established the sole source aquifer (SSA) protection program, which regulates certain activities in areas where aquifers (water-bearing geologic formations) provide at least half of the drinking water consumed in the overlying area (i.e., SSA). No SSAs exist in the TVA PSA (EPA 2024e).

The SDWA also established the Wellhead Protection Program, a pollution prevention and management program implemented by each state, used to protect underground sources of drinking water. The SDWA also created the Underground Injection Control Program to protect underground sources of drinking water from contamination by fluids injected into wells. Several other environmental laws contain provisions aimed at protecting groundwater, including Resource Conservation and Recovery Act (RCRA), the Comprehensive Environmental Response, Compensation, and Liability Act, and the Federal Insecticide, Fungicide, and Rodenticide Act.

3.4.1.2 Regional Aquifers

Four basic types of aquifers occur in the TVA PSA: carbonate rock aquifers, sandstone aquifers, semiconsolidated sand aquifers, and unconsolidated sand and gravel aquifers. Differences in the constitution of each aquifer type change the ways in which groundwater can be stored and transported. Carbonate rocks, such as limestone and dolomite, contain a high percentage of carbonate minerals (e.g., calcite) in the rock matrix. These minerals can dissolve when exposed to acidic groundwater, leading to enlarged fractures and cavities throughout the rock, which readily transmits large amounts of groundwater. In certain conditions, karst features, such as sinkholes and caves, can form from enlarged solution openings. Sandstone aquifers rely on joints and fractures along bedding planes to store and transmit water, as groundwater storage from intergranular pore space is limited due to the compaction and cementation of the sand during rock formation. Water storage in sandstone aquifers is generally low to moderate compared to carbonate aquifers but can grow depending on the size of the aquifer (USGS 2021a). Unlike sandstone aquifers, semiconsolidated sand aquifers store water in the intergranular pore space of sand that is interbedded with silt, clay, and minor carbonate rocks. Groundwater storage within these aquifers is generally moderate to high and can range in extent from local to regional (USGS 2021b). Similarly, unconsolidated sand and gravel aquifers store groundwater in their intergranular pore space and contain water in “unconfined” conditions (i.e., the uppermost boundary is the water table). Storage within these aquifers is generally high but depends on the quantities of silt and clay present within the soil matrix (USGS 2021b)

Aquifers in the TVA PSA generally align with the major physiographic provinces shown in Figure 3-1. The TVA coal plants considered for CCR BPFs are located across several physiographic provinces, including the Interior Low Plateaus, Southeastern Coastal Plain, Valley and Ridge, and Appalachian Plateaus, each of which has unique but relatively consistent hydrogeologic characteristics, discussed in Appendix C.

3.4.1.3 Groundwater Use

Groundwater data are compiled by the USGS and cooperating state agencies in connection with the national public water use inventory conducted every five years. The largest use of

groundwater in the TVA PSA is for public water supply, with approximately 18 percent of the water used for domestic supply and approximately 27 percent of water used for irrigation originating from groundwater. Groundwater is also used for industrial, mining, livestock, and aquaculture purposes (TVA 2024a).

The use of groundwater to meet public water supply needs varies across the TVA PSA and is the greatest in west Tennessee and northern Mississippi due to groundwater availability, the absence of adequate surface water sources in some areas, and the presence of combined cycle plants that use groundwater for industrial purposes such as fire protection and cooling. In 2020, total groundwater use for public water supply in the TVA PSA was 122 million gallons per day (MGD). The largest withdrawals of groundwater for public water supply were from the sand aquifers in the Mississippi Embayment and Southeastern Coastal Plains physiographic provinces. These withdrawals accounted for about two-thirds of all groundwater withdrawals for public water supply in the TVA PSA (TVA 2024b). Groundwater use in the vicinity of TVA coal plants is variable and generally limited to private water supply wells (TVA 2024b).

3.4.2 Environmental Consequences

3.4.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, groundwater resources would remain consistent with existing conditions; therefore, there would be no impacts associated with this alternative. All required groundwater protection monitoring would continue in conjunction with the CCR Rule, TDEC agreements, or as required under TVA's agreement with TDEC.

3.4.2.2 Alternative B – Construction and Operation of CCR Beneficiation Processing Facilities

Construction of a CCR BPF would involve ground disturbances up to a maximum depth of approximately 40 feet below land surface for the establishment of piers to support deep foundations, depending on the geological characteristics of the site. Because surficial aquifers such as unconsolidated sand and gravel aquifers can range from 25 to more than 300 feet below ground surface, excavations beyond 25 feet have the potential to directly impact surficial aquifers present. Impacts associated with piers in surficial aquifers primarily include the displacement of groundwater storage or the interference in existing groundwater flow patterns. Additionally, consolidated aquifers may occur at depths as shallow as 25 feet below ground surface requiring consideration in the design of structure foundations. Ultimately, impacts to groundwater associated with ground-disturbing activities would be minor, primarily impacting the movement and storage of groundwater directly beneath the site while not significantly impacting the overall quantity or quality of groundwater within the TVA PSA.

Construction of a CCR BPF also involves the storage and handling of chemicals and equipment associated with construction activities. The use of petroleum fuels, lubricants, and hydraulic fluids during construction and by construction equipment may result in the risk of small on-site spills or leaks. In the case of spills, leaks, or other chemical releases resulting from the handling or storage of chemicals or equipment, temporary and indirect impacts to groundwater quality may occur from the contamination of stormwater infiltration. BMPs employed and maintained as required by state-issued construction stormwater permits under the NPDES would prevent, minimize, and mitigate potential stormwater contamination from construction activities, leaks, and spills. SWPPPs or construction best management practices plans (CBMPPs) would be used to track the implementation and

effectiveness of BMPs. Each BMP would comply with erosion and sediment control handbooks and technical specifications published by the applicable state agency. Site developers would be expected to comply with all appropriate state and federal permit requirements including the implementation of appropriate BMPs. All proposed project activities would be conducted in a manner to ensure that waste materials and chemicals would be contained and the introduction of pollutants to stormwater would be minimized. Additionally, on-site stormwater basins would aid in on-site stormwater treatment and management. Due to the use of BMPs and other preventive measures associated with stormwater contamination, indirect impacts to groundwater associated with the contamination of stormwater infiltration would not be anticipated.

Because the CCR BPF alternative includes both thermal and nonthermal facilities, the more impactful attributes of the two options are analyzed in this section as they relate to groundwater. A singular CCR BPF may require up to 175 gallons per minute or 0.252 MGD of water for operation which may be obtained, in whole or in part, from existing groundwater wells. The use of groundwater for operation would be based on the site-specific presence of groundwater wells and associated groundwater availability which may vary based on well location and underlying aquifer attributes. In the case existing groundwater wells are not present, no additional groundwater wells would be constructed. Ultimately, impacts to groundwater availability from operational use are site-specific and depend on the aquifer from which water is withdrawn. It is assumed that existing groundwater wells built at coal plant locations were intended to provide or supplement the coal plants with groundwater, therefore, there would be no impacts to groundwater associated with the use of existing groundwater wells for CCR BPFs.

Operation of BPFs would require the removal, handling, and storage of raw CCR prior to processing, which could potentially contaminate stormwater and indirectly impact the quality of groundwater under the facility through infiltration. Removal of raw CCR may expose existing on-site impoundments to precipitation and increased stormwater runoff. Use of stormwater BMPs, decanting, and on-site water treatment would prevent or minimize contamination and infiltration of stormwater. Raw CCR removed from existing impoundments for processing would be stored in a weather protected silo, dome, or equivalent structure that would prevent CCR contact with stormwater runoff—eliminating the potential for stormwater contamination. Overall, uncapping and removing CCR from existing impoundments for processing would not be anticipated to adversely impact groundwater due to use of appropriate BMPs, decanting of water at the existing impoundment, and on-site water treatment. Additionally, NEPA review of closure-by-removal has been previously conducted for many of the ash impoundments at the coal plant sites evaluated in this PEA.

Chemical additives may be used in the operation of the BPF and would be stored and handled in accordance with all applicable local, state, and federal laws and regulations, including those established by the Occupational Safety and Health Administration (OSHA). Any accidental leaks or spills would be handled in an efficient manner and would follow all local, state, and federal laws with respect to agency notification and cleanup practices. Due to the use of standardized handling, storage, and cleanup practices, any potential chemical additives used in the operation of CCR BPFs would have negligible impacts to groundwater quality.

3.5 Surface Water

3.5.1 Affected Environment

Water resources provide habitat for aquatic life, recreation opportunities, domestic and industrial water supplies, and other benefits. Freshwater abounds in the study area and generally supports most beneficial uses, including fish and aquatic life, public and industrial water supply, waste assimilation, agriculture, and water-contact recreation (e.g., swimming).

The affected environment that could be impacted by the proposed action would span several hydrologic subregions, including those associated with the Tennessee River, the Cumberland River, the Ohio River, and the Green River. Major surface waters in these watersheds are large rivers and associated reservoirs. Smaller streams, lakes, ponds, and other drainages are also present. The largest surface water features (i.e., major reservoir, river, or other dominant waterbody) adjacent to the TVA coal plants under consideration are shown in Table 3-2 and discussed in more detail in Appendix C.

Table 3-2. Proposed Project Area(s) and Associated Surface Waters

TVA Reservations	Associated Major Surface Waters
Bull Run Fossil Plant	Melton Hill Reservoir (reservoir on the Clinch River); Bull Run Creek
Colbert Fossil Plant	Pickwick Reservoir (reservoir on the Tennessee River)
Cumberland Fossil Plant	Barkley Reservoir (reservoir on the Cumberland River)
Gallatin Fossil Plant	Cumberland River
John Sevier Fossil Plant	Holston River
Johnsonville Fossil Plant	Kentucky Reservoir (reservoir on the Tennessee River)
Kingston Fossil Plant	Watts Bar Reservoir (reservoir on the Tennessee River); Clinch River; Emory River
Paradise Fossil Plant	Green River
Shawnee Fossil Plant	Ohio River; Little Bayou Creek; Metropolis Lake
Widows Creek Fossil Plant	Guntersville Reservoir (reservoir on the Tennessee River); Widows Creek

3.5.2 Environmental Consequences

3.5.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, there would be no changes to existing conditions and NPDES permitted stormwater and wastewater discharges would have negligible direct or indirect adverse impacts.

3.5.2.2 Alternative B – Construction and Operation of CCR Beneficiation Processing Facilities

Under Alternative B, construction of the facilities would have no direct impacts to major surface waters identified in Table 3-2. Per the bounding attributes identified in Table 2-1, construction of the CCR BPFs would require disturbance of up to 15 acres of TVA-owned property per selected site. However, each BPF would be sited in previously disturbed areas within the TVA plant boundary. No substantial surface waters would be present within the 10-acre facility footprint, or the 5-acre laydown area required for construction. Fill within major surface waters identified in Table 3-2 would not be anticipated.

Construction of the proposed facilities may require potential alterations to smaller tributaries and ephemeral drainages that may exist at each proposed site and within which impacts may be unavoidable. For those features, TVA would obtain appropriate federal and state permits for any potential fill. Mitigation may be required to offset impacts. The Environmental Screening Checklist would be used to determine the level of potential impacts to minor surface waters and if mitigation would be required to prevent significant impacts.

TVA would also follow internal guidance to avoid and minimize impacts to smaller streams during construction. For example, water courses would not be blocked or diverted unless required by the specifications or the TVA engineer. Diversions would be made in accordance with TVA's *A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Construction and Maintenance Activities* (TVA 2022). Mechanized equipment would not be operated in flowing water except when approved and then, only to construct crossings or to perform required construction under direct guidance of TVA. Construction of stream fords or other crossings would only be permitted at approved locations and to current TVA construction access road standards. Material would not be deposited in watercourses or within stream bank areas where it could be washed away by high stream flows. Wastewater from construction or dewatering operations would be controlled to prevent excessive erosion or turbidity in a stream, wetland, lake, or pond. Any work or placing of equipment within a flowing or dry watercourse would require prior approval of TVA.

Construction activities in or near surface waters would be controlled to prevent impacts. Because construction would occur over more than 1 acre of land, a state-issued construction stormwater permit would be required under NPDES along with a site-specific SWPPP or CBMPP, depending on the state agency issuing the permit. The SWPPP or CBMPP would identify BMPs adopted to minimize stormwater impacts from construction activities. Additionally, each BMP would comply with erosion and sediment control handbooks and technical specifications published by the applicable state agency. Site developers would be expected to comply with all appropriate state and federal permit requirements including the implementation of appropriate BMPs. All proposed project activities would be conducted in a manner to ensure that waste materials would be contained and the introduction of pollutants to the receiving waters would be minimized. As necessary, on-site stormwater basins could be constructed to aid in stormwater management.

Installed BMPs would be inspected routinely by the TVA field engineer, other designated TVA personnel, or contractor personnel, and any necessary repairs would be made as soon as practicable. Additional inspections would also occur during periods of high rainfall (i.e., during periods with additional risk of excess runoff). BMP inspections would be conducted in accordance with permit requirements. Records of all inspections would be maintained on site, and copies of inspection forms would be forwarded to the TVA construction environmental engineer.

No direct impacts from operation of the proposed CCR BPFs would be anticipated. Water used in facility operations would be obtained from a local public drinking water system or groundwater wells—no direct surface water withdrawals would be used. Process water would require up to 150 gallons per minute (GPM) and potable water would require up to 25 GPM. Discharges of process wastewater associated with facility operation would be pretreated on site and discharged by means of an existing publicly owned treatment works

(POTW) connection or permitted NPDES outfall. Discharges of process wastewater are expected to have a maximum flow of up to 50 GPM, not including stormwater or sewage. Sanitary wastewater discharges would be sent to a POTW. Stormwater would potentially require pretreatment, indirect discharge permit, or on-site permitted NPDES outfall. Stormwater and process water discharged to receiving waterbody would be within NPDES permit limits. If present, stormwater may be discharged to an existing Municipal Separate Storm Sewer System for which applicable permits would be obtained. Operation of BPFs would comply with federal, state, and local regulations and permits, and would include necessary BMPs and mitigation measures; therefore, adverse impacts on surface waters would not be anticipated.

Chemical additives may be used in nonthermal CCR beneficiation processing, but the facility would ensure that the chemicals used in operational processes and any potential wastewater discharges would not adversely impact water quality. Chemicals would be evaluated to ensure that they would not contribute to aquatic toxicity. TVA environmental staff would conduct a characterization of new wastewater discharges using the Environmental Screening Checklist to confirm that no significant impacts to surface waters would occur. If the operational characterization showed potential adverse impacts, then mitigation measures, such as water treatment or additional BMPs, would be implemented to ensure discharges would meet NPDES or pretreatment requirements and would not cause exceedance of state water quality standards. Overall, direct adverse impacts to surface waters would not be anticipated because any potential discharges would be required to meet NPDES toxicity limits or pretreatment requirements.

Indirect impacts to adjacent surface waters related to construction and operation of the proposed facilities would be minor, temporary, and not considered significant. For example, stormwater runoff due to temporary construction activities may cause indirect impacts to surface waters such as increased turbidity; but all construction activities would adhere to permit requirements and implement BMPs to minimize the likelihood and magnitude indirect effects.

TVA would comply with all appropriate local, state, and federal permit requirements to reduce potential surface water impacts. Possible permits would include NPDES Construction General Stormwater coverage; NPDES for discharge process wastewater; 401 Water Quality Certification; Tennessee Aquatic Resource Alteration Permit; and Section 404 U.S. Army Corps of Engineers (USACE) permitting. Required permits would be assessed on a site-specific basis using the Environmental Screening Checklist. Overall, any construction impacts to surface waters would comply with federal, state, and local regulations and permits, and would include necessary BMPs and mitigation measures to eliminate significant impacts.

3.6 Aquatic Ecology

3.6.1 Affected Environment

The TVA PSA encompasses portions of several major river systems including all of the Tennessee River drainage and portions the Cumberland, Ohio, Mobile, and the Mississippi River drainages. These watersheds drain a diverse physiography and associated topography providing abundant habitats occupied by an extremely diverse group of aquatic faunas and represent important commercial and recreational fisheries (TVA 2005). These systems are recognized as a globally important area for freshwater biodiversity due to the

large variety of freshwater fishes and invertebrates (e.g., freshwater mussels, snails, crayfish and insects) they support (TVA 2016).

Many rivers in the TVA PSA have been substantially altered by human activity impacting the available aquatic habitat and species compositions. For example, construction of the Tennessee River dam and reservoir system fundamentally altered the aquatic habitat of the Tennessee and Clinch rivers. Dams and their associated reservoirs have benefits for power generation, navigation, flood control, and recreation; however, they also disrupt the daily, seasonal, and annual flow patterns of the waterway. By converting free-flowing riverine ecosystems into lake-like reservoir ecosystems, dams shaped the available aquatic habitats and associated aquatic communities above and below them. Dammed sections expanded some species' ranges in the system, primarily shad (*Alosa sapidissima*) and sunfishes (*Lepomis* sp.). Conversely, undammed sections support a much higher diversity of aquatic life including federally and state-listed species.

Reservoirs, in general, in the TVA PSA have an ecological structure and function linked to water residence time. Phytoplankton, periphyton, and macrophytes supply most of the organic matter to the food web in impounded waters. Due to fluctuating water levels, phytoplankton production dominates most impoundments; however, rooted and floating macrophytes can dominate where water levels are stable in a reservoir (TVA 2016). Fish, amphibians, reptiles, birds and mammals are the main groups of vertebrates found in and associated with reservoirs in the area during a portion of their life cycle (TVA 2016).

Fish populations comprise forage fishes, including shads and silversides (*Atheriniformes* sp.) in reservoirs and sunfishes in impoundments, while the dominant predators in reservoirs are typically basses (TVA 2016). Common invertebrate species found in area reservoirs include rotifers, protozoans, and crustaceans. Larvae of true midges and oligochaete worms are the dominant macroinvertebrates in the benthos of most reservoirs (TVA 2016). Many benthic organisms have narrow habitat requirements that are not always met in reservoirs or tailwaters below dams. Further downstream from dams, the number of benthic species increases as natural reaeration occurs and dissolved oxygen and temperatures rise.

Each TVA coal plant under consideration has a dominant surface water feature (i.e., large reservoir or large river) adjacent to the site that provides the most aquatic habitat (Table 3-2). Smaller streams, lakes, ponds, and other drainages are also potential aquatic habitats at each site; however, the dominant aquatic habitats are provided by the waterbodies identified in Table 3-2 in Subsection 3.5.

3.6.1.1 Tennessee River Basin

The Tennessee River drainage basin is the dominant aquatic system within the TVA PSA, and most TVA coal plants are within this watershed.

3.6.1.1.1 Tennessee River Reservoir Habitat

Reservoirs on the Tennessee River are shallower, have greater flows, and retain the water for a shorter period of time (TVA 2024b). Although dissolved oxygen in lower reservoir levels is often reduced, it is seldom depleted. Winter drawdowns on mainstem reservoirs are less severe, so bottom habitats generally remain wetted all year. This benefits benthic organisms and promotes the growth of aquatic plants in the extensive shallow overbank areas of some reservoirs. Tennessee River mainstem reservoirs generally support healthy

fish communities, ranging from approximately 50 to 90 species per reservoir. Good to excellent sport fisheries exist, primarily for black bass (*Micropterus salmoides*), crappie (*Pomoxis* sp.), sauger (*Sander canadensis*), white bass, striped bass (*Morone saxatilis*), sunfish, and catfish. The primary commercial species are channel catfish, blue catfish (*Ictalurus furcatus*), and buffalo (*Ictiobus* sp.) (TVA 2024b).

Facilities located on mainstem reservoirs of the Tennessee River include Colbert, Johnsonville, Kingston, and Widows Creek coal plants.

3.6.1.1.2 Reservoirs on Tributaries to the Tennessee River and Tailwaters Habitats

Reservoirs on tributaries to the Tennessee River are typically deep and retain water for long periods of time (TVA 2024b). The results from retention time and water depth include thermal stratification, the formation of an upper layer that is warmer and well oxygenated, an intermediate layer of variable thickness and a lower layer that is colder and poorly oxygenated. These aquatic habitats are simplified compared to undammed streams and fewer species are found. Aquatic habitats in the tailwater can also be impaired due to a lack of minimum flows and low dissolved oxygen levels which may restrict movement, migration, reproduction, and the available food supply for fish and other aquatic organisms. Dams on tributary rivers affect the habitat of benthic invertebrates, which are a vital part of the food chain of aquatic ecosystems. Benthic life includes worms, snails, crayfish, aquatic insects, mussels, and clams. However, many benthic organisms have narrow habitat requirements that are not always met in reservoirs or tailwaters below dams (TVA 2024b).

Facilities on reservoirs located on tributaries to the Tennessee River include the Bull Run Fossil Plant (Clinch River) and John Sevier Fossil Plant (Holston River).

3.6.1.2 Other Basins

The other major drainages within the TVA PSA (the Cumberland and Ohio River drainages) share a diversity of aquatic life equal to or greater than the Tennessee River drainage. As with the Tennessee River, these river systems have seen extensive human alteration including construction of reservoirs, navigation channels, and locks. Despite these changes, remarkably diverse aquatic communities are present in each of these river systems.

Facilities located in other watersheds include Cumberland and Gallatin fossil plants on the Cumberland River, Paradise Fossil Plant on the Green River, and Shawnee Fossil Plant on the Ohio River (TVA 2016).

3.6.1.3 TVA Aquatic Monitoring Program

TVA began a systematic program to monitor the ecological conditions of its reservoirs in 1990. Reservoir and stream monitoring programs were combined with TVA's fish tissue and bacteriological studies to form an integrated Vital Signs Monitoring Program (VSMP) (Carriker 1999). VSMP activities focus on (1) physical/chemical characteristics of waters; (2) physical/chemical characteristics of sediments; (3) benthic macroinvertebrate community sampling; and (4) fish assemblage sampling (TVA 2016)..

3.6.2 Environmental Consequences

3.6.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, there would be no changes to existing conditions; therefore, there would be no impacts to aquatic ecology.

3.6.2.2 Alternative B – Construction and Operation of CCR Beneficiation Processing Facilities

Under Alternative B, construction of the facilities would have no direct impacts to major waterbodies that provide the majority of the aquatic habitats in the study area. Construction of the facilities may result in unavoidable direct impacts to smaller waterbodies, but these impacts would be permitted and mitigated, as required, and considered not significant. Operation of the facilities would have no direct impacts to aquatic habitats. Indirect impacts to major and minor aquatic habitats related to construction and operation would be minimized and mitigated and would not be considered significant.

Construction of the facilities would have no direct impacts to major waterbodies that provide most of the aquatic habitats in the study area. Per the bounding attributes identified in Table 2-1, construction of the CCR BPFs would require disturbance of up to 15 acres of TVA-owned property per selected site. However, each BPF would be sited in previously disturbed areas within the TVA plant boundary. No substantial aquatic habitats would be present within the 15-acre facility footprint. Significant fill of aquatic habitat is not anticipated to occur.

Construction of the proposed facilities may require alterations to potential minor surface water features located at each proposed site. Smaller streams and ephemeral drainages may exist within TVA reservations and may be unavoidable. For those smaller aquatic habitats, TVA would obtain appropriate federal and state permits for any potential fill. Mitigation may be required to minimize impacts to aquatic resources. The Environmental Screening Checklist would be used to determine the level of potential impacts to minor surface waters and if mitigation would be required to prevent significant alterations to aquatic habitats.

TVA would also follow internal guidance to avoid and minimize impacts to smaller streams during construction. For example, water courses would not be blocked or diverted unless required by the specifications or the TVA engineer. Diversions would be made in accordance with TVA's *A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Construction and Maintenance Activities* (TVA 2022). Mechanized equipment would not be operated in flowing water except when approved and then, only to construct crossings or to perform required construction under direct guidance of TVA. Construction of stream fords or other crossings would only be permitted at approved locations and to current TVA construction access road standards. Material would not be deposited in watercourses or within stream bank areas where it could be washed away by high stream flows. Wastewater from construction or dewatering operations would be controlled to prevent excessive erosion or turbidity in a stream, wetland, lake, or pond.

Construction activities in or near aquatic habitats would be controlled to prevent impacts to aquatic habitats. All requirements for a general stormwater permit, aquatic resource alteration permit, or a site-specific permit would be met including monitoring and implementation of appropriate BMPs. For example, a NPDES stormwater construction permit would be obtained during construction. This permit would require the preparation of a SWPPP outlining BMPs and other measures that would be implemented to avoid or reduce adverse effects of stormwater to receiving waterbodies.

Example BMPs to protect aquatic life would include appropriate construction methods, erosion controls, and safe waste management. Construction activities would be performed

using methods that would prevent entrance or accidental spillage of solid matter, contaminants, debris, and other objectionable pollutants and wastes into flowing caves, sinkholes, streams, dry watercourses, lakes, ponds, and underground water sources. Contractors would also install and maintain erosion controls such as silt fences on steep slopes and adjacent to any aquatic habitats. Acceptable measures for disposal of waste oil from vehicles and equipment would also be followed so no waste oil would be disposed of within the right-of-way, on the construction site, or on access roads. Implementing appropriate BMPs during construction would avoid potential adverse effects to water quality and aquatic life.

Installed BMPs would be inspected routinely by the TVA field engineer, other designated TVA personnel, or contractor personnel, and any necessary repairs would be made as soon as practicable. Additional inspections would also occur during periods of high rainfall (i.e., risk of excess runoff). BMP inspections would be conducted in accordance with permit requirements. Records of all inspections would be maintained on site, and copies of inspection forms would be forwarded to the TVA construction environmental engineer.

No direct impacts from operation of the proposed CCR BPFs would be anticipated. All waste streams from operation of the facilities would be treated by local utilities and would not impact aquatic habitats.

Indirect impacts to adjacent aquatic habitats related to construction and operation of the proposed facilities would be minimized and would not be considered significant. For example, stormwater runoff due to temporary construction activities may cause indirect impacts; but construction activities would adhere to permit limit requirements and would implement BMPs to minimize indirect effects on aquatic resources. Removal of vegetation within the riparian zone could indirectly lead to loss of instream habitat due to increased siltation from construction stormwater runoff and increased water temperatures from lack of seasonal shade. However, construction of the BPFs would not likely remove significant amounts of riparian vegetation as it would be sited on a previously disturbed site within the plant boundary. Following the construction phase, care and maintenance of the system and site-wide management of stormwater using appropriate BMPs would minimize indirect impacts to the aquatic community of receiving waters.

Major aquatic habitats would be avoided during construction of beneficiation facilities and any alterations to minor surface waters would be permitted, minimized, and mitigated to avoid significant impacts. No cumulative impacts to aquatic ecology are anticipated.

3.7 Vegetation

3.7.1 Affected Environment

Ecoregions are identified by analyzing the patterns and composition of biotic and abiotic phenomena that affect or reflect differences in ecosystem quality and integrity (Omernik 1987, 1995). These phenomena include geology, landforms, soils, vegetation, climate, land use, wildlife, and hydrology. The PSA intersects four level III ecoregions in Alabama, Kentucky, and Tennessee (the states that contain coal plant sites evaluated in this PEA), including the Interior Plateau, the Ridge and Valley, the River Valleys and Hills, and the Southwestern Appalachians (Omernik 1987; Griffith et al. 2001). These ecoregions support a diverse array of plant communities, from southern floodplain and oak hickory forests in the River Valleys and Hills to upland mixed oak and mesophytic forest in the Southwestern Appalachians. Many specific plant communities occur throughout these ecoregions

including bottomland hardwood and oak, southern floodplain forest, Appalachian oak forest, upland oak-hickory, and swamp forests, along with an array of herbaceous plant habitats. Appendix C contains additional descriptions of the ecoregions and associated vegetation that occurs within the study area.

Invasive species are non-native species whose introduction does or is likely to cause economic or environmental harm or harm to human health (NISC 2016). EO 13112 – Invasive Species directs federal agencies to prevent the introduction of invasive species, control their populations, restore invaded ecosystems, and take other related actions (USDA 1999). Additionally, EO 13751 – Safeguarding the Nation from the Impacts of Invasive Species amends EO 13112 and directs actions to continue coordinated federal prevention and control efforts to address invasive species (USDA 2016).

Invasive plants are prevalent on most lands in the TVA PSA. There are 58 invasive plant species considered to be an established or emerging threat that occur on or near TVA generating facilities and transmission line rights-of-way (TN-IPC 2023; TVA 2024b). These include tree-of-heaven (*Ailanthus altissima*), Asian bittersweet (*Celastrus orbiculatus*), autumn olive (*Elaeagnus umbellata*), Chinese privet (*Ligustrum sinense*), kudzu (*Pueraria montana*), common reed grass (*Phragmites australis*), Eurasian water milfoil (*Myriophyllum spicatum*), multiflora rose (*Rosa multiflora*), and tall fescue (*Festuca arundinacea*). Not all non-native species pose threats to natives. Naturalized additions to the ecosystem are considered to be non-native non-invasive species and have minor negative impacts to native vegetation. Examples include Queen Anne's lace (*Daucus carota*) and dandelion (*Taraxacum* sp.).

For this analysis, the affected environment is considered to be the existing TVA coal plant sites listed in Table 1-1 in Chapter 1 of this PEA. Most of these sites are heavily disturbed by prior construction and operation of the respective plants. They typically have limited amounts of vegetation, although there may be some small patches of grassed areas or small trees within the facility grounds. Plant communities present consist of ruderal/early successional vegetation, maintained lawn/turf associated with berms, denuded and unvegetated lands (e.g., parking lots, riprapped berms, etc.) and fringing scrub and sapling trees. Vegetation is typically dominated by non-native plants with little to no conservation value.

3.7.2 Environmental Consequences

3.7.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, there would be no impacts to vegetation from the proposed action.

3.7.2.2 Alternative B – Construction and Operation of CCR Beneficiation Processing Facilities

Under Alternative B, specific sites for the potential BPFs have not been identified; however, under the bounding conditions listed in Table 2-2, the facility would be constructed on previously disturbed industrial land at existing TVA coal plant sites that generally have sparse vegetation dominated by non-native species and do not support natural plant communities. Potential site development activities under the bounding condition would result in disturbance of up to 15 acres of land with minimal impacts to forested land cover types. Therefore, only minor impacts to vegetation associated with the construction and operation of the BPF would be expected.

Operation of the facility would include the transport of CCR to the on-site facility via existing, on-site haul roads and delivery of processed CCR product to various markets within the region along the existing road network. Minor indirect effects may occur to vegetation along haul routes associated with the deposition of fugitive dust from truck movements. BMPs such as covered loads and pneumatic trucks would be implemented, as appropriate, to minimize risk of CCR deposition. Therefore, only minor impacts to vegetation from road dust would be anticipated.

3.8 Wildlife

3.8.1 Affected Environment

The coal plant sites evaluated in this PEA are located within portions of four level III ecoregions (see Section 3.7, Vegetation) that provide a mixture of wildlife habitat, ranging from bottomland hardwood and cypress swamps to higher elevation northern hardwood forests (TVA 2024b). This diverse mixture of habitats supports approximately 77 species of mammal, 56 reptiles, 70 amphibians, and 340 birds in Tennessee alone (TWRA 2021). Although some species have widespread distributions, others have restricted ranges unique to specific ecoregions.

Many wide-ranging species occur throughout the TVA PSA, and most that are tolerant to humans have stable or increasing populations. Loss and modification of habitats due to agriculture, hydrologic modification (e.g., construction of reservoirs and dams), and municipal discharges (TWRA 2021) have greatly altered wildlife populations. While some species flourish under these changes, others show marked declines. Grassland-dependent and woodland-dependent birds, for example, have shown dramatic decreases in their numbers (NABCI 2022). Conversely, some species of wildlife are of management concern because of overly abundant populations, leading to damage to natural ecosystems and human interests (e.g., the Canada goose [*Branta canadensis*]; TVA 2024b).

EO 13186, Responsibilities of Federal Agencies to Protect Migratory Birds (EPA 2001), requires federal agencies implementing or planning actions that could affect migratory birds and their habitats to “support the conservation intent of the migratory bird conventions by integrating bird conservation principles, measures, and practices into agency activities and by avoiding or minimizing, to the extent practicable, adverse impacts on migratory bird resources when conducting agency actions.”

Review of the U.S. Fish and Wildlife Service (USFWS) Information for Planning and Consultation (IPaC) website indicated 22 migratory bird species of conservation concern (BCC) have the potential to occur at the coal plants evaluated in this PEA (see Table C-4 in Appendix C). In general, gulls (Laridae), wading birds, waterfowl, raptors, game birds, game mammals, and nongame wildlife (reptiles, amphibians, and small mammals) exhibit stable or increasing numbers throughout the TVA PSA (TVA 2024b). Review of the TVA Regional Natural Heritage database in December 2024 indicated osprey nests are known within 3 miles of all of the coal plant sites evaluated in this PEA. However, numbers of several species of songbirds continue to decline in the region, especially those species typically found in grassland or unfragmented forests (TVA 2011). A discussion of affected environment and consequences for threatened and endangered species can be found in Section 3.9, Threatened and Endangered Species.

Caves are abundant features throughout the TVA PSA, especially in north Alabama, northwest Georgia, and the eastern half of Tennessee. These sites provide a unique

mixture of microhabitats used by a diverse array of cave-dependent species, some endemic to single-cave systems. Caves are known within 3 miles of the Bull Run, Colbert, Gallatin, John Sevier, Kingston, and Widows Creek coal plant sites.

As discussed in Section, 3.7 Vegetation, the coal plant sites evaluated in this PEA are heavily disturbed with little to no remaining natural habitat. Early successional vegetative habitats, forested edge habitat, and forest do occur in areas surrounding the sites. Because the disturbed terrestrial and aquatic habitat near the sites regularly receive high levels of noise disturbance and vehicle traffic, only small numbers of common wildlife species are likely to occur within the immediate areas.

3.8.2 Environmental Consequences

3.8.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, there would be no change to wildlife habitats from the proposed action at TVA coal plant sites.

3.8.2.2 Alternative B – Construction and Operation of CCR Beneficiation Processing Facilities

Under Alternative B, the primary source of impacts to wildlife populations from construction and operation of CCR BPFs is the alteration of habitats from grading and the removal of on-site vegetation at existing TVA coal plant sites. The extent of habitat disturbance and the resulting effects on wildlife would be site-specific and vary depending on the habitat conditions, topography, and size of the site. However, under the bounding conditions listed in Table 2-2, previously disturbed industrial land is preferred for construction of the facility; disturbance of rare/sensitive vegetation communities, caves, water bodies, sinkholes would be avoided; and removal of forested lands would be minimized. Therefore, although construction and operation of the BPF would result in alteration of up to 15 acres of habitat and potential displacement of common wildlife species, these effects are not expected to result in notable alteration or destabilization of populations of any species. Therefore, impacts to wildlife resulting from the development and operation of the proposed CCR BPFs under Alternative B would be minor.

Should osprey nests, heronries, or other migratory bird nests occur within 660 feet of a project area, seasonal avoidance measures would be implemented, if possible. If seasonal avoidance measures are not feasible and impacts must occur during the breeding/active season of osprey or other migratory BCCs, coordination with U.S. Department of Agriculture (USDA) – Wildlife Services or USFWS would occur, as appropriate, to ensure actions are in compliance with Executive Order 13186 - Responsibilities of Federal Agencies to Protect Migratory Birds. Because appropriate BMPs would be implemented during construction, operation, and maintenance, and because all appropriate permits would be obtained, any direct or indirect impacts to migratory bird species are anticipated to be minor.

3.9 Threatened and Endangered Species

3.9.1 Affected Environment

The TVA PSA provides habitat for numerous species of plants and animals that have declining populations or are otherwise rare and considered to be endangered, threatened, or of special concern at the national and state levels.

3.9.1.1 Regulatory Framework for Threatened and Endangered Species

The ESA (16 USC §§ 1531-1543) was passed to conserve the ecosystems upon which endangered and threatened species depend and to conserve and recover those species. An endangered species is defined by the ESA as any species in danger of extinction throughout all or a significant portion of its range. A threatened species is likely to become endangered within the foreseeable future throughout all or a significant part of its range. Areas known as critical habitats, essential to the conservation of listed species, also can be designated under the ESA. The ESA establishes programs to conserve and recover endangered and threatened species and makes their conservation a priority for federal agencies. Under Section 7 of the ESA, federal agencies are required to consider the potential effects of their proposed action on endangered and threatened species and critical habitats. If the proposed action has the potential to affect these resources, the federal agency is required to consult with the USFWS and take measures to avoid or minimize adverse effects.

All seven states in the TVA PSA, including the states that contain the coal plant sites considered in this PEA (i.e., Tennessee, Kentucky, and Alabama), have enacted laws protecting endangered and threatened species and additional species classified as “in need of management,” “state protected,” etc. (TVA 2024b).

3.9.1.2 Federally Listed Species in the TVA PSA

Thirty-three species of plants and 104 species of animals in the TVA PSA are listed under the ESA as endangered or threatened or formally proposed for such listing by the USFWS (TVA 2024b). Across the TVA PSA, there are also 45 areas designated as critical habitat essential to the conservation of listed species. In addition to the species listed under the ESA, about 1,070 plant and animal species are formally listed as protected species by one or more of the states or otherwise identified as species of conservation concern (TVA 2024c).

The highest concentrations of terrestrial and aquatic species listed under the ESA occur in the Blue Ridge, Appalachian Plateaus, and Interior Low Plateau physiographic provinces. Relatively few listed species occur in the Coastal Plain and Mississippi Alluvial Plain provinces. The taxonomic groups with the highest proportion of species listed under the ESA are fish and mollusks. Factors contributing to the high proportions of vulnerable species in these groups include the high number of endemic species in the TVA PSA and the alteration of their habitats by reservoir construction and water pollution. River systems near the proposed sites with the highest numbers of listed aquatic species include the Tennessee and Cumberland rivers. Populations of a few listed species have increased, primarily because of conservation efforts, to the point where they are no longer listed under the ESA (e.g., bald eagle, peregrine falcon, Tennessee coneflower, and snail darter) or their listing status has been downgraded from endangered to threatened (e.g., large-flowered skullcap and small whorled pogonia). However, some listed species’ populations continue to decline due to a multitude of factors. The formerly common northern long-eared bat was listed in 2015 under the ESA as threatened and upgraded to an endangered listing in 2022 due to recent dramatic population declines caused by white-nose syndrome. The formerly common tricolored bat is expected to be listed as endangered under the ESA in the foreseeable future with the little brown bat to follow due to the same pathogen. Population trends of many other listed species in the TVA PSA are poorly understood (TVA 2024b).

3.9.1.3 Federally Listed Species within Coal Plant Sites Evaluated in the PEA

The USFWS IPaC website was queried for all of the proposed coal plant sites in December of 2024. Within these areas there is potential for a total of 42 federally listed or protected species to occur, including four mammals, two bird species, one reptile, one amphibian, three fishes, 30 clam species, one snail species, one insect, and two plant species. John Sevier Fossil Plant falls within the critical habitat area for purple bean (*Ivillosa perpurpurea*) and Shawnee Fossil Plant falls within the critical habitat area for rabbitsfoot (*Quadrula cylindrica cylindrica*) (USFWS 2024a). Results from each site-specific IPaC are included in Table 3-3. TVA would review the IPaC website for an updated species list during the site-specific Environmental Screening Checklist process to determine the potential for effects to federally listed species.

Table 3-3. Federally Protected Species within the Vicinity of Coal Plant Sites Evaluated in this PEA

Common Name	Scientific Name	Federal Status[1]	Location[2]
Mammals			
Gray Bat	*Myotis grisenscens*	E	BRF, COF, CUF, GAF, JSF, JOF, KIF, PAF, SHF, WCF
Indiana Bat	*Mytois sodalis*	E	BRF, COF, CUF, JSF, KIF, PAF, SHF, WCF
Northern Long-eared Bat	*Myotis septentronalis*	E	CUF, KIF, PAF, WCF
Tricolored Bat	*Perimyotis subflavus*	PE	BRF, COF, CUF, GAF, JSF, JOF, KIF, PAF, SHF, WCF
Birds			
Bald Eagle	*Haliaeetus leucocephalus*	DM	BRF, COF, CUF, GAF, JSF, JOF, KIF, PAF, SHF, WCF
Whooping Crane	*Frus americana*	EXPN	BRF, COF, CUF, GAF, JOF, KIF, PAF, SHF, WCF
Reptiles and Amphibians			
Alligator Snapping Turtle	*Macrochelys temmminchkii*	PT	JOF
Eastern Hellbender	*Cryptobranchus alleganiensis alleganiensis*	PE	COF, WCF
Fish			
Slender Chub	*Erimystac cahni*	T	BRF, JSF
Spotfin Chub	*Erimonax monachus*	T	JSF
Yellowfin Madtom	*Noturus flacispinnis*	T	BRF
Mollusks			
Alabama Lampmussel	*Lampsilis virescens*	E, EXPN*	BRF, COF*
Birdwing Pearlymussel	*Lemios rimosus*	EXPN*	COF*
Clubshell	*Pleurobema clava*	EXPN*, E	COF*, KIF, PAF, SHF
Cracking Pearlymussel	*Hemistena lata*	EXPN*	COF*
Cumberland Bean (pearlymussel)	*Cillosa trabalis*	EXPN*	COF*
Cumberland Moccasinshell	*Medionidus conradicus*	PE	JSF

Common Name	Scientific Name	Federal Status[1]	Location[2]
Cumberland Monkeyface (pearlymussel)	*Theliderma intermedia*	EXPN*	COF*
Cumberland Combshell	*Epioblasma brevidens*	EXPN*	COF*
Dromedary Pearlymussel	*Fromus dromas*	EXPN*	COF*
Fanshell	*Cyprogenia stegaria*	E	BRF, COF, KIF, PAF, SHF
Fat Pocketbook	*Potamilus capax*	E	SHF
Finerayed Pigtoe	*Fusconaia cuneolus*	EXPN*	COF*
Fluted Kidneyshell	*Ptychobranchus subtentus*	E	JOF
Longsolid	*Fusconaia subrotunda*	T	COF, JOF, KIF, PAF, SHF
Orangefoot Pimpleback (pearlymussel)	*Plethbasus cooperianus*	E	KIF, PAF, SHF
Oyster Mussel	*Epiolasma capsaeformis*	EXPN*	COF*
Pink Mucket (pearlymussel)	*Lampsilis abrupta*	E	BRF, COF, JOF, KIF, PAF, SHF, WCF
Purple Bean[3]	*Ivillosa perpurpurea*	PE	JSF
Purple Cat's Paw (Purple Cat's Paw Pearlymussel)	*Epioblasma obliquata*	EXPN*	COF*
Rabbitsfoot[4]	*Quadrula cylindrica cylindrica*	T	SHF
Ring Pink	*Obovaria retusa*	E	KIF, PAF, SHF
Rough Pigtoe	*Pleurobema plenum*	E	BRF, KIF, PAF, SHF
Sheepnose Mussel	*Plethobasus cyphyus*	E	COF, SHF
Shiny Pigtoe	*Fusconaia cor*	EXPN*	COF*
Snuffbox Mussel	*Epioblasma triquetra*	E	KIF, PAF
Spectaclecase (mussel)	*Cumberlandia monodonta*	E	BRF, COF, KIF, PAF, SHF
Tennessee Pigtoe	*Pleuronaia barnesiana*	PE	JSF
White Wartyback (pearlymussel)	*Plethobasus cicatricosus*	E	COF
Winged Mapleleaf	*Quadrula fragosa*	EXPN*	COF*
Snails			
Anthony's Riversnail	*Athearnia anthonyi*	E, EXPN*	BRF, WCF, COF*
Insects			
Monarch Butterfly	*Danaus plexippus*	PE	BRF, COF, CUF, GAF, JSF, JOF, KIF, PAF, SHF, WCF
Plants			
Price's Potato-bean	*Apios priceana*	T	CUF, WCF
White Fringeless Orchid	*Platanthera integrilabia*	T	WCF

Source: USFWS 2024a

[1] Federal Status Codes: PE=Proposed Endangered, PT= Proposed Threatened, E=Endangered, T=Threatened, DM = Delisted, Recovered, and Being Monitored, EXPN=Experimental Population.

[2] Location names are: BRF= Bull Run Fossil Plant, COF= Colbert Fossil Plant, CUF=Cumberland Fossil Plant, GAF= Gallatin Fossil Plant, JSF=John Sevier Fossil Plant, JOF=Johnsonville Fossil Plant, KIF= Kingston Fossil Plant, PAF= Paradise Fossil Plant, SHF= Shawnee Fossil Plant, WCF= Widows Creek Fossil Plant.

[3] JSF within critical habitat area for this species; [4] SHF within critical habitat area for this species.

Asterisk (*) denotes corresponding location and federal status code.

3.9.1.4 State-listed Species

Based on TVA's Natural Heritage database, about 1,070 plant and animal species are formally listed as protected species by one or more of the states or otherwise identified as species of conservation concern (TVA 2024b). Each of the three states for the coal plant sites evaluated in this PEA maintains databases of listed species. Websites for these databases are provided in Table 3-4 below. TVA would use these resources, in-house expertise, and/or knowledge through partnerships with local and regional experts in the site-specific Environmental Screening Checklist process to determine the potential for effects to state-listed species.

Table 3-4. Websites for State-listed Species within Coal Plant Sites Evaluated

State	Web Address
Alabama	https://www.auburn.edu/cosam/natural_history_museum/alnhp/data/index.htm
Kentucky	https://eec.ky.gov/Nature-Preserves/biodiversity/Pages/Species-and-Natural-Community-Reports.aspx
Tennessee	https://www.tn.gov/environment/program-areas/na-natural-areas/na-natural-heritage-inventory-program.html

3.9.2 Environmental Consequences

3.9.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, TVA would not establish a program to programmatically review, construct, and operate CCR BPFs at TVA coal plant sites. Therefore, there would be no impacts to threatened and endangered species habitats from the proposed action at TVA coal plant sites.

3.9.2.2 Alternative B – Construction and Operation of CCR Beneficiation Processing Facilities

Under Alternative B, an assessment of habitat availability and potential presence of either state- or federally listed species would be conducted as part of the site-specific review. If potential habitat for rare or protected species is identified within the project area, and if TVA determines there is potential to adversely affect listed species, avoidance, minimization, and conservation measures to eliminate the potential for adverse impacts would be developed and implemented. However, in the event TVA determines that these measures would not be practicable or effective in eliminating the potential for adverse effects to listed species (e.g., resulting in the potential take of a federally listed species), TVA would conduct a site-specific NEPA review for that facility and would coordinate with the appropriate state regulatory agency or initiate Section 7 consultation with the USFWS, as appropriate. That site-specific review could incorporate relevant parts of this PEA. Potential impacts to endangered and threatened terrestrial animals, aquatic species, and plants are described further in the following sections.

3.9.2.2.1 Terrestrial Animals

Construction may include clearing of vegetation, grading, excavation to install piers to a depth of up to 40 feet and trenching to install new gas pipeline. Extent of disturbance would

be site-specific and would vary depending on topography, current land use, type of facility, and the extent of vegetation to be cleared.

Among federally listed or protected terrestrial animal species documented within the TVA PSA, the greatest potential for adverse effects is to those species that are widespread across the TVA PSA (e.g., the bald eagle, Indiana bat, northern long-eared bat). Prospective facility sites near nesting bald eagles may be subject to seasonal restrictions on construction. Seasonal construction conducted in compliance with the National Bald Eagle Management Guidelines (USFWS 2007) is not expected to have adverse impacts to the bald eagle. Removal of nest trees (active or inactive) would be considered an adverse impact but is not expected as there would be minimal impacts to vegetation under the bounding conditions (Table 2-2).

If forest is present, surveys would be conducted to determine suitability for summer roosting habitat for federally listed bats. Although disturbance of existing buildings or bridges would be avoided as possible, surveys of these structures also would be conducted to ensure that bats are not using them for roosting. Sites with presence of suitable summer roosting habitat for Indiana bat, northern long-eared bat, or tricolored bat, and for which the removal of such habitat would not be avoidable, may be subject to seasonal surveys to determine bat presence prior to construction actions (USFWS 2024b). Results of habitat assessments or bat surveys would be used to determine site-specific impacts. TVA has adopted many BMPs to help minimize impacts to bat species, including standards for noise during construction, human presence guidance, tree removal, sedimentation, spills, pollutants, and contaminants, lighting, and bat species monitoring (TVA 2023b).

TVA's commitment to abiding by the ESA and state-level regulations would minimize impacts to terrestrial animal species that are state- or federally listed. Under the bounding condition (Table 2-2), project activities would comply with the MBTA and BGEPA, as construction activities would be at least 660 feet away from any known protected species nests. Additionally, potential impacts to bats and other sensitive species would be avoided by observing seasonal restrictions on clearing of suitable roost trees and avoiding impacts to caves, water bodies, sinkholes, buildings, and bridges.

Therefore, based on the bounding attributes identified in Table 2-2, construction and operation of proposed BPFs on previously disturbed TVA coal plant sites would not impact threatened or endangered species or their critical habitats.

3.9.2.2.2 Aquatic Species

Streams and rivers within and in the vicinity of the proposed project area(s) support a variety of biologically diverse aquatic species. These species include fishes, mussels, and snails. Streams present within the proposed project area(s) could potentially provide suitable habitat for threatened and endangered aquatic species. However, under the bounding condition (Table 2-2), facility sites would be located on previously disturbed sites with no substantial surface water features, ground disturbance would be minimized, and all work would be conducted in accordance with applicable BMPs outlined in TVA's *A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Construction and Maintenance* Activities manual (TVA 2022). With proper implementation of BMPs (e.g., stormwater management and buffers) and adherence to CWA Section 404 and 401 permit requirements, no impacts to federal or state-listed aquatic species or their critical habitats would be anticipated from Alternative B.

3.9.2.2.3 Plants

Under the bounding conditions (Table 2-2), proposed CCR BPFs would be sited in previously disturbed portions of TVA coal plant sites where there is very little suitable habitat for state-listed or federally listed plant species. Impacts to vegetation and forested lands would be minimized. Therefore, impacts to state-listed and federally listed plant species would not be anticipated under Alternative B.

3.10 Floodplains

3.10.1 Affected Environment

A floodplain is the relatively level land area along a stream or river that is subject to periodic flooding. The area subject to a 1 percent chance of flooding in any given year is normally called the 100-year floodplain. The area subject to a 0.2 percent chance of flooding in any given year is normally called the 500-year floodplain. To ensure that the project is consistent with the requirements of EO 11988, Floodplain Management, evaluating development in the floodplain area is necessary.

3.10.1.1 Floodplain Management in the TVA PSA

TVA reservoirs have either power storage or flood storage or both. Power storage is allocated to a range of elevations called the Power Storage Zone and water occupying space in that zone is used to generate electric power through a dam's hydroturbines. Flood storage is allocated to a range of elevations called the Flood Storage Zone and water occupying space within that zone is used to store flood water during a flood or high-flow rain event.

Some of TVA's dams are also able to be surcharged. Surcharge is the ability to raise the water level behind the dam above the top-of-gates elevation. Surcharge can be sustained only for a short period of time during a flood when inflows are highest. To control flood-damageable development on TVA lands, TVA uses a concept known as the Flood Risk Profile (FRP). The FRP is the elevation of the 500-year flood that has been adjusted for surcharge at the dam.

3.10.1.2 Regulatory Framework for Floodplains

As a federal agency, TVA adheres to the requirements of EO 11988, Floodplain Management. The objective of EO 11988 is "…to avoid to the extent possible the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative" (EO 11988, Floodplain Management). The EO is not intended to prohibit floodplain development in all cases, but rather to create a consistent government policy against such development under most circumstances (U.S. Water Resources Council 1978). The EO requires that agencies avoid the 100-year floodplain unless there is no practicable alternative.

For certain "critical actions," the minimum floodplain of concern is the 500-year floodplain. The U.S. Water Resources Council defines "critical actions" as "any activity for which even a slight chance of flooding would be too great" (U.S. Water Resources Council 1978). Critical actions can include facilities producing hazardous materials (such as liquefied natural gas terminals), facilities whose occupants may be unable to evacuate quickly (such as schools and nursing homes), and facilities containing or providing essential and

irreplaceable records, utilities, or emergency services (such as large power-generating facilities, data centers, hospitals, or emergency operations centers).

3.10.2 Environmental Consequences

3.10.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, CCR would remain as-is in its current location at TVA coal plant sites, posing no unanalyzed impacts to floodplains. Potential impacts of past and current projects affecting CCR were analyzed in previous environmental reviews.

3.10.2.2 Alternative B – Construction and Operation of CCR Beneficiation Processing Facilities

Under Alternative B, as per the bounding parameters identified in Table 2-2, the facility would be constructed in an area outside 100-year floodplains as delineated on FEMA flood insurance rate maps and/or on contour maps showing known 100-year flood elevations. Therefore, this action would be consistent with EO 11988, and the construction, operation, and maintenance of the project would result in no direct or indirect impacts to floodplains and their natural and beneficial values. Further environmental review would be necessary should the facility be constructed within 100-year floodplains as delineated on FEMA flood insurance rate maps and/or on contour maps showing known 100-year flood elevations.

Transport of raw CCR materials and processed CCR would be along established roads. Consequently, there would be no impact to floodplains associated with transporting CCR and CCR materials.

3.11 Wetlands

3.11.1 Affected Environment

Wetlands are areas inundated by surface or groundwater such that vegetation adapted to saturated soil conditions is prevalent. Wetlands are typically transitional habitats between terrestrial and aquatic communities and include swamps, marshes, bogs, sloughs, potholes, wet meadows, mud flats, and natural ponds. These ecosystems are ecologically important because of their beneficial effects on water quality, their moderation of flow regimes by retaining and gradually releasing water, their value as wildlife habitat, and as areas of botanical diversity (EPA 2002).

The USACE regulates the discharge of fill material into waters of the United States including wetlands, pursuant to Section 404 of the CWA (33 USC 1344). Additionally, EO 11990 (Protection of Wetlands) requires federal agencies to avoid, to the extent possible, adverse impacts to wetlands and to preserve and enhance their natural and beneficial values.

In Tennessee, the TDEC certifies CWA Section 401 and 404 permits and impacts to intrastate wetland resources through a general or individual aquatic resources alteration permit. This permit is required for any alteration to the physical, chemical, or biological properties of any waters of the state, including wetlands, pursuant to the Tennessee Water Quality Control Act (§69-3-108, 0400-40-07). TDEC's permit process ensures compliance with Tennessee's anti-degradation policy as well (§ 693-108, 0400-40-04).

In Alabama, the ADEM Office of Field Services is responsible for monitoring and assessing wetlands as well as certifying CWA Section 401 permits. The application for Section 401

WQC from ADEM is submitted jointly with a Section 404 application to the USACE for potential alterations to waters of the State (NAWM 2015).

In Kentucky, the Kentucky DEP, Division of Water (DOW) regulates impacts to jurisdictional surface water resources in accordance with USACE jurisdictional determinations. Kentucky DOW's WQC program has not adopted mitigation provisions for wetlands beyond what is required under CWA Section 404, does not require state-level jurisdictional determinations, nor has it developed wetland-specific water quality standards. However, general Water Quality Standards applicable to all surface waters may also be applicable to wetlands, as wetlands are included in the definition of surface waters (Kentucky DOW 2020).

The study area intersects all or portions of 10 Hydrologic Unit Code (HUC)-8 sub-basins that are described further in Table C-3 in Appendix C. Within these sub-basins, wetlands comprise less than nine percent (roughly 1,176 miles) of the total land cover. Wetlands identified on National Wetlands Inventory (NWI) maps include riverine and lacustrine features as well as palustrine forested/shrub and emergent wetlands. As described by Cowardin et al. (1979), palustrine wetlands are nontidal wetlands dominated by trees, shrubs, persistent emergent vegetation, and emergent mosses or lichens. These wetlands include bottomland hardwood forests and upland swamps (forested wetlands), shrub-scrub wetlands, beaver ponds (aquatic-bed or emergent wetlands), wet meadows and marshes (emergent wetlands), and highland bogs. Lacustrine (i.e., related to a lake) and riverine (i.e., river related) systems consist of aquatic beds containing floating or submersed aquatic plants and are more common in the western portion of the TVA PSA.

Overall, riverine and lacustrine features represent roughly 66 percent of wetlands classified within the TVA PSA (TVA 2024b; Appendix C). Palustrine freshwater forested/shrub (roughly 31 percent) and emergent (roughly 3 percent) wetlands represent less than half of wetland types within the PSA. Potential project areas encompass predominantly previously disturbed areas within TVA coal plant reservations. Wetlands in potential project areas are typically associated with low-lying, poorly drained areas, floodplains and riparian zones of streams and rivers, groundwater seepage areas, and marginal areas associated with ponds and reservoirs.

3.11.2 Environmental Consequences

3.11.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, there would be no change to wetland resources; therefore, there would be no impacts to wetlands associated with this alternative.

3.11.2.2 Alternative B – Construction and Operation of CCR Beneficiation Processing Facilities

Under Alternative B, per the bounding attributes identified in Table 2-1, construction of the CCR BPFs would require disturbance of up to 15 acres of TVA-owned property per selected site. However, wetlands account for less than 10 percent of the total land cover in watersheds of the study area (see Table C-3 in Appendix C). Additionally, potential facilities would be sited in previously disturbed areas where high quality wetlands are less likely to occur.

Construction of the proposed CCR BPFs may require minor alterations to potential wetlands located at each proposed site. Despite being sited in previously disturbed, industrial properties, some wetlands could still be present within project footprints. As part

of its site-specific screening process using the Environmental Screening Checklist, TVA would determine if a proposed facility would have wetlands present and if there would be potential adverse effects to wetlands. This includes jurisdictional (i.e., those wetlands that are subject to federal regulation) and non-jurisdictional wetlands. Wetlands would be preferentially avoided during construction. Any potential unavoidable wetland impacts would be mitigated under regulations implementing Sections 401 and 404 of the CWA, applicable state regulations, and EO 11990. Thus, direct impacts to wetlands from construction would not be significant. No direct impacts to wetlands from operation of the proposed CCR BPFs would be anticipated.

Indirect impacts to adjacent wetlands related to construction and operation of the proposed facilities would be minimized and would not be considered significant. For example, stormwater runoff due to temporary construction activities may cause indirect impacts; but construction activities would adhere to permit limit requirements and would utilize BMPs to minimize indirect effects on aquatic resources. Following the construction phase, care and maintenance of the system and site-wide management of stormwater using appropriate BMPs would minimize indirect impacts to adjacent wetlands. Indirect impacts associated with transport of CCR from on-site storage to processing facilities would not be expected during operation.

3.12 Visual Resources

3.12.1 Affected Environment

This assessment provides a review and classification of the visual attributes of existing scenery, along with the anticipated attributes resulting from the proposed action. The classification criteria used in this analysis are adapted from a scenic management system developed by the U.S. Forest Service (USFS) and integrated with planning methods used by TVA (USFS 1995). Potential visual impacts to cultural and historic resources are not included in this analysis as they are assessed separately in Section 3.13, Cultural and Historic Resources.

The visual landscape of an area is formed by physical, biological, and man-made features that combine to influence both landscape identifiability and uniqueness. The scenic value of a particular landscape is evaluated based on several factors that include scenic attractiveness, scenic integrity, and visibility. Scenic attractiveness is a measure of scenic quality based on human perceptions of intrinsic beauty as expressed in the forms, colors, textures, and visual composition of each landscape. Scenic attractiveness is expressed as one of the following three categories: distinctive, common, or minimal. Scenic integrity is a measure of scenic importance based on the degree of visual unity and wholeness of the natural landscape character. The scenic integrity of a site is classified as high, moderate, low, or very low. The subjective perceptions of a landscape's aesthetic quality and sense of place are dependent on where and how it is viewed.

Views of the landscape are described in terms of what is seen in the foreground, middleground, and background distances. In the foreground, an area within 0.5 miles of the observer, details of objects are easily distinguished. In the middleground, from 0.5 miles to 4 miles from the observer, objects may be distinguishable, but their details are weak and tend to merge into larger patterns. In the distant part of the landscape, the background, details and colors of objects are not normally discernible unless they are especially large, standing alone, or have a substantial color contrast. In this assessment, the background is measured as 4 to 10 miles from the observer. Visual and aesthetic impacts associated with

an action may occur as a result of the introduction of a feature that is not consistent with the existing viewshed. Consequently, the visual character of an existing site is an important factor in evaluating potential visual impacts.

For this analysis, the affected environment is considered to include the project area within a TVA coal plant reservation area, which encompasses both permanent and temporary impact areas, as well as the physical and natural features of the landscape. The project area(s) located within the TVA facility would be located on previously disturbed lands and within existing industrial infrastructure. For operating coal or gas plant facilities, principal features in the foreground include plant structures such as the powerhouse, coal-handling system, emissions stacks, generators, switch yards or major transmission corridors. Most of the TVA facilities have limited amounts of mature vegetation, although there may be some areas of herbaceous vegetation or small trees within the facility grounds. Therefore, scenic attractiveness of the affected environment is considered to be minimal to common, whereas the scenic integrity is considered to be low.

Since many of TVA's coal plant reservations are located in remote areas, groups that would likely have direct views of the project area include authorized employees, contractors and visitors to the plant site near the project area. However, some plants are visible to neighboring residents and commuters on nearby roadways. Views of the project area are generally restricted to the foreground (i.e., within a half mile) in all directions, however that may be buffered by nearby vegetation and the local topography.

3.12.2 Environmental Consequences

3.12.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, the landscape character and integrity would remain in its current state; therefore, there would be no new impacts to aesthetics and visual resources.

3.12.2.2 Alternative B – Construction and Operation of CCR Beneficiation Processing Facilities

Under Alternative B, no specific provider of beneficiation services or the specific site on which a BPF would be constructed has been identified at this time. However, as noted in Table 2-1, the facility would be developed on a previously disturbed area on a TVA coal plant site, which are industrial in nature. During construction of the CCR BPF, there would be increased visual discord from the existing conditions due to an increase in personnel and equipment in the area. However, this increase would be minor and temporary (up to 18 months). Once constructed, the maximum stack height of the facility would be 140 feet. The facility would introduce notable visual alterations for viewers in the foreground (within approximately 0.5 miles), however, the existing industrial facilities already in place within the TVA reservations currently contribute visual discord with the natural landscape. These elements contribute to the landscape's ability to absorb negative visual change. For visual receptors located at further distances, in the middleground and background, the proposed CCR BPF would be less visible and obtrusive as it would largely fall into an observer's view where objects are less distinguishable.

The operation of BPFs would include the transport of processed CCR to various markets within the region along existing roads. As detailed in Section 3.16, Transportation, increased traffic associated with the facility may result in minor impacts on roadways accessing the site but would disperse into existing traffic patterns once merging onto the nearest major roadway. Thus, the additional vehicular traffic would not result in a visual

discord along these roadways. Therefore, visual impacts resulting from the implementation of Alternative B would be minor.

3.13 Cultural and Historic Resources

3.13.1 Affected Environment

Cultural resources are properties and places that illustrate aspects of prehistory or history or have long-standing cultural associations with established communities or social groups. Cultural resources may include archaeological sites, unmodified landscapes and discrete natural features, modified landscapes, human-made objects, structures such as bridges or buildings, and groups of any of these resources, sometimes referred to as districts.

3.13.1.1 Regulatory Framework for Cultural Resources

Section 106 of the NHPA, as amended (54 USC § 300101 *et seq.*), is specifically designed to address the effects of federal and federally funded projects on tangible cultural resources—that is, physically concrete properties—of historic value. The NHPA provided for a national program to support both public and private efforts to identify, evaluate, and protect the nation's important cultural resources. Once identified, these resources are evaluated for inclusion in the NRHP maintained by the National Park Service. Tangible cultural resources may qualify for inclusion in the NRHP if they are 50 years of age or older (unless in exceptional cases) and if found to embody one or more of four different values, or criteria, in accordance with 36 CFR § 60.4, as listed below:

- Criterion A: association with events that have made a significant contribution to the broad patterns of our history. Such events may include a specific occurrence or pattern of occurrences, cultural traditions, or historic trends important at a local, regional, or national level. To be considered in association with a cultural resource, events must be important within the particular context being assessed.
- Criterion B: association with the lives of persons significant in our past. People considered may be important locally, regionally, or nationally, and the cultural resources considered are limited to properties illustrating a person's achievements rather than commemorating them.
- Criterion C: embodiment of the distinctive characteristics of a type, period, or method of construction; representative of the work of a master; possessing high artistic values; or representative of a significant and distinguishable entity whose components may lack individual distinction. Cultural resources considered generally include architectural resources such as buildings, objects, districts, and designed landscapes.
- Criterion D: cultural resources that have yielded, or may be likely to yield, information important in prehistory or history. Considered cultural resources typically include archaeological sites but may also include buildings, structures, and objects if they are the principal source of important information not contained elsewhere.

Cultural resources that are listed or considered eligible for listing in the NRHP are called "historic properties." Federal agencies are required by the NHPA to consider the possible effects of their undertakings on historic properties and take measures to avoid, minimize, or mitigate any adverse effects. NEPA requires federal agencies to consider how their undertakings may affect the quality of the human environment, including both cultural resources and those defined as historic properties, so that the nation may "preserve

important historic, cultural, and natural aspects of our national heritage." "Undertaking" includes any project, activity, or program that has the potential to have an effect on a historic property and that is under the direct or indirect jurisdiction of a federal agency or is licensed or assisted by a federal agency.

1. Initiation (defining the undertaking and the APE and identifying the parties to be consulted in the process);
2. Identification (studies to determine whether cultural resources are present in the APE and whether they qualify as historic properties);
3. Assessment of adverse effects (determining whether the undertaking would affect the qualities that make the property eligible for the NRHP); and
4. Resolution of any adverse effects (by avoidance, minimization, or mitigation).

A project may have effects on a historic property that are not adverse. However, if the agency determines that the undertaking's effect on a historic property within the APE would diminish any of the qualities that make the property eligible for the NRHP (based on the criteria for evaluation at 36 CFR part 60.4), the effect is said to be adverse. Examples of adverse effects would be ground-disturbing activity in an archaeological site or erecting tall buildings or structures within the viewshed of a historic building in such a way as to diminish the structure's integrity of feeling or setting.

Adverse effects must be resolved in consultation with others, such as the SHPO and federally recognized Indian tribes. Resolution may consist of avoidance (such as redesigning a project to avoid impacts or choosing a project alternative that does not result in adverse effects), minimization (such as redesigning a project to lessen the effects or installing visual screenings), or mitigation. Adverse effects to archaeological sites are typically mitigated by means of excavation to recover the important scientific information contained within the site. Mitigation of adverse effects to historic buildings and structures sometimes involves thorough documentation of the resource by compiling historic records, studies, and photographs.

Agencies are required to consult with the appropriate SHPO(s), federally recognized Indian tribes that have an interest in the undertaking, and any other party with a vested interest in the undertaking. Through various regulations and guidelines, federal agencies are encouraged to coordinate Section 106 and NEPA reviews to improve efficiency and allow for more informed decisions. Under NEPA, impacts to cultural resources that are part of the affected human environment but not necessarily eligible for the NRHP must also be considered by federal agencies. Generally, these considerations, as well as those of NRHP-eligible traditional cultural resources (also called traditional cultural properties), are accomplished through consultation with parties having a vested interest in the undertaking, as described above.

3.13.1.2 Cultural Resources in the TVA PSA

The earliest known human occupation on TVA-owned lands occurred during the Paleoindian period. Artifacts typically associated with this period include lanceolate fluted and unfluted basally ground projectile points and later, the Dalton projectile point and adze. The Archaic Period, which immediately followed the Paleoindian period, is divided into the Early (8000-6000 Before Common Era [BCE]), Middle (6000-3000 BCE) and Late (3000-1000 BCE) subperiods.

The Early Archaic is characterized by a shift from the nomadic bands of the Paleoindian period to a more sedentary social structure with an increased reliance on wild plant foods, small game and aquatic resources (Chapman 1985, Steponaitis 1986). Typical lithic technology consists of Kirk, Big Sandy, LeCroy, during the Early Archaic and Kirk, Morrow Mountain, White Springs, Benton and Stanley cluster projectile points/knives during the Middle Archaic period. The Late Archaic is characterized by an increase in the number and size of sites with diagnostic stone tools that included the Savannah River, Appalachian Stemmed and Iddins projectile points/knives, steatite bowls and grooved axes (Chapman 1985).

In the southeast, the Woodland period is divided into three subperiods: Early (1000 BCE-Common Era [CE] 100), Middle (CE 100–600) and Late (CE 600–900) (Steponaitis 1986). The bow and arrow were introduced during the Woodland period, and extensive trade networks were established. The Early and Middle Woodland period is characterized by large base camps in major river valleys with an increase in the reliance on cultivated plants. The Late Woodland period witnessed the continued reliance on domesticated plants, particularly maize, while hunting small game and gathering wild plant foods was still necessary. Increased ceremonialism and religious activity are noted in the construction of conical burial mounds, as well as an increase in the stratification of the social structure (Steponaitis 1986). The Mississippian period, which is divided into Early (CE 900–1000), Middle (CE 1000–1300) and Late (CE 1300–1600) subperiods, is characterized by major changes in the social structure, subsistence patterns and settlement patterns of the prehistoric people. Large permanent settlements ruled by elite chief and a strong reliance on maize agriculture are typical of the Mississippian period (Bense 1994).

In the Southeastern United States, the historic period began with the arrival of the Spanish conquistador Hernando de Soto. Europeans soon migrated into the southeast encountering the Cherokee in the eastern woodlands and mountainous areas, the Chickasaw in the Mississippi River delta, the Shawnee in the Ohio River Valley region, and the Choctaw and Creek in the southeastern woodlands (Gibson 1971). During the 17th and 18th centuries. Native American communities in the southeast had to deal with several European powers including France, Spain, and Britain. During this time period, there were constant struggles between the English, French, and Spanish, and between various tribes aligned with those powers, which had a long-term deleterious effect on local Native American tribes.

Archaeological resources typically are identified through Phase I archaeological surveys conducted for compliance with Section 106. Numerous surveys have been conducted along reservoir shorelines, within reservoirs, and on power plant reservations. Some TVA transmission line corridors and roadways have also been surveyed. Outside of TVA reservoirs and plant reservations, the overall density of archaeological resources can be difficult to quantify due to the lack of consistent survey coverage. Archaeological surveys outside of reservations for power generation vary state by state with most surveys conducted on a project-by-project basis. Across all these types of areas, through hundreds of surveys, TVA has identified many thousands of archaeological sites, representing the entire time range of known human habitation of the Tennessee Valley including historic periods.

3.13.1.3 Archaeological Resources

Archaeological sites occur throughout the TVA-owned lands in a variety of environmental contexts. Archaeological sites are rarely found in areas of extreme slope, wet areas, or areas that have been heavily disturbed by modern construction activities or mining.

Within the boundaries of TVA's coal plant sites, ash impoundments are typically located near the coal-fired plant and in or near floodplains. Because ash impoundments are located on heavily disturbed industrial lands where construction required surface grading and excavation, there is usually a very low potential for significant cultural resources to be present within the ash impoundment footprints. Ash processing facilities would be in areas that have been heavily disturbed by modern construction activities and would likely not contain resources that are potentially eligible or listed on the NRHP.

TVA has completed archaeological surveys on 100 percent of the fee-owned property at the following coal plant sites: Cumberland, John Sevier, Johnsonville, Kingston, and Paradise. TVA has completed surveys on nearly all of the Bull Run Fossil Plant and Gallatin Fossil Plant property, and on large portions of the Colbert, Shawnee, and Widows Creek coal plants. Most surveys identified archaeological resources and resulted in a recommendation regarding the NRHP eligibility of each resource (Table 3-5). TVA provided the survey reports to the appropriate SHPO and federally recognized Indian tribes and has reached consensus with the SHPOs on the eligibility status of each site for all the coal sites except for the Paradise coal plant, where SHPO comments on the survey are pending completion of TVA's consultation.

Table 3-5. Archaeological Sites Previously Identified at TVA Coal Plant Sites and Their NRHP Eligibility Statuses

Coal Plant	NRHP Eligible/Listed	NRHP Undetermined	NRHP Ineligible or Non-extant
Bull Run	0	0	0
Colbert	1	16	2
Cumberland	2	8	23
Gallatin	4	0	0
John Sevier	0	0	11
Johnsonville	0	0	1
Kingston	1	4	11
Paradise	0	1	2
Shawnee	2	0	0
Widows Creek	0	2	0

3.13.1.4 Historic Structures and Sites

Historic architectural resources are standing structures (e.g., houses, barns, dams, power plants) that are usually at least 50 years of age and are considered eligible for listing on NRHP as defined by the Secretary of the Interior criteria for evaluation (36 CFR 60.4). Approximately 5,000 structures, buildings, power plants, and infrastructure have been identified and recorded on TVA-owned lands. TVA, in consultation with the various state SHPOs, has evaluated all of its coal-fired plants for their NRHP eligibility. Of the proposed coal plants, Bull Run, John Sevier, and Shawnee have previously been determined eligible for listing on the NRHP; the Shawnee Fossil Plant is TVA's only plant listed on the NRHP.

In the case of these three plants, the powerhouse, switchyard, original coal-handling equipment, and other original structures were all considered eligible under Criterion A and C. The John Sevier Fossil Plant has been retired and demolished; the Bull Run Fossil Plant has been retired and is currently in the process of being demolished. TVA continues to operate Shawnee units 1 through 9. The remaining plants within the fossil fleet have been determined ineligible in consultation due to a loss of integrity from removal of original structures and installation of modern emissions-control equipment.

TVA typically located coal-fired power plants away from populated areas, such that their locations tend to be surrounded by agricultural or undeveloped lands with few structures. Kingston and Bull Run coal plants, however, are exceptions; each is located in areas that have residential subdivisions. The Gallatin Fossil Plant, though located near the city of Gallatin and adjacent to a sparsely populated subdivision, is fairly isolated on a bend of the Cumberland River. Other TVA coal plants are generally in rural areas, away from areas that were developed historically. Thus, the potential for NRHP-listed or -eligible resources within the viewshed of a CCR BPF tends to be low.

TVA has completed surveys of historic architectural resources in areas surrounding portions of some of the coal plant sites under consideration for a BPF, as part of TVA's Section 106 compliance for various past undertakings. These surveys have identified few resources. Only one of these surveys has identified a NRHP-listed resource within 0.5 mile of a coal plant site (Cumberland Fossil Plant). TVA has entered into a MOA regarding the resolution of adverse visual effects from the Cumberland Fossil Plant Retirement and Replacement Generation Project on a NRHP-listed ca. 1850 house and is in the process of developing mitigation.

3.13.2 Environmental Consequences

3.13.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, there would be no impacts to cultural resources because this alternative does not include ground-disturbing activities or changes in the visual character of the APE.

3.13.2.2 Alternative B – Construction and Operation of CCR Beneficiation Processing Facilities

Under Alternative B, during potential construction of CCR BPFs, TVA would use existing haul roads that have been previously surveyed and permitted where feasible, and use of borrow is not anticipated. Approximately 15 acres would be developed for the facility, which would include temporary laydown areas for parking and equipment and material storage. Were TVA to propose siting a CCR BPF on the Shawnee Fossil Plant, Alternative B would not include modifications or removal of any of its character-defining features or any of the contributing buildings or structures. TVA would also choose a location that would not result in adverse visual effects on the Shawnee Fossil Plant.

Pursuant to 36 CFR 800.4(b)(2), TVA would use a phased process for identifying historic properties in any proposed APE and evaluating potential project effects. TVA would initiate consultation with the SHPO and tribes to determine the APE, identify historic properties in the APE, and assess the potential effects of the proposed action on any NRHP-listed or -eligible properties in the APE. In siting any CCR BPF, TVA would seek an existing disturbed location, or an area that past archaeological surveys have shown do not contain NRHP-listed or -eligible archaeological sites, to ensure that no such sites would be affected

by the action. TVA would complete any needed surveys for historic architectural surveys, assess potential adverse effects to any identified NRHP-listed or -eligible historic architectural properties, and seek ways to avoid such adverse effects, in consultation with the appropriate SHPO and tribes as project plans are developed. Should avoidance of adverse effects on historic properties prove to be infeasible, TVA would work with the appropriate consulting parties to develop a MOA for the resolution of the adverse effects, pursuant to § 800.6(b)(1). Execution of the MOA would signify completion of TVA's Section 106 compliance responsibilities. Therefore, TVA does not anticipate that any proposed action would fall outside these bounded potential impacts on cultural resources or historic properties at this time, thereby not resulting in any potentially significant impacts to cultural resources or historic properties.

3.14 Land Use

3.14.1 Affected Environment

Major land uses in the TVA PSA include agriculture; forestry; and urban, suburban, and industrial uses. About 5.7 percent of the land area is in federal ownership. The major components of federal land are national parks, national forests, national wildlife refuges, and TVA reservoir lands. Of the remaining non-federal land area, about 80 percent is rural. Rural undeveloped lands include farmlands (19 percent of the rural area) and forestland (about 42 percent of the rural area). Agriculture (i.e., farmland) is a major land use and industry in the TVA PSA. In 2012, 41 percent of the land area in the region was farmland comprised of 151,000 individual farms. Approximately 53 percent of the TVA PSA is forested. Forestland is predicted to decrease in the majority of counties in the TVA PSA primarily as a result of increasing urbanization and development (TVA 2024b). About 9 percent of the remaining non-federal land area is classified as developed. Developed land has almost doubled in area since 1982 due to high rates of urban and suburban growth. Recent data for Tennessee shows that total developed land has grown almost 3 percent between 2012 and 2017. About 4.4 percent of the remaining TVA PSA is water—primarily lakes and rivers (TVA 2024b).

3.14.2 Environmental Consequences

3.14.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, there would be no changes to existing conditions; therefore, there would be no impacts to land use.

3.14.2.2 Alternative B – Construction and Operation of CCR Beneficiation Processing Facilities

Per the bounding attributes identified in Table 2-1, construction of the CCR BPFs would require disturbance of up to 15 acres of TVA-owned property per selected site. Each proposed site would be on previously disturbed portions of TVA-owned land—an industrial site with typical industrial uses. No conversion of land use from preexisting conditions would be required. Construction and operation of BPFs, regardless of their size, would not be expected to affect land use directly or indirectly.

3.15 Natural Areas, Parks, and Recreation

3.15.1 Affected Environment

Managed areas include lands held in public ownership that are managed by an entity (e.g., TVA, U.S. Department of Agriculture, U.S. Forest Service, State of Tennessee) to protect

and maintain certain ecological and recreational features. Natural areas include ecologically significant sites; federal, state, or local park lands; national or state forests; wilderness areas; scenic areas; wildlife management areas; recreational areas; greenways; trails; Nationwide Rivers Inventory streams; and wild and scenic rivers. Ecologically significant sites are either tracts of privately owned land that are recognized by resource biologists as having significant environmental resources or identified tracts on TVA lands that are ecologically significant but not specifically managed by TVA's Natural Areas program.

Numerous parks, managed areas, and ecologically significant sites occur throughout the TVA PSA in all physiographic regions but are mostly concentrated in the Blue Ridge and Mississippi Alluvial Plain physiographic regions. Individual parks, managed areas, and ecologically significant areas vary in size from a few acres to thousands of acres. Many areas cross state boundaries or are managed cooperatively by multiple agencies. Parks, managed areas, and ecologically significant sites occur on or very near many TVA generating plant reservations, including the Colbert, Gallatin, Kingston, and Shawnee coal plants. This is especially the case at hydroelectric plants, where portions of the original dam reservations and reservoir lands have been developed into state and local parks. Wildlife management areas (WMAs) that are managed by the Tennessee Wildlife Resources Agency (TWRA) are also located on some TVA property, including portions or full parts of Owl Hollow Mill WMA, Chickamauga WMA, Watts Bar WMA, Paint Rock WMA, Rankin Bottom WMA, Nolichucky WMA, Beech River WMA, and more, with other WMAs abutting TVA property (TVA 2024b).

Alabama also contains several managed and natural areas, including those that are managed by the Alabama Department of Conservation and Natural Resources (ADCNR 2025). These areas include state properties, including wildlife management areas, special opportunity hunting areas, state parks, public fishing lakes, and Forever Wild lands (ADCNR 2025). Kentucky managed and natural areas are operated by the Office of Kentucky Nature Preserves and include state natural areas with fishing, paddling, and outdoor recreation, as well as heritage lands with environmental education centers and outdoor recreation areas (KYEEC 2025).

Natural areas, parks and recreation sites can vary in size from less than an acre for a river access (boat ramp) site to thousands of acres for designated WMAs (TVA 2016). Several of these areas are located in the vicinity of TVA coal plant sites. At each of the proposed sites, reservoirs are located in the vicinity and provide recreational opportunities such as fishing, boating, and bird watching. Recreational facilities are also found within some TVA reservations. These include boat launching ramps, bank fishing areas and walking trails (TVA 2016).

3.15.2 Environmental Consequences

3.15.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, there would be no change to natural areas, parks, and recreation at coal plant sites within the TVA PSA.

3.15.2.2 Alternative B – Construction and Operation of CCR Beneficiation Processing Facilities

Under Alternative B, managed areas, natural areas, or recreation areas in the vicinity (within 3 miles) of a BPF site may experience indirect impacts such as fugitive dust, construction noise, and increased traffic during construction. However, construction impacts

would be temporary (up to 18 months) and would be minimized through use of BMPs (e.g., dust control measures) as required to reduce off-site emissions. In addition, because construction would be contained within TVA-owned coal plant sites, it is anticipated that impacts would be minor and limited to managed and natural areas directly adjacent or in proximity (within 0.1 miles) of the project area.

Users of recreational facilities on TVA properties could be directly impacted if these amenities were closed as a result of construction and operation. However, this impact would be temporary as facilities likely would reopen once construction is complete or the CCR materials are transported to the new BPFs.

Furthermore, after CCR material has been beneficially processed, it would be hauled off site to be sold. If managed, natural, or recreational areas are along the haul routes to these off-site locations, they could be affected by increased traffic on nearby roadways. However, these impacts are considered minor due to traffic dispersion after trucks reach major highways along the haul routes. Therefore, impacts to managed, natural, and recreational areas under Alternative B are anticipated to be minor.

As part of its site-specific screening process using the Environmental Screening Checklist, TVA would determine if a proposed facility has managed, natural, or recreational areas present within 0.1 mile. If there is potential for substantial visual or ecological impacts to nearby managed, natural, or recreational areas, TVA Natural Areas and Recreation Subject Matter Experts would make a determination for whether additional environmental review is needed.

3.16 Transportation

3.16.1 Affected Environment

The principal modes of transportation within the TVA PSA includes thousands of miles of roads, bridges, regional airports, rail lines, navigable waterways, marinas, boat ramps, and ports. Public road managers in the TVA PSA include state departments of transportation, conservation, forestry; county highway departments; and municipal road departments. Rail lines are managed by large railroad operators such as Union Pacific Railroad and Burlington Northern and Santa Fe Railway in the western part of the PSA, Norfolk Southern Railway in the eastern part and CSX Transportation, Inc. throughout the PSA. Several short-line and local railroads exist in the TVA PSA as well. Barge operation is present on the Mississippi River, Ohio River, Tennessee River, and the Tennessee-Tombigbee Waterway. TVA's coal plants are served by public roadway, railway, and waterway modes of transportation. Road access to these plants varies from two-lane roads to four-lane divided highways and is via at-grade intersections, with some of them controlled by traffic signals.

3.16.2 Environmental Consequences

3.16.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, there would be no change to existing traffic conditions or to the overall transportation network.

3.16.2.2 Alternative B – Construction and Operation of CCR Beneficiation Processing Facilities

As identified in Table 2-1, the maximum distances from the 10 TVA coal plants evaluated in this PEA to the nearest four-lane divided highway is 20 miles. Transportation impacts associated with this alternative would occur from the use of vehicles by the construction workforce, construction deliveries, and operation of the BPF. There are no impacts to rail or barge as these modes would not be utilized.

The daily workforce during the 18-month construction phase is expected to be up to 250 workers per day. Traffic is expected to be distributed during a peak morning period (to the project area) and a peak evening period (away from the project area). Assuming one person per commuting vehicles, there would be a daily morning inbound traffic volume of 250 vehicles per day and a daily outbound traffic volume of 250 vehicles per day for a total of 500 trips per day. It is assumed that these motorists would use interstate highways or major arterial roadways as much as possible but would likely have to use lower functioning roadways (such as collectors and local roads) closer to TVA coal plants. The construction workforce traveling to and from a coal plant site would contribute to the traffic on the local transportation network. Overall, the traffic volume generated by the construction workforce would be minor and temporary as it would be contained to the 18-month construction period and generally limited to the morning and evening peak periods.

As stated in Table 2-1, the maximum distance from the project area to a major four-lane divided highway is 20 miles. Because of this distance, during construction there would be minor impacts on roadways accessing the site as a result of an increase in vehicular traffic. However, once traffic merges onto a major roadway, the additional traffic would be dispersed and would not result in congestion or the degradation of existing traffic patterns.

Additional truck traffic would also occur near the project area during the construction phase due to material and equipment deliveries. However, because this increase would primarily occur during the mobilization and demobilization phases, long-term impacts to the surrounding transportation network during the construction phase are not anticipated.

Operation of the BPF would require approximately 25 workers, with the facility operable 24 hours per day, seven days per week for a maximum of 350 operating days. It is anticipated that during operations up to 125 truckloads of processed CCR product (250 truck trips) would be transported off site per day for up to 300 days per year. Once purchased, the processed material would be loaded into customer bulk pneumatic tanker trucks for transport to market. At this point, TVA would no longer maintain ownership and control of the processed CCR. As stated in Table 2-1, the maximum distance from the project area to a major four-lane divided highway is 20 miles where a majority of the processed CCR would be trucked on major interstate highways and arterial roadways. Therefore, the additional truck traffic would be absorbed into the larger transportation network and would not result in congestion or degradation of the existing traffic patterns.

Additionally, the thermal BPF reconditions CCR, specifically fly ash, and generates approximately 1,500 tons per year of dry scrubber material waste, which would be sent to an existing, permitted off-site landfill. Landfill locations are unknown at this time. However, as stated above, the TVA coal plants identified to house a BPF are located near a major four-lane divided highway and impacts from the transportation of the scrubber waste would be absorbed into the larger transportation network and would not result in additional congestion of the regional transportation network.

3.17 Noise

3.17.1 Affected Environment

Noise is unwanted or unwelcome sound usually caused by human activity and added to the natural acoustic setting of a locale. It is further defined as sound that disrupts normal activities or diminishes the quality of the environment. Community response to noise is dependent on the intensity of the sound source, its duration, the proximity of noise-sensitive land uses, and the time of day the noise occurs. For instance, higher sensitivities to noise would be expected during the quieter overnight periods at noise-sensitive receptors such as residences.

Sound is measured in logarithmic units called decibels (dB). Given that the human ear cannot perceive all pitches or frequencies of sound, noise measurements are typically weighted to correspond to the limits of human hearing. This adjusted unit of measure is known as the A-weighted decibel (dBA) which filters out sound in frequencies above and below human hearing. A noise level change of 3 dBA or less is barely perceptible to average human hearing. However, a 5 dBA change in noise level is clearly noticeable. The noise level associated with a 10 dBA change is perceived as being twice as loud; whereas the noise level associated with a 20 dBA change is considered to be four times as loud and would therefore represent a “dramatic change” in loudness.

To account for sound fluctuations, environmental noise is commonly described in terms of the equivalent sound level. The equivalent sound level is the constant noise level that conveys the same noise energy as the actual varying instantaneous sounds over a given period. Fluctuating levels of continuous, background, or intermittent noise heard over a specific period are averaged as if they had been a steady sound. The day-night sound level (L_{dn}), expressed in dBA, is the 24-hour average noise level with a 10-dBA correction penalty for the hours between 10 p.m. and 7 a.m. to account for the increased sensitivity of people to noises that occur at night. Typical background day-night noise levels for rural areas are anticipated to range between an L_{dn} of 35 and 50 dB, whereas higher-density residential and urban areas background noise levels range from 43 dB to 72 dB (EPA 1974). Common indoor and outdoor noise levels are listed in Table 3-6.

The perceived loudness or intensity between a noise source and a receptor may change because of distance, topography, vegetation, water bodies, and structures. The closer a receptor is to a noise source, the louder the noise seems; for every doubling of distance from a source the intensity drops by about 6 dBA over land and about 5 dBA over water (USDOI 2008). Topography, vegetation, and structures can change noise intensity through reflection, absorption, or deflection. Reflection tends to increase the intensity, while absorption and deflection tend to decrease the intensity.

Table 3-6. Common Indoor and Outdoor Noise Levels

Common Outdoor Noises	Sound Pressure Levels (dB)	Common Indoor Noises
	110	Rock Band at 5 m (16.4 ft)
Jet Flyover at 300 m (984.3 ft)		
	100	Inside Subway Train (New York)
Gas Lawn Mower at 1 m (3.3 ft)		
	90	

Common Outdoor Noises	Sound Pressure Levels (dB)	Common Indoor Noises
		Food Blender at 1 m (3.3 ft)
Diesel Truck at 15 m (49.2 ft)		Garbage Disposal at 1 m (3.3 ft)
	80	
		Shouting at 1 m (3.3 ft)
Gas Lawn Mower at 30 m (98.4 ft)	70	Vacuum Cleaner at 3 m (9.8 ft)
Commercial Area		Normal Speech at 1 m (3.3 ft)
	60	
		Large Business Office
	50	Dishwasher Next Room
Quiet Urban Daytime		
	40	Small Theater, Large Conference Room
Quiet Urban Nighttime		Library
Quiet Suburban Nighttime		
	30	
		Bedroom at Night
Quiet Rural Nighttime		Concert Hall (Background)
	20	
		Broadcast and Recording Studio
	10	
		Threshold of Hearing
	0	

Source: FHWA 2018

3.17.1.1 Noise Regulations

The Noise Control Act of 1972, along with its subsequent amendments (Quiet Communities Act of 1978, USC 42 4901-4918), delegates authority to the states to regulate environmental noise and directs government agencies to comply with local community noise statutes and regulations. Many local noise ordinances are qualitative, such as prohibiting excessive noise or noise that results in a public nuisance. TVA would comply with applicable portions of the Noise Control Act where it does not otherwise conflict with Federal standards or regulations that control Federal facilities.

Potential facilities considered in this PEA could be located on any of the coal plant sites listed in Table 1-1 (Chapter 1). Only one of the counties in which these coal plants are located (Anderson County, Tennessee) has established quantitative sound-level regulations, specifying environmental sound-level limits based on the land use of the property receiving the noise. Per the Anderson County Zoning Ordinance, Residential (R-1) districts have the most stringent regulations, and noise cannot exceed 60 dBA during daytime hours (7 a.m. to 10 p.m.) or 55 dBA during the night (10 p.m. to 7 a.m.), measured at the closest adjacent property line. The Bull Run Fossil Plant is located in an area that has been zoned for heavy industrial use by Anderson County. Allowable noise levels from areas zoned for heavy industrial use cannot exceed 80 dBA at the adjacent property line. Construction activities are exempt from the noise regulations (Anderson County 2021).

There is considerable variation in individual response to noise. Noise that one person would consider mildly annoying, another person may consider highly annoying or not annoying at

all. The EPA noise guideline recommends an L_{dn} of 55 dBA, which is sufficient to protect the public from the effect of broadband environmental noise in typical outdoor and residential areas. These levels are not regulatory goals but are “intentionally conservative to protect the most sensitive portion of the American population” with “an additional margin of safety” (EPA 1974). The U.S. Department of Housing and Urban Development (HUD) considers an Ldn of 65 dBA or less to be compatible with residential areas (HUD 1985).

3.17.1.2 Sources of Noise

Coal-fired and natural-gas power plant operations and ancillary activities are the primary source of background noise at most operational TVA facilities. Operations at operating coal-fired power plants generate varying amounts of environmental noise and can include noise generating activities associated with barge operations, coal unloading activities and heavy equipment operations associated with coal pile management, truck operations and occasional rail operations. Operations at the natural gas plants generate localized noise through operation of gas or steam turbines, generators, mechanical draft cooling towers, and other ancillary equipment. Existing noise emission levels associated with these activities typically range from 59 to 87 dBA (TVA 2014b).

Ambient noise at those coal-fired power plants that are no longer operational would be characterized by adjacent roadway traffic and general environmental background noise which would be relatively low as most coal-fired power plants are located in rural settings. Noise sources common to activities evaluated in this PEA include noise from operating industrial and utility facilities, transportation noise and construction noise.

Transportation noise related to activities evaluated in this PEA primarily includes noise from highway traffic. Three primary factors influence highway noise generation: traffic volume, traffic speed and vehicle type. Generally, heavier traffic volumes, higher speeds and greater numbers of trucks increase the loudness of highway traffic noise. Other factors that affect the loudness of traffic noise include a change in engine speed and power, such as at traffic lights, hills and intersecting roads and pavement type. Highway traffic noise is not usually a serious problem for people who live more than 500 feet from heavily traveled freeways or more than 100 to 200 feet from lightly traveled roads (FHWA 2011). Due to the nature of the decibel scale and the attenuating effects of noise with distance, a doubling of traffic would result in a 3 dBA increase in noise levels, which in and of itself would not normally be a perceptible noise increase. In addition, some of TVA’s coal plants support rail traffic which would also generate noise. Railway noise depends primarily on the speed of the train, but variations are present depending upon the type of engine, wagons and rails (Berglund and Lindvall 1995).

3.17.1.3 Noise Receptors

Sensitive noise receptors include residences or other developed sites where frequent human use occurs, such as churches, parks, and schools. In general, the closest sensitive noise receptors to the coal plant sites are developed recreational areas. These include public boat ramps, campgrounds, bank fishing areas, playgrounds, and picnic areas. The distance from the coal plants to the nearest residential development varies widely.

3.17.2 Environmental Consequences

3.17.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, there would be no impacts resulting from the proposed action to noise receptors under this alternative. Ambient noise levels would remain similar to current conditions.

3.17.2.2 Alternative B – Construction and Operation of CCR Beneficiation Processing Facilities

While specific location(s) have not been chosen, based on the facility attributes and bounding characteristics listed in Table 2-1 and Table 2-2, including the location of the facility on a previously disturbed site within a TVA coal plant reservation boundary, the facility would not be sited immediately proximate to sensitive noise receptors such as residences, schools, or churches.

Construction activities for large-scale projects such as the construction of a BPF result in increased noise levels as a result of the operation of construction equipment on-site and the movement of construction-related vehicles (i.e., worker trips, and material and equipment trips) on the surrounding roadways. Noise levels associated with construction activities would increase ambient noise levels adjacent to the construction site and along roadways used by construction-related vehicles. Noise levels from typical construction equipment and vehicles such as front-end loaders, dozers, excavators, graders, and dump/haul trucks are expected to be 85 dBA or less at a distance of 50 feet from the construction equipment (FHWA 2016a). Depending on the location of the proposed facility, noise associated with the construction may temporarily exceed 65 dBA at the property boundaries; however, construction noise would be intermittent and temporary, limited to a period of approximately 18 months.

According to the bounding characteristics, the noise generated during operation of a BPF would not exceed 65 dBA at the property boundary, consistent with the HUD L_{dn} guidelines and within generally acceptable noise levels for residential, commercial, industrial, and other compatible uses. Additionally, as detailed in Section 3.16, Transportation, increased traffic associated with the construction and operation of the beneficial reuse processing facility, including construction traffic, operational workforce traffic, and trucking of processed CCR, may result in minor impacts on roadways accessing the site, but would disperse into existing traffic patterns once merging onto the nearest major roadway. Thus, project-related traffic would not have a notable impact on existing traffic patterns or, consequently, traffic noise. Therefore, due to the location of the facility on a previously disturbed site within a TVA coal plant reservation, and the minimal changes in traffic volume and associated noise on area roadways, noise impacts associated with the construction and operation of the beneficial processing facility would be minor.

3.18 Socioeconomics

3.18.1 Affected Environment

Potential beneficiation facilities considered in this PEA could be constructed and operated at any of the sites listed in Table 1-1. Given the scale of the proposed activities, it is likely that the majority of social and economic impacts would occur on a local rather than regional scale. Therefore, the study area for socioeconomics is defined as the 10 counties in which the TVA coal plant sites are located. As the study area spans Alabama, Kentucky, and Tennessee, these three states are also included as appropriate secondary geographic

areas of reference. In addition, information on the TVA PSA is provided as a baseline for comparison to the study area counties. The TVA PSA consists of 181 counties and two independent cities in seven states, including all counties in Tennessee and portions of Alabama, Georgia, Kentucky, Mississippi, North Carolina, and Virginia (TVA 2024b).

Demographic and economic characteristics of populations within the study area were assessed using the most recent U.S. Census Bureau (USCB) data available, including 2020 Decennial Census counts (USCB 2020) for total population and racial characteristics, and 2018-2022 American Community Survey (ACS) 5-year estimates (USCB 2022) for the remaining datasets. Regional population, economic and employment, income, and minority data for the affected environment are incorporated by reference from TVA's 2025 Integrated Resource Plan (IRP) Environmental Impact Statement (TVA 2024b). Demographic and economic characteristics of the populations within the study area are detailed in Appendix D.

3.18.2 Environmental Consequences

3.18.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, there would be no new impacts to socioeconomic resources.

3.18.2.2 Alternative B – Construction and Operation of CCR Beneficiation Processing Facilities

Construction of a BPF would require a workforce of up to 250 personnel over the construction period which would last for up to 18 months (Table 2-1 and Table 2-2). Following the construction period, the facility would require a long-term operational workforce of up to 25 personnel. It is estimated that approximately 90 percent of the workforce would be drawn from the labor force residing in the region where the facility is sited. However, specialty workers and laborers not available within the region would be expected to relocate to the area, either temporarily to support construction, or long term to support operational activities. Therefore, demographic characteristics of the region selected for construction of the beneficial reuse processing facility would be expected to experience both temporary and long-term changes in response to the in-migration of construction and operational workforces, respectively. However, given the small number of long-term operational personnel required, and that the majority of the workers would be drawn from the existing labor force in the area, the impact on local demographics would be minor.

The construction of a CCR BPF would entail a temporary increase in employment and associated construction payrolls, the purchases of materials and supplies, and procurement of additional services. Beneficial economic impacts would result from capital costs associated with the construction, expenditure of wages earned by the workforce, and sales tax revenue from workforce purchases. Following construction, a long-term increase in employment and associated payrolls for the operational workforce would occur, resulting in beneficial economic impacts similar to but less than those associated with the construction period.

The CCR BPF would be constructed on a previously disturbed area of a TVA coal plant reservation, which are industrial in nature and generally removed from urban areas. Thus, the facility would not be constructed in the immediate vicinity of residential properties and construction and operation of the facility would not have any direct impacts on residential communities. Communities near the project sites could experience transportation-related

impacts, first from construction workforce commuting, followed by operational workforce commuting and the delivery of processed CCR product to various markets. During the construction period, lasting up to 18 months, a workforce of up to 250 personnel would be required. Once operational, the facility is anticipated to operate up to 350 days per year, with a commuting workforce of up to 25 employees, while trucking of product (up to 125 truckloads or 250 truck trips per day) would occur 300 days per year, primarily on weekdays. However, as detailed in Section 3.16, Transportation, increased traffic associated with the construction and operation of the beneficial reuse processing facility would result in minor impacts to traffic patterns, and consequently, traffic noise, on roadways accessing the site. Once on the nearest major roadway, project-related traffic would disperse into existing traffic patterns. Therefore, impacts to communities, including low-income and minority communities, associated with the construction and operation of the BRF are anticipated to be minor. Additionally, employment opportunities may be provided to residents of the region where the facility is sited during both the construction and operational phases, potentially providing positive impacts to area minority and low-income populations.

3.19 Solid and Hazardous Waste

3.19.1 Affected Environment

3.19.1.1 Solid Waste

Solid waste consists of a broad range of materials that include refuse, sanitary wastes, contaminated environmental media, scrap metals, nonhazardous wastewater treatment plant sludge, nonhazardous air pollution control wastes, various nonhazardous industrial waste, and other materials (solid, liquid, or contained gaseous substances). Solid waste is regulated by the EPA and RCRA Subtitle D. Each state is required to ensure the federal regulations for solid waste are met and may implement more stringent requirements.

In some states, special wastes may include sludges, bulky wastes, pesticide wastes, industrial wastes, combustion wastes, friable asbestos and certain hazardous wastes exempted from RCRA Subtitle C requirements. Any of these wastes, if generated, would be disposed as required by state and federal regulations.

The primary solid wastes produced by coal combustion are fly ash, bottom ash, boiler slag, char, spent bed material, and flue gas desulfurization residue. The properties of these wastes, also known as CCR, vary with the type of coal plant, the chemical composition of the coal, and other factors. Ash and slag are formed from the noncombustible matter in coal and small amounts of unburned carbon. Fly ash is composed of small, silt- and clay-sized, mostly spherical particles carried out of the boiler by the exhaust gas. Bottom ash is heavier and coarser with a grain size similar to fine sand to fine gravel and falls to the bottom of the boiler where it is typically collected by a water-filled hopper. Boiler slag, a coarse, black, granular material, is produced in cyclone furnaces when molten ash is cooled in water. Ash and slag are primarily composed of silica, aluminum oxide, and iron oxide.

The locations for the potential BPFs considered in this PEA are listed in Table 1-1. They are located within three states (Tennessee, Alabama, and Kentucky) at the following coal plant sites: Bull Run, Colbert, Cumberland, Gallatin, John Sevier, Johnsonville, Kingston, Paradise, Shawnee, and Widows Creek.

3.19.1.2 Hazardous Waste

Hazardous materials are regulated under a variety of federal laws including OSHA standards, Emergency Planning and Community Right to Know Act (EPCRA), the RCRA, the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 and the Toxic Substances Control Act.

Regulations implementing the requirements of EPCRA are codified in 40 CFR 355, 40 CFR 370 and 40 CFR 372. Under 40 CFR 355, facilities that have any extremely hazardous substances present in quantities above the threshold planning quantity are required to provide reporting information to the State Emergency Response Commission, Local Emergency Planning Committees**,** and local fire departments. Inventory reporting to emergency response parties is required for facilities with greater than the threshold planning quantity of any extremely hazardous substances or greater than 10,000 pounds of any OSHA regulated hazardous material. EPCRA also requires inventory reporting for all releases and discharges of certain toxic chemicals.

RCRA regulations define what constitutes a hazardous waste and establishes a “cradle to grave” system for management, tracking and disposal of hazardous wastes. Subtitle C of RCRA includes separate, less stringent regulations for certain potentially hazardous wastes. Used oil, for example, is regulated as hazardous waste if it is disposed of, but it is separately regulated if it is recycled. Specific requirements are provided under RCRA for generators, transporters, processors, and burners of used oil that are recycled. Universal wastes are a subset of hazardous wastes that are widely generated. Universal wastes include batteries, pesticides, mercury-containing equipment, lamps, and aerosol cans. Universal wastes may be managed in accordance with the RCRA requirements for hazardous wastes or by special, less stringent provision.

3.19.2 Environmental Consequences

3.19.2.1 Alternative A – No Action Alternative

Under the No Action Alternative there would be no impacts associated with additional solid and hazardous waste generation. However, the long-term beneficial impact associated with Alternative B (i.e., solid wastes going to a BPF, compared to being disposed in an on-site landfill), would not be realized under this alternative.

3.19.2.2 Alternative B – Construction and Operation of CCR Beneficiation Processing Facilities

Wastes typically produced by construction activities include vegetation, demolition debris, oily debris, packing materials, scrap lumber, and domestic wastes (garbage). During construction of BPFs, all solid and hazardous wastes generated would be managed in accordance with standard procedures for spill prevention and cleanup and waste management protocols in accordance with pertinent federal, state and local requirements.

Solid wastes that would be generated from operation of the proposed facility include paper and plastics from packaging of maintenance-related materials, personal protective equipment, oils and lubricants, spent resins, desiccants, batteries, and domestic wastes. Pumps, valves, and controls associated with the processing facility would require replacement during operations. Generation of regulated hazardous wastes is not expected (see Table 2-2); however, any regulated hazardous waste that may be generated would be managed in accordance with RCRA requirements. Solid wastes from production processes

at the facility and delivery of processed CCR product are expected to be minor. Solid waste generated during outages/maintenance activities would vary in amounts and would be disposed of in an appropriate existing licensed landfill (see Table 2-2).

Impacts also would be associated with maintenance of vehicles that deliver processed CCR product to various markets. Under the bounding condition (Table 2-1), it is anticipated that during operations up to 125 truckloads per day (250 truck trips) of processed CCR would be transported. Wastes from vehicle maintenance activities would be managed in accordance with standard procedures for spill prevention and cleanup and waste management protocols in accordance with pertinent federal, state and local requirements.

Under this alternative, there would be a long-term beneficial impact associated with solid wastes going to a beneficial reuse facility as compared to being disposed in an on-site landfill. The majority of CCR at the coal plant sites would be beneficially reused in concrete and other building materials. This would allow for the transformation of up to 236 million tons of CCR into reusable, beneficiated products. Therefore, this same quantity of CCR would not be disposed of in a landfill or capped surface impoundment under this alternative.

If thermal treatment is needed, the thermal BPF involves a carbon reduction process that would result in the production of approximately 1,500 tons per year of dry scrubber material. The dry scrubber material would be sent to an existing, licensed off-site landfill. While both thermal and nonthermal beneficiation processes would reduce the amount of CCR sent to a landfill, nonthermal beneficiation does not result in the production of dry scrubber material. In addition, processed CCR could be used as a substitute for other materials which would indirectly limit generation of solid waste associated with obtaining such materials.

Therefore, adverse impacts associated with generation of solid and hazardous wastes during construction and operation of the BPF would be minor; however, there would be a long-term moderate beneficial impact associated with solid wastes as the majority of CCR at the selected sites would be beneficially reused.

3.20 Public Health and Safety

3.20.1 Affected Environment

Workplace health and safety regulations are designed to eliminate personal injuries and illnesses from occurring in the workplace. These laws may comprise both federal and state statutes. U.S. Department of Labor, OSHA is the main statute protecting the health and safety of workers in the workplaces. OSHA regulations are presented in 29 CFR 1919, OSHA Standards. A related statute, 29 CFR 1926, contains health and safety regulations specific to the construction industry. The Tennessee Department of Labor and Workforce Development has adopted federal OSHA standards contained in 29 CFR Parts 1910 and 1926 pursuant to Tennessee Code Annotated Section 50-3-201. Additionally, the federal regulations govern workplace health and safety requirements in private sector workplaces in Alabama since no state law governs workplace safety for public sector employers. The Kentucky Occupational Safety and Health Program, under the statutory authority of Kentucky Revised Statutes Chapter 338 has a state plan approved by the OSHA to protect the health and safety of workers in the workplaces.

TVA has a robust, safety-conscious culture that focuses on awareness and understanding of workplace hazards, prevention, intervention, and integration of BMPs to avoid or minimize hazards. Health hazards are associated with the routine operations and

maintenance activities at the existing TVA coal plants. To minimize hazards and ensure workplace safety; activities are performed consistent with OSHA and state standards and requirements and specific TVA guidance. Additionally, TVA has a safety program in place to prevent worker injuries and accidents (TVA 2024b). Personnel at TVA facilities, including TVA authorized contractors, are conscientious about health and safety, having addressed and managed maintenance and operations activities to reduce or eliminate occupational hazards through implementation of safety practices, training and control measures.

Mitigative measures are used to ensure protection of human health which includes the workplace, public and the environment. Applicable regulations and attending administrative codes that prescribe monitoring requirements may include those associated with emergency management, environmental health, drinking water, water and sewage, pollution discharge, air pollution, hazardous waste management and remedial action.

Additionally, wastes generated by operation of TVA coal plants pose a health hazard. Wastes streams including solid wastes, hazardous waste, liquid wastes, discharges, and air emissions are managed in accordance with applicable federal, state and local laws and regulations and all applicable permit requirements. TVA is committed to complying with all applicable regulations, permitting, and monitoring requirements.

There is access to emergency room services, including hospitals, urgent care, law enforcement, and fire protection services near each TVA coal plant. The maximum distance to medical services from the 10 TVA coal plants identified to potentially house a BPF is approximately 12.6 miles. The maximum distance to law enforcement and fire protection services are approximately 12.8 miles and 7.0 miles respectively.

3.20.2 Environmental Consequences

3.20.2.1 Alternative A – No Action Alternative

Under the No Action Alternative, the operations and maintenance activities at TVA coal plants would continue within the safety-conscious culture, and activities currently performed would be in accordance with applicable standards or specific TVA guidance. Therefore, the No Action Alternative would not have an impact on public health and safety.

3.20.2.2 Alternative B – Construction and Operation of CCR Beneficiation Processing Facilities

Although construction work has known hazards, it is TVA's policy that contractors establish and maintain site-specific health and safety plans in compliance with OSHA regulations. The site-specific health and safety plans emphasize BMPs to minimize potential risks to workers. Examples of BMPs include employee safety orientations; establishment of work procedures and programs for site activities; use of equipment guards, emergency shutdown procedures, lockout procedures, site housekeeping, and personal protective equipment; regular safety inspections; and plans and procedures to identify and resolve hazards.

Potential public health and safety hazards could result from increased traffic on roadways due to construction of the beneficial processing facility. Residential and other human use areas along roadways used by construction traffic to access the TVA coal plants may experience delays due to increased traffic. Awareness of these residences and establishment of traffic procedures to minimize potential safety concerns would be addressed in the health and safety plans followed by construction contractors.

Debris and wastes streams associated with construction activities would be managed in accordance with federal, state, and local laws and regulations. An emergency response plan would be developed to address potential accidental spills on site and discussed with local emergency management agencies. Emergency response for the TVA coal plant would be provided by the local, regional, and state law enforcement, fire, and emergency responders, as described above.

As identified in Table 2-1, the CCR BPFs would be located on existing TVA coal plants, with limited public access. Therefore, the potential for public safety concerns is reduced due to the industrial setting and lack of public access.

Through TVA guidance and regulations, operations of the CCR BPF would adhere to established OSHA and applicable state health and safety requirements. TVA's Safety Standard Programs and Processes would be strictly adhered to during the proposed actions. These practices would address and provide management procedures for the reduction or elimination of occupational and public health hazards.

Under Alternative B, unprocessed CCR materials removed from impoundments would be transported via on-site haul roads to the proposed BPFs. Therefore, all CCR transport activity would take place on TVA property and would not require the utilization of public roadways. It is TVA policy that all contractors have in place a site-specific health and safety plan prior to operation on TVA properties. CCR materials that have successfully been processed for beneficial uses would be hauled to off-site facilities. As stated in Table 2-1, up to 125 truckloads per day (250 truck trips) of processed CCR product could be transported from the BPF. Increased truck traffic could lead to a slightly higher risk of accidents in the vicinity of the 10 proposed sites due to the increase in the number of vehicle miles traveled on those roadways. According to the Federal Highway Administration (FHWA), transport-related injuries occur at a rate of 32.953 for every billion ton-miles of freight transport by trucks. Additionally, transport-related fatalities occur at a rate of 1.375 for every billion ton-miles of freight transport by trucks (FHWA 2016b). During operation, processed CCR could be transported off site by truck at a rate of 27 tons per truck and up to 125 trucks per day for a maximum of 300 days (see Table 2-1). This equates to 1,012,500 tons of processed CCR transported from the BPF per year, which is approximately 101 million ton-miles per year for every 100 miles of freight transport. This equates to approximately 3.3 potential injuries and 0.14 potential fatalities annually per 100 miles traveled. Therefore, the rate for injury or fatality from transport of the processed CCR is minor given the relatively low total ton-miles of transport per year.

The establishment of appropriate BMPs and job site safety plans would address transportation in describing how job safety would be maintained during the project. With the preparation and execution of safety plans and training, overall impacts of construction, operation, and transport of processed CCR product would be minor.

3.21 Cumulative Impacts

Cumulative effects should focus on analysis of changes to the human environment from the proposed action or alternatives and other past, present, and reasonably foreseeable actions which may have a direct impact or indirect impact on the human environment, including the natural and physical environment.

The affected environment for each resource described the baseline conditions of the resources to be affected by the alternatives under consideration. These baseline conditions include the effects of past and present actions. and, therefore, incorporate the cumulative effects of past and present actions.

3.21.1 Geographic Area of Analysis

The appropriate geographic area of analysis over which past, present and future actions could reasonably contribute to cumulative effects is variable and dependent on the resource evaluated and the individual action under consideration. Actions related to construction and operation of a BPF at one or more of the 10 TVA coal plants within the TVA PSA vary with respect to location and timing. However, they are unified under this cumulative effects analysis as “similar” actions.

Therefore, for this programmatic level cumulative effects analysis TVA’s PSA is considered to be the appropriate context for analysis of cumulative effects for most resource areas. The TVA PSA covers approximately 80,000 square miles and includes 181 counties in Tennessee and portions of Alabama, Kentucky, Mississippi, North Carolina, and Virginia. (TVA 2024b). This geographic area includes the 10 existing coal plant sites under consideration for construction of a CCR BPF which are located within Tennessee, Alabama, and Kentucky.

Impacts of the proposed action would primarily occur on land that is previously disturbed and is currently used for industrial purposes. Consequently, as described in prior subsections of this PEA, the existing quality of environmental resources with the potential to be directly or indirectly affected by the project activities is generally low. Therefore, for most resources, the appropriate geographic area for the analysis of cumulative effects is limited to the TVA coal plant site. However, impacts to air quality, GHG, and transportation have the potential to impact areas outside of the plant site itself and the specific geographic area of analysis for those resources is further identified below.

3.21.2 Identification of Other Actions

Past, present, and reasonably foreseeable future actions that are appropriate for consideration in a cumulative effects analysis are those that when viewed with the proposed action, have cumulatively significant impacts. Future cumulative impacts can result not only from possible actions of TVA in accordance with the proposed construction and operation of CCR beneficiation facilities under Alternative B, but also from other TVA actions on the same coal plant site and actions of other agencies and the public. Due to the geographic scope of the TVA PSA, predicting potential future actions by others involves substantial uncertainty and therefore the effects of these actions would be based on general trends that are anticipated within the TVA PSA. These general trends include improvements to the transportation network and continued land development for manufacturing and industrial uses. These actions cannot be identified sufficiently to take them into account in TVA’s analyses other than in the broadest sense. For example, continued land development within the PSA spurred by population growth, whether for residential, commercial, transportation or industrial purposes, could involve extensive clearing and grading, increased impervious surfaces, and result in possible point source pollution to surrounding receiving waterbodies. However, the extent of impacts associated with any of these actions would be dependent on the specifics of future development and as such any analysis of impacts would be speculative.

TVA operations within the PSA form a baseline of actions that influence environmental resources. Those TVA actions potentially applicable to the proposed action include development and maintenance of transmission infrastructure, development of future energy generating assets in accordance with the IRP and continued operations, including CCR management, at operating and retired coal plants.

3.21.3 Analysis of Cumulative Effects

This analysis is limited only to those resource issues potentially adversely affected by preferred alternative. Accordingly, geology and soils; groundwater; surface water; aquatic ecology; vegetation; wildlife; threatened and endangered species; floodplains; wetlands; visual resources; cultural and historic properties; land use; managed and natural areas and recreation; noise; socioeconomics; solid and hazardous waste; or public health and safety are not included in this analysis as these resources are either not adversely affected, or the effects are considered to be minimal or beneficial. Accordingly, the potential for cumulative effects is largely driven by the change in air quality, GHG emissions, and transportation.

Additionally, as noted in Chapter 1, TVA has developed an Environmental Screening Checklist as part of this programmatic assessment. While the cumulative analysis in this PEA evaluated general future cumulative actions within the TVA PSA, during the review of each site for construction and operation of a BPF, local cumulative impacts would be analyzed as part of the Environmental Screening Checklist.

3.21.3.1 Air Quality

The geographic area of analysis for air quality is defined as the county in which the BPF would be located as air quality designations are made on a county-by-county basis. The determination of whether or not a county is in attainment or nonattainment is based on monitoring data that reflect the cumulative air emissions from all existing sources within the county. As discussed in Section 3.1.1, all counties within the TVA PSA are designated as unclassifiable/attainment for all criteria pollutants.

It is expected that emissions associated with ongoing TVA operations at the existing coal plants in the PSA would continue but would not impact regional air quality, as these activities would be expected to continue their operations within the terms of their existing environmental permits. Additionally, construction activities, associated with development and maintenance of transmission infrastructure and development of future energy generating assets, are expected to implement BMPs to minimize potential air quality impacts and conform with applicable state and federal permits. Construction of any CCR BPF in conjunction with construction operations related to reasonably foreseeable future actions at existing coal plants would have the potential to temporarily increase local emissions and fugitive dust. However, the construction period for the BPFs is temporary, and emissions are not anticipated to appreciably change levels of criteria pollutants. Emissions and fugitive dust can be mitigated through the use of BMPs.

Operation of the BPFs would result in increases in local emissions; however, they would not exceed permit limits or air quality standards. The cumulative effect of operational emissions combined with ongoing emissions from continued operations at adjacent coal plant facilities would incrementally increase emissions, but such increases would not be notable on a regional scale and exceedances of applicable ambient air quality standards are not expected due to adherence to state and federal regulations and permit requirements. Therefore, cumulative impacts from the additional increases in emissions due to the

operation of the BPFs in combination with the other general reasonably foreseeable future actions minor and would not result in an exceedance of applicable air quality standards.

3.21.3.2 Climate Change and Greenhouse Gases

As described in Section 3.2, Climate Change and Greenhouse Gas, overall concerns about GHG emissions are driven by associated worldwide increases in GHG concentrations within the atmosphere, associated increases in global temperature, and potential changes in a range of global weather patterns. Therefore, the geographic area of analysis for GHG emissions and associated climate change effects is the globe. Given that climate change is the result of the increased global accumulation of GHGs climate effects analysis is inherently cumulative in nature.

While reasonably foreseeable future actions are expected to produce GHG emissions, the impacts of GHGs are experienced on a global scale and are typically not considered to result in regional impacts. Therefore, cumulative impacts to GHG emissions would be primarily driven by global changes in GHG emission rates within a global geography, rather than at an individual project level.

3.21.3.3 Transportation

The geographic area of analysis for transportation is, as described in Section 3.16, Transportation, the maximum distances from the 10 TVA plants identified to the nearest four-lane divided highway (i.e., 20 miles). Additional traffic would be dispersed and would not result in congestion or the degradation of existing traffic patterns. Therefore, the potential for cumulative effects to transportation from reasonably foreseeable future actions would be related to traffic associated with continued operations at existing and retired coal plants where the CCR BPFs would be located. However, ongoing operations and the traffic they generate are considered part of the existing environmental setting and are not expected to increase in the foreseeable future. Therefore, there would be minor cumulative impacts to transportation.

3.22 Unavoidable Adverse Impacts

Unavoidable adverse impacts are the effects of the proposed action on natural and human resources that would remain after mitigation measures or BMPs have been applied. Mitigation measures and BMPs are typically implemented to reduce a potential impact to a level that would be below the threshold of significance as defined by the courts. Impacts associated with the proposed activities have the potential to cause unavoidable adverse effects to natural and human environmental resources.

Impacts associated with the construction and operation of CCR BPFs have the potential to cause unavoidable adverse effects to several environmental resources. Conversely, these facilities would also be environmentally beneficial by reducing the amount of CCR disposed in a landfill. The magnitude of adverse impacts and the degree to which they can be avoided, minimized, or mitigated would vary from site to site. However, impacts from Alternative B would primarily be related to construction activities.

Activities associated with the use of construction equipment may result in varying amounts of dust, air emissions, and noise that may potentially impact both on-site workers and nearby off-site residences and parks. Emissions from on-site construction activities and equipment are minimized through implementation of BMPs including proper maintenance of construction equipment and vehicles. During construction, BMPs to minimize runoff would

be implemented but there could still be some uncontrolled runoff that could affect nearby outfalls and water bodies. Unavoidable localized increases in air emissions and GHGs would occur during operation of the CCR BPFs; however, they would not exceed permit limits or air quality standards.

Transport of unprocessed CCR would be confined to the TVA reservation; therefore, there would be no increase in traffic on public roads. However, during construction there would be an increase in traffic on public roads due to use by the construction workforce and construction-related equipment being transported to the proposed site. This additional construction-related traffic would also increase noise and fugitive dust in areas proximate to these roads. Emissions from construction equipment are minimized through implementation of BMPS including proper maintenance of construction equipment and vehicles. Additionally, there would be an increase in traffic on public roadways due to processed CCR materials being transported off site.

3.23 Relationship of Short-Term Uses to Long-Term Productivity

NEPA requires a discussion of the relationship between short-term uses of the environment and the maintenance and enhancement of long-term productivity. This PEA focuses on the analyses of environmental impacts associated with the construction and operation of CCR BPFs at TVA coal plants. For the purposes of this section, activities associated with the BPFs are considered short-term uses of the environment and the long-term impacts to site productivity are those that last beyond the life of the project.

Construction of the BPFs would have a negative effect on a limited number of short-term uses of the environment such as air, noise, and transportation resources as described above. Access to the TVA property where ash impoundments are located would be restricted during construction activities. This would primarily impact recreational users such as bank fisherman or birders. In addition, construction activities such as site preparation and noise may displace some wildlife during the construction period. Most environmental impacts during construction activities would be relatively short-term and would be addressed by programmatic BMPs and mitigation measures.

Operation of the CCR BPFs would have a favorable short-term impact to the local economies where TVA coal plants are located through the creation of construction, support jobs, and revenue. As well as creating a negative short-term impact of short-term uses of the environment such as air, noise, and transportation resources.

Long-term effects would include the impacts to transportation resources due to hauling beneficiated materials off-site. However, there would be a long-term beneficial impact associated with solid wastes being processed for beneficial reuse as compared to being disposed in an on-site landfill, as well as enhanced long-term productivity of the land that previously stored the solid waste that was beneficially processed. In addition, processed CCR could be used as a substitute for other materials which would indirectly limit generation of solid waste associated with obtaining such materials.

3.24 Irreversible and Irretrievable Commitments of Resources

A resource commitment is considered irreversible when impacts from its use would limit future use options and the change cannot be reversed, reclaimed, or repaired. Irreversible commitments generally occur to nonrenewable resources such as minerals or cultural resources and to those resources that are renewable only over long timespans, such as soil productivity. A resource commitment is considered irretrievable when the use or

consumption of the resource is neither renewable nor recoverable for use by future generations until reclamation is successfully applied. Irretrievable commitments generally apply to the loss of production, harvest, or other natural resources and are not necessarily irreversible.

Resources required for the construction of the CCR BPFs, including labor, fossil fuels, and land would be irretrievably lost. Nonrenewable fossil fuels would be irretrievably lost by gasoline and diesel-powered equipment during construction. Additionally, the materials used for the construction of the facility would be committed for the life of the facility. While some of these building materials may be irreversibly committed, some metal components and structures could be recycled.

During operation of the CCR BPFs, nonrenewable fossil fuels would be irretrievably lost through the use of gasoline and diesel-powered equipment during the removal of CCR, transport of CCR to the BPFs, and transport of processed CCR materials off-site. Labor utilized during these operations would also be irretrievably lost.

Although, construction and operation of the CCR BPFs would require irretrievable use of certain resources, it is unlikely that their limited use, these efforts would adversely affect the overall future availability of these resources.

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APPENDIX A – ENVIRONMENTAL SCREENING CHECKLIST

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Environmental Screening Checklist

The goal of this program is to optimize the reuse of coal combustion residuals (CCR) currently produced and stored at TVA coal plants through programmatically evaluating the construction and operation of on-site CCR beneficiation processing facilities at TVA coal plants. This Environmental Screening Checklist is used to collect project information to determine that proposed actions fall within the bounding parameters identified in Table 2-1 in the Programmatic Environmental Assessment (PEA).

A TVA NEPA Specialist/Environmental Program Manager will complete this environmental checklist well before construction activities begin in accordance with TVA's legal and policy requirements associated with this program. The NEPA Specialist and Environmental Program Manager will ensure that TVA Subject Matter Experts (SMEs) document input in ENTRAC for their respective resource categories for final environmental review and site approval.

TVA NEPA Specialist (name): _____

TVA Environmental Program Manager (name): _____

Proposed Coal Plant Site Name/Address (or lat/long): _____

If the answer to any question below is *YES*, further review of environmental impacts by TVA may be required.

If TVA determines that the proposed project impacts sensitive resources beyond the bounded values assessed in the PEA associated with this checklist, the proposed project would be subject to a site-specific environmental review consistent with TVA NEPA procedures.

Facility Attributes	
☐ Yes ☐ No	Will the land requirements exceed 15 acres? Project area acreage:
☐ Yes ☐ No	Will more than 7 megawatts (MW) of power be needed?
☐ Yes ☐ No	Would new transmission facilities be needed?
☐ Yes ☐ No	Would the process water requirement be greater than 150 gallons per minute (GPM)?
☐ Yes ☐ No	Would the potable water requirement be greater than 25 GPM?
☐ Yes ☐ No	Would more than 50 GPM be discharged to publicly owned treatment works?
☐ Yes ☐ No	Would the total output capacity be greater than 1,000,000 tons of processed CCR per year?
☐ Yes ☐ No	Would raw material storage be greater than 15,000 cubic yards (yd^3)?
☐ Yes ☐ No	Would processed material storage be greater than 45,000 yd^3?

Construction-Phase Attributes	
☐ Yes ☐ No	Will the duration of construction exceed 18 months?
☐ Yes ☐ No	Will foundation piers exceed 40 feet in depth?
☐ Yes ☐ No	Is borrow material needed to support construction?
☐ Yes ☐ No	Will removal of trees with a trunk diameter greater than 3 inches at breast height be necessary? If so, how many trees or acres of trees will be cleared? _____ trees/acres If yes, how will the cleared trees be disposed (i.e. sold, hauled offsite, mulched, burned, etc.): _____
☐ Yes ☐ No	Can the project commit to tree clearing only within a winter window (approximately October 15-March 31 - dates may vary depending on site location)?
☐ Yes ☐ No	Will development of the site require filling in, or alterations to, wetlands or streams, or streamside management zones?
☐ Yes ☐ No	Will development of the site result in impacts to caves or sinkholes?
Operational Characteristics	
☐ Yes ☐ No	Will operations exceed 50 weeks per year; 350 operating days per year?
☐ Yes ☐ No	Would storage requirements of natural gas/propane be greater than 100,000 gallons?
☐ Yes ☐ No	Would haul trucks have a capacity greater than 25 yd^3?
☐ Yes ☐ No	Would the daily truckloads be greater than 125 (250 truck trips)?
☐ Yes ☐ No	Would trucking of processed CCR product exceed 300 days per year?
☐ Yes ☐ No	Would solid waste generated be greater than 1,500 tons per year?
☐ Yes ☐ No	Would transport by rail or barge be utilized?
Air Quality/Greenhouse Gases (GHG)	
☐ Yes ☐ No	Will emissions exceed the following thresholds? Sulfur dioxide: 140 tons per year; nitrogen oxides and carbon monoxide: 120 tons per year; particulate matter: 120 tons/year; hazardous air pollutants (HAPs): Single HAP 10 tons/year or 25 tons/year for any combination of HAPs.
☐ Yes ☐ No	Will GHG emissions exceed the following thresholds? Carbon dioxide: 160,872 tons per year; methane: 0.07 tons per year; nitrous oxide: 0.01 tons per year; carbon dioxide equivalent: 161,000 tons per year.

Reasonably Foreseeable Future Actions	
☐ Yes ☐ No	Are other actions underway or proposed that, when combined with potential effects of construction and operation of the proposed project, could have a notable collective effect on human health or the environment?

TVA subject matter experts reviewed the material presented in this checklist. Documentation of their review is attached.

In accordance with the National Environmental Policy Act (NEPA), TVA must evaluate and document whether the proposed action described within this document is already covered under an existing NEPA review. The following questions record the evaluation of four criteria for making this determination.

Determination of NEPA Adequacy	
☐ Yes ☐ No	Is the site-specific proposed action bounded by the proposed action as analyzed in the TVA Beneficiation Facility (PEA)? If no, describe:
☐ Yes ☐ No	Are there significant circumstances or information relevant to site-specific environmental concerns that would substantially change the analysis in the TVA Beneficiation Facility PEA? If yes, describe:
☐ Yes ☐ No	Are there effects that would result from the site-specific proposed action that were not addressed in the TVA Beneficiation Facility PEA? If yes, describe:
☐ Yes ☐ No	Is additional site-specific NEPA necessary? If yes, explain:

Based on the evaluation documented herein, I conclude that the TVA Beneficiation Facility Programmatic Environmental Assessment (PEA) and Finding of No Significant Impact (FONSI) fully covers the proposed site-specific action and constitutes TVA's compliance with the requirements of NEPA. The site-specific project does not present significant changes to the proposed action or significant new circumstances or information relevant to environmental concerns that would require supplemental analysis. Impacts associated with the proposed action would be minor to moderate and are bounded by the conclusions of the Final PEA and FONSI. This form documents TVA's compliance with the National Environmental Policy Act for this site-specific action.

_____ _____

NAME
Manager, NEPA Program
Project Support
Tennessee Valley Authority

Date Signed

This form must be completed and signed by an authorized representative or agent for TVA, an individual who can certify, under penalty of law, and based on information and belief formed after reasonable inquiry and appropriate training or licensing, that the statements and information contained in this Environmental Screening Checklist are true, accurate and complete.

_____ _____

NAME
TITLE, PROGRAM NAME
BUSINESS UNIT
Tennessee Valley Authority

Date Signed

APPENDIX B – SHPO CONSULTATION INITIATION

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TENNESSEE VALLEY AUTHORITY

400 West Summit Hill Drive, Knoxville, Tennessee 37902

December 30,2024

Mr. E. Patrick McIntyre, Jr.
Executive Director
and State Historic Preservation Officer
Tennessee Historical Commission
2941 Lebanon Road
Nashville, Tennessee 37243-0442

Dear Mr. McIntyre:

TENNESSEE VALLEY AUTHORITY (TVA), CONSTRUCTION AND OPERATION OF COAL COMBUSTION RESIDUAL (CCR) PROCESSING FACILITIES PROJECT, COLBERT AND JACKSON COUNTIES, ALABAMA; McCRACKEN AND MUHLENBERG COUNTIES, KENTUCKY; AND ANDERSON, HAWKINS, HUMPHREYS, ROANE, STEWART, AND SUMNER COUNTIES, TENNESSEE – INITIATION OF CONSULTATION

TVA is considering CCR processing facilities at one or more properties across the Tennessee Valley to prepare CCR for market. Since adoption in the 1970s the marketing and utilization of combustion by-products in innovative ways has been used to offset cost and manage storage. Residuals are often used as a supplementary component to agricultural fertilizers, cement and concrete, asphalt paving, wallboard such as sheetrock, and many other uses. The construction and operation of CCR processing facilities would improve and optimize TVA's CCR management by enabling utilization and marketing of more CCR, in an environmentally acceptable and sustainable manner. The construction and operation of CCR processing facilities would be done by a third party at various fossil plant sites within the Tennessee Valley. TVA has selected six potential sites for processing facilities in Tennessee, two in Alabama, and two in Kentucky; all sites would be within TVA fossil plant reservations (Figures 1-6).

Residuals could be processed using two different methods, thermal and non-thermal processing. Both methods include a control room building, small lab, maintenance area, ash storage domes and silos, parking, and office/meeting space. Reclaimed ash would be excavated prior to being placed in covered storage. From the storage location the material would be fed via a fully contained system to the processing center. The processing center would transform the raw ash into a marketable product by drying, classifying, and grinding material. Once transformed, the ash would cool in a baghouse that recycles heat to dry the feed material. Material ready for market and delivery would be dispensed via a load-out storage silo that would feed product into tanker trucks used for transportation outside of the reservation.

Thermal processing facilities would use propane storage tanks or liquified natural gas (LNG) delivered via a pipeline. In addition to the major equipment, thermal processing would require a sulfur dioxide scrubber to meet permit limitations. Dry scrubber material would be produced as a by-product, and TVA would send it to an off-site landfill for disposal. Should LNG be used the

pipeline would tie into an existing line within the TVA reservation. At this point, Cumberland (in Stewart County, Tennessee) is the only reservation being considered for thermal production based on existing infrastructure. Subsurface piles would be installed to support foundations for facility components, as required. At full buildout, the facility associated with either method would not exceed 15 acres on the reservation and structural elements would not exceed 140 feet in height.

Due to the nature of the project, potential sites would be limited to former or existing TVA fossil plants. Plans are still being developed, and at this time, TVA is unable to completely determine how many, or which, fossil plants would process CCR using this method. Whichever locations are chosen, the processing facilities would be confined to a disturbed setting or an area that has been surveyed for archaeological resources and no eligible or potentially eligible resources were identified. In order to ensure that the actions do not adversely effect historic properties, TVA proposes to choose sites that are found, after a Section 106 review and consultation, to not result in adverse effects on historic properties.

Due to the complexity of this undertaking TVA proposes to develop a project Programmatic Agreement (PA), as provided for under 36 CFR §800.14(b). This PA would set out a process for TVA to complete phased identification, evaluation of effect and resolution of adverse effects. TVA is seeking your agreement to develop a PA between our offices regarding the undertaking.

Pursuant to 36 CFR Part 800.3(f)(2), TVA is consulting with federally recognized Indian tribes regarding the program.

Please contact Tyler Parrott by email, stparrott@tva.gov with your comments.

Sincerely,

Steve C. Cole
Manager, Cultural Reviews—Energy
Cultural Resources

STP:ERB
Enclosures
cc (Enclosures):
Ms. Jennifer Barnett
Tennessee Division of Archaeology
1216 Foster Avenue, Cole Bldg. #3
Nashville, Tennessee 37210

TENNESSEE VALLEY AUTHORITY
400 West Summit Hill Drive, Knoxville, Tennessee 37902

December 30, 2024

Mr. Craig Potts
Executive Director
and State Historic Preservation Officer
Kentucky Heritage Council
300 Washington Street
Frankfort, Kentucky 40601

Dear Mr. Potts:

TENNESSEE VALLEY AUTHORITY (TVA), CONSTRUCTION AND OPERATION OF COAL COMBUSTION RESIDUAL (CCR) PROCESSING FACILITIES PROJECT, COLBERT AND JACKSON COUNTIES, ALABAMA; McCRACKEN AND MUHLENBERG COUNTIES, KENTUCKY; AND ANDERSON, HAWKINS, HUMPHREYS, ROANE, STEWART, AND SUMNER COUNTIES, TENNESSEE – INITIATION OF CONSULTATION

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Due to the nature of the project, potential sites would be limited to former or existing TVA fossil plants. Plans are still being developed, and at this time, TVA is unable to completely determine how many, or which, fossil plants would process CCR using this method. Whichever locations are chosen, the processing facilities would be confined to a disturbed setting or an area that has been surveyed for archaeological resources and no eligible or potentially eligible resources were identified. In order to ensure that the actions do not adversely effect historic properties, TVA proposes to choose sites that are found, after a Section 106 review and consultation, to not result in adverse effects on historic properties.

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Pursuant to 36 CFR Part 800.3(f)(2), TVA is consulting with federally recognized Indian tribes regarding the program.

Please contact Tyler Parrott by email, stparrott@tva.gov with your comments.

Sincerely,

Steve C. Cole
Manager, Cultural Reviews—Energy
Cultural Resources

TENNESSEE VALLEY AUTHORITY

400 West Summit Hill Drive, Knoxville, Tennessee 37902

December 30, 2024

Ms. Lee Anne Hewitt
Deputy State Historic Preservation Officer
Alabama Historical Commission
468 South Perry Street
Montgomery, Alabama 36130-0900

Dear Ms. Hewett:

TENNESSEE VALLEY AUTHORITY (TVA), CONSTRUCTION AND OPERATION OF COAL COMBUSTION RESIDUAL (CCR) PROCESSING FACILITIES PROJECT, COLBERT AND JACKSON COUNTIES, ALABAMA; McCRACKEN AND MUHLENBERG COUNTIES, KENTUCKY; AND ANDERSON, HAWKINS, HUMPHREYS, ROANE, STEWART, AND SUMNER COUNTIES, TENNESSEE – INITIATION OF CONSULTATION

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Residuals could be processed using two different methods, thermal and non-thermal processing. Both methods include a control room building, small lab, maintenance area, ash storage domes and silos, parking, and office/meeting space. Reclaimed ash would be excavated prior to being placed in covered storage. From the storage location the material would be fed via a fully contained system to the processing center. The processing center would transform the raw ash into a marketable product by drying, classifying, and grinding material. Once transformed, the ash would cool in a baghouse that recycles heat to dry the feed material. Material ready for market and delivery would be dispensed via a load-out storage silo that would feed product into tanker trucks used for transportation outside of the reservation.

Thermal processing facilities would use propane storage tanks or liquified natural gas (LNG) delivered via a pipeline. In addition to the major equipment, thermal processing would require a sulfur dioxide scrubber to meet permit limitations. Dry scrubber material would be produced as a by-product, and TVA would send it to an off-site landfill for disposal. Should LNG be used the

pipeline would tie into an existing line within the TVA reservation. At this point, Cumberland (in Stewart County, Tennessee) is the only reservation being considered for thermal production based on existing infrastructure. Subsurface piles would be installed to support foundations for facility components, as required. At full buildout, the facility associated with either method would not exceed 15 acres on the reservation and structural elements would not exceed 140 feet in height.

Due to the nature of the project, potential sites would be limited to former or existing TVA fossil plants. Plans are still being developed, and at this time, TVA is unable to completely determine how many, or which, fossil plants would process CCR using this method. Whichever locations are chosen, the processing facilities would be confined to a disturbed setting or an area that has been surveyed for archaeological resources and no eligible or potentially eligible resources were identified. In order to ensure that the actions do not adversely effect historic properties, TVA proposes to choose sites that are found, after a Section 106 review and consultation, to not result in adverse effects on historic properties.

Due to the complexity of this undertaking TVA proposes to develop a project Programmatic Agreement (PA), as provided for under 36 CFR §800.14(b). This PA would set out a process for TVA to complete phased identification, evaluation of effect and resolution of adverse effects. TVA is seeking your agreement to develop a PA between our offices regarding the undertaking.

Pursuant to 36 CFR Part 800.3(f)(2), TVA is consulting with federally recognized Indian tribes regarding the program.

Please contact Tyler Parrott by email, stparrott@tva.gov with your comments.

Sincerely,

Steve C. Cole
Manager, Cultural Reviews—Energy
Cultural Resources
External Strategy & Regulatory Oversight

APPENDIX C – DETAILED DESCRIPTIONS OF GEOLOGY, GROUNDWATER, SURFACE WATERS, AND WILDLIFE RESOURCES WITHIN THE STUDY AREA

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Detailed Descriptions of Geology, Groundwater, Surface Waters, and Wildlife Resources within the Study Area

1.0 Geologic Setting

Physiographic provinces are areas of similar land surfaces resulting from similar geologic history. There are four physiographic provinces overlain by the Tennessee Valley Authority (TVA) coal plants considered in this programmatic environmental assessment (PEA), including the Valley and Ridge, the Appalachian Plateaus, the Interior Low Plateaus, and the Coastal Plains (Table C-1). The easternmost part of the study area includes the Valley and Ridge Province, which is characterized by alternating valleys and ridges that trend northeast to southwest. Ridges have elevations up to 3,000 feet above sea level and are generally capped by dolomites and resistant sandstones, while valleys have been formed in less resistant dolomites and limestones (TVA 2024b).

The Appalachian Plateaus Province is an elevated area between the Valley and Ridge and Interior Low Plateaus Provinces. It consists of two sections, the Cumberland Plateau and the Cumberland Mountains. The Cumberland Plateau rises about 1,000 to 1,500 feet above the adjacent provinces and is formed by layers of near horizontal Pennsylvanian sandstones, shales, conglomerates, and coals, and underlain by Mississippian and older shale and limestones. The sandstones are resistant to erosion and have produced a relatively flat landscape cut by deep stream valleys. Toward the northeast, the Cumberland Mountains section is more rugged due to extensive faults and several peaks exceeding 3,000 feet elevation. The province has a long history of coal mining and encompasses the Appalachian coal field (TVA 2024b).

The Interior Low Plateaus Province occupies most of Kentucky, much of central Tennessee, and northern Alabama. Bedrock of the Interior Low Plateaus Province includes Mississippian limestones, chert, shale, and sandstone. The terrain varies from hilly to relatively flat in the northwest and southeast. An oval area in middle Tennessee, the Central Basin, sits lower than the surrounding rock, with an elevation about 200 feet below the surrounding Highland Rim. The southern end of the Illinois Basin coal region (TVA 2024b) overlaps the province in northwest Kentucky and includes part of the TVA power service area (PSA). Bedrock is composed of generally flat lying limestone. Soil cover is typically thin, and streams cut into the limestone bedrock.

The Coastal Plains Province encompasses much of the southeastern United States, ranging from eastern Texas to Long Island, New York. The underlying geology is a mix of poorly consolidated gravels, sands, silts, and clays. Soils are primarily of windblown and alluvial (deposited by water), have low to moderate fertility, and are easily eroded. The terrain varies from hilly to flat in broad river bottoms. The Mississippi Alluvial Plain (i.e., Mississippi Embayment) occupies the western edge of the province and much of the historic floodplain of the Mississippi River. The New Madrid Seismic Zone, an area of large prehistoric and historic earthquakes, is located in the northern portion of the province (TVA 2024b).

Table C-1. Summary of Geologic and Soil Characteristics at TVA Coal Plants

Plant Name	Physiographic Province	Dominant Soil Types[1]
Bull Run Fossil Plant	Valley and Ridge	Udorthents; Collegdale silt loam-rock outcrop complex;
Colbert Fossil Plant	Interior Low Plateaus	Fullerton gravelly silt loam; Urban Land
Cumberland Fossil Plant	Interior Low Plateaus	Bodine gravelly silt loam; Lindell silt loam (occasionally flooded); Maury silty clay loam (eroded); Melvin silt loam (frequently flooded); Sengtown gravelly silt loam;
Gallatin Fossil Plant	Interior Low Plateaus	Udorthents; Barfield silty clay loam-Rock outcrop complex; Slickens
John Sevier Fossil Plant	Valley and Ridge	Holston loam-Urban land complex; Holston loam
Johnsonville Fossil Plant	Interior Low Plateaus	Paden silt loam (eroded)
Kingston Fossil Plant	Valley and Ridge	Urban land; Waynesboro loam; Dewey silt loam
Paradise Fossil Plant	Interior Low Plateaus	Fairpoint gravelly clay loam-Bethesda channery silty clay loam complex; Dumps (mine); Udorthents
Shawnee Fossil Plant	Coastal Plain	Dumps (coal and waste disposal areas); Newark silt loam-Lindside silt loam complex (frequently flooded); Wheeling silt loam (frequently flooded); Urban land-Udorthents complex
Widows Creek Fossil Plant	Appalachian Plateau	Lindside silt loam; Melvin silt loam; Limestone rockland rough; Capshaw silt loam (undulating and level phase); Etowah silt loam (level phase); Greendale cherty silt loam (undulating phase); Huntington silt loam; Taft silt loam; Tupelo silt loam (level and undulating phase); Waynesboro fine sandy loam (eroded, rolling phase); Etowah loam; Bruno fine sandy loam; Fullerton gravelly silt loam (eroded); Sequatchie fine sandy loam (undulating phase); Talbott silty clay loam (eroded, rolling phase); Covert silty clay (eroded, undulating phase); Melvin silty clay loam

Source: TVA 2016; NRCS 2001a; NRCS 2001b; NRCS 2004; NRCS 2007; NRCS 2012a; NRCS 2012b; NRCS 2015; NRCS 2024.

[1] The combination of listed soil types covers at least 50 percent of the respective coal plant site.

2.0 Ecoregions

Ecoregions are identified by analyzing the patterns and composition of biotic and abiotic phenomena that affect or reflect differences in ecosystem quality and integrity (Omernik 1987). These phenomena include geology, landforms, soils, vegetation, climate, land use, wildlife, and hydrology. The TVA PSA includes nine level III ecoregions: the Blue Ridge, the Ridge and Valley, the Central Appalachian, the Southwestern Appalachian, the Interior Plateau, the River Valley and Hills, the Southeastern Plains, Mississippi Valley Loess Plain,

and the Mississippi Alluvial Plain (Omernik 1987; TVA 2024b). Approximately 5,000 species of plants occur within the TVA PSA (TVA 2024b).

As shown in Table C-2, the PSA intersects four level III ecoregions in Alabama, Kentucky, and Tennessee (the states that contain coal plant sites evaluated in this PEA), including the Interior Plateau, the Ridge and Valley, the River Valleys and Hills, and the Southwestern Appalachians (Omernik 1987; Griffith et al. 2001).

The Interior Plateau Ecoregion occupies much of central Tennessee and parts of Kentucky and Northern Alabama and includes the Cumberland, Johnsonville, and Gallatin coal plants in Tennessee and the Colbert Fossil Plant in Alabama. This Ecoregion is a series of grassland plateaus and forested uplands with flat, carbonate bedrock and thin soil with globally uncommon ecosystems. Forests are predominantly mesophytic, with a high proportion of American beech (*Fagus grandifolia*), American basswood (*Tilia americana*), and sugar maple (*Acer saccharum*). Approximately 38 percent of the Interior Plateau is forested, 50 percent is agricultural land, and 9 percent is developed (TVA 2024b).

The Ridge and Valley Ecoregion occupies much of eastern Tennessee and includes the Kingston, Bull Run, and John Sevier coal plants. The landscape is characterized by a series of complex folds and faults with alternating valleys and ridges trending northeast to southwest. Roughly 56 percent of the land cover is forested, with mesophytic and Appalachian oak forest as the dominant sub-types (TVA 2024b).

Widows Creek Fossil Plant is located within the Southwestern Appalachian Ecoregion. This ecoregion ranges northeast to southeast across Alabama, Tennessee, and Kentucky. The bedrock is a sequence of near horizontal Pennsylvanian sandstones, shales, conglomerates, and coals, underlain by Mississippian and older shale and carbonates. The area underlain by the resistant Pennsylvania sandstones has produced a “table-top” landscape. These low mountains contain a mosaic of forest and woodland with some cropland and pasture. Mixed mesophytic forest is restricted to the deeper ravines and escarpment slopes, and the summit or tableland forests are dominated by mixed oaks with shortleaf pine (*Pinus echinata*) (Griffith et al. 2001).

The Paradise and Shawnee coal plants are located within a small portion of the Interior River Valley and Hills Ecoregion. This ecoregion can be found in northwest Kentucky, where it is made up of nearly level lowlands dominated by agriculture and forested hills. Bottomland deciduous forests and swamp forests were once extensive on poorly drained, nearly level, lowland sites, but most have been replaced by cropland and pastureland. Hilly uplands remain mostly forested (TVA 2024b).

Table C-2. Level III and IV Ecoregions of Coal Plant Sites Considered in the PEA

Site Name	Ecoregion (III)	Ecoregion (IV)	Vegetation
Cumberland Fossil Plant Johnsonville Fossil Plant	Interior Plateau	Western Highland Rim	Oak-hickory forest; somewhat transitional between the more xeric oak-hickory forest to the west and the more mesic mixed mesophytic forest to the east.
Colbert Fossil Plant		Eastern Highland Rim	Mostly oak-hickory, but transitional between the more xeric oak-hickory forest to the west and the more mesic mixed mesophytic forest to the east; some areas of cedar glades and bottomland hardwoods.
Gallatin Fossil Plant		Outer Nashville Basin	Mostly oak-hickory, but transitional between the more xeric oak-hickory forest to the west and the more mesic mixed mesophytic forest to the east.
Kingston Fossil Plant Bull Run Fossil Plant	Ridge and Valley	Southern Limestone/Dolomite Valleys and Low Rolling Hills	Appalachian oak forest (mixed oaks, hickory, pine, poplar, birch, maple); bottomland oak and mesophytic forests; cedar barrens.
John Sevier Fossil Plant		Southern Shale Valleys	Appalachian oak forest (mixed oaks, hickory, pine, poplar, birch, maple).
Shawnee Fossil Plant	Interior River Valley and Hills	Wabash-Ohio Bottomlands	Southern floodplain forest (dominants: Quercus, Nyssa, Taxodium)/ Bottomland mixed deciduous forests. Bottomland oak forests in wettest areas that are often flooded: bald cypress–tupelo forests.
Paradise Fossil Plant		Green River-Southern Wabash Lowlands	Oak-hickory forest/ On uplands: oak forest often dominated by white oak with post oak, southern red oak, cherrybark oak, and shingle oak. On mesic sites: forests dominated by yellow-poplar, sugar maple, and northern red oak. On bottomlands: bottomland oak forests with overcup oak, pin oak, silver maple, pecan, slippery elm, sweetgum, and red maple. In wettest areas that are often flooded: bald cypress.
Widows Creek Fossil Plant	Southwestern Appalachian	Sequatchie Valley	Mixed mesophytic forest (oak, elm, hickory, ash, maple, blackgum, pine, sweetgum, basswood, beech).

Source: Woods et al. 2002a, 2002b; Griffith et al. 2001

3.0 Groundwater Aquifers

Aquifers in the TVA PSA generally align with the major physiographic provinces shown in Figure 3-1 of the PEA. As described in Section 1.0 of this appendix, the TVA coal plants considered for CCR BPFs are located across several physiographic provinces, including the Interior Low Plateaus, Southeastern Coastal Plain, Valley and Ridge, and Appalachian Plateaus, each of which has unique but relatively consistent hydrogeologic characteristics

3.1 Interior Low Plateaus Aquifers

The Interior Low Plateaus Province spans central Kentucky to northern Alabama and encompasses the Paradise, Cumberland, Colbert, Gallatin, and Johnsonville coal plants. The Interior Low Plateaus aquifers present within the TVA PSA include unconsolidated sand and gravel aquifers, Pennsylvanian sandstone aquifers, Ordovician carbonate aquifers, and Mississippian sandstone and carbonate rock aquifers (Lloyd and Lyke 1995). Precipitation is the primary source of recharge in the Interior Low Plateaus Province and groundwater discharges from springs are common.

Unconsolidated sand and gravel aquifers are only located along the Ohio River Valley and a few of its tributaries. Ranging from 25 to more than 300 feet in depth, the unconsolidated sand and gravel aquifers produce large yields from wells, particularly those hydraulically connected to the Ohio River. The water is generally hard with high concentrations of iron. Dissolved-solids concentrations may vary depending on the type of underlying bedrock (Lloyd and Lyke 1995).

Wells completed in Pennsylvanian sandstone aquifers range in depth from 25 to more than 400 feet below land surface and yield from 1 to 200 gallons per minute. These aquifers are susceptible to large water-level declines from small to moderate groundwater withdrawals due to low permeability, small areal extent, and limited recharge (Lloyd and Lyke 1995). Mississippian sandstone and carbonate aquifers are covered by as much as 150 feet of regolith containing clay, silt, sand, and pebble-sized limestone deposits that can store large quantities of water as it percolates slowly downward to recharge aquifers in the underlying consolidated limestone. Karst features are common throughout the Mississippian aquifers; facilitating recharge and groundwater transport (Lloyd and Lyke 1995). Ordovician carbonate aquifers are overlain and interspersed with confining units of shale, creating lower, middle, and upper rock groups throughout the aquifers. Wells can range from 50 to more than 1,400 feet below land surface and yield between 2 to more than 300 gallons per minute. In the Ordovician aquifers, the regolith is thinner and dissolution of rock features is less advanced than in Mississippian aquifers. Confining units are made of clay particles and can impede vertical movement of groundwater, isolating groundwater above and below the confining layers. Regionally, groundwater movement drains toward the nearest river system (Lloyd and Lyke 1995). Concentrations of dissolved solids, iron, and hardness in the sandstone and carbonate aquifers of Kentucky and Tennessee are less than or equal to the secondary maximum contaminant levels for drinking water established by the U.S. Environmental Protection Agency (EPA) (Lloyd and Lyke 1995; EPA 2024f). Groundwater in limestone aquifers is susceptible to contamination from discharges of solid and liquid wastes into sinkholes or from polluted stormwater runoff into losing streams or swallow holes. Additionally, water rapidly pumped from large-capacity wells can dislodge silt or clay resulting in high turbidity (Lloyd and Lyke 1995).

3.2 Southeastern Coastal Plains Aquifers

The Southeastern Coastal Plains aquifer system is complex and hydrogeologic units within the system may encompass multiple local aquifers, confining units, formations or parts of formations (Renken 1996). Generally, the Southeastern Coastal Plains aquifers are located throughout Alabama, Georgia, South Carolina, and Florida; with small sections wrapping north into the western edges of Tennessee and Kentucky (Lloyd and Lyke 1995; Miller 1995). More specifically, the Shawnee Fossil Plant is located on the northern end of the Southeastern Coastal Plains Province, along the Ohio River. The Southeastern Coastal Plains aquifers are primarily comprised of semiconsolidated sand and separated by clayey confining units (Miller 1995). The Shawnee Fossil Plant is located in an area where the Southeastern Coastal Plains aquifer system grades into parts of the Mississippi Embayment aquifer system (Lloyd and Lyke 1995; Miller 1995). Recharge into the Southeastern Coastal Plain aquifers occurs from precipitation onto outcrop areas. Groundwater movement occurs laterally and discharges into small streams, with only a small part of the water percolating downward into the aquifer system (Miller 1995). Groundwater within the Southeastern Coastal Plains predominantly contains dissolved solids, dissolved iron, and dissolved chloride. Dissolved-solids concentrations generally remain below Secondary Drinking Water Maximum Contaminant Levels established by the EPA; however, when freshwater mixes with saltwater, concentrations rise well above the Secondary Drinking Water Maximum Contaminant Levels (Miller 1995; EPA 2024f). In recharge areas, concentrations of dissolved iron are lower than the EPA Secondary Drinking Water Maximum Contaminant Levels but are in exceedance further downgradient (Miller 1995; EPA 2024f).

3.3 Valley and Ridge Aquifers

The Valley and Ridge aquifers extend from Alabama and Georgia to as far north as New York and encompass the Bull Run, John Sevier, and Kingston coal plants. The Valley and Ridge aquifers consist primarily of carbonate rocks with recharge occurring from direct connections with rivers and lakes. Groundwater movement predominantly occurs in valleys and is localized to shallow, isolated groundwater flow systems within 300 feet of the land surface. Yields throughout the Valley and Ridge aquifers ranges from 1 to 2,500 gallons per minute (Lloyd and Lyke 1995). Groundwater within the Valley and Ridge aquifers is hard and contains dissolved solids with concentrations below the EPA's Secondary Maximum Contaminant Levels for Drinking Water (Lloyd and Lyke 1995; EPA 2024f). Carbonate aquifers are susceptible to contamination from the land surface, especially if overlying residuum is thin. Solution openings in carbonate rocks can result in the rapid and widespread transport of contaminated groundwater (Lloyd and Lyke 1995).

3.4 Appalachian Plateaus Aquifers

The Appalachian Plateaus aquifers extend from the northeastern corner of Ohio to the northeastern corner of Alabama, along the west of the Appalachian Mountains and encompassing the Widows Creek Fossil Plant. Like the Interior Low Plateaus aquifers, the Appalachian Plateaus aquifers are made of carbonate and sandstone aquifers of Mississippian and Pennsylvanian age; however, in the southern reaches of the Appalachian Plateaus Province, Pennsylvanian sandstone aquifers overlie Mississippian limestone aquifers. Because the limestone isn't exposed, precipitation must percolate through joints and fractures in the sandstone before it reaches the limestone (Miller 1995). Groundwater movement and yield is largely dependent on the interconnectedness of fractures within the overlying sandstone, resulting in restricted circulation of groundwater movement through the underlying carbonate rocks (Lloyd and Lyke 1995; Miller 1995). Water availability in Alabama, near the Widows Creek Fossil Plant, is generally poor to fair with yields ranging

from less than 5 to 60 gallons per minute from wells 100 to 250 feet deep in sandstone aquifers, and less than 5 to 150 gallons per minute from wells 200 feet deep in limestone aquifers (Miller 1995). Water in the sandstone and carbonate aquifers of the Appalachian Plateaus Province is suitable for most uses with minimal treatment (Lloyd and Lyke 1995; Miller 1995). Groundwater in sandstone aquifers is generally softer than groundwater found in limestone aquifers which contain more dissolved solids. Additionally, carbonate aquifers often have higher concentrations of dissolved solids (Lloyd and Lyke 1995).

4.0 Surface Waters and Wetlands

The affected environment that could be impacted by the proposed action would span several hydrologic subregions, including those associated with the Tennessee River, the Cumberland River, the Ohio River, and the Green River. These watersheds are described further in the following subsections.

4.1 Tennessee River Watershed

The Tennessee River watershed covers approximately 41,000 square miles over 129 counties in Tennessee, Alabama, Kentucky, Georgia, Mississippi, North Carolina, and Virginia. The Tennessee River watershed begins with headwaters in the mountains of western Virginia, North Carolina, eastern Tennessee, and northern Georgia. At Knoxville, Tennessee, the Holston and French Broad rivers join to form the Tennessee River, which then flows southwest through the state, gaining water from three other large tributaries: the Little Tennessee, Clinch, and Hiwassee rivers. The Tennessee River eventually flows into Alabama, where it picks up another large tributary, the Elk River. At the northeast corner of Mississippi, the river turns north and re-crosses Tennessee, picking up the Duck River, and continues to Paducah, Kentucky where it enters the Ohio River.

The entire length of the Tennessee River is regulated by a series of nine locks and dams built mostly in the 1930s and 1940s. All the major tributaries have at least one dam, creating 14 multipurpose storage reservoirs and seven single-purpose power reservoirs. This system of dams and their operation is the most significant factor affecting water quality and aquatic habitats in the Tennessee River and its major tributaries.

Major water quality concerns within the Tennessee River drainage basin include point and non-point sources of pollution that degrade water quality at several locations on mainstream reservoirs and tributary rivers and reservoirs. Toxic substances have been found in sediment and fish in reservoirs along the Tennessee River that otherwise have good water quality. Other water quality concerns include occurrences of low dissolved oxygen levels downstream of dams, which stresses aquatic life and limits the ability of the water to assimilate wastes.

Point and non-point sources of pollution within TVA reservoirs and watersheds include:

- Heat-releases – Utility and industrial plants may release water into streams or lakes that have been heated above the ambient temperature of the body of water.
- Wastewater discharges – Sewage treatment systems, utilities, industry, and others discharging waste into streams and lakes or using outdated or damaged infrastructure.
- Physical alterations – channelization and vegetation removal.
- Runoff from agriculture, urban uses and development, landfills, and mined land.

- Air pollution – Pollutant concentrations in the air can affect surface waters through rain and deposition (TDEC 2024).

4.2 Cumberland River

The Cumberland River travels from its headwaters in Lechter County, Kentucky, across almost 700 miles to its mouth on the Ohio River, draining a watershed of 18,000 square miles. More than 300 miles of the Cumberland River flow through Tennessee collecting water from 11,000 square miles of watershed (Troplovich 2017).

Generally, water quality in the Cumberland River is good (KYEEC 2000). The Cumberland River and its tributaries exhibit moderate to high concentrations of calcium and magnesium and a slightly alkaline pH because much of the basin consists of limestone and dolomitic bedrock. Additionally, the mainstream Cumberland River exhibits lower suspended solids concentrations than its tributaries. Water quality concerns within the Cumberland River basin are primarily attributed to agriculture and livestock, such as sedimentation and fecal contamination, but can also be attributed to physical stream alterations, land disposal of wastes, municipal and industrial discharges, mining, and urban runoff (KYEEC 2000).

4.3 Lower Ohio River

The headwaters of the Ohio River originate in Pittsburgh, Pennsylvania at the confluence of the Allegheny and Monongahela Rivers, and flow southwesterly to its confluence with the Mississippi River in Cairo, Illinois. The lower Ohio River receives drainage from an extensive, 204,000-square-mile watershed that reaches into 13 states, encompassing much of the east central United States. A series of locks and dams allows commercial navigation along the entire 981-mile length of the river from the Mississippi River to Pittsburgh, Pennsylvania. It forms the northern boundary of Kentucky for a distance of 664 stream miles (ORSANCO 2022).

The upper Ohio Valley is highly industrialized and sources of pollution from industrial and municipal sources are many and varied. Non-point source pollution, primarily from agricultural runoff and mining, contributes to sediment and nutrient contamination of the Ohio River whereas point source pollution from industrial discharges or illegal dumping contributes to heavy metal contamination (KYEEC 2024). The Ohio River Valley Water Sanitation Commission is responsible for evaluating water quality in the main stream. Fish consumption advisories have been placed on paddlefish (*Polyodon spathula)*, paddlefish eggs (harvested for caviar), channel catfish (*Ictalurus punctatus*), carp (Cyprinidae), and white bass (*Morone chrysops*) along the entire length of the Ohio River bordering Kentucky because of chlordane (a pesticide) and polychlorinated biphenyl (PCB) contamination.

4.4 Green River

The Green River Basin is located in south central Kentucky and north central Tennessee. The drainage area is 9,273 square miles, of which 377 square miles are in Tennessee. The Green River originates in Lincoln and Casey counties in Kentucky and flows generally westward for 330 miles to its confluence with the Ohio River just upstream from Henderson, Kentucky. A system of seven locks and dams enables navigation on the downstream portion of the Green River. The upper basin is characterized by rugged, hilly terrain. The central part of the basin drains the karst region, an area that is interlaced with large cave systems. In the karst region, surface streams are almost non-existent and most of the water drainage is subterranean, eventually draining to the Green River via large springs.

Concentrations of chloride in the upper basin of the Green River are higher than those recorded at other locations in the basin and have been associated with brines from oil production. Additionally, concentrations of sulfate were low in samples collected from 1987 through 1989. Nitrite levels were among the highest for Kentucky's monitoring locations possibly due to agricultural and urban runoff and municipal wastewater discharges; however, water quality in the Green River Basin is good overall. Major non-point sources of basin contamination are attributed to agriculture (sediment, nutrients, and pesticides) and urban stormwater runoff (sediments); whereas point source contamination is attributed to mining or drilling (chloride, sediments, total dissolved solids) and municipal or industrial wastewater discharges (chlorine, dissolved oxygen, PCBs) (KYEEC 2001, 2024).

4.5 Wetlands

The PEA study area intersects all or portions of 10 Hydrologic Unit Code (HUC)-8 sub-basins. Wetland characteristics within these sub-basins are described in Table C-3.

Table C-3. Wetland Characteristics by HUC-8 Sub-basin

Site	Watershed[1]	Area (square miles)[1]	Watershed Characteristics[1]
		Tennessee	
Cumberland Fossil Plant; Stewart County	Lower Cumberland River	2,333.7	Wetlands account for roughly 6% of the total land area of the Lower Cumberland watershed. Roughly 77% of wetlands are classified as riverine, lake, and freshwater pond. Roughly 20% are classified as freshwater forested/shrub wetland and roughly 3% are classified as freshwater emergent wetland.
Johnsonville Fossil Plant; Humphreys County	Kentucky Lake	1,185.0	Wetlands account for roughly 16% of the total land area of the Kentucky Lake watershed. Roughly 70% of wetlands are classified as riverine, lake, and freshwater pond. Roughly 28% are classified as freshwater forested/shrub wetland and roughly 2% are classified as freshwater emergent wetland.
Gallatin Fossil Plant; Sumner County	Lower Cumberland-Old Hickory Lake	985.7	Wetlands account for roughly 5% of the total land area of the Lower Cumberland-Old Hickory Lake watershed. Roughly 91% of wetlands are classified as riverine, lake, and freshwater pond. Roughly 8% are classified as freshwater forested/shrub wetland and roughly 1% are classified as freshwater emergent wetland.
Kingston Fossil Plant; Roane County	Emory River	866.2	Wetlands account for roughly 3% of the total land area of Emory watershed. Roughly 82% are classified as riverine, lake, and freshwater pond. Roughly 17% are classified as freshwater forested/shrub

Site	Watershed[1]	Area (square miles)[1]	Watershed Characteristics[1]
			wetland and roughly 1% are classified as freshwater emergent wetland.
Bull Run Fossil Plant; Anderson County	Lower Clinch River	636.2	Wetlands account for roughly 4% of the total land area of the Lower Clinch watershed. Roughly 89% are classified as riverine, lake, and freshwater pond. 10% are classified as freshwater forested/shrub wetland and roughly 1% are classified as freshwater emergent wetland.
John Sevier Fossil Plant; Hawkins County	Holston River	1,000.0	Wetlands account for roughly 7% of the total land area of Hoston watershed. Roughly 95% are classified as riverine, lake, and freshwater pond. Roughly 3% are classified as freshwater forested/shrub wetland and roughly 2% are classified as freshwater emergent wetland.
		Kentucky	
Shawnee Fossil Plant; McCracken County	Lower Ohio River	923.6	Wetlands account for roughly 13% of the total land area of the Lower Ohio watershed. Roughly 48% are classified as riverine, lake, and freshwater pond. Roughly 49% are classified as freshwater forested/shrub wetland and roughly 3% are classified as freshwater emergent wetland.
Paradise Fossil Plant; Muhlenberg County	Middle Green River	1,027.6	Wetlands account for roughly 5% of the total land area of the Middle Green watershed. Roughly 50% are classified as riverine, lake, and freshwater pond. Roughly 46% are classified as freshwater forested/shrub wetland and roughly 4% are classified as freshwater emergent wetland.
		Alabama	
Colbert Fossil Plant; Colbert County	Pickwick Lake	2,282.4	Wetlands account for roughly 11% of the total land area of Pickwick Lake. Roughly 42% are classified as riverine, lake, and freshwater pond. Roughly 54% are classified as freshwater forested/shrub wetland and roughly 4% are classified as freshwater emergent wetland.
Widow's Creek Fossil Plant; Jackson County	Guntersville Lake	1,997.5	Wetlands account for roughly 8% of the total land area of Guntersville Lake. Roughly 83% are classified as riverine, lake, and freshwater pond. Roughly 16% are classified as freshwater forested/shrub wetland and roughly 1% are classified as freshwater emergent wetland.

Site	Watershed[1]	Area (square miles)[1]	Watershed Characteristics[1]
Combined Wetlands			
TVA PSA Total Land Cover[2]		~80,000.0	Within above-mentioned HUC-8 sub-basins, wetlands account for roughly 9% of the total land area. Roughly 66% are classified as riverine, lake, and freshwater pond. Roughly 31% are classified as freshwater forested/shrub wetland and roughly 3% are classified as freshwater emergent wetland. Wetlands within these sub-basins account for roughly 1.5% of the total land cover of the TVA PSA.
Total Land Cover in HUC8 sub-basins surrounding TVA Fossil Plant Reservations		13,867.8	
Total wetlands in HUC8 sub-basins surrounding TVA Fossil Plant Reservations		1,019.8	

Source: [1]USFWS 1982; [2]TVA 2024b

5.0 Wildlife Habitat

TVA manages an extensive reservoir system across the PSA. The construction of the TVA and U.S. Army Corps of Engineers reservoir systems created large areas of habitat for waterfowl, herons and egrets, ospreys, gulls, and shorebirds, especially in the central and eastern portions of the TVA PSA where this habitat was historically limited. Riparian habitats associated with the Tennessee River and its tributaries provide important habitats for wildlife. Coupled with unique features such as vernal pools, oxbows, bluffs, and islands, these areas provide a diverse array of nesting and foraging habitats (TVA 2024b). Review of the TVA Regional Natural Heritage database in December 2024 indicated osprey nests are known within 3 miles of all of the coal plant sites evaluated in this PEA.

Populations of white-tailed deer (*Odocoileus virginianus*), wild turkey (*Meleagris gallopavo*), coyote (*Canis latrans*), and beaver (*Castor canadensis*) have shown significant population increases in the TVA PSA (TVA 2024b). Species associated with river corridors such as osprey (*Pandion haliaetus*), herons and egrets (Ardeidae), and the Canada goose (*Branta canadensis*) have also shown notable recoveries. Recent surveys show that shorebirds and waterfowl communities are quite diverse in portions of the PSA, especially during autumn and spring migrations. However, numbers of several species of songbirds continue to decline in the region, especially those species typically found in grassland or unfragmented forests (TVA 2011).

Review of the U.S. Fish and Wildlife Service (USFWS) Information for Planning and Consultation (IPaC) website indicated 22 migratory bird species of conservation concern (BCC) have the potential to occur at the coal plants evaluated in this PEA (Table C-4). Suitable foraging or nesting habitat for these species could occur within some of the coal plant reservation areas, particularly in areas where ecologically significant sites occur on or near the plant sites. The number of BCCs to potentially occur within individual plant sites ranges from five species within the Widows Creek coal plant area to 17 species within the Johnsonville and Shawnee coal plant sites, respectively (Table C-4).

Table C-4. Birds of Conservation Concern in the Vicinity of TVA Coal Plant Sites

Common Name	Scientific Name	Coal Plant Site[1]
Swifts		
Chimney swift	*Chaetura pelagica*	BRF, COF, CUF, GAF, JSF, JOF, KIF, PAF, SHF, WCF
Woodpeckers		
Red-headed Woodpecker	*Melanerpes erythrocephalus*	BRF, COF, CUF, GAF, JSF, JOF, KIF, PAF, SHF, WCF
Nightjars		
Eastern Whip-poor-will	*Antrostomus vociferus*	BRF, COF, CUF, JOF, KIF, PAF, SHF
Chuck-will's-widow	*Antrostomus carolinensis*	BRF
Shorebirds		
Lesser Yellowlegs	*Tringa flavipes*	COF, GAF, JOF, KIF, PAF, SHF
Semipalmated Sandpiper	*Calidris pusilla*	GAF, JOF, KIF, PAF, SHF
Least Tern	*Sternula antillarum antillarum*	JOF, SHF
Black-billed Cuckoo	*Coccyzus erythropthalmus*	BRF, JSF, JOF, SHF
Perching Birds		
Rusty Blackbird	*Euphagus carolinus*	BRF, COF, CUF, JSF, JOF, KIF, PAF, SHF, WCF
Wood Thrush	*Hylocichla mustelina*	BRF, COF, CUF, GAF, JSF, JOF, KIF, PAF, SHF
Bobolink	*Dolichonyx oryzivorus*	BRF, COF, JOF, SHF
Brown-headed Nuthatch	*Sitta pusilla*	JOF
Warblers		
Kentucky Warbler	*Geothylpis Formosa*	BRF, COF, CUF, GAF, JSF, JOF, KIF, PAF, SHF, WCF
Prairie Warbler	*Setophaga discolor*	BRF, COF, CUF, GAF, JSF, JOF, KIF, PAF, SHF, WCF
Prothonotary Warbler	*Protonotaria citrea*	BRF, COF, CUF, GAF, JSF, JOF, KIF, PAF, SHF
Cerulean Warbler	*Setophaga cerulea*	BRF, JSF, SHF
Canada Warbler	*Cardellina canadensis*	JOF
Golden-winged Warbler	*Vermivora chrysoptera*	BRF
Sparrows		
Field Sparrow	*Spizella pusilla*	COF, CUF, GAF, JOF, KIF, PAF, SHF
Grasshopper Sparrow	*Ammodramus savannarum perpallidus*	COF, GAF, JOF, KIF, PAF, SHF
Henslow's Sparrow	*Centronyx henslowii*	BRF, KIF, PAF, SHF
Le Conte's Sparrow	*Ammospiza leconteii*	COF, JOF

Source: USFWS Information for Planning and Consultation (IPaC) resource list (https://ecos.fws.gov/ipac/), accessed 12/20/2024.

[1] Coal plant names are as follows: BRF= Bull Run Fossil Plant, COF= Colbert Fossil Plant, CUF=Cumberland Fossil Plant, GAF= Gallatin Fossil Plant, JSF=John Sevier Fossil Plant, JOF=Johnsonville Fossil Plant, KIF= Kingston Fossil Plant, PAF= Paradise Fossil Plant, SHF= Shawnee Fossil Plant, WCF= Widows Creek Fossil Plant.

6.0 Literature Cited

Literature cited within this appendix is listed in Appendix G.

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APPENDIX D – DEMOGRAPHIC AND ECONOMIC CHARACTERISTICS OF THE POPULATIONS WITHIN THE STUDY AREA

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Demographic and Economic Characteristics of the Study Area

1.0 Demographic and Economic Characteristics

The estimated population of the Tennessee Valley Authority (TVA) power service area (PSA) was 10.5 million in 2022 (TVA 2024b). This represents a 7.4 percent increase over the 2010 population (approximately 9.8 million). The rate of increase from 2010 to 2022 is greater than the 7.0 percent increase for the United States as a whole. However, in more recent years, the rate of population increase has declined in both the TVA PSA and the nation. The annual rate of population growth in the TVA PSA declined from 0.72 percent between 2010 and 2020 to 0.1 percent between 2020 and 2022. Between 2022 and 2040, the annual rate of population growth in the TVA PSA is projected to be 0.69 percent, greater than the projected growth rate of the nation of 0.4 percent (TVA 2024b).

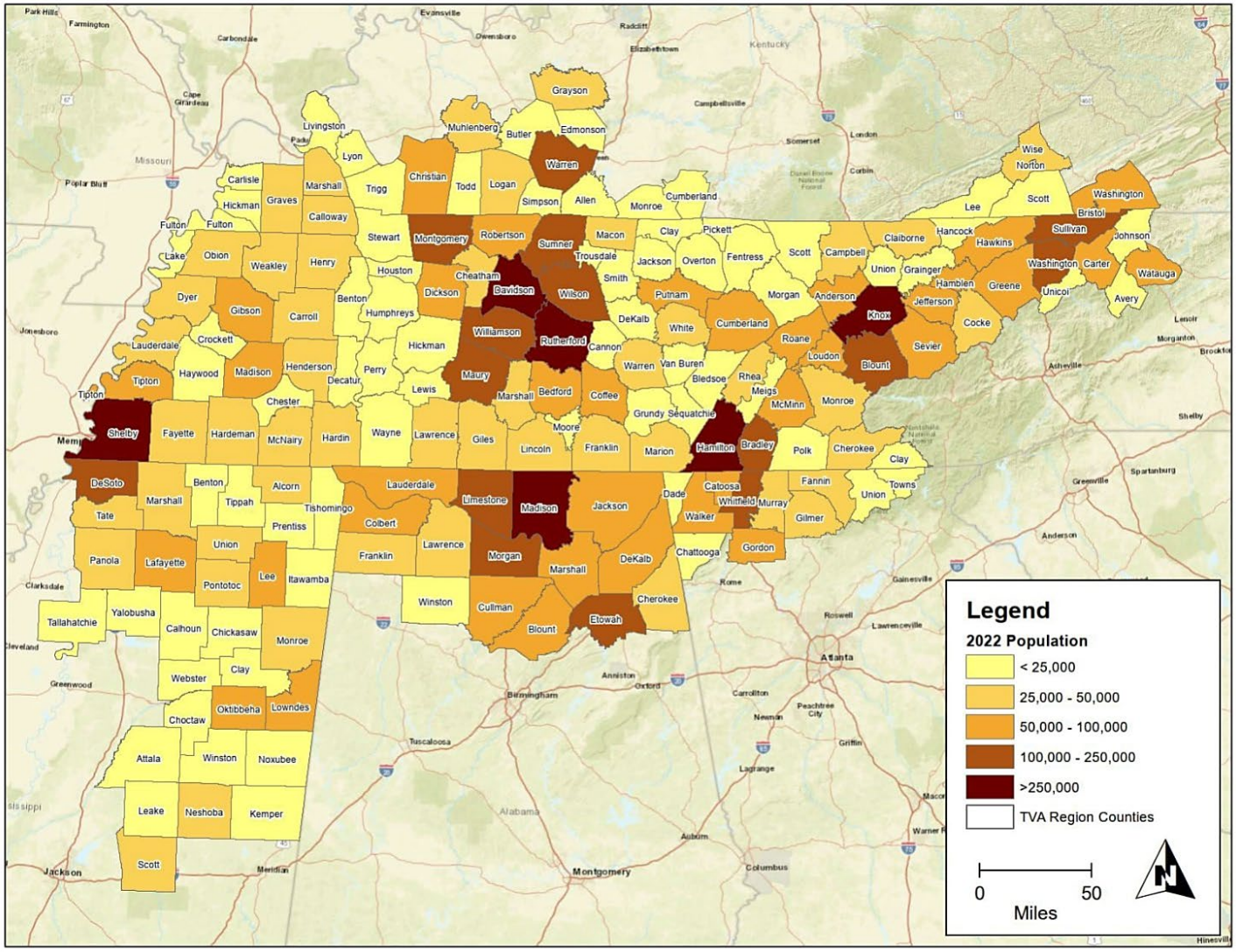
Population varies greatly among the counties in the PSA (Figure D-1). The larger population concentrations tend to be located along major river corridors: the Tennessee River and its tributaries from northeast Tennessee through Knoxville and Chattanooga into north Alabama; the Nashville area around the Cumberland River; and the Memphis area on the Mississippi River. Low population counties are scattered around the region, but most are in Mississippi, the Cumberland Plateau of Tennessee, and the Highland Rim of Tennessee and Kentucky (TVA 2024b).

Socioeconomic characteristics of the 10 counties containing TVA coal plants considered in this PEA are summarized in Table D-1 and Table D-2. Although most of the TVA PSA's total population live in metropolitan areas (68.2 percent in 2022) (TVA 2024b), only four of the 10 TVA coal plants considered in this PEA are located in designated metropolitan areas.

- Colbert Fossil Plant is located in Colbert County, in the Florence-Muscle Shoals, Alabama metropolitan area.
- John Sevier Fossil Plant is located in Hawkins County, in the Kingsport-Bristol-Bristol, Tennessee-Virginia metropolitan area.
- Kingston Fossil Plant is located in Roane County, in the Knoxville, Tennessee metropolitan area.
- Gallatin Fossil Plant is located in Sumner County, in the Nashville-Davidson-Murfreesboro-Franklin, Tennessee metropolitan area.

Furthermore, although the above listed plants are included within the boundaries of the metropolitan areas, the coal plant reservations are generally located in the more remote, less populated regions of these metropolitan areas.

Estimates of population within counties outside of the metropolitan areas ranged from 13,657 in Humphreys County, Tennessee to 77,123 in Anderson County, Tennessee, in 2022. As with the coal-fired power plants located in the metropolitan areas, plants outside of metropolitan areas are also generally located in less populated areas of the county.



Source: TVA 2024b

Figure D-1. Variation in Population of Counties in the TVA PSA

In general, the population in the 10 counties with coal plants under consideration in this PEA has remained relatively consistent, with the exception of Sumner County, Tennessee which increased by 22.2 percent between 2010 and 2020. Over the same period, five of the remaining nine counties had growth rates between 2.4 and 5.1 percent, while four counties experienced population declines, ranging from 0.2 to 1.8 percent (Table D-1 and Table D-2). Apart from Sumner County, the study area has experienced less population growth since 2010 than the TVA PSA and the nation.

The TVA 2025 Integrated Resource Plan (IRP) Environmental Impact Statement (TVA 2024b) identified minority populations within the PSA at the county level. The minority population (i.e., all nonwhite racial groups combined and Hispanic or Latino) of the TVA PSA, as of 2022, was approximately 26.7 percent of the region's total population of 10.5 million (TVA 2024b). This is well below the national average minority population of 42.1 percent (USCB 2020). Within the PSA, the Black or African American population comprised the largest single minority or ethnic group, with 15.7 percent of the total population (TVA 2024b). As shown in Figure D-2, minority populations are largely concentrated in the metropolitan areas in the western half of the region and in rural counties in Mississippi and western Tennessee. Total minority populations within the 10 counties comprising the study area range from 6.9 percent to 24.4 percent of the population. All of these counties are below the TVA PSA average.

Racial characteristics in the 10 counties that contain TVA coal plants are predominantly white alone (not Hispanic or Latino), with Black or African Americans typically comprising the largest single minority or ethnic group, which is consistent with the state-wide percentages for Alabama, Kentucky, and Tennessee (see Tables D-1 and D-2) and the TVA PSA. McCracken County, Kentucky has slightly higher percentages of Black and African American residents, and those that identify as two or more races, than the state. Other minority racial and ethnic groups present in the 10-county study area are generally at or below comparative rates for their respective states.

The TVA 2025 IRP Environmental Impact Statement defined low-income populations as those with poverty rates above the TVA PSA average rate of 14.8 percent. As shown in Figure D-3, 124 counties and two independent cities in the PSA had poverty rates above the PSA average (TVA 2024b). Per capita income in the study area counties ranged from $27,695 to $40,419 in 2022. These are below the nation's per capita income of $41,261, which is typical for the TVA PSA, where only five counties had per capita incomes above the nation's (TVA 2024b).

Within the 10-county study area, the percentage of the population living below the poverty level ranges from 9.4 percent to 18.6 percent. Humphreys, Stewart, Sumner, and Roane counties in Tennessee have poverty rates below the TVA PSA average rate of 14.8 percent. This is higher than the national average of 12.5 percent (USCB 2022). Colbert and Jackson counties in Alabama, McCracken and Muhlenberg Counties in Kentucky, and Anderson and Hawkins counties in Tennessee have poverty rates that exceed the TVA PSA average; however, none of them fall within the highest poverty rate category (greater than 19.7 percent) depicted in Figure D-3. In 2022, the average unemployment rate for the TVA PSA was five percent, lower than the nation (5.3 percent) during the same time period (TVA 2024b). The total civilian labor force within the 10 counties that contain TVA coal plants is 294,019. Unemployment rates in the study area are largely similar to that of the PSA as a whole, though a few counties have somewhat higher rates, the highest of which is Humphreys County, Tennessee at 10.2 percent (see Tables D-1 and D-2).

Table D-1. Summary of Demographic Data for Counties in Alabama and Kentucky Containing TVA Coal Plants

Demographic Characteristics	Colbert County, AL	Jackson County, AL	State of Alabama	McCracken County, KY	Muhlenberg County, KY	State of Kentucky
Population[1,2,3]						
Population, 2020	57,227	52,579	5,024,279	67,875	30,928	4,505,836
Population, 2010	54,428	53,227	4,779,736	65,565	31,499	4,339,367
Percent Change 2010-2020	5.1%	-1.2%	5.1%	3.5%	-1.8%	3.8%
Persons Under 18 years, 2022	20.9%	20.6%	22.1%	21.8%	20.8%	22.5%
Persons 65 Years Over, 2022	20.0%	20.6%	17.3%	20.1%	19.8%	16.8%
Racial Characteristics[2]						
Not Hispanic or Latino						
White alone, 2020[(a)]	75.6%	85.8%	63.1%	79.3%	91.2%	81.3%
Black or African American, 2020[(a)]	16.1%	3.1%	25.6%	11.1%	3.9%	7.9%
American Indian and Alaska Native, 2020[(a)]	0.4%	1.3%	0.5%	0.3%	0.2%	0.2%
Asian, 2020[(a)]	0.8%	0.4%	1.5%	1.0%	0.2%	1.6%
Native Hawaiian and Other Pacific Islander, 2020[(a)]	0.0%	0.0%	0.1%	0.0%	0.0%	0.1%
Some Other Race alone (2020)[(a)]	0.2%	0.2%	0.3%	0.3%	0.2%	0.3%
Two or More Races, 2020	3.9%	6.0%	3.7%	4.9%	2.5%	3.9%
Hispanic or Latino, 2020	3.0%	3.2%	5.3%	3.1%	1.8%	4.6%
Economic and Employment Characteristics[3]						
Per Capita Income in Past 12 months, 2022	$30,724	$27,695	$33,344	$36,401	$31,621	$33,515
Persons Below Poverty Level, 2022	15.9%	18.6%	15.7%	15.2%	16.3%	16.1%
Civilian Labor Force, 2022	26,492	21,717	2,329,696	31,073	13,169	2,133,954
Percent Employed, 2022	96.6%	94.0%	94.8%	96.4%	95.1%	94.9%
Percent Unemployed, 2022	3.4%	6.0%	5.2%	3.6%	4.9%	5.1%

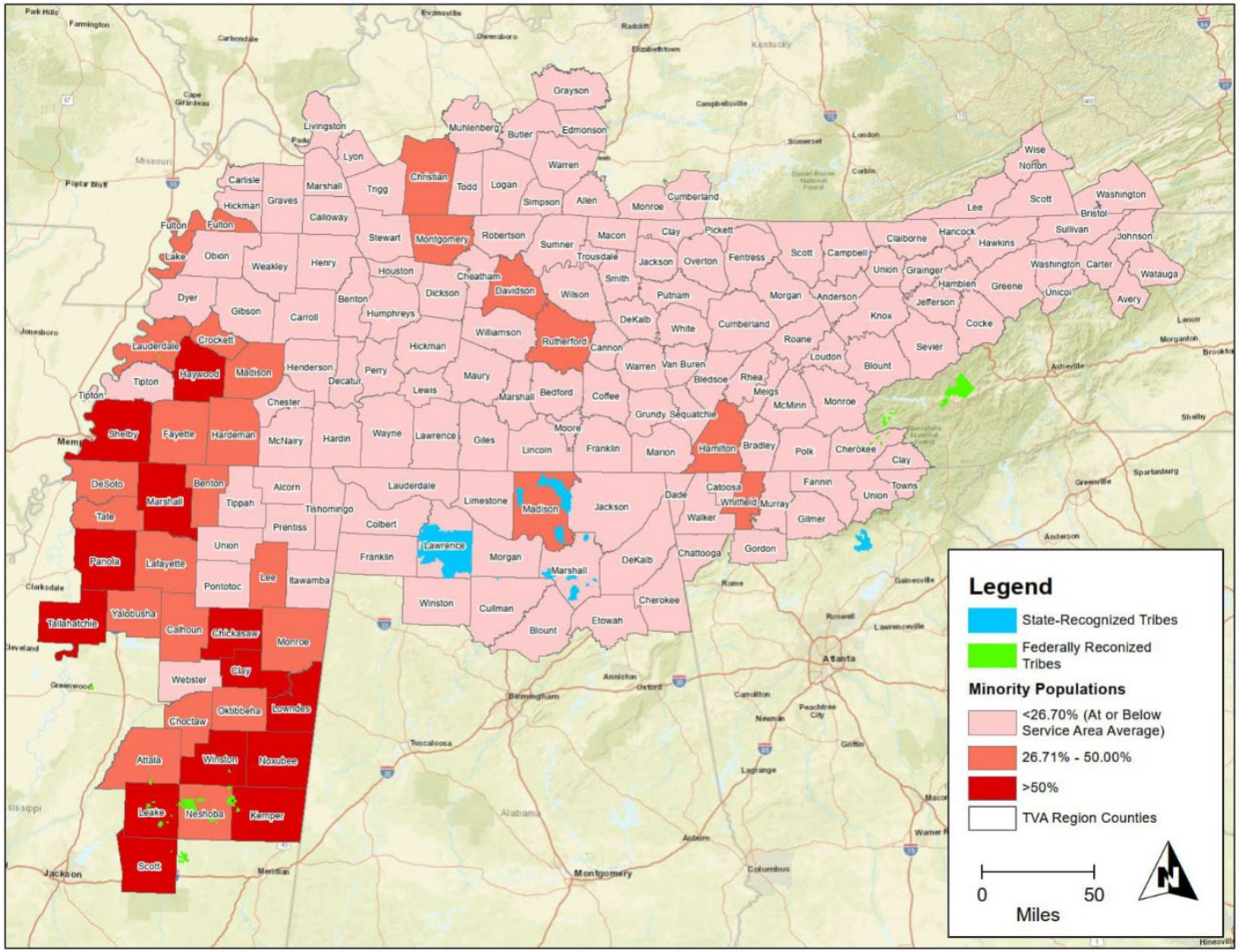
Sources: 1. USCB 2010, 2. USCB 2020, 3. USCB 2022

[(a)] Includes persons reporting only one race

Table D-2. Summary of Demographic Data for Counties in Tennessee Containing TVA Coal Plants

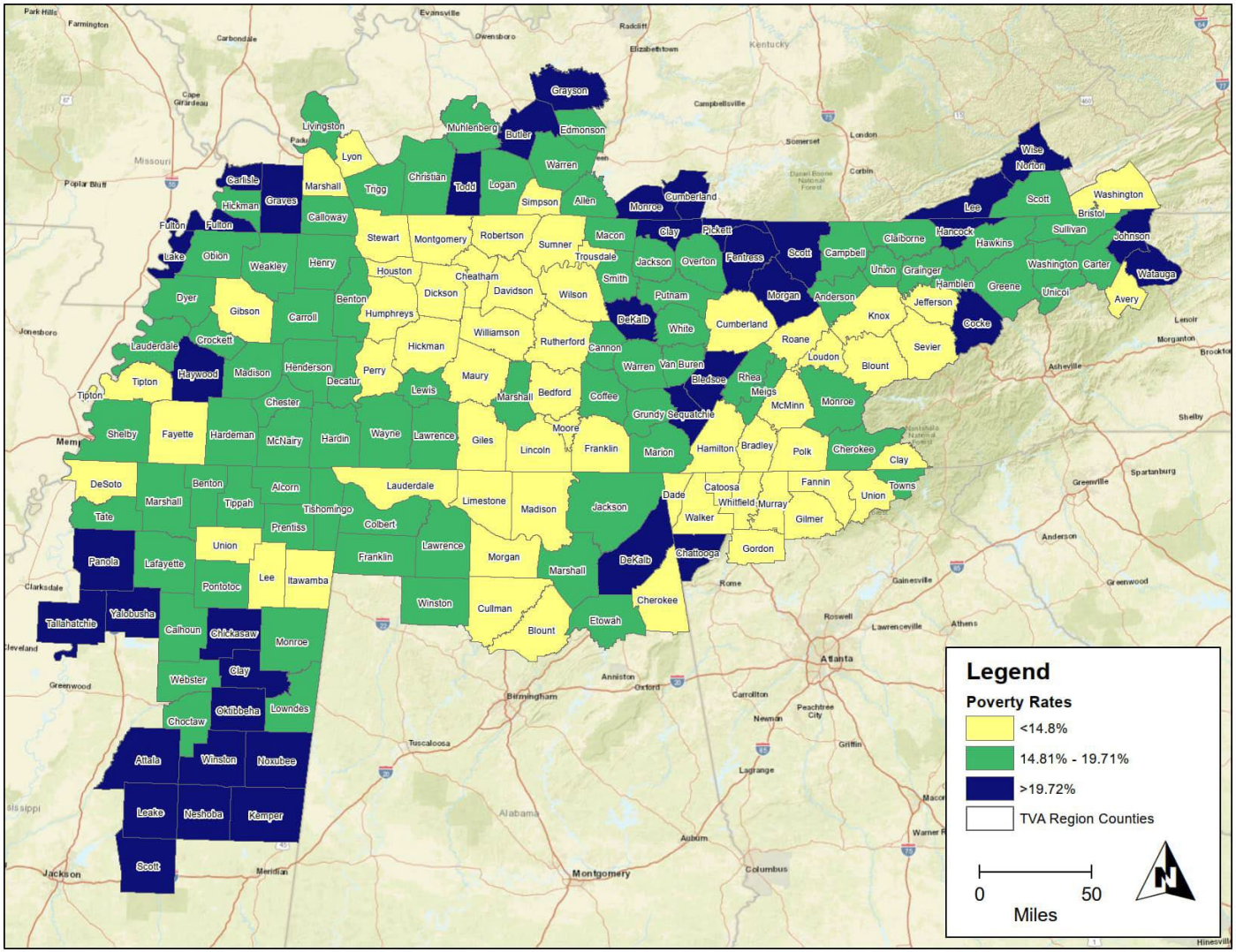
Demographic Characteristics	Anderson County	Hawkins County	Humphreys County	Roane County	Stewart County	Sumner County	State of Tennessee
Population[1,2,3]							
Population, 2020	77,123	56,721	18,990	53,404	13,657	196,281	6,910,840
Population, 2010	75,129	56,833	18,538	54,181	13,324	160,645	6,346,105
Percent Change 2010-2020	2.7%	-0.2%	2.4%	-1.4%	2.5%	22.2%	8.9%
Persons Under 18 years, 2022	21.2%	19.3%	22.2%	18.7%	22.0%	23.2%	22.0%
Persons 65 Years Over, 2022	20.2%	21.5%	20.2%	23.0%	20.5%	16.3%	16.7%
Racial Characteristics[1]							
Not Hispanic or Latino							
White alone, 2020[(a)]	85.6%	93.1%	90.1%	90.1%	90.2%	79.1%	70.9%
Black or African American, 2020[(a)]	3.7%	1.2%	2.6%	2.4%	1.3%	7.9%	15.7%
American Indian and Alaska Native, 2020[(a)]	0.3%	0.2%	0.2%	0.3%	0.5%	0.2%	0.2%
Asian, 2020[(a)]	1.3%	0.5%	0.3%	0.6%	0.6%	1.5%	1.9%
Native Hawaiian and Other Pacific Islander, 2020[(a)]	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%
Some Other Race alone (2020) [(a)]	0.4%	0.2%	0.4%	0.3%	0.3%	0.3%	0.3%
Two or More Races, 2020	5.1%	3.3%	4.1%	4.3%	4.6%	4.3%	3.9%
Hispanic or Latino, 2020	3.7%	1.6%	2.4%	1.9%	2.5%	6.6%	6.9%
Economic and Employment Characteristics[3]							
Per Capita Income in Past 12 months, 2022	$32,803	$28,648	$29,561	$36,579	$28,362	$40,419	$36,040
Persons Below Poverty Level, 2022	15.4%	16.9%	12.0%	12.2%	11.5%	9.4%	14.0%
Civilian Labor Force, 2022	34,837	23,986	8,678	24,887	5,833	103,347	3,430,845
Percent Employed, 2022	94.6%	91.4%	89.8%	95.1%	96.2%	96.5%	95.0%
Percent Unemployed, 2022	5.4%	8.6%	10.2%	4.9%	3.8%	3.5%	5.0%

Sources: 1. USCB 2010, 2. USCB 2020, 3. USCB 2022 [(a)] Includes persons reporting only one race



Source: TVA 2024b

Figure D-2. Minority Populations at the County Level in the TVA PSA



Source: TVA 2024b

Figure D-3. Poverty Rates of Counties in the TVA PSA

2.0 Literature Cited

Literature cited within this appendix is listed in Appendix G.

APPENDIX E – SYMBOLS, ACRONYMS, AND ABBREVIATIONS

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Symbols, Acronyms, and Abbreviations

ADEM	Alabama Department of Environmental Management
APE	Area of Potential Effect
ASTM	American Society for Testing and Materials
BCC	Birds of Conservation Concern
BCE	Before Common Era
BGEPA	Bald and Golden Eagle Protection Act
BMP	best management practice
BPF	beneficiation processing facility
BRF	Bull Run Fossil Plant
CAA	Clean Air Act
CBMPP	Construction Best Management Practices Plans
CCR	coal combustion residuals
CE	Common Era
CFR	Code of Federal Regulations
CH_4	methane
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
COF	Colbert Fossil Plant
CUF	Cumberland Fossil Plant
CWA	Clean Water Act
dB	decibel(s)
dBA	a-weighted decibel
DEP	Kentucky Department for Environmental Protection
DOW	Kentucky Division of Water
EA	environmental assessment
EO	Executive Order
EPA	U.S. Environmental Protection Agency
EPCRA	Emergency Planning and Community Right to Know Act
ESA	Endangered Species Act
ETSZ	East Tennessee Seismic Zone
F	Fahrenheit
FEMA	Federal Emergency Management Agency
FGD	flue gas desulfurization
FHWA	Federal Highway Administration
FONSI	finding of no significant impact
FR	Federal Register
FRP	Flood Risk Profile
g	gravitation pull
GAF	Gallatin Fossil Plant
GHG	greenhouse gas
GPM	gallons per minute
HPA	habitat protection area
HUD	U.S. Department of Housing and Urban Development
IPaC	Information for Planning and Consultation
IRP	Integrated Resource Plan
JOF	Johnsonville Fossil Plant
JSF	John Sevier Fossil Plant
KIF	Kingston Fossil Plant
KYEEC	Kentucky Energy and Environment Cabinet
L_{dn}	day-night sound level
L_{eq}	equivalent sound level
LOI	loss on ignition

MBTA	Migratory Bird Treaty Act
MCF	thousand cubic feet
MOA	Memorandum of Agreement
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMSZ	New Madrid Seismic Zone
NO_2	nitrogen dioxide
N_2O	nitrous oxide
NPDES	National Pollution Discharge Elimination System
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory
O_3	ozone
OSHA	Occupational Safety and Health Administration
PA	Programmatic Agreement
PAF	Paradise Fossil Plant
PM	particulate matter
PGA	peak ground acceleration
POTW	Publicly Owned Treatment Works
PSA	Power Service Area
RCRA	Resource Conservation and Recovery Act
SHF	Shawnee Fossil Plant
SHPO	State Historic Preservation Office
SO_2	sulfur dioxide
SWPPP	Stormwater Pollution Prevention Plan
TDEC	Tennessee Department of Environment and Conservation
tpy	tons per year
TVA	Tennessee Valley Authority
TWRA	Tennessee Wildlife Resources Agency
USACE	U.S. Army Corps of Engineers
USCB	U.S. Census Bureau
USDA	U.S. Department of Agriculture
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VdB	vibration decibels
VSMP	Vital Signs Monitoring Program
WCF	Widows Creek Fossil Plant
WMA	Wildlife Management Area
WOTUS	Waters of the U.S.
WQC	Water Quality Certification
WWC	wet weather conveyance
yd^3	cubic yards

APPENDIX F – LIST OF PREPARERS

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APPENDIX G – LITERATURE CITED

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