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FINAL ENVIRONMENTAL ASSESSMENT

# INSTALLATION OF FLUE GAS DESULFURIZATION SYSTEM AT KINGSTON FOSSIL PLANT

**Roane County, Tennessee**

TENNESSEE VALLEY AUTHORITY
APRIL 2006

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**Final Environmental Assessment** **April 2006**

**Proposed project:** Installation of Flue Gas Desulfurization (Scrubber) System at Kingston Fossil Plant
Roane County, Tennessee

**Lead agency:** Tennessee Valley Authority

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**Abstract:** The Tennessee Valley Authority (TVA) has prepared an Environmental Assessment (EA) of a proposal to reduce sulfur dioxide ($SO_2$) emissions at Kingston Fossil Plant (KIF) by installing flue gas desulfurization equipment that employs the wet limestone forced oxidation technology. TVA needs to reduce systemwide $SO_2$ emissions to meet requirements under the 1990 Clean Air Act amendments. Reductions at KIF would help TVA meet those requirements. This EA considers the impacts of both a No Action and an Action Alternative.

Issue areas identified in scoping of potential environmental impacts and subsequently analyzed in the EA were air resources; solid waste and groundwater; transportation; natural areas and recreation; visual resources; surface water and wastewater; noise; wetlands; floodplains and flood risk; aquatic life; terrestrial ecology; endangered, threatened, and rare species; cultural resources; socioeconomics; and environmental justice, and prime farmland. With identified mitigations, environmental impacts to these resources were found to be insignificant.

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# ACRONYMS, ABBREVIATIONS, AND SYMBOLS

| | |
|---|---|
| **°C** | Degree Celsius |
| **~** | Approximately |
| **<** | Less Than |
| **≤** | Less Than or Equal to |
| **>** | Greater Than |
| **≥** | Greater Than or Equal to |
| **%** | Percent |
| **3Q20** | The minimum 3-day flow that occurs once in 20 years |
| **AADT** | Average Annual Daily Traffic |
| **APE** | Area of Potential Effect |
| **ARAP** | Aquatic Resource Alteration Permit |
| **BMP** | Best Management Practice |
| **BRF** | Bull Run Fossil Plant |
| **$Ca(OH)_2$** | Lime |
| **CAIR** | Clean Air Interstate Rule |
| **$CaCO_3$** | Limestone |
| **$CaSO_3$** | Calcium Sulfite |
| **$CaSO_4$** | Calcium Sulfate |
| **CCB** | Coal Combustion Byproduct |
| **CCW** | Condenser Cooling Water |
| **CFR** | Code of Federal Regulations |
| **cfs** | Cubic Feet per Second |
| **CO** | Carbon Monoxide |
| **COF** | Colbert Fossil Plant |
| **CRM** | Clinch River Mile |
| **dB** | Decibel – How Noise is Measured |
| **dBA** | Decibel, A-weighted – An adjustment (or weighting) of the high- and low-pitched sounds to approximate the way humans hear sounds |
| **DOE** | U.S. Department of Energy |
| **DSN** | Discharge Serial Number |
| **EA** | Environmental Assessment |
| **e.g.** | Latin term, exempli gratia, meaning “for example” |
| **etc.** | Latin term et cetera meaning “and other things” “and so forth” |
| **FGD** | Flue Gas Desulfurization |
| **FHWA** | Federal Highway Administration |
| **FRP** | Flood Risk Profile |
| **ft-msl** | Feet Mean Sea Level |
| **gpm** | Gallons per Minute |
| **I-40** | Interstate Highway 40 |
| **i.e.** | Latin term, id est, meaning “that is” |
| **$IC_{25}$** | 25 percent inhibition concentration |
| **ISC3** | Industrial Source Complex 3 |
| **KIF** | Kingston Fossil Plant |
| **km** | Kilometer |
| **kV** | Kilovolt |
| **lb** | Pound |
| **LSFO** | Limestone Forced Oxidation |
| **m** | Meter |
| **MGD** | Million Gallons per Day |

| | |
|---|---|
| **mg/kg** | Milligrams per Kilogram |
| **mg/L** | Milligrams per Liter |
| **µg/m$^3$** | Micrograms per Cubic Meter |
| **mg/m$^3$** | Milligrams per Cubic Meter |
| **mmBtu** | Million British Thermal Units |
| **MVA** | Megavolt Ampere |
| **MW** | Megawatt |
| **NAAQS** | National Ambient Air Quality Standard |
| **$NO_2$** | Nitrogen Dioxide |
| **$NO_X$** | Nitrogen Oxides |
| **NEPA** | National Environmental Policy Act |
| **NFIP** | National Flood Insurance Program |
| **NPDES** | National Pollutant Discharge Elimination System |
| **NRCS** | Natural Resource Conservation Service |
| **NRHP** | National Register of Historic Places |
| **$O_3$** | Ozone |
| **PAF** | Paradise Fossil Plant |
| **Pb** | Lead |
| **PM** | Particulate Matter |
| **$PM_{2.5}$** | Particulate Matter With a Diameter Less Than or Equal to 2.5 Micrometers |
| **$PM_{10}$** | Particulate Matter With a Diameter Less Than or Equal to 10 Micrometers |
| **ppm** | Parts per Million |
| **SAMI** | Southern Appalachian Mountains Initiative |
| **SCR** | Selective Catalytic Reduction |
| **SFI** | Sport Fishing Index |
| **SIP** | State Implementation Plan |
| **$SO_2$** | Sulfur Dioxide |
| **$SO_3$** | Sulfur Trioxide |
| **s.u.** | Standard Unit |
| **TDEC** | Tennessee Department of Environment and Conservation |
| **TDOT** | Tennessee Department of Transportation |
| **TRM** | Tennessee River Mile |
| **TSS** | Total Suspended Solids |
| **TVA** | Tennessee Valley Authority |
| **TVARAM** | Tennessee Valley Authority Rapid Assessment Method |
| **TWRA** | Tennessee Wildlife Resources Agency |
| **U.S.** | United States |
| **US** | U.S. Highway |
| **USEPA** | U.S. Environmental Protection Agency |
| **yd$^3$** | Cubic Yard |

# CHAPTER 1

# 1. PURPOSE, NEED, BACKGROUND, AND SCOPING

## 1.1. Purpose and Need for the Proposed Action

The purpose of the proposed project is to reduce sulfur dioxide ($SO_2$) emissions from Kingston Fossil Plant (KIF) by installing flue gas desulfurization (FGD) or scrubber equipment that employs the wet limestone forced oxidation (LSFO) technology. Installation of the scrubber at KIF would assist the Tennessee Valley Authority (TVA) in reducing systemwide $SO_2$ emissions to meet requirements under the 1990 Clean Air Act amendments, as well as maintaining compliance with the U.S. Environmental Protection Agency's (USEPA) Title IV regulations for the Acid Rain Program. The Title IV regulations require reductions and caps for utility industry $SO_2$ emissions. Compliance with the regulations is based on emission allowances. TVA's current $SO_2$ allocation allowance per year is approximately 430,000 tons. In 2004, TVA's emissions were 492,603 tons, and compliance was maintained by utilizing banked $SO_2$ emission allowances.

## 1.2. Background

In TVA's continuing efforts to improve air quality in the Tennessee Valley and to comply with the Clean Air Act, TVA is considering potentially designing, building, and operating several FGD systems to reduce $SO_2$ emissions from TVA's coal-fired power plants. TVA is currently installing an FGD system at Paradise Fossil Plant (PAF) Unit 3 in Kentucky and at Bull Run Fossil Plant (BRF) in East Tennessee. Additionally, TVA is contemplating the installation of scrubbers at other facilities. This Environmental Assessment (EA) will focus on the proposed installation of two modules to control $SO_2$ emissions from KIF's nine units. These FGD systems would collectively cost approximately $1.5 billion and would reduce emissions of $SO_2$ by more than 200,000 tons per year, bringing TVA's total emissions down by 85 percent since 1977. This EA describes the impacts of constructing and operating an FGD system to serve KIF. As pollution-control technology improves in the future, TVA may potentially shift to other technology.

### 1.2.1. Kingston Fossil Plant

KIF is located in Roane County, Tennessee, about 35 miles west of downtown Knoxville (Figure 1-1). The plant site is located on the right descending bank of the Clinch River near the confluence of the Emory River (Clinch River Mile [CRM] 2.7). The plant adjoins Swan Pond Road just north of U.S. Highway (US) 70 in Midtown. Most nearby Federal lands are U.S. Department of Energy (DOE) reservation properties for the Oak Ridge facilities, but residential and recreational areas are in close proximity. The closest residences are directly across Swan Pond Road from the plant reservation. Residences are also located across Swan Pond embayment and the Clinch and Emory Rivers.

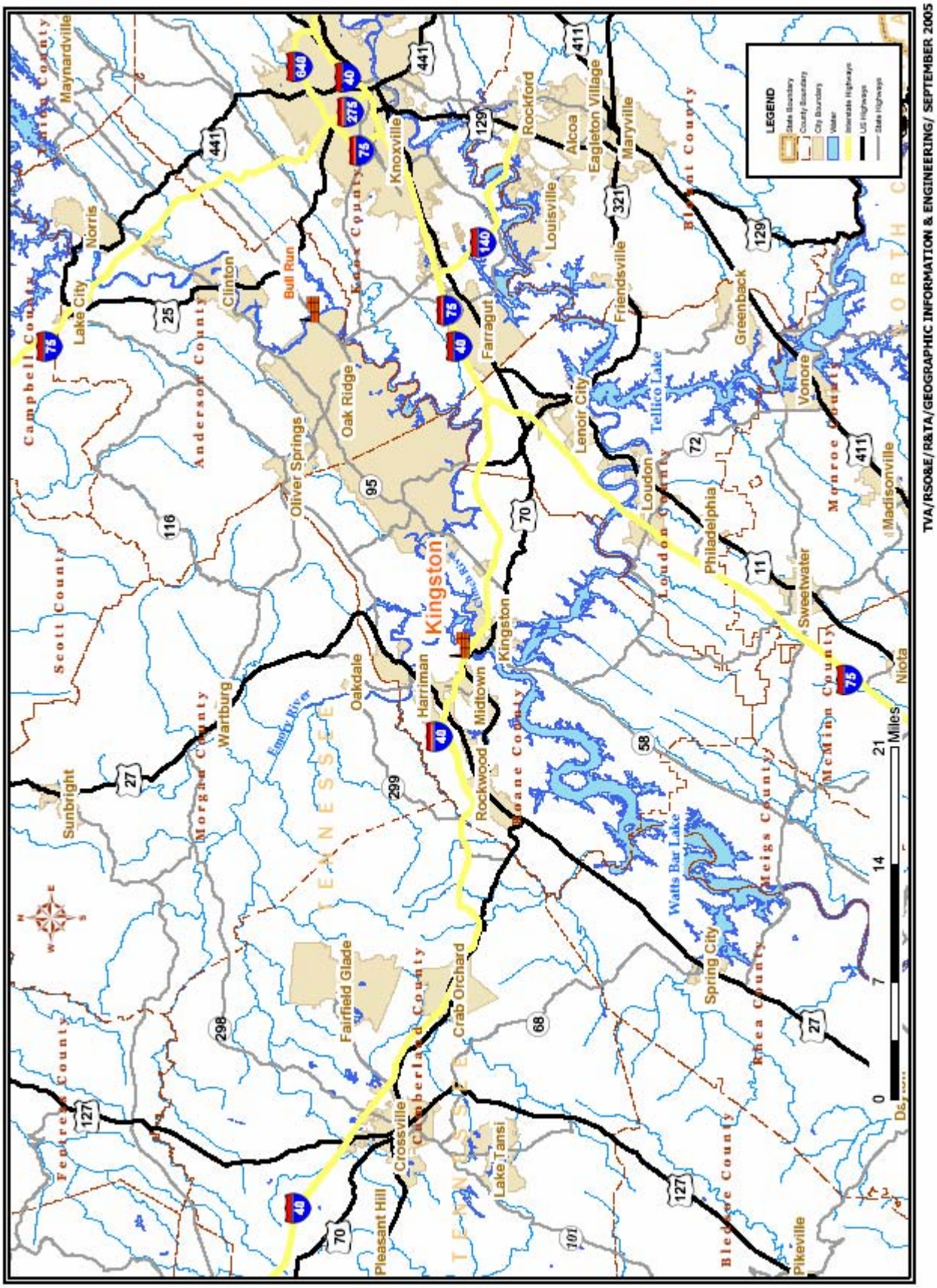


**Figure 1-1. Location of Kingston Fossil Plant**

The plant was built between 1951 and 1955. The first commercial operation began in February 1954, and the last unit began operation in December 1955. Nameplate generating capacity for the nine-unit plant is 1,600 megawatts (MW). KIF generates about 10 billion kilowatt-hours of electricity in a typical year, or enough energy to meet the needs of 700,000 homes. To meet this demand, Kingston burns about 14,000 tons of coal per day, an amount that would fill 140 railroad cars.

All nine of the units at KIF are pulverized coal-fired units. The coal combustion process produces sulfur oxides, nitrogen oxides ($NO_X$) and ash particles (called fly ash or opacity/particulate). Large concentrations of these pollutants may adversely affect human health, vegetation, and wildlife. To remove fly ash and reduce chimney opacity, electrostatic precipitators (that are more than 99 percent efficient) were installed in 1978. The state air permit's general limit (excluding allowances for startup, shutdown, malfunction, and certain other episodes) for opacity at KIF is 20 percent, but the plant typically operates at less than 10 percent opacity. Currently to reduce $SO_2$ emissions, all nine units use a blend of low-sulfur coal. The proposed addition of scrubbers would allow the plant to burn higher-sulfur coal; however, the scrubber would reduce $SO_2$ emissions by at least 95 percent. To reduce $NO_X$, Units 1 through 4 and Unit 9 use combustion controls and boiler optimization. Units 5 through 8 use low-$NO_X$ burners. In addition, eight selective catalytic reduction (SCR) systems have been installed to control $NO_X$ emissions and Unit 9's SCR system is planned to be operational in May 2006. SCR systems were placed in operation at KIF in April 2004. These systems reduce $NO_X$ emissions by up to 90 percent. SCR uses a catalyst to promote the chemical reaction between $NO_X$ and a nitrogenous compound, generally ammonia, to produce molecular nitrogen and water. Gaseous emissions from burning coal currently are dispersed through two 1,000-foot chimneys.

### 1.2.2. Sulfur Dioxide Emissions and Control Technologies

Sulfur is present in coal as an impurity and reacts with oxygen to form $SO_2$ when the coal is burned to generate electricity. Reduction of $SO_2$ emissions has typically been achieved through one or a combination of the following:

- Use of fuel desulfurization methods
- Switching to lower-sulfur fuels
- Use of FGD systems

TVA utilizes all of these techniques in meeting regulatory requirements at its 11 coal-fired plants. Each of these options has its own costs and benefits; however, there is no single universal solution. Fuel desulfurization occurs through the washing of coal before it is burned. Coal washing is effective in reducing pyrite content (small, discrete iron sulfide particles in the coal), but is not effective for removing the organic sulfur from the coal matrix. Organic sulfur accounts for 35 to 75 percent of the total sulfur content of coals burned in many TVA power plants.

The current strategy for maintaining compliance at KIF involves the use of low-sulfur fuel from eastern Kentucky, Tennessee, and the Powder River Basin. The sulfur content of the coal used at KIF has ranged from 1.2 to 2.3 pounds (lb) $SO_2$/million British thermal units (mmBtu) since 1978. The plant operated at or below 1.5 lb $SO_2$/mmBtu from 2000 through 2005. The current State Implementation Plan's (SIP) $SO_2$ limit for KIF is 2.8 lb $SO_2$/mmBtu.

The Clean Air Interstate Rule (CAIR), issued on March 10, 2005, requires deep $NO_X$ and $SO_2$ reductions from electric utilities in 28 states in phased cap and trade programs. The U.S. Environmental Protection Agency (USEPA) determined that the targeted "upwind" states were significantly contributing to "downwind" states ability to achieve and maintain

ozone and fine particle air quality standards. The rule is designed to eliminate these significant contributions. To control emissions that contribute to fine particles, the USEPA is requiring sources in 23 states to control $SO_2$ and annual $NO_X$ emissions. For the 8-hour ozone standard, sources in 25 states also will have to control ozone season (May through September) emissions of $NO_X$.

Tennessee, Alabama, and Kentucky must submit SIPs for USEPA's approval to administer the following cap and trade programs for sources in their states:

The USEPA-promulgated regional haze regulations on July 1, 1999, have a goal of pristine visibility at all Class I areas (national parks) by 2064. Like the $PM_{2.5}$ (particulate matter with a diameter less than or equal to 2.5 micrometers) National Ambient Air Quality Standards (NAAQS), this rule targets the reduction of fine particulates. The rule calls for visibility improvements to be achieved incrementally in 10-year-planning cycles. The first 10-year plan is due in 2008, with subsequent plans due every 10 years thereafter. In its May 24, 2002, decision, the Circuit Court of Appeals for the District of Columbia vacated in part and remanded to USEPA its Regional Haze Rule. Under a consent decree with the Environmental Defense Fund, USEPA was mandated to address the issues vacated by the federal court in a final rule to be promulgated no later than April 15, 2005.

A regional haze control strategy is being developed for a 2008 implementation date. The plan currently targets $SO_2$ and $NO_X$-control technologies and allows for trading on a limited basis. Since KIF falls under the guidance of CAIR, TVA is proposing to install scrubbers on the units in time to meet the initial visibility control strategy.

The FGD technology review for KIF was based on TVA performance needs, compatibility with existing facilities at the plant, costs, availability of fuels, and maintenance procedures. TVA additionally required that the technology be commercially available and fully demonstrated on utility coal-fired plants larger than 100 MW and burn medium- to high-sulfur coal (greater than [>] 3 lb/mmBtu). KIF's historic $SO_2$ emissions are depicted in Figure 1-2.

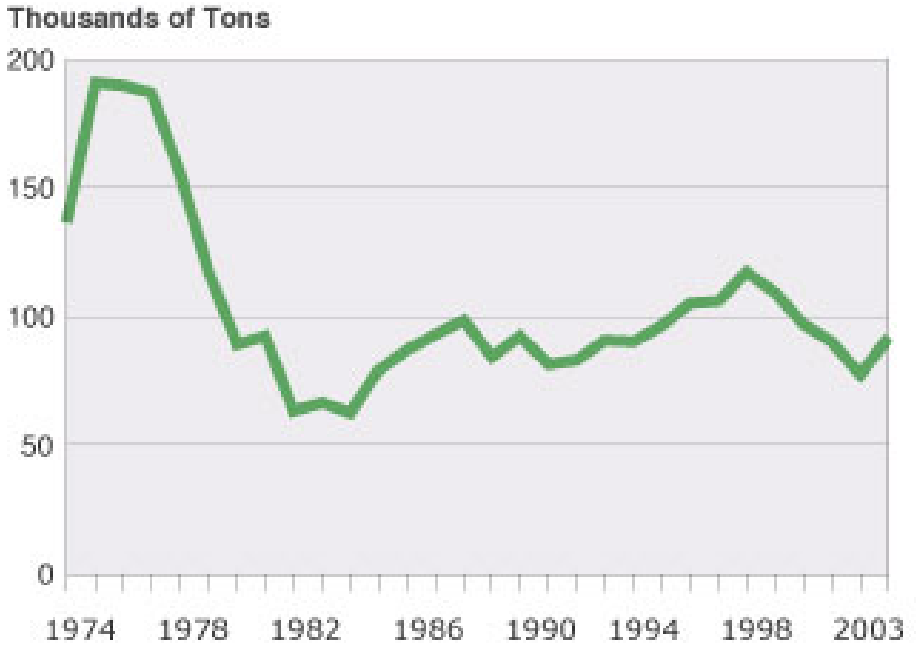


**Figure 1-2. Historic Kingston Fossil Plant Sulfur Dioxide Emissions**

**The Scoping Process**
A TVA interdisciplinary team reviewed the potential direct, indirect, and cumulative effects of the proposed use of LSFO technology at KIF for $SO_2$ reduction. From this review, the following project aspects were identified for detailed analyses.

- Air
- Solid Waste and Groundwater
- Transportation
- Natural Areas and Recreation
- Visual Resources
- Surface Water and Wastewater
- Noise
- Wetlands
- Floodplains and Flood Risk
- Aquatic Life
- Terrestrial Ecology
- Protected Species
- Cultural Resources
- Socioeconomics
- Environmental Justice
- Prime Farmland

## 1.3. Related TVA National Environmental Policy Act (NEPA) Documents

- Coal Combustion Byproduct Marketing Environmental Assessment, February 1990 (TVA, 1990)
- Energy Vision 2020 - Integrated Resource Plan Environmental Impact Statement, December 1995 (TVA, 1995)
- Installation of Flue Gas Desulfurization (Scrubber) System on Paradise Fossil Plant Unit 3 (Muhlenberg County, Kentucky) Environmental Assessment, March 2003 (TVA, 2003)
- Installation of Flue Gas Desulfurization System on Bull Run Fossil Plant, Anderson County, Tennessee, Environmental Assessment, April 2005 (TVA, 2005)
- Kingston Fossil Plant Selective Catalytic Reduction System for Nitrogen Oxide Control Environmental Assessment, March 2002 (TVA, 2002)
- Lower Watts Bar Reservoir, Environmental Impact Statement, Record of Decision, United States Department of Energy, United States Environmental Protection Agency, Tennessee Department of Environment and Conservation (TDEC), October 1995 (DOE, USEPA, TDEC, 1995)

## 1.4. Public and Agency Involvement

Concurrent with public review, the Draft EA was sent to the agencies listed below for comments:

- National Park Service
- Roane County Mayor's Office
- Tennessee Department of Environment and Conservation
- Tennessee Wildlife Resources Agency
- U.S. Army Corps of Engineers
- U.S. Department of Energy
- U.S. Fish and Wildlife Service

# CHAPTER 2

# 2. ALTERNATIVES INCLUDING THE PROPOSED ACTION

## 2.1. The Proposed Action

The proposed action is to construct and operate an FGD (scrubber) system at KIF. The project is intended to reduce $SO_2$ emissions by at least 95 percent at full load conditions. The scrubber(s) would utilize wet LSFO technology because of its high $SO_2$ removal performance and excellent reliability. Two absorbers would be constructed along with those subsystems and utilities necessary to support its operation. A truck limestone receiving, handling facility would be constructed to provide the reagent needed in the scrubbers. Additional construction would include a gas handling system to transport flue gas from the existing precipitators to the absorber, a new chimney, water supply systems, fire control systems, power supply and control systems, a gypsum dewatering facility, facilities for transporting gypsum to market via truck, barge, or rail, and a wet-ponded gypsum disposal area (for gypsum that could not be marketed). The new disposal area would not require any additional acreage to be purchased; however, it would require the permitting of a new disposal area. The new proposed disposal area is located on the area known as the peninsula. The peninsula property is owned by TVA and is managed by The Tennessee Wildlife Resources Agency (TWRA) as a wildlife refuge with limited hunting allowed.

To reduce $SO_2$ emissions, TVA is switching to low-sulfur coal at some fossil plants and has equipped 30 percent of its coal-fired capacity with scrubbers. Engineering studies and planning have begun for two scrubbers at KIF. The plant is also proposing to utilize lime ($Ca(OH)_2$) for flue gas conditioning (sulfur trioxide [$SO_3$] mitigation) to help reduce plume opacity. The $Ca(OH)_2$ would react with $SO_3$ in the flue gas to produce calcium sulfate (gypsum). The gypsum and any unreacted lime would be removed from the flue gas by the electrostatic precipitators and would be wet-sluiced to the KIF ash pond (Outfall 001).

A new chimney would have to be constructed for this project; the height would be determined by Good Engineering Practice standards, regulatory requirements, computer dispersion modeling of ambient air impacts, and computer and/or physical flow modeling of the flue gas handling systems. The new proposed chimney would have a fiber-reinforced plastic liner that would be constructed on site. Modifications to existing fans or booster fans may be added to maintain the necessary flow through the absorber or maintain optimum flows elsewhere in the plant.

The current proposal contemplates construction to begin on the KIF scrubber potentially as soon as April 2006, with operation starting about October 2010. Regardless of the preliminary schedule, the scrubber would be operational no later than 2011. The scrubber would be designed and constructed to achieve various electricity production goals and to maximize operational flexibility. Most of the plant and its operation would remain the same after the new scrubber is in place. Due to the high removal efficiency of the scrubber, more higher-sulfur coal may be burned than is currently burned, but the overall result would be a substantial reduction in $SO_2$ emissions. The scrubber would be installed downstream of the current particulate and $NO_X$ control systems.

The footprint for the proposed FGD system is shown in Figures 2-1 and 2-2. Figure 2-3 depicts more detailed drawings of these facilities. Following is a brief description of the major components and systems of the proposed scrubber and their operational aspects.

### 2.1.1. The Absorber

Two absorbers are proposed for the project. The design proposed for this project can deliver $SO_2$ removal performance of at least 95 percent when burning medium- to high-sulfur coals.

The typical absorber (sometimes called the reaction tank) consists of a limestone slurry/flue gas contact area and mist eliminators. The preliminary design for the absorber buildings would be approximately 70 feet by 82 feet with a height around 81 feet. The slurry elevation in the reaction tank would be approximately 23 feet, giving a total volume of approximately 1 million gallons for each absorber.

The absorber is larger than all other tanks used in connection with scrubbing. Limestone slurry occupies the lower portion of the absorber. The operation of the scrubber requires oxidation air that is sparged or blown into the absorber. Liquid converts the dissolved calcium sulfite to calcium sulfate (gypsum).

### 2.1.2. The Limestone Reagent Preparation System

This system consists of the equipment used to receive, store, and process the limestone, resulting in production of the limestone slurry used in scrubbing. Process water and crushed limestone are fed to a ball mill that pulverizes the limestone. Limestone that has been pulverized offsite could be purchased and stored in silos on site. Regardless of the type of limestone purchased a propylene glycol-based antifreeze solution may be added to the limestone and/or conveying system when moisture content and extremely cold conditions warrant. However, because of procedural and structural enhancements in the limestone handling system, not more than 50 gallons of antifreeze is expected to be used during any 24-hour period and not more than two days at a time. This use results in insignificant concentrations of propylene glycol entering the FGD and subsequently the wastewater treatment system.

### 2.1.3. Limestone Purchase and Transport

Limestone is used to make the reagent used in wet LSFO scrubbers. Crushed or pulverized limestone would be purchased from one or more quarries located in the vicinity and transported to the site by truck. Crushed limestone would be delivered in open trucks with tarps covering the limestone. Pulverized limestone would be in delivered in bulk trucks and pneumatically conveyed to silos. The quantity of limestone needed for scrubbing is contingent on the limestone purity, the reagent ratio (i.e., strength of limestone slurry solution), fuel heating value, and the amount of sulfur in the coal. Based on preliminary assumptions of fuel quality and TVA business plan coal-burn projections, estimates were prepared of the quantity of limestone needed. It is expected that the coal burned at KIF after installation of the scrubber would be from Central Appalachia and contain sulfur producing approximately 3.2 lb $SO_2$/mmBtu. However, it is possible that the coal sulfur content could be 5.0 lb $SO_2$/mmBtu. The current SIP limit for KIF is 2.8 lb $SO_2$/mmBtu; however, with the use of two absorber modules the plant could continue to operate and meet the SIP requirements if one module were offline. This would mean that from 356,000 to 572,000 tons per year of limestone would be required.

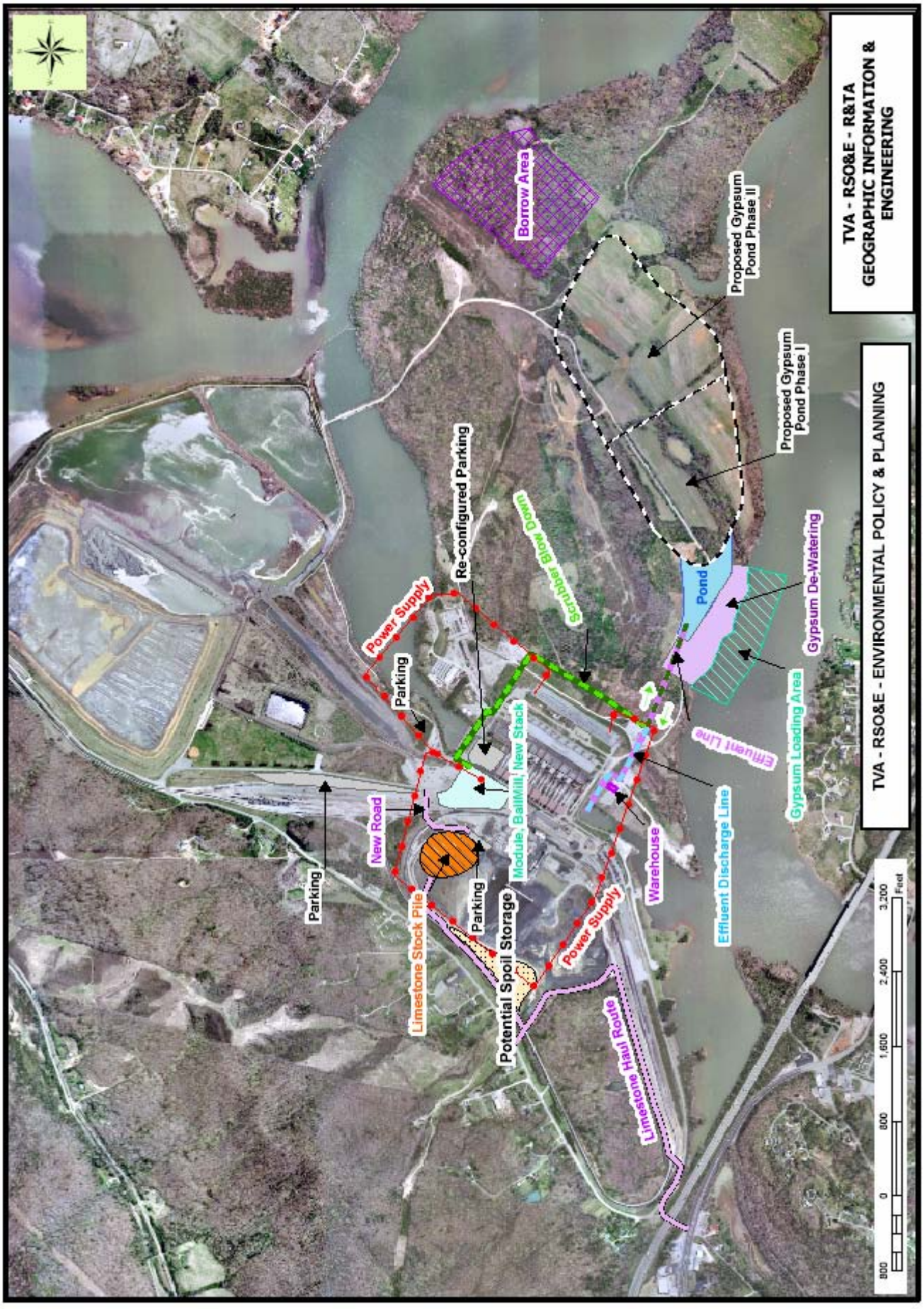


**Figure 2-1. Generalized Footprint of Flue Gas Desulfurization Project at Kingston Fossil Plant**

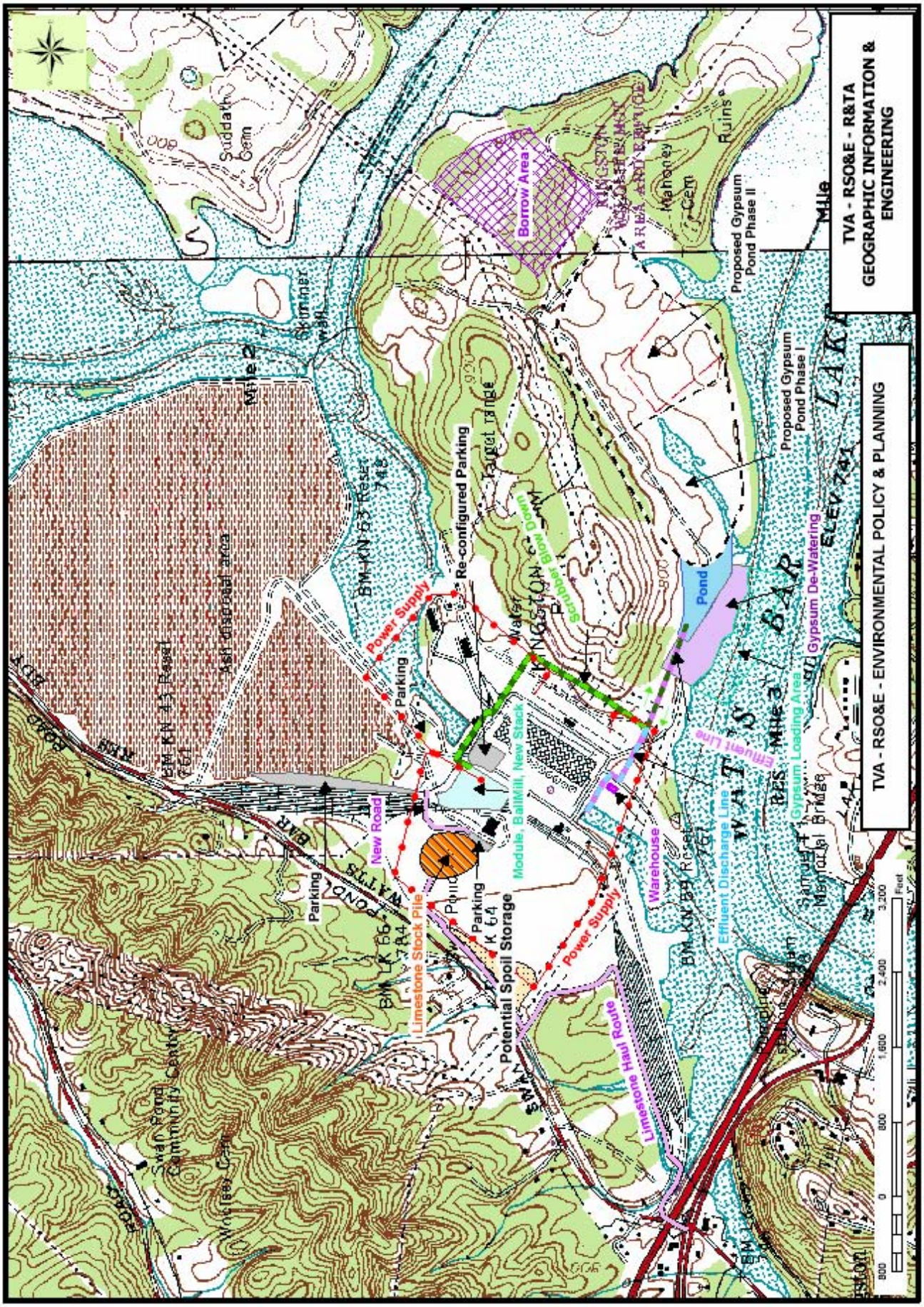


**Figure 2-2. Generalized Topographic Footprint of Flue Gas Desulfurization Project at Kingston Fossil Plant**

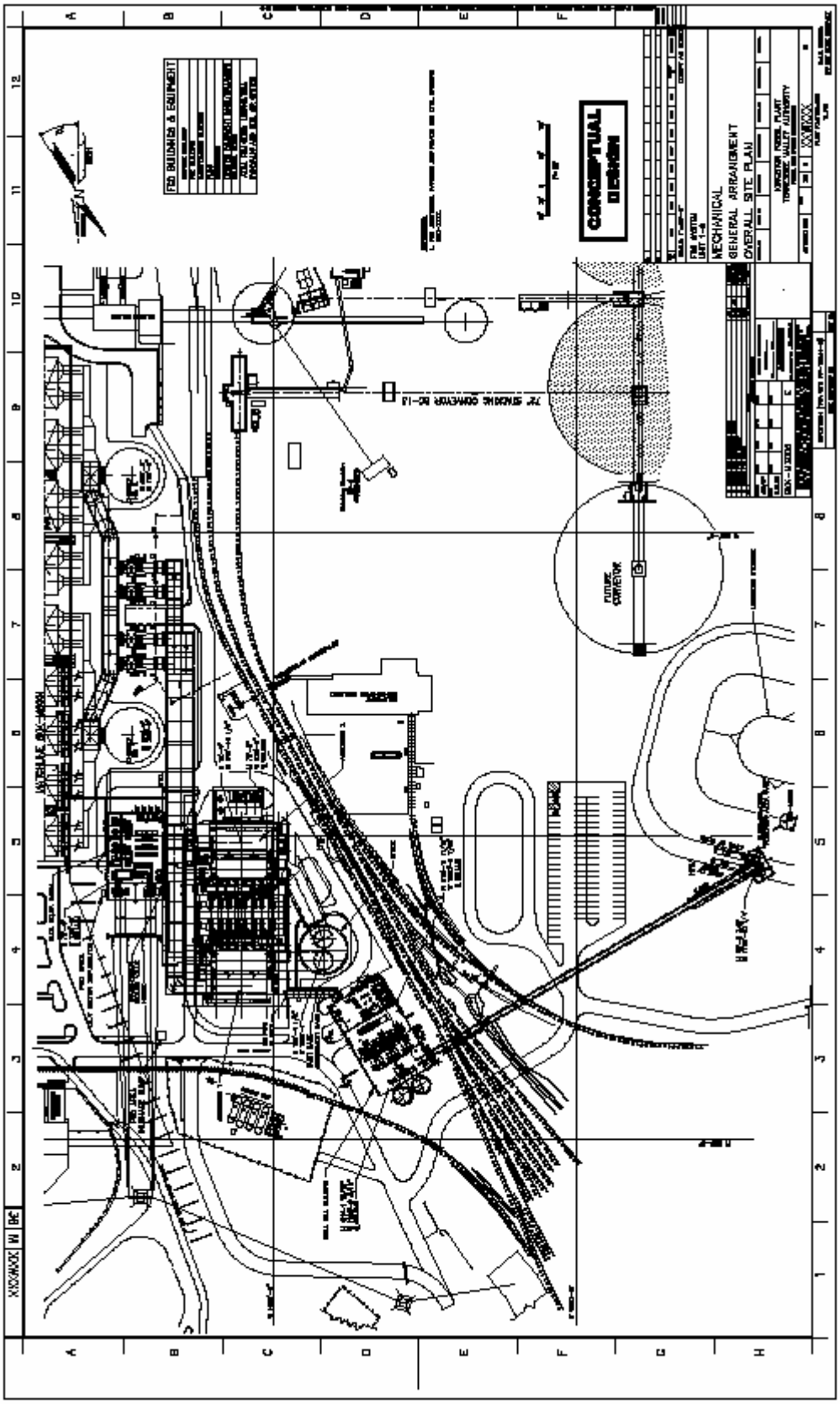


**Figure 2-3. General Plan for Kingston Fossil Plant Scrubber**

### 2.1.4. Solid Waste

The amount of gypsum produced by LSFO scrubbing is dependent on the sulfur content and heating value of the coal, absorber efficiency, and the amount of coal fired. The maximum theoretical production of gypsum production at KIF based on 75 percent capacity factor for operation of the plant and the use of 5.0 lb $SO_2$/mmBtu coal is expected to be 560,000 tons per year (for gypsum composed primarily of calcium sulfate). Figures 2-1 and 2-2 depict approximately the proposed location of the two-phased disposal area and borrow area, which encompasses approximately 125 acres. This would provide approximately 25 years of disposal capacity for the gypsum produced.

If constructed this facility could impact approximately 5.85 acres of wetlands and reduce the amount of acreage available for wildlife management by the TWRA.

### 2.1.5. Gypsum Marketing

Gypsum is produced by the reaction of the limestone and $SO_2$ in the LSFO absorber. Gypsum is formed when the $SO_2$ released from burning coal in the furnace reacts with the finely pulverized limestone slurry that is sprayed into the flue gases. Calcium Carbonate in the limestone ($CaCO_3$) reacts with the $SO_2$ to first form Calcium Sulfite ($CaSO_3$) and the air provided for forced oxidation “forces” the chemical reaction from Calcium Sulfite to Calcium Sulfate ($CaSO_4$) which is chemically the same as natural or “rock” gypsum. As the gypsum crystallizes in the absorber tank, the heavier gypsum crystals sink to the bottom of the absorber and are continuously removed in a slurry which is pumped either to a pond for disposal or to a proposed processing facility for dewatering and sales. Because of the anticipated high quality of the gypsum, facilities are being considered to process and transport (truck, rail, or barge) this material to markets.

This EA will review construction of a dewatering facility and evaluate the trucking and rail delivery aspects of marketing the gypsum. At this time there is not sufficient enough information available to develop permit applications (TDEC 401 certification and United States Army Corps of Engineers (USACE) Section 404 application) for the barging option. TVA has evaluated some aspects of the barging option to give the reader an idea of what the facility may entail. The material dredged from the channel in the desired barge terminal locations may be contaminated with cesium and mercury due to past activities of the DOE facilities upstream in Oak Ridge. DOE performed initial spot sampling between river miles 2.4 and 3.3 for potential contamination of river sediments in this area of the facility and did not detect cesium or any hazardous constituents above the Resource Conservation and Recovery Act hazardous waste criteria levels. DOE has sampled for potential contamination of river sediments in this area and all of the sample data was below hazardous waste criteria. Once there is sufficient information to complete the permit applications another environmental review will be conducted in conjunction with the USACE and TDEC for the construction and operation of the barge facility. Additional sampling may be necessary to verify the initial sampling results for the specific area. Specific handling and disposal methods for the sediments would be determined following review of all the appropriate sediment sampling data.

The dewatering facility would consist of a mechanical dewatering system, staging area, and loading/unloading areas. This facility would be built and operated by an

independent entity on an easement consisting of approximately 2 to 5 acres as depicted on Figures 2-1 and 2-2.

Gypsum processing consists of removing the excess water from the gypsum slurry by passing the slurry over a vacuum filter belt. The gypsum can also be washed on the belt to help improve purity by removing excess chlorides from the material. The finished product is a gypsum "cake" which is low in free moisture—generally between 5-10 percent moisture. This gypsum cake is readily moved using conveyors or common equipment like front-end loaders and dump trucks. Decant from the vacuum filters and wash water are collected in a sump along with any excess or un-processed slurry and pumped to the disposal pond.

The facility would be capable of processing 100 percent of the gypsum produced at KIF and will operate 24 hours/day, 365 days/year. Up to 15 full-time employees would staff the facility. During scheduled or unscheduled processing facility outages, gypsum slurry will be routed to the disposal area. Occasionally, it may be feasible to reclaim accumulated gypsum from the disposal area if additional material is needed for marketing.

The proposed processing facility will require electric power, raw water, potable water, and sewage service. Electric power may be supplied by TVA or through a local power distributor if feasible. Raw water can be obtained from one or more of several sources including pumping from the river, from water wells at the site or from TVA. Sewage from on-site personnel will be accommodated by installation of a septic tank sewage system if permitted by the county or by using a holding tank serviced by a local contractor. Potable bottled water may be brought in by a contractor.

The amount of gypsum produced by LSFO scrubbing is dependent on the sulfur content and heating value of the coal, absorber efficiency, and the amount of coal fired.

It is anticipated that at least 385,000 tons per year of KIF gypsum can be marketed for uses including gypsum wallboard, cement manufacturing, and agricultural applications.

### 2.1.6. Barge Terminal Description

The type and volume of material to be loaded and the velocity of the Clinch River would ultimately determine the design of the gypsum barge terminal at KIF. A low moisture-content gypsum byproduct would likely require some kind of covered conveyor system to load the barges. The relatively high velocity approximately [~]4 feet per second at this location suggests that mooring cells would provide the most stable platform the most reliable moorage for the barges being loaded. However, dolphins and deadmen would be evaluated for moorage options.

Another necessary component of terminal operations at KIF would be a fleeting area. Empty barges awaiting loading and full barges awaiting outbound tow service must be stored in a safe location. Because of the high flows and fairly narrow channel on the Clinch River, a location on the Tennessee River would be most desirable. This would require a localized "switch" boat to shuttle barges back and forth between the two locations. If the fleeting area is of sufficient size, it may also accommodate barges awaiting service to and from BRF.

### 2.1.7. Wastewater and Water Supply

The scrubber requires both process and cooling water. For this EA, it is conservatively assumed that water demands could be as high as 3,500 gallons per minute (gpm); of that amount, 540 gpm would be for equipment cooling and 2,960 gpm would be for process needs. At this rate for a capacity factor of 75 percent, the scrubber would use approximately 1,400 million gallons of raw water annually. A little less than half of this would be returned to the river; the remainder would be discharged to the atmosphere as water vapor. Of this amount, approximately 730 gpm would exit as scrubber effluent and ultimately be discharged through the condenser cooling water (CCW) outfall. In addition, the gypsum dewatering facility would require up to 200 gpm for production of steam and rinse water.

The water supply needs of the KIF FGD project would be met by tapping into the existing plant intake system. No new intake pumps would be required for this project, and no increase in through screen velocity is anticipated.

#### 2.1.7.1. Power Supply

During construction, it is estimated that 1.0 to 1.5 megavolt amperes (MVA) are needed to supply equipment needs. KIF would continue to produce about the same amount of gross power as it does now; however, in operational mode, the new scrubber would be a power consumer. Electrical equipment would be designed to meet TVA codes and safety requirements. Where possible, use would be made of existing power supplies during construction. A new transformer yard (or switchyard) would be constructed to supply power to the scrubber equipment (Figures 2-1 and 2-2). Connections into this yard would be provided from two sources: a transmission line connection to the existing plant 161-kilovolt (kV) switchyard and a tap connection to the 161-kV transmission line located on the plant site. New circuit breakers would be installed, and associated relays, control, and communication equipment would be installed in the plant switch house and the new transformer yard. Both transmission connections would utilize fiber optic ground wire to provide communication and control circuits.

The tap point in the 161-kV transmission line is in front of the powerhouse and the new switchyard would be located on the plant site adjacent to the scrubber module. Two disconnect switches would be installed in the line, one on each side of the tap point. The tap point and the switches would be within the existing area now occupied by the transmission line. Associated relays and control and communication equipment would be installed in the new transformer yard.

All work for the transmission connection would be carried out within the footprint identified in Figures 2-1 and 2-2 for the new scrubber facilities, within the existing plant switchyard and switch house, on existing line right-of-way.

The gypsum dewatering facility would also require 500-ampere electric power supply, which may be provided by a local power distributor or by TVA.

Standard Best Management Practices (BMPs) would be used to limit erosion and storm water runoff during the construction period.

Figure 2-3 shows the location of the dedicated control room for the KIF scrubber. Underground cables would be constructed from the control room to the scrubber, limestone preparation building, the limestone conveyor and transfer points, and the

switchgear room. The control system would be designed to meet all TVA specifications for materials, performance, and fire protection.

#### 2.1.7.2. Equipment Laydown Areas

Probable equipment laydown areas are shown in Figures 2-1 and 2-2 and no new laydown areas would be constructed. Typically, laydown areas are nearby and not currently used for other plant functions but have been cleared and/or previously disturbed by industrial activities. The most likely areas to be used for laydown are south and north of the site proposed for the scrubber. Approximately 2 to 3 acres would be devoted to fabrication activities in these areas. All laydown and fabrications areas would utilize BMPs, such as gravel, hay bales, etc., to control surface water runoff.

### 2.1.8. Staffing and Workforce Management

The plot below (Figure 2-4) shows preliminary construction staffing projected for the scrubber project.

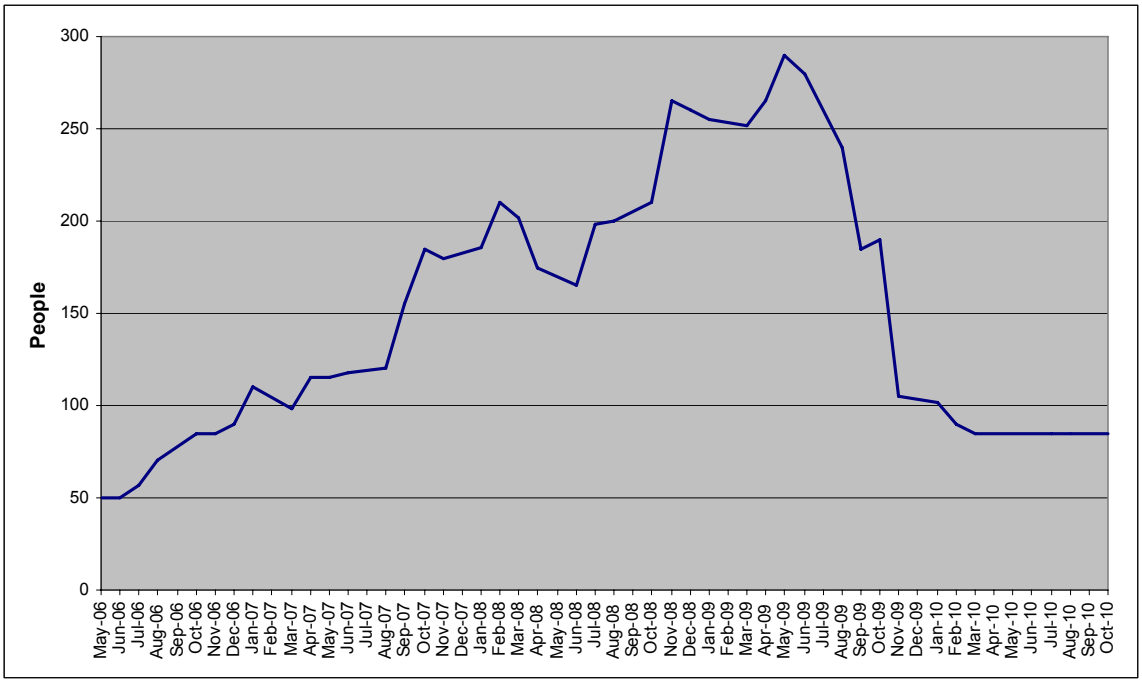


**Figure 2-4. Kingston Fossil Plant Construction - Additional On-Site Staffing**

A conservative peak estimate for workers on site at any one time during the construction phase of the scrubber project is 500, which includes 300 for scrubber construction (all day shift), 160 permanent plant staff (day shift), and approximately 40 people working on site on small construction projects and/or unit outages. Scrubber construction would take place during daylight hours, except to overcome unacceptable schedule delays, and with the current preliminary schedule, it would take approximately 4.5 years to complete.

Plant permanent staffing is expected to increase by 25 to 30 people following startup of the scrubber. This would bring the total permanent daytime staff for operating the plant

to as many as 190. Staffing of the gypsum dewatering facility would be up to 15 people following scrubber startup.

## 2.2. Alternatives to the Proposed Action

### 2.2.1. No Action Alternative

Under a No Action Alternative, no FGD or other system for $SO_2$ reduction from KIF would be installed. A No Action Alternative would not meet TVA's goal to reduce $SO_2$ emissions from KIF in order to help meet systemwide needs for reduction in $SO_2$ emissions. The No Action Alternative for KIF would likely result in the need to reduce $SO_2$ emissions from other TVA fossil plants or require purchase of additional pollution credit allowances.

### 2.2.2. Other Alternatives Not Considered in Detail

Other commercially available technologies were initially considered for application at KIF. Compatibility with existing operating and maintenance systems at the plant were the major considerations resulting in selection of wet limestone scrubbing as the proposed application at KIF. The other technologies considered are covered in the appendix of the Paradise Scrubber EA. Additional information concerning this environmental review can be found in Section 1.3 of this document.

## 2.3. Comparison of Alternatives

The FGD system for KIF would be an addition to an expansive, heavy industrial facility having a significant property buffer, located in an area that has been heavily disturbed by previous plant developmental activities. No new facilities would be required to unload equipment transported to the site. With mitigation, the potential for on-site construction impacts to air quality, terrestrial ecology, wetlands, protected and sensitive species, land use, and visual aesthetics would be insignificant. This system would produce gypsum (a new byproduct for KIF) and result in a change in the effluent characteristics emanating from the byproduct handling facility. Operational impacts are primarily dependent upon the engineering features and safeguards included in the design of the FGD system and the environmental commitments. The potential for impacts due to operations are shown in Table 2-1.

**Table 2-1. Summary and Comparison of Alternatives by Resource Area**

| Issue Area | Impacts From No Action Alternative | Impacts From Proposed Action Alternative |
|---|---|---|
| Air Quality | • None; however, TVA would still be required to make reductions in $SO_2$ emissions | • Impacts to local and regional air quality would be minor but beneficial with the addition of the scrubber; overall, the air quality impact of construction-related activities for the project would not be significant |
| Solid Waste | • None | • Insignificant impacts from the construction and operation of a new landfill as described below |

**Table 2-1. Summary and Comparison of Alternatives by Resource Area**

| Issue Area | Impacts From No Action Alternative | Impacts From Proposed Action Alternative |
|---|---|---|
| Groundwater Quality | • None | • Insignificant with the addition of a geologic buffer and leachate collection for the new landfill |
| Transportation | • None | • Insignificant with the addition of a turning lane on US 70 and a deceleration lane on Swan Pond Road |
| Managed Areas and Ecologically Significant Sites | • Reduction in $SO_2$ emission would not occur and there would be a loss of any indirect or cumulative impacts as a result of the continued current $SO_2$ emissions | • Indirect effects anticipated to natural areas would be improved air quality due to particulate matter reduction. Cumulative effects anticipated over time to all natural areas would include improved regional air quality with respect to visibility and reduced ecosystem acidification, improving wildlife habitat and visitor experience as a result of the Action Alternative. Direct effects anticipated as a result of the Action Alternative would be permanent loss of some wildlife management opportunities on the site. However, direct impacts from this proposal are expected to be localized and, therefore, insignificant. |
| Visual Resources | • None | • A water vapor plume would be visible, and views of the new equipment and facilities would be permanent but insignificant |
| Surface Water | • None | • Construction impacts would be insignificant with the implementation of BMPs |
| Wastewater | • None | • Insignificant changes in water quality emanating from the ash pond and CCW |
| Noise | • None | • Insignificant impacts from construction and operation |
| Wetlands | • None | • Permanent loss of 5.85 acres of wetlands |
| Floodplains | • None | • Minimized loss of approximately 48 acre-feet of the 100-year floodplain with the complete build out of the |

**Table 2-1. Summary and Comparison of Alternatives by Resource Area**

| Issue Area | Impacts From No Action Alternative | Impacts From Proposed Action Alternative |
|---|---|---|
| | | gypsum disposal facility |
| Aquatic Ecology | • None | • None |
| Terrestrial Ecology | • None | • Local and regional impacts to plants and animals are expected to be beneficial from an $SO_2$ perspective; an insignificant loss of plant and animal communities is expected from the construction of the gypsum disposal facility |
| Protected and Sensitive Species | • None | • None |
| Cultural Resources | • None | • None |
| Socioeconomics | • None | • Small positive impact to the local economy |
| Environmental Justice | • None | • None |
| Prime Farmland | • None | • Soil characteristics for 11.6 acres meet the criteria for prime farmland; however, the total score for the land is less than 160 points, so this location does not warrant the consideration of alternative locations |

## 2.4. Summary of Commitments and Mitigation Measures for the Proposed Action Alternative

Routine and compliance measures include the following: The project would comply with Tennessee regulations applicable to fugitive emissions. Wastewaters generated during construction of the proposed KIF FGD scrubber system may include construction storm water runoff, domestic sewage, dewatering of work areas, nondetergent equipment washings, and hydrostatic test discharges. These wastewaters would be handled through existing plant processes and procedures.

Special commitments identified for the proposed action are that:

- Portable toilets and existing facilities would be provided for the additional scrubber construction workforce. Outages occur routinely, and those additional workers would be handled by portable toilets. All portable toilets would be regularly pumped out and the sewage transported by tanker truck to a publicly owned treatment works accepting pump out.

- Addition of a left-turning lane off US 70 and a new deceleration lane on Swan Pond Road would help maintain the level of service on the local roadways.

- One potentially eligible archaeological site was encountered within the survey area for the gypsum disposal facility. This site would be avoided by construction activities, or the location would be subject to a Phase 2 site evaluation prior to any ground disturbance.

- If necessary, emissions from open construction areas and unpaved roads can be mitigated by spraying water on the roadways as needed to reduce fugitive dust emissions.

- TVA would evaluate the ash pond and gypsum settling pond discharge quality by performing column tests or other appropriate technique for determining adequate treatment design basis. If determined to be necessary, then appropriate mitigative measures would be evaluated and implemented as needed to ensure that the total suspended solids (TSS) monthly average limitation on the ash pond (Discharge Serial Number [DSN] 001) and expected gypsum monthly average discharge limitation are not exceeded. The appropriate level of NEPA would be conducted if additional treatment were determined to be needed.

## 2.5. Environmental Permits and Applicable Regulations

- Implementation of the proposed action would result in the need to modify the National Pollutant Discharge Elimination System (NPDES) Permit TN005452.

- A new Solid Waste Disposal Permit would be required for the disposal of gypsum byproduct produced by the new scrubber. This permit would contain applicable groundwater protection measures.

- Mitigation would be provided for the loss of four wetlands totaling approximately 5.85 acres in compliance with Clean Water Act permits (USACE and Aquatic Resource Alteration Permit [ARAP]).

- Coverage under the Construction Storm Water Permit would be obtained from TDEC to ensure all construction-related activities comply with applicable regulatory requirements.

- Hydrostatic Testing would be handled in accordance with NPDES Permit TN0005452 or the TDEC General NPDES Permit for Discharges of Hydrostatic Test Water (TN670000).

- Air construction notification to TDEC would be required. A minor source construction permit may be required for the limestone handling system. No other permits would be required by TDEC due to the pollution prevention nature of this project.

- The Emergency Planning and Community Right to Know Act requires Tier II reporting of styrene if at any time the amount on site exceeds 10,000 pounds. The Act also requires Toxics Release Inventory reporting if the use of styrene exceeds 10,000 pounds annually.

- ARAPs would be required for the wetlands acquisition.

- As necessary, emissions from open construction areas and unpaved roads would be mitigated by spraying water on the roadways as needed to reduce fugitive dust emissions by as much as 75 percent.

- Standard BMPs and regulatory compliance measures would be incorporated.

- A USACE 404 Permit for affected water resource areas in the Clinch River would be required.

- A TDEC ARAP and 401 Water Certification for affected water resource area in the Clinch River would be required.

- The gypsum processing facility would acquire its own construction and air permits.

- Modifications to the Integrated Pollution Prevention Plan would be made for the addition of new ponds, switchyards, and fuel tanks.

# CHAPTER 3

# 3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

## 3.1. Air Resources

### 3.1.1. Affected Environment

Air quality is an environmental resource value that is considered important to most people. Through its passage of the Clean Air Act, Congress has mandated the protection and enhancement of our nation's air quality resources. National Ambient Air Quality Standards (NAAQS) for the following criteria pollutants have been set to protect the public health and welfare:

- sulfur dioxide ($SO_2$)
- ozone ($O_3$)
- nitrogen dioxide ($NO_2$)
- particulate matter whose particles are less than or equal to ($\leq$) 10 micrometers ($PM_{10}$)
- particulate matter whose particles are $\leq$ 2.5 micrometers ($PM_{2.5}$)
- carbon monoxide (CO)
- lead (Pb)

A listing of the NAAQS is shown in Table 3-1.

National standards, other than annual standards, are not to be exceeded more than once per year (except where noted). Table 3-2 shows the results of ambient air quality monitoring of criteria pollutants that are considered representative of the KIF site. All areas in the vicinity of the site are currently in attainment for $PM_{10}$, $NO_2$, CO, $SO_2$, and Pb standards.

Regionally, air quality is generally good. The air quality in the vicinity of KIF is also generally good; the area complies with all ambient air quality standards, except for the new 8-hour ozone and fine particulate matter ($PM_{2.5}$) standards. The USEPA recently included a portion of Roane County, which contains the KIF site, and three of its surrounding counties, Anderson, Knox, and Loudon as part of the Knoxville nonattainment area for fine particulate matter ($PM_{2.5}$) based on the USEPA's criteria for identifying nonattainment areas. The USEPA also recently proposed that the $PM_{2.5}$ daily exposure standard be reduced from 65 micrograms per cubic meter ($\mu g/m^3$) to 35 $\mu g/m^3$ and introduced a new standard $PM_{2.5-10}$ for daily exposure of 70 $\mu g/m^3$. Currently this proposal is out for review. These new standards would be significantly more difficult to achieve.

All areas in Tennessee had met attainment of the old 1-hour ozone standard. However, for some areas, attainment of the 8-hour ozone standard of 80 parts per billion has been more difficult to achieve. Although Roane County is in attainment for the 8-hour ozone standard, four of the counties that surround Roane County are classified as being nonattainment for the 8-hour ozone standard. These counties are Anderson, Knox, Loudon and Meigs.

**Table 3-1. National Ambient Air Quality Standards**

| Pollutant | Primary[a] | Secondary[b] |
|---|---|---|
| Sulfur Dioxide | 0.14 parts per million (ppm) (365 micrograms per cubic meter [µg/$m^3$]) maximum 24-hour concentration not to be exceeded more than once per year<br>0.03 ppm (80 µg/$m^3$) annual arithmetic mean | 0.5 ppm (1,300 µg/$m^3$) maximum 3-hour concentration not to be exceeded more than once per year |
| Ozone (New) | 0.08 ppm based on the average of the fourth-highest daily maximum 8-hour concentration during each ozone season (currently May 1–September 30) for each of three consecutive years | Same as primary standard |
| Nitrogen Dioxide | 0.053 ppm (100 µg/$m^3$) annual arithmetic mean | Same as primary standard |
| Carbon Monoxide | 35 ppm (40 milligrams per cubic meter [mg/$m^3$]) maximum 1-hour concentration not to be exceeded more than once per year<br>9 ppm (10 mg/$m^3$) maximum 8-hour average concentration not to be exceeded more than once per year | None |
| $PM_{2.5}$ (New Standard) | 65 µg/$m^3$ maximum 24-hour average concentration with an expected exceedence of no more than one per year based upon a 3-year average<br>15 µg/$m^3$ annual arithmetic mean | Same as primary standard |
| $PM_{10}$ | 150 µg/$m^3$ maximum 24-hour average concentration with an expected exceedence of no more than one per year based upon a 3-year average<br>50 µg/$m^3$ annual arithmetic mean | Same as primary standard |
| Lead | 1.5 µg/$m^3$ maximum quarterly arithmetic mean | Same as primary standard |

Source: 40 Code of Federal Regulations (CFR), Part 50, as currently amended
a - Standards set to protect public health
b - Standards set to protect public welfare

**Table 3-2. Ambient Concentrations of Criteria Air Pollutants Near Kingston Fossil Plant Compared With Air Quality Standards**

| Pollutant | Level of Standard (ppm)[a] | 3-Year Mean | |
|---|---|---|---|
| | | Concentration (ppm)[a] | Percent of Standard |
| Ozone (New Standard)[b] | 4th Highest 8-hour average (0.08) | 0.08[c] | 100 |
| Sulfur Dioxide | Maximum 3-hour average (0.5)<br>Maximum 24-hour average (0.14)<br>Annual mean (0.030) | 0.059[d]<br>0.012[d]<br>0.0019[d] | 12<br>9<br>6 |
| Nitrogen Dioxide | Annual mean (0.053) | 0.0107[e] | 20 |
| Carbon Monoxide | Maximum 1-hour average (35)<br>Maximum 8-hour average (9) | 2.4[f]<br>1.3[f] | 7<br>14 |
| $PM_{10}$ (Old Standard) | ($\mu g/m^3$)<br>Maximum 24-hour average (150)<br>Annual mean (50) | ($\mu g/m^3$)<br>49[g]<br>22.7[g] | <br>33<br>45 |
| $PM_{2.5}$ (New Standard) | ($\mu g/m^3$)<br>Maximum 24-hour average (65)<br>Annual average (15) | ($\mu g/m^3$)<br>31.2[g]<br>13.7[g] | <br>48<br>91 |
| Lead | ($\mu g/m^3$)<br>Quarterly mean (1.5) | ($\mu g/m^3$)<br>0.20[f] | <br>13 |

a - ppm unless otherwise noted
b - Fourth-highest concentration must be 0.085 ppm to be considered above the level of the standard (0.08 ppm)
c - $O_3$ value for Anderson County, Tennessee, average for 2002, 2003 and 2004
d - $SO_2$ values for Roane County, Tennessee, 2005
e - $NO_2$ value for McMinn County, Tennessee, 2005
f - CO and lead values for Sullivan County, Tennessee, 2005
g - PM values for Roane County, Tennessee, average for 2002, 2003, and 2004

### 3.1.2. Environmental Consequences

**No Action Alternative**
Under the No Action Alternative, air pollutant emissions would be unchanged. Consequently, air quality would not be improved. However, TVA would be required to either make additional systemwide reductions or purchase emission credits to meet its requirements under Title IV and CAIR.

**Action Alternative**
*Construction Impacts*
The proposal under consideration would have associated transient air pollutant emissions during the construction phase of the project. Construction-related air quality impacts are primarily related to land clearing, site preparation, and the operation of internal combustion engines.

Land clearing, site preparation, and vehicular traffic over unpaved roads and the construction site result in the emission of fugitive dust PM during site preparation and active construction periods. The largest fraction (greater than 95 percent by weight) of fugitive dust emissions would be deposited within the construction site boundaries. The remaining fraction of the dust would be subject to transport beyond the property

boundary. If necessary, emissions from open construction areas and unpaved roads can be mitigated by spraying water on the roadways as needed to reduce fugitive dust emissions. The project would comply with Tennessee regulations applicable to fugitive emissions.

Combustion of gasoline and diesel fuels by internal combustion engines (vehicles, generators, construction equipment, etc.) would generate local emissions of PM, NOx, CO, volatile organic compounds, and $SO_2$ during the site preparation and construction period. The total amount of these emissions would be small and would result in minimal off-site impacts.

Styrene would be used in the fabrication of the fiberglass reinforced plastic chimney liner constructed at KIF. Modeling results show that on-site and off-site ground-level concentrations of styrene during the fabrication process would be well below the 1 part per million (ppm) odor threshold. Also, dispersion modeling was done to determine the impacts from a possible accidental release of the entire contents of a liquid styrene tank. In this release scenario, the off-site impacts were below the Occupational Safety and Health Administration and American Conference of Governmental Industrial Hygienists time-weighted average and short-term exposure limits. Based on these modeling results, it is unlikely that an accidental release would pose a threat to the health of people off site. The Emergency Planning and Community Right to Know Act requires Tier II reporting of styrene if at any time the amount on site exceeds 10,000 pounds. The Act also requires Toxics Release Inventory reporting if the use of styrene exceeds 10,000 pounds annually.

Air quality impacts from all of these construction activities including construction of the gypsum processing facility would be temporary and dependent on both man-made factors (e.g., intensity of activity, control measures, etc.) and natural factors (e.g., wind speed, wind direction, soil moisture, etc.). However, even under unusually adverse conditions, these emissions would have, at most, a minor, transient impact on off-site air quality and be well below the applicable ambient air quality standard. Overall, the air quality impact of construction-related activities for the project would not be significant.

*Operational Impacts*

An air quality analysis was performed in accordance with the USEPA's Guidelines on Air Quality Models (USEPA, 2001a). The focus of the analysis was to determine the air quality impacts of $SO_2$ and $PM_{10}$ emissions on the area surrounding KIF before and after installation of FGD. In addition, a fog analysis was performed to determine the potential for fogging on the area surrounding KIF after installation of FGD.

The refined air quality modeling was performed using the Industrial Source Complex 3 (ISC3) model assuming maximum emissions. These modeling runs were made using detailed receptor sets and representative hourly meteorology. The model was run assuming various operational loads and scrubber bypass options. Descriptions of the dispersion models, sources, data requirements, and modeling results are presented in the following sections. The fog modeling was performed using the CALPUFF dispersion model's FOG module.

A new 400-foot chimney containing two flues would be constructed as part of the FGD project.

*Air Quality Dispersion Model* - The ISC3 model, a USEPA-approved model, was used to estimate air pollutant concentrations surrounding KIF (USEPA, 1995). A description of ISC3 is contained in Volume II of the user's guide. The model is based on the straight-line, steady-state Gaussian plume equation, which is used with some modifications to model simple point source emissions. In addition, the CALPUFF FOG model was used to estimate fogging impacts from the FGD chimney to surrounding sensitive areas.

*Sources* - The physical dimensions and flue gas parameters of the chimneys used in the modeled case are presented in Table 3-3. Several loads and bypass options were modeled. There may be periods when one or both absorbers are bypassed due to malfunctions or maintenance requirements. In that event, the flue gas would be ducted to one of the existing 1,000-foot chimneys. These periods should be brief, and the plant-total $SO_2$ emissions would not exceed 2.8 lb/mmBtu during any absorber bypass. In the event an extended bypass is necessary, the plant would return to burning coal(s) with lower sulfur content. However, the modeling for partial bypass cases was performed using emissions from 5 lb $SO_2$/mmBtu coal to represent a worst-case scenario.

The emission rates used in the modeled case are presented in Table 3-4 and represent continuous operation during the year. The emissions and exhaust flows presented in these tables reflect various operating conditions. This approach ensured that the modeling produced conservative estimates of ambient impacts. The modeling results are presented in Table 3-5, Table 3-6, and Table 3-7.

**Table 3-3. Chimney Location, Physical Dimensions, and Flue Gas Parameters of Proposed Kingston Fossil Plant Flue Gas Desulfurization Chimney**

| Bypass Option | Load | FGD Absorber | Easting (km) | Northing (km) | Chimney Base Elevation (ft-msl) | Chimney Height (m) | Chimney Diameter (m) | Chimney Exit Velocity (m/s) | Chimney Temperature (K) |
|---|---|---|---|---|---|---|---|---|---|
| None | 100% | A & B | 723.78 | 3975.38 | 765.0 | 121.9 | 9.1 | 17.1 | 328.2 |
| | 75% | A & B | 723.78 | 3975.38 | 765.0 | 121.9 | 9.1 | 13.8 | 328.2 |
| | 50% | A & B | 723.78 | 3975.38 | 765.0 | 121.9 | 9.1 | 10.6 | 328.2 |
| | 40% | A & B | 723.78 | 3975.38 | 765.0 | 121.9 | 9.1 | 9.3 | 328.2 |
| Single | 100% | A (in service) | 723.78 | 3975.38 | 765.0 | 121.9 | 9.1 | 17.1 | 328.2 |
| | 100% | B (bypass) | 723.81 | 3975.30 | 764.0 | 304.8 | 7.9 | 26.9 | 433.7 |
| Single | 100% | A(in service) | 723.78 | 3975.38 | 765.0 | 121.9 | 9.1 | 17.1 | 328.2 |
| | 50% | B (bypass) | 723.81 | 3975.30 | 764.0 | 304.8 | 7.9 | 16.7 | 433.7 |
| Single | 100% | A(in service) | 723.78 | 3975.38 | 765.0 | 121.9 | 9.1 | 17.1 | 328.2 |
| | 10% | B (bypass) | 723.81 | 3975.30 | 764.0 | 304.8 | 7.9 | 2.1 | 408.2 |

km = kilometer
ft-msl = feet mean sea level
m = meter
m/s = meters per second
K = Kelvin

**Table 3-4. Emissions Used in Modeling**

| Bypass Option | Load | FGD Absorber | $SO_2$ Emission Rate (lb/hr) | $PM_{2.5}$ Emission Rate (lb/hr) | $H_20$ Emission Rate (lb/hr) |
|---|---|---|---|---|---|
| No Bypass | 100% | A & B | 4,212.0 | 404.6 | 1,760,000.0 |
| | 75% | A & B | 3,184.0 | 306.6 | 1,427,644.0 |
| | 50% | A & B | 2,192.0 | 210.8 | 1,095,290.0 |
| | 40% | A&B | 1,762.0 | 169.6 | 962,348.0 |
| Single | 100% | A (in service) | 2,106.0 | 202.3 | 880,000.0 |
| | 100% | B (bypass) | 42,110.0 | 365.2 | 415,000.0 |
| Single | 100% | A(in service) | 1,962.0 | 188.3 | 880,000.0 |
| | 50% | B (bypass) | 24,422.0 | 211.7 | 258,264.0 |
| Single | 100% | A(in service) | 1,592.0 | 153.3 | 880,000.0 |
| | 10% | B (bypass) | 2,472.0 | 21.5 | 34,256.0 |

Note: Emissions are based on coal with 5.0 lb $SO_2$/mmBtu; lb/hr = pounds/hour.

*Receptors* - The refined ISC3 modeling was performed with receptors extracted from the United States Geological Survey Digital Elevation Model database. The receptors covered a 40-kilometer (km) by 40-km area centered on the new chimney. Receptors were spaced 100 meters (m) apart to a distance of 3 km from the plant, receptors 3 to 10 km from the plant were spaced 250 m apart, and receptors 10 to 20 km from the plant were spaced 500 m apart for a total of 13,161 receptors. The CALPUFF FOG modeling was performed with receptors covering a 150-km by 150-km area, with receptors spaced 1000 m apart. In addition, discrete receptors representing Interstate 40 (I-40) and Swan Pond Road, were used in the fog modeling. The I-40 discrete receptors were spaced approximately 100 m apart to a distance 2 km from the new chimney, and the Swan Pond Road receptors were spaced approximately 50 m apart to a distance 600 m from the new chimney.

*Meteorology* - ISC3 dispersion modeling was performed using 5 years (1985-87, 1990-91) of meteorological data based on hourly National Weather Service surface meteorological measurements at Knoxville and twice-daily upper air measurements from Nashville, Tennessee. Hourly mixing heights were determined from Nashville, Tennessee, morning and afternoon mixing depths. In addition, CALPUFF FOG modeling was performed using one year (1990) of comprehensive National Weather Service surface data from Knoxville and twice-daily upper air data from Nashville.

*Air Quality Modeling Results* - Modeling was performed to evaluate the impact of the KIF FGD project on air quality in the surrounding area. The modeling results also provide a comparison of impacts relative to established air quality metrics. In particular, pollutant-specific NAAQS are the concentration levels established by USEPA to protect public health for various averaging times.

Tables 3-5 and 3-6 summarize the ISC3 modeling results of $SO_2$ and $PM_{2.5}$ air impacts. The highest concentration (in $\mu g/m^3$) in the vicinity of the plant is presented for the annual averaging period and the highest-second-highest is presented for both the 24-hour and 3-hour averaging periods (to enable comparison with air quality standards).

**Table 3-5. $SO_2$ Modeling Results**

| Bypass Option | Load (Percent) | FGD Absorber | Averaging Period | NAAQS (ug/m3) | Concentration (ug/m3) |
|---|---|---|---|---|---|
| None | 100 | A & B | Annual | 80 | 7.9 |
| | | | 24-Hour | 365 | 82.6 |
| | | | 3-Hour | 1300 | 408.5 |
| | 75 | A & B | Annual | 80 | 7.3 |
| | | | 24-Hour | 365 | 67.0 |
| | | | 3-Hour | 1300 | 318.9 |
| | 50 | A & B | Annual | 80 | 6.4 |
| | | | 24-Hour | 365 | 50.1 |
| | | | 3-Hour | 1300 | 222.9 |
| | 40 | A & B | Annual | 80 | 5.8 |
| | | | 24-Hour | 365 | 48.4 |
| | | | 3-Hour | 1300 | 179.8 |
| Single | 100<br>100 | A (in service)<br>B (bypass) | Annual | 80 | 18.5 |
| | | | 24-Hour | 365 | 163.7 |
| | | | 3-Hour | 1300 | 757.4 |
| | 100<br>50 | A (in service)<br>B (bypass) | Annual | 80 | 12.8 |
| | | | 24-Hour | 365 | 110.4 |
| | | | 3-Hour | 1300 | 502.2 |
| | 100<br>10 | A (in service)<br>B (bypass) | Annual | 80 | 5.3 |
| | | | 24-Hour | 365 | 57.0 |
| | | | 3-Hour | 1300 | 265.9 |

**Table 3-6. $PM_{2.5}$ Modeling Results**

| Bypass Option | Load (Percent) | FGD Absorber | Averaging Period | NAAQS (ug/m3) | Concentration (ug/m3) |
|---|---|---|---|---|---|
| None | 100 | A & B | Annual | 15 | 0.7 |
| | | | 24-Hour | 65 | 7.9 |
| | 75 | A & B | Annual | 15 | 0.7 |
| | | | 24-Hour | 65 | 6.4 |
| | 50 | A & B | Annual | 15 | 0.6 |
| | | | 24-Hour | 65 | 4.8 |
| | 40 | A & B | Annual | 15 | 0.6 |
| | | | 24-Hour | 65 | 4.7 |
| Single | 100<br>100 | A (in service)<br>B (bypass) | Annual | 15 | 0.4 |
| | | | 24-Hour | 65 | 4.0 |
| | 100<br>50 | A (in service)<br>B (bypass) | Annual | 15 | 0.4 |
| | | | 24-Hour | 65 | 3.7 |
| | 100%<br>10% | A (in service)<br>B (bypass) | Annual | 15 | 0.3 |
| | | | 24-Hour | 65 | 3.0 |

Air quality modeling results show that concentrations of $SO_2$ and $PM_{2.5}$ after installation of FGD at KIF Units 1-9 will not result in any NAAQS exceedences. Concentrations of other pollutants for which NAAQS exist are not expected to be appreciably changed by the addition of the scrubber. When the SCR is operating, mercury can be converted to a water-soluble compound and be removed in the scrubber at a rate of 80 to 90 percent for the type of coal expected to be burned at KIF (Moore, 2003). Without an SCR, the removal of mercury in wet limestone scrubbers is typically 55 percent.

*Plume Fog Modeling Results* - In order to quantify the potential plume impacts from the proposed KIF FGD system, the CALPUFF FOG dispersion model was used to estimate worst-case fogging distances and plume heights from the FGD chimney. The CALPUFF FOG processor simulates the transport and diffusion of water vapor from point sources, which makes it well suited for the new FGD chimney at KIF. From the FOG simulations, visible plume lengths due to fogging are estimated, and the potential for plume-induced fogging is determined at specific receptors.

For the FOG analysis, I-40 and Swan Pond Road were input into the model as discrete receptors to determine if plume-induced fogging could occur at these sensitive areas. The nearest section of I-40 is approximately 1.1 km from the new FGD chimney location, and has an average base elevation of 250 m. The nearest portion of Swan Pond Road is approximately 450 m from the new chimney and has an average base elevation of 240 m.

A total of 10 scenarios were run with the FOG module, each scenario distinguished by the percent load and/or bypass option (see Table 3-7 for model input). The results of the runs are summarized in Table 3-7. All runs showed no potential for fogging impact at I-40. Several of the partial load runs showed plume-induced fogging possibly reaching

Swan Pond Road, but plume heights would extend much higher than the road base elevation.

**Table 3-7. CALPUFF FOG Modeling Results**

| Bypass Option | Load (Percent) | FGD Absorber | Maximum Fog Plume Distance (m) | Fog Plume Centerline Height Range (m) |
|---|---|---|---|---|
| None | 100 | A & B | 442.03 | 412.41 – 464.81 |
| | 75 | A & B | 442.03 | 403.66 – 535.45 |
| | 50 | A & B | 442.03 | 394.83 – 303.52 |
| | 40 | A & B | 310.02 | 357.72 |
| Single | 100 | A (in service); B (bypass) | 267.79 | 395.3 – 421.08 |
| | 100; 50 | A (in service); B (bypass) | 267.79 | 395.3 – 421.09 |
| | 100; 10 | A (in service); B (bypass) | 267.79 | 395.3 – 421.10 |

*Opacity* - Some utilities with coal-fired power-generating facilities that have installed SCR controls and limestone scrubbers in series to control $NO_x$ and $SO_2$ emissions have experienced an increase in opacity of the exhaust plume exiting the chimney. TVA, along with the Electric Power Research Institute and other utilities, is evaluating this problem and developing methods and technology to address this issue. TVA will evaluate available methods and technology and, if it is determined to be necessary, will install the most appropriate technology to maintain opacity at acceptable levels.

The operation of the limestone handling facility associated with the scrubber would result in minor emissions of particulate, would be subject to Tennessee Division of Air Pollution Control emission requirements, and would not have a significant impact on local air quality. Most of the particulate emissions would result from the hauling of limestone and/or gypsum by truck over paved and unpaved roads. These particulate emissions from paved and unpaved roads could be mitigated by spraying water on the roadways as needed to reduce fugitive dust emissions.

**Cumulative Regional Impacts**

The installation of FGD at KIF Units 1-9 is part of an $SO_2$ emissions reduction effort that contemplates FGD installation on several of TVA's fossil plants. Construction of FGD systems at PAF Unit 3 and BRF Unit 1 are already underway. The proposed action (installation of FGD on KIF Units 1-9) is part of a TVA systemwide emissions reduction effort that is expected to benefit overall regional air quality.

Cumulative impacts on air quality in the Southeast due to changes in future emissions were evaluated by the Southern Appalachian Mountains Initiative (SAMI) by performing extensive photochemical and regional haze modeling. A primary conclusion from SAMI's work was that reduction of emissions within a state would provide the most improvement to the air quality within the same or adjacent states. Although SAMI did not model individual sources, the conclusions of the study can be extended to a collection of sources to infer that the primary air quality benefit of $SO_2$ emissions

reductions will be within the states where they are located and in the region adjacent to those states. Thus, although $SO_2$ emissions reductions due to installation of FGD are expected to lead to improvement in overall regional air quality, the most improvement would be within the TVA region.

## 3.2. Solid Waste and Groundwater

### 3.2.1. Affected Environment

KIF currently produces two coal combustion byproducts (CCB): Fly ash and bottom ash are byproducts from the combustion of coal and are disposed on site. KIF is expected to burn between 3.2 and 4.4 million tons of coal annually through at least 2015. The coal averages 12.5 percent ash; therefore, total ash production would range from approximately 400,000 to 550,000 tons of ash per year. Fly ash comprises approximately 80 percent (320,000 to 440,000 tons per year) and bottom ash is the remaining 20 percent (80,000 to 110,000 tons per year).

All fly ash and bottom ash produced at KIF is currently sluiced to the active ash pond. Bottom ash is reclaimed for use in dike construction for the two dredge cells that were developed on part of the inactive ash pond area. Periodically, fly ash is hydraulically dredged from the active ash pond into either of two active dredge cells. Decant water from the dredge cells drains by gravity back to the active ash pond for discharge. Between 320,000 to 440,000 tons of fly ash and 80,000 to 110,000 tons of bottom ash are handled in this manner annually.

KIF is considered a small quantity generator by TDEC for generation of hazardous waste. The types of these wastes currently generated include small quantities of waste paint; waste paint solvents; mercury contaminated debris; sandblasting, scraping, paint chips; solvent rags due to cleaning electric generating equipment; Coulomat (used as moisture removal from oil); and liquid-filled fuses. The status of KIF as a conditionally exempt small quantity generator of hazardous waste would not change as a result of the Action Alternative.

### 3.2.2. Environmental Consequences

**No Action Alternative**
For the No Action Alternative, KIF could continue to handle fly ash by sluicing to the pond and dredging to the dredge cells until capacity in these cells is exhausted.

**Action Alternative**
*Proposed Scrubber*
For the proposed action to construct and operate a wet LSFO FGD system at KIF, gypsum would be produced as a new byproduct. TVA proposes to market the gypsum, and it is anticipated that at least 385,000 tons per year of KIF gypsum can be marketed for use in wallboard, cement, and agricultural uses. However, the gypsum that is not marketed would be disposed on site. The proposed gypsum disposal facility at KIF would be located on the west bank of the Clinch River/Watts Bar Reservoir near CRM 3.5 in Roane County, Tennessee (KIF Peninsula Area #2, Figures 3-1 and 3-3).

Several sites were initially considered for the location of the proposed KIF gypsum disposal area. Eight sites were determined to be not practicable based on preliminary investigations. For a site to be economically feasible, it must provide a minimum capacity for 5 years of operation if it is located at the KIF site or 20 years of operation capacity if it is located off site. For long-term operation, the ultimate goal is to design for

20 years of total capacity. In addition, the gypsum dewatering facility would need to be close to the gypsum pond and stack area, and the barge loading area to be economically feasible. The preferred site is the mid-section of the KIF Peninsula (KIF Peninsula Area #2) which is outlined in Figures 3-1 and 3-3. Figure 3-2 is a cross section of figure 3-1 (A-A') that depicts vertical height of the stack at closure.

The gypsum stack would be constructed in a phased approach so that the initial stacking area to be developed would encompass only about 35 acres of the total 125 acres. Land surface across the proposed disposal site ranges from 740 to 792 feet mean sea level (ft-msl), and is mainly above the 100-year flood stage elevation (747.1 ft-msl at CRM 3.5). If marketing were successful, it is anticipated that the smaller footprint could serve for surge capacity and disposal for over 20 years. If marketing were unsuccessful, it would be necessary to develop the total footprint, which is anticipated to have a life of up to 25 years of gypsum disposal capacity. The proposed stack would be permitted as a Class II waste disposal facility and would meet design and siting criteria of TDEC's Division of Solid Waste Management, with waivers from gas migration and certain other standards not appropriate for this facility.

Depending on the sulfur content of the coal and the efficiency of the scrubbers, between 349,000 tons per year (3.1 lb sulfur per mmBtu coal) and 560,000 tons per year (5.0 lb sulfur per mmBtu coal) of high purity gypsum byproduct would be produced.

The status of KIF as a small quantity generator of hazardous waste would not change as a result of the Action Alternative.

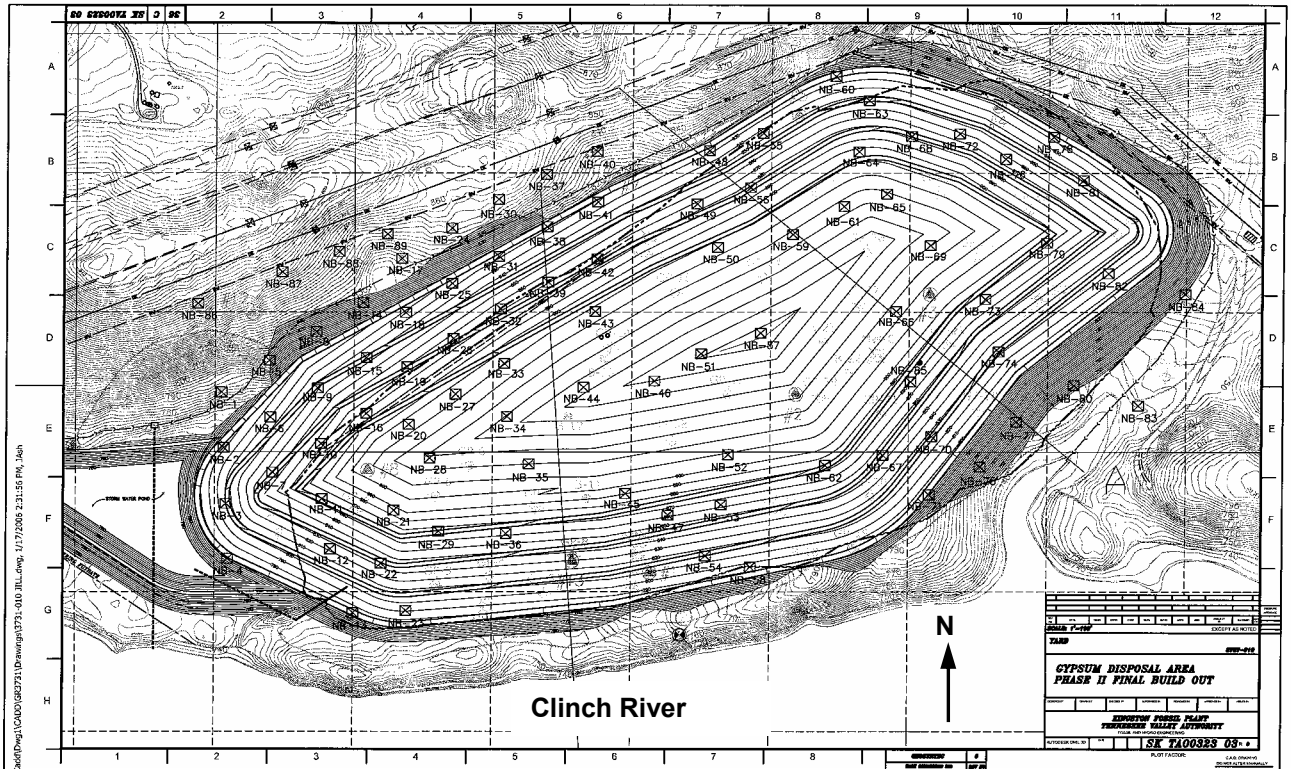


**Figure 3-1. Plan View of Site at Proposed Final Grade Including Cross-Section Location A**

*Flue Gas Conditioning by Addition of Lime*

KIF is also proposing to utilize lime ($Ca(OH)_2$) for flue gas conditioning ($SO_3$ mitigation) to help reduce plume opacity. The $Ca(OH)_2$ would react with $SO_3$ in the flue gas to produce calcium sulfate (gypsum). The gypsum and any unreacted lime would be removed from the flue gas by the electrostatic precipitators and would be wet-sluiced to the KIF ash pond (Outfall 001).

The estimated quantities of lime and gypsum that would be sluiced to the KIF ash pond are 25,682 tons/year of lime (62,664 cubic yards ($yd^3$)/year) and 10,091 tons/year (8,930 $yd^3$/year) of gypsum, respectively. A portion of the lime and gypsum would probably dissolve in the ash pond sluice water and be discharged. Any undissolved lime and gypsum would probably settle in the ash pond. It is not anticipated that the lime and gypsum sluiced to the ash pond would have a significant impact on operation of the KIF ash disposal facilities or operation of those facilities.

*Groundwater*

The construction of a new of Class II CCB disposal facility proposed at KIF may occur in two separate phases. Both phases would involve disposal of gypsum derived from FGD. Phase 1 would be constructed pending successfully marketing of the FGD-derived gypsum. The footprint for Phase 1 includes an area of approximately 35 acres. If efforts to market the gypsum were unsuccessful, the disposal facility would be expanded laterally under Phase 2. Phase 2 includes an additional area adjacent to the site and encompasses approximately 80 acres (total for both Phases 1 and 2). If approved, approximately 1 million $yd^3$ of gypsum is tentatively scheduled to be deposited in Phase 1 between 2009 and 2029. If the facility is expanded to include Phase 2, approximately 8 million $yd^3$ of gypsum would be deposited in the facility between 2009 and 2029. Estimates of FGD wastes for disposal are approximate and depend on the sulfur content of coal utilized by the plant, as well as TVA's ability to market the FGD-derived gypsum successfully for other uses. Current design plans for the disposal facility include a low-permeability liner and underdrain system. Hydrogeologic evaluations of the proposed facility were performed to examine its suitability relative to the appropriate standards of TDEC Rule 1200-1-7. Evaluations addressed effects of proposed disposal facilities on local groundwater and surface water resources.

Hydrogeologic data used to support the site evaluation were derived from recent geotechnical investigations at the site conducted by MACTEC Engineering and Consulting, Inc., from single-well aquifer testing and from several previous site investigations. Recent investigations included 26 geotechnical soil borings, bedrock coring at 14 locations, and installation of 13 wells for the purposes of single-well aquifer testing and to supplement water level data provided by five existing piezometers. Cone penetrometer surveys were performed at 10 locations and 55 Geoprobe borings were installed within the proposed disposal site to supplement boring data.

The proposed disposal site is topographically bounded by a relatively high ridge along the northeast margin and hydraulically by the Clinch River along the south-southeast. A mantle of predominantly residual soil resides above bedrock. Soil thickness is highly variable, ranging from 8.5 to 120 feet and averaging 40.5 feet based on all available data (139 holes) within the confines of the proposed disposal area. Residuum primarily consists of clay and silt with variable chert gravel content. Silty alluvial soils (clayey to sandy silt) were encountered along a small, low-lying area on the western margin of the site.

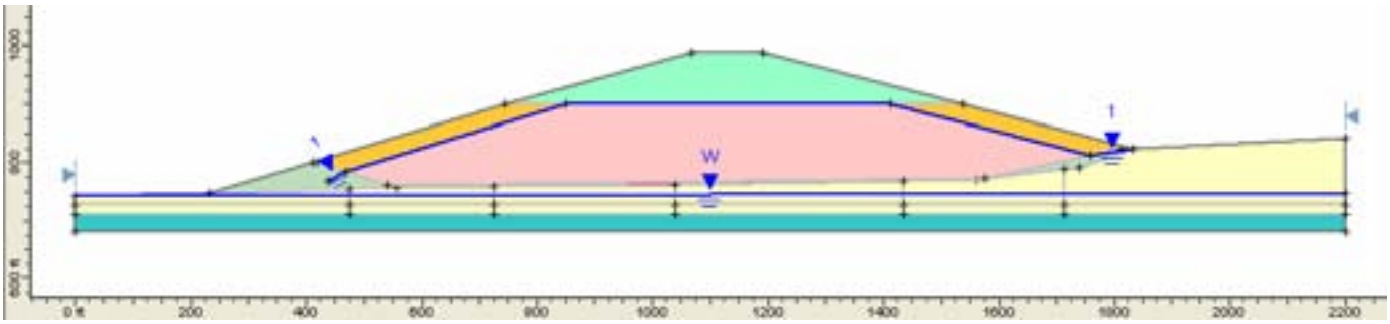


**Figure 3-2. Typical Cross-Section Geometry for End of Dry Stack Operation**

The Knox Group comprises bedrock beneath the proposed disposal area, and the general variation in lithology of the Knox is from massive, crystalline, very cherty dolomite at the base to generally less massively bedded, dense to fine crystalline, less cherty dolomite at the top. Core samples of the Knox bedrock at the site exhibit slight to highly fractured conditions. Most cavities and joints were also observed to be completely or partially filled with clays or sands. An exception was at NB-66 where open cavities were observed. Cavity thicknesses ranged from 0.4 to 8.0 feet. Cavities of measurable thickness were observed at half of the core hole locations.

Groundwater movement at the site generally follows topography with groundwater flowing southeasterly from the site ridgeline toward the Clinch River. All groundwater originating on, or flowing beneath, the proposed disposal site ultimately discharges to the Clinch River without traversing private property.
Hydrogeologic conditions at the proposed disposal site appear to satisfy geologic and hydrologic standards for Class II disposal facilities. Key findings and recommendations are summarized as follows:

- A survey of water use in June 2005 indicates that there are no surface water or groundwater supplies located within a 1-mile radius of the site. Furthermore, considering that the site is hydraulically bounded on virtually all sides, there is no potential for off-site impacts to residential or municipal groundwater supplies. The facility poses no risk to existing or future groundwater users because there are no existing groundwater wells downgradient of the proposed facility. There is no potential for future development of such wells, since all downgradient property between the disposal site and surface water boundaries lies within the plant reservation.

- There is no evidence of Holocene-age faulting within the 200-foot facility exclusion zone. Although topographic expressions of dolines (enclosed depressions) are exhibited at the site, these features do not possess open throats or avenues for reception of incipient recharge. Rather, the dolines are thickly mantled by soil thicknesses ranging from about 35 to 75 feet. Visual and laboratory classifications of these soils indicated that they are of residual origin except in the area of NB-21 and NB-44 (site pond) where alluvial deposition has

occurred. There were no voids detected immediately above bedrock that would indicate stooping of soil into the deeper bedrock system.

- Two small areas within the proposed facility boundary reside within the 100-year flood stage of the Clinch River, and the natural geologic buffer zone within these areas is lacking. However, the proposed facility design includes plans for filling of these areas with suitable borrow soil. Furthermore, the current facility plan includes a bottom liner residing above the seasonal high groundwater elevation and an under-drain system to intercept leachate.

- Groundwater monitoring for potential CCB leachate contaminants is anticipated to include several discrete locations immediately beneath the landfill liner. Although design of the complete groundwater-monitoring network is dependent on the features of the final landfill design, it is expected that perimeter network would be proposed. Perimeter monitoring wells would be installed at critical locations to complement those monitoring locations beneath the landfill. Upgradient wells are currently being installed at higher elevations of the site (ridgeline) that should serve to gage background groundwater quality. The final groundwater-monitoring plan will be detailed in the facility operations plan.

- Consequently, potential impacts to groundwater from any of the options considered under the Action Alternative for disposal of gypsum are insignificant.


**Figure 3-3. Location of Proposed Disposal Facility**

## 3.3. Transportation

### 3.3.1. Affected Environment

Highway, railway, and waterway modes of transportation serve KIF; however, there are currently no barge facilities on site. The plant, located in Roane County, Tennessee, is approximately 35 miles east of downtown Knoxville. Most lands nearby are DOE reservation properties for the Oak Ridge facilities, but residential and recreational areas are in close proximity.

*Highways and Roads*

The plant adjoins Swan Pond Road just off US 70. US 70 is a principal, four-lane divided highway with wide shoulders traversing a gently rolling suburban area in an east-west direction, while Swan Pond Road is a rural, two-lane road. Delivery trucks would exit Interstate Highway 40 (I-40) at the Midtown exit and travel east on US 70 to Swan Pond Road before entering the KIF reservation. Therefore, Swan Pond Road and US 70 are the primary routes studied in this portion of the assessment. The following Figure 3-4 shows the 2004 Tennessee Department of Transportation (TDOT) Average Annual Daily Traffic (AADT) counts for the traffic volumes as well as the locations of the routes.

Since TVA's purchase of limestone for KIF constitutes only a small fraction (less than 10 percent) of the total limestone production capacity of existing quarries in the vicinity and since multiple uses of limestone are present in the general area, the demand for this commodity is fungible, and TVA's purchase of limestone for KIF would likely not result in the opening of additional quarries. The exact source of limestone is not known since limestone purchases are competitively bid, and a request for proposals for limestone to supply the scrubber(s) would not be released until 2007 or 2008.

Information provided by the Hershey and Maher (1985) indicates that 17 limestone quarries are operated in Roane County or counties that border Roane. However, not all quarries in the vicinity could provide limestone that would meet the minimum specifications needed for efficient scrubbing of $SO_2$. In general, the limestone eventually purchased for use in the KIF scrubber would need to contain at least 90 percent calcium carbonate (for reactivity), have relatively low silica content (for ease of grinding), have low dolomite content and low bitumen content (to control foaming in the scrubber and to provide an aesthetically pleasing gypsum byproduct for marketing purposes).

*Railroads*

Both CSX Transportation and Norfolk Southern Transportation operate along rail lines that serve KIF. However, this mode of transportation is not being evaluated as a potential delivery/removal option due to the higher cost of the handling systems and the lack of competitiveness between the limestone sources that meet the criteria for scrubber use.

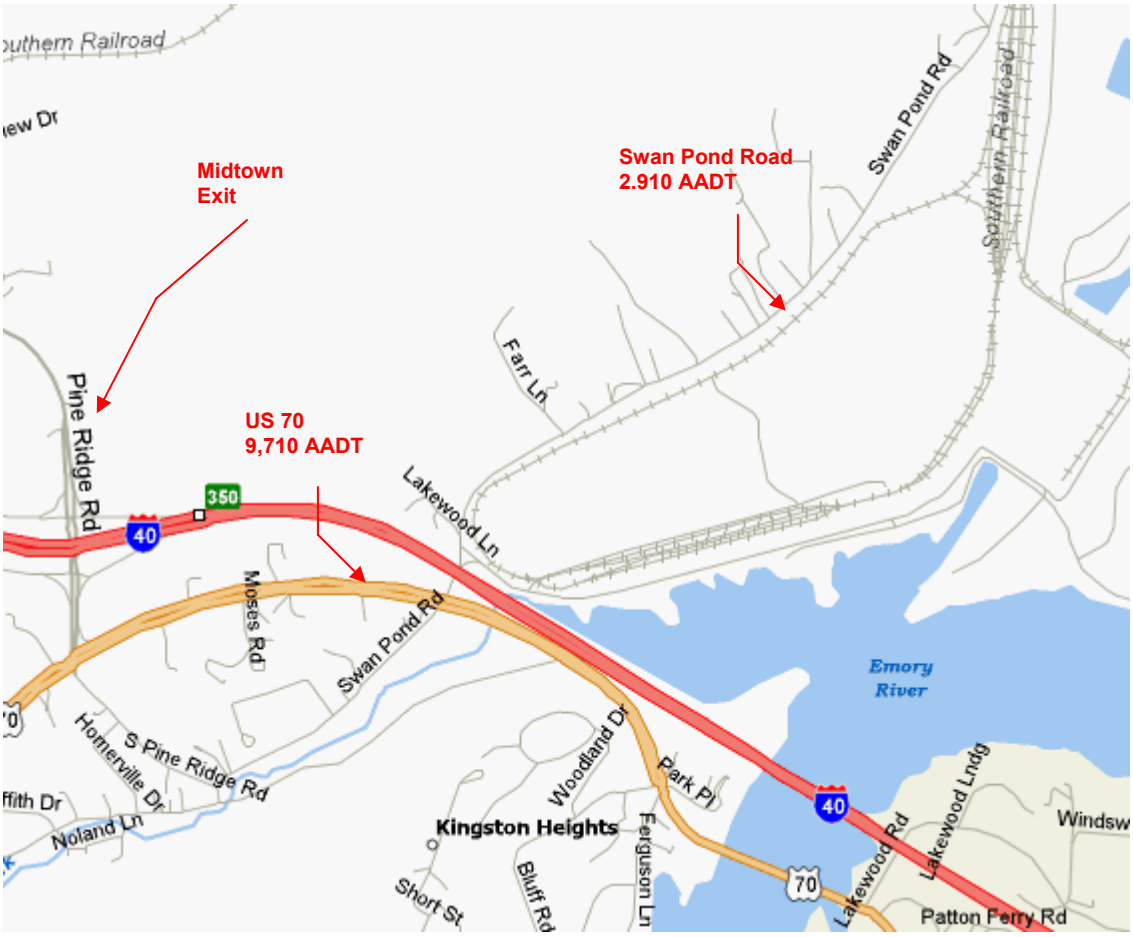


**Figure 3-4. Area Map and 2004 Tennessee Department of Transportation Average Annual Daily Traffic Values**

### 3.3.2. Environmental Consequences

**No Action Alternative**
If no plans were undertaken to add an FGD facility at KIF, none of the transportation modes listed would be affected.

**Comparison of Alternatives**
By adding an FGD facility, there will be additional highway and waterway traffic from delivery of major scrubber components by barge generated during the construction of the facility, the delivery of limestone to the plant, and the removal of gypsum from the plant.

*Highways and Roads*
By building an FGD facility at KIF, there would be impacts to the road systems both during the construction and operation periods. An additional 350 workers would be on site during construction. Assuming an average of 1.6 persons per vehicle with a trip to and from the plant each day, 438 trips would be generated to accommodate the workers. Once construction was completed, permanent staffing would increase by 40 to 50

people (25 to 35 people for permanent plant staffing and 15 people for gypsum dewatering facility staffing).

Once scrubber operations begin, there could be a maximum of 95 trucks delivering limestone and 90 additional trucks removing gypsum during normal working hours Monday through Friday, if all the gypsum is marketed and transported by truck. The more likely case is that there would be 60 limestone delivery trucks and 45 gypsum removal trucks each of those five days, during normal working hours. This more likely case takes into account a lower-sulfur coal being used, which would require less limestone and produce less gypsum. The potential also exists for limestone delivery trucks to remove gypsum from the facility in the form of haul backs that have the potential to reduce the number of trucks even further. However, assuming a worst-case scenario with 100 percent truck removal of gypsum with no limestone truck haul backs, a higher-sulfur coal, and the maximum number of additional employees, no more than 808 vehicle trips would be generated and added to the existing roadway network due to FGD construction/operation.

If the FGD construction/operation were to take place, TVA would construct a new left turn lane from US 70 onto Swan Pond Road to minimize the impacts on motorists traveling on US 70. This left turn lane would be capable of storing delivery trucks while they wait to turn left onto Swan Pond Road.

There is currently one entrance to the KIF reservation suitable for truck deliveries. During normal operations, limestone and gypsum trucks would use this entrance to KIF shown in Figure 3-5 as the “Typical Truck Entrance Route.” When using this normal entrance, the trucks would only travel approximately 300 feet on Swan Pond Road with regular traffic before passing under the I-40 overpass and turning right. This entrance is blocked periodically by rail deliveries of coal. While this entrance is temporarily blocked, the limestone trucks would travel approximately 0.5 mile on Swan Pond Road to the proposed new deceleration and right turn lane entrance to the KIF reservation. This new entrance would be constructed near the coal storage yard and would accommodate at least five 50-foot-long delivery trucks in the event of a blocked rail crossing at this location. The gypsum trucks would not be impacted by the rail delivery of coal. TVA would also construct receiving and handling facilities for the limestone. For the purposes of this study, 100 percent of the truck traffic was assumed to mix with the projected 2010 AADT for Swan Pond Road.

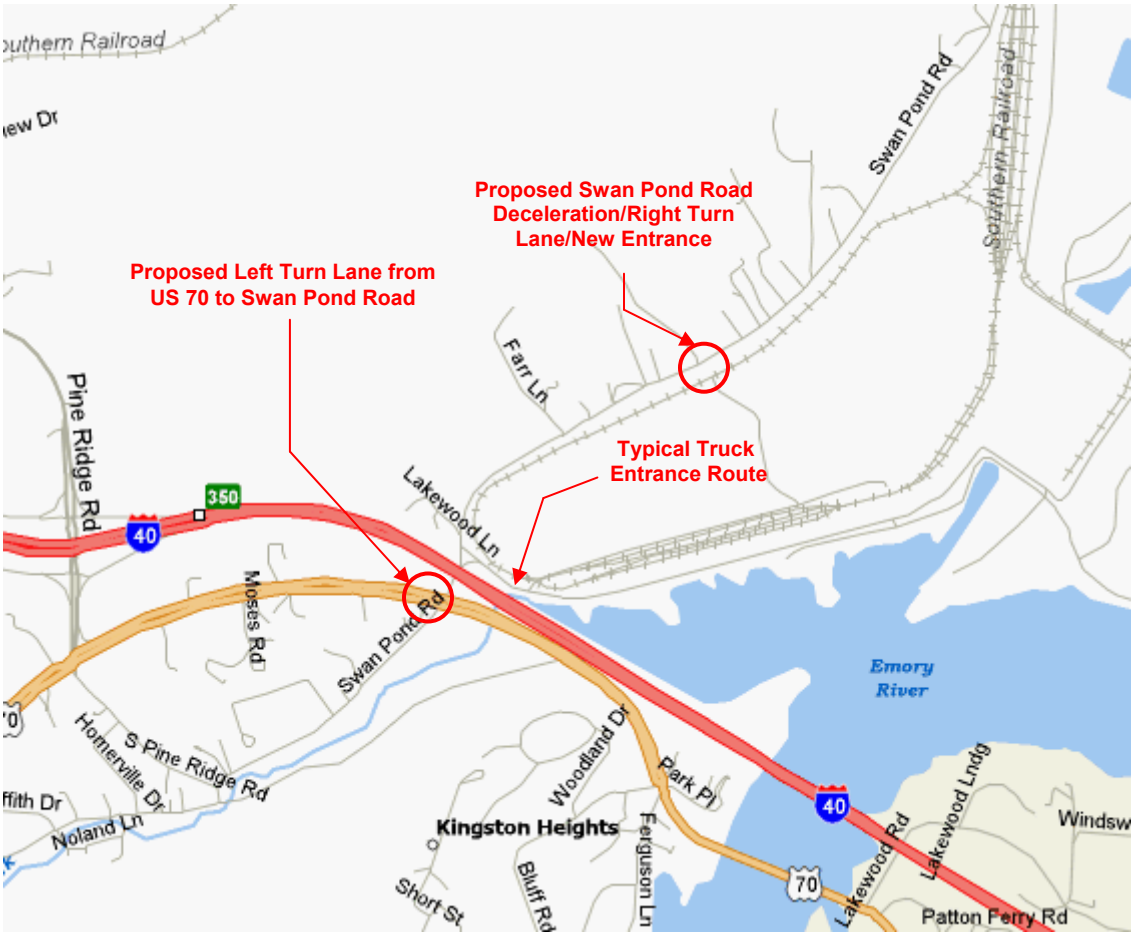


**Figure 3-5. Typical Truck Entrance Route**

The *Highway Capacity Manual* (Transportation Research Board, 2000) outlines methods for evaluating the operational conditions within a traffic stream. These methods take into account average highway speed, lane widths, shoulder widths, and alignment among other inputs. These methods define six levels of service (LOS); using the letters A through F:

- LOS A is defined as the highest quality of service that a particular class of highway can provide. It is a condition of free flow in which there is little or no restriction on speed or maneuverability caused by the presence of other vehicles.
- LOS B is a zone of stable flow. The restriction on maneuverability is negligible, and there is little probability of major reduction in speed or flow.
- LOS C is a zone of stable flow but at this volume and density level, most drivers are becoming restricted in their freedom to select speed, change lanes, or pass.
- LOS D approaches unstable flow. Tolerable average operating speeds are maintained, but could be subject to considerable and sudden variation. This condition is tolerable for short periods.

- LOS E is unstable with lower operating speeds and some momentary stoppages. There is little independence of speed selection and maneuverability. The upper limit of this level is the capacity of the facility.

- LOS F indicates forced-flow operations at low speeds. The level of density increases to the effect of a traffic "jam."

The following table contains the AADT and LOS data from the analyses. The projected values for 2010 include: (a) only a 7 percent annual increase in AADT and (b) a 7 percent annual increase in AADT plus the additional traffic from the FGD construction/operation. The analyses assume that 100 percent of the additional traffic would use Swan Pond Road and US 70 to reach I-40 and the final destinations.

**Table 3-8. Existing and Projected Traffic Data**

| Route | Year | AADT | LOS |
|---|---|---|---|
| US 70 | 2004 | 9,710 | A |
| | 2010* | 14,572 | A |
| | 2010** | 15,380 | A |
| Swan Pond Road | 2004 | 2,910 | B |
| | 2010* | 4,367 | C |
| | 2010** | 5,175 | C |

*7 percent Annual Increase Without FGD Traffic
** FGD Additional Traffic and 7 percent Annual Increase

Both Swan Pond Road and US 70 currently have very good levels of service. When the projected traffic volumes in 2010, based on growth alone, are analyzed, Swan Pond Road decreases to an LOS C while US 70 maintains its LOS A. Once the worst-case traffic volumes associated with the FGD are combined with the projected growth, the levels of service do not change. Therefore, the drop in LOS for Swan Pond Road is due to natural growth of the area and not associated with the addition of traffic due to the construction and operation of the FGD at KIF.

The *Highway Capacity Manual,* (Transportation Research Board, 1994), outlines methods for evaluating the operational conditions at intersections. These methods take into account the volumes making various turning movements, conflicting flow volumes, and lane capacities to name a few. These methods define the same six levels of service, LOS A through LOS F.

Assuming a worst-case scenario, where all additional traffic associated with this project uses the new intersection off Swan Pond Road onto the KIF reservation, the intersection would not have a significant impact on the traffic traveling on Swan Pond Road. The new intersection would have an average of 0.5 second per vehicle total delay and an LOS A designation.

In the long term, operation of the scrubbers would not degrade the level of service of the transportation facilities. The potential increase in traffic for both the construction and operational phases of the scrubber is insignificant. The roads in the area are fully

capable of absorbing the additional traffic with no problems; the level of service would be unchanged based on our conclusions. The new left-turn lane on US 70 would prevent truck traffic going to KIF from congesting US 70 while waiting to turn on Swan Pond Road. The addition of a new entrance to KIF from Swan Pond Road has little effect on the traffic traveling on Swan Pond and has minimal average.

*Railroads*

There would be no effects to the existing railway system, since rail is not being considered as a viable option for transportation of limestone. Transportation of gypsum by rail would require a staging area within the rail loop at KIF where rail cars could be loaded with a front-end loader. Each rail car is capable of hauling about 100 tons of material.

## 3.4. Natural Areas and Recreation

### 3.4.1. Affected Environment

A review of the TVA Natural Heritage database indicated that the proposed construction and operation of an FGD (scrubber) system at KIF is within 3 miles of seven managed areas and/or ecologically significant sites, and no Nationwide Rivers Inventory stream or wild and scenic rivers are present within the 3-mile radius.

- A portion of the proposed project is located within the boundaries of **Kingston State Wildlife Management Area (WMA) and Refuge.** Located in Roane County, this 835-acre area includes KIF and the wildlife observation area. This area features a variety of plants and wildlife. Only the southeast peninsula is actively managed by TWRA. Limited hunting is permitted for deer and dove.

- **Kingston Fossil Plant State Wildlife Observation Area (WOA**) in Roane County is a 200-acre area located approximately 0.2 mile from the proposed activity. This area is managed in cooperation with TWRA. Situated near the confluence of the Clinch and Emory Rivers, KIF's ash settling ponds provide habitat for a wide variety of shorebirds, wading birds, and waterfowl. Once a popular public viewing locale for observing migrating shore birds from Canada and the northern U.S., the renovation of the settling ponds to accommodate fossil plant operations over the years has changed the water levels and other conditions causing lower numbers of birds to utilize the area.

- **Rayburn Bridge TVA Habitat Protection Area (HPA)** in Roane County is an 8.6-acre area located approximately 0.2 mile from the proposed activity. This HPA, located under the bridges of I-40 and US-70, features suitable habitat for populations of spreading false foxglove (*Aureolaria patula*), a threatened plant in Tennessee.

- **Stowe Bluff TVA HPA** in Roane County is an 11.4-acre area located approximately 1.2 miles from the proposed activity. This area features suitable habitat for populations of northern bush-honeysuckle (*Diervilla ionicera*), spreading false foxglove, and Appalachian bugbane (*Cimicifuga rubifolia*). These plants are threatened in Tennessee.

- **Kingston City Park** in Roane County is located approximately 1.2 miles from the proposed activity. This park is open to the public and features a picnic area, boat ramp, and dock. This park is managed by the City of Kingston.

- **Southwest Point Park** in Roane County is located approximately 1.9 miles from the proposed activity. This park is open to the public and is managed by the City of Kingston.

- **Sugar Grove TVA HPA** in Roane County is a 6.4-acre area located approximately 1.2 miles from the proposed activity. This HPA features suitable habitat for populations of spreading false foxglove and mountain honeysuckle (*Lonicera dioica*).

### 3.4.2. Environmental Consequences

**No Action Alternative**
Under the No Action Alternative, no FGD or other system for $SO_2$ emission reduction from KIF would be installed; therefore, no direct impacts to natural areas would occur as a result of this proposal. Large-scale reduction in $SO_2$ emissions would not occur at KIF; and similar impacts to natural areas as a result of $SO_2$ production would continue. However, TVA would be required to either make additional systemwide reductions or purchase emission credits to meet its requirements under Title IV and CAIR.

**Action Alternative**
Under the Action Alternative, the FGD scrubber system installation to lower $SO_2$ emissions at KIF would be implemented. A portion of the project is within the boundaries of Kingston Refuge, and this area would be directly affected by the proposed activity. The proposed construction of a gypsum dewatering facility and disposal area would be developed on the peninsula of the Kingston State WMA and Refuge resulting in ground disturbance of approximately 125 acres and alteration of topography of the natural area.

Kingston Refuge was established for interim use for wildlife management and to provide a secure resting area for wintering waterfowl with the intent of converting the use of the property to industrial use when needed by fossil plant operations. In recent years, TWRA reports low use of the area by hunters, and subsequently, limited wildlife management activities have occurred on the refuge during that period. Direct effects anticipated as a result of the Action Alternative would be permanent loss of some wildlife management opportunities on the site. However, direct impacts from this proposal are expected to be localized and, therefore, insignificant. Other available areas suitable for hunting and wildlife management exist along the upper portions of Watts Bar Reservoir.

The other natural areas would not be directly affected by implementation of the Action Alternative. Indirect effects anticipated to natural areas would be improved air quality due to particulate matter reduction. Cumulative effects anticipated over time to all these natural areas would include improved regional air quality with respect to visibility and reduced ecosystem acidification, improving wildlife habitat and visitor experience as a result of the Action Alternative.

## 3.5. Visual

### 3.5.1. Affected Environment

Visual resources are evaluated based on existing landscape character, distances of available views, sensitivity of viewing points, human perceptions of landscape beauty/sense of place (scenic attractiveness), and the degree of visual unity and wholeness of the natural landscape in the course of human alteration (scenic integrity).

The topography of the proposed project area ranges from mildly sloping along the river edges to gently sloping within KIF. Land use is predominately industrial with dispersed areas of open pasture and woodlands. Potential user groups that would likely have direct views of the proposed project area include motorists traveling along I-40 near the Samuel T. Rayburn Memorial Bridge, motorists along local roads within 2 miles of the plant site, recreational users along the Clinch River, employees and visitors to the plant, and residents outside the proposed project area.

Views of the proposed project area from I-40 for motorists include broadly horizontal buildings, parking areas, the switchyard on the east side of KIF, and a variety of open spaces and woodlands. Predominate focal points include the existing chimneys, which can be seen in the foreground (0 to 0.25 mile) and the middleground (0.25 mile to 4 miles). Recreational users along the Clinch River have oblique views of the project area from the south, particularly of taller buildings and the chimneys. Employees and visitors to the plant site view numerous industrial features within the project area; these features include storage and laydown areas, associated fencing, railway beds and tracks, and myriad temporary and permanent buildings of various heights. Residents outside the project area would have views in the foreground, middleground, and background (4 miles to the horizon) distances from adjacent shorelines and surrounding ridges. These views are influenced by seasonal variations and atmospheric conditions.

Scenic attractiveness of the proposed project area within KIF is minimal, and scenic integrity ranges from low to very low. Scenic attractiveness along the Clinch River is common and scenic integrity is moderate.

### 3.5.2. Environmental Consequences

Consequences of the impacts to visual resources are examined based on changes between the existing landscape and the landscape character after alteration, identifying changes in the landscape character based on commonly held perceptions of landscape beauty and the aesthetic sense of place.

**No Action Alternative**

Under the No Action Alternative, the scrubbers would not be installed, resulting in no need for a change in current land use within the existing KIF boundary or along the Clinch River adjacent to the plant site. Visual character would remain in its current state.

**Action Alternative**

Under the Action Alternative, TVA would proceed with the installation of the scrubber module(s), resulting in a need to utilize current lands within KIF and along the Clinch River adjacent to the plant site in order to support activities associated with construction, operation, and maintenance. Following is a discussion of potential visual impacts of the proposed scrubber and associated components.

Temporary impacts would include an increase in traffic along Swan Pond Road due to an increase in personnel needed to construct the scrubber components, and an increase in deliveries of materials. No new laydown and staging areas would be needed during construction. Additional visual disruptions would occur with an increase in equipment at construction sites.

Permanent impacts would include minor discernable alterations such as a truck limestone receiving and handling facility, gypsum dewatering facility, gas handling system, and a wet-ponded gypsum disposal area. These areas would be viewed in the foreground of plant operations and would become visually subordinate to the overall landscape character associated with the plant site. A new chimney would be constructed near the existing plant structures. This chimney would likely be visible in the middleground and background distances to motorists and area residents, particularly those to the south along Lakewood Road, but when viewed in context with existing plant structures would remain subordinate to the established landscape character. Water vapor plumes from the new chimney would be seen from points near KIF that have views of the existing chimneys now. Motorists and residents farther away from KIF may have views of the new plume, depending upon atmospheric conditions and viewer location. The new plume would be viewed as a focal point in the landscape, contributing to additional adverse visual contrast in the landscape around and near KIF.

Views of clearing, site grading, and other site preparation activities from points along Swan Pond Road, I-40, and from the Clinch River would remain in context with the existing industrial setting, and the scenic value would not be substantially diminished. Minor increases in truck traffic during the transportation of limestone would be visually insignificant compared to the volume of traffic seen along I-40 now. If barge delivery of gypsum to markets is preferred, increases would likely be visually insignificant for area residents to the south and recreational users along the Clinch River.

The construction, operation, and maintenance of the new scrubber would have insignificant visual impacts for area residents, motorists, recreation users, and KIF employees and visitors. There may be some minor visual discord during the construction and subsequent post-construction maintenance period due to an increase in personnel and equipment and the use of laydown and materials storage areas. These minor visual obtrusions would be temporary until all areas have been restored through the use of TVA standard BMPs (Muncy, 1999). Therefore, no significant visual impacts are anticipated as a result of this project.

## 3.6. Surface Water and Wastewater

### 3.6.1. Affected Environment

**Resource Description**

KIF is located in eastern Tennessee, approximately 1.5 miles due north of the town of Kingston, Tennessee. KIF is situated on a peninsula formed by the Clinch and Emory Rivers at CRM 2.6 and is in the headwaters of Watts Bar Reservoir near the confluence of the Clinch and Emory Rivers. Watts Bar Dam is approximately 40.5 river miles below KIF (37.9 miles on the Tennessee River and 2.6 miles on the Clinch River) at Tennessee River Mile (TRM) 529.9. River reaches on the Clinch and Emory in the vicinity of KIF appear to be a riverine nature but are actually impounded waters from Watts Bar Dam. Flow past KIF on the Clinch River averages 5,226 cubic feet per second (cfs) over the year with the summer mean being 4,306 cfs and the winter mean 6,221 cfs. Flow past

KIF on the Emory River averages 1,478 cfs over the year with the summer mean being 504 cfs and the winter mean 2,675 cfs.

*Clinch and Emory Rivers/Watts Bar*

As previously stated, KIF is located at approximately CRM 2.6 near the mouth of the Emory River. Much of the Clinch River flow is controlled by Melton Hill Dam, upstream of KIF at CRM 23.2. Being in the headwaters of Watts Bar Reservoir, flow at KIF is also controlled by Watts Bar Dam. Momentary flows at the site may vary considerably from daily average flows, depending upon turbine operations for peak power demands at Watts Bar and Melton Hill Dams. The 3-day 20-year (3Q20) low flow from Melton Hill Reservoir on the Clinch River is 0.0 cfs. The 3Q20 flow from Poplar Creek and East Fork Poplar Creek (tributaries to the Clinch below Melton Hill, but above KIF) total 19.07 cfs. The 3Q20 flow on the Emory River at KIF is 0.04 cfs. Under normal operating conditions, short-term flow reversals can develop in the reservoir. However, the duration of flow reversal rarely lasts more than half a day.

The watershed health indicator for the Watts Bar Reservoir watershed and the Lower Clinch River watershed are both rated by the state of Tennessee as having more serious water quality problems and low vulnerability (USEPA, 2001a). The status of "more serious water quality problems" indicates a watershed with aquatic conditions well below state water quality goals that have serious problems exposed by other indicators. Low vulnerability indicates watersheds where data suggest pollutants or other stressors are low and, therefore, there exists a lower potential for future declines in aquatic health. Actions to prevent declines in aquatic conditions in these watersheds are appropriate but at a lower priority than in watersheds with higher vulnerability. The "more serious water quality problems" in the Watts Bar Reservoir and Lower Clinch River watersheds are due to concerns over (1) not meeting designated uses, (2) fish and wildlife consumption advisories, and (3) contaminated sediments. Because of these concerns, the 28.2-mile section of the Clinch River from its mouth to Hickory Creek has been placed on the State's 303d list of "impaired" waters. A fishing advisory is in effect due to the presence of PCBs. Chlordane and metals, specifically mercury, are also of concern (USEPA, 2001b).

**Existing Wastewater**

*Existing Coal Combustion Byproducts (CCB) Wastewater Treatment Facilities*

Fuel burning at KIF is described in the Solid and Hazardous Waste Section of this EA. The CCB handling systems include the ash pond and CCW, which receive and treat wastewater effluents and which may be impacted by the proposed action. The ash pond receives all of the fly ash and bottom ash wastewater. The scrubber blowdown is proposed to be discharged directly into the CCW discharge.

Ash Pond

Ash is periodically dredged to either of the two active dredge cells on the north side of the ash pond. This is estimated to provide capacity for ash storage until 2014; however, a permit modification has been submitted to TDEC to provide additional capacity until 2047. Decant water from the dredge cells drains by gravity back to the active ash pond for discharge. TDEC issued the existing solid waste disposal permit for the ash pond and dredge facility in September 2000, and an approval of the modification is anticipated in 2006.

Bottom ash, along with pyrites from the reject hoppers in the plant, are wet-sluiced to a separate, unlined channel parallel to the fly ash sluice channel. Most of the bottom ash settles in the sluice channel, is removed with a dragline, and is used to raise the dredge cell dikes.

Currently, on average 40.4 MGD of ash sluice water and other constituent flows are discharged from the ash pond via DSN 001. DSN 001 discharges directly into the 1,347 MGD plant intake. TVA is required to meet effluent characteristics as shown in Table 3-9 for DSN 001 and 002. Flow distribution to the ash pond and the CCW is shown in Table 3-10.

Flow distribution to the ash pond for this configuration would remain as they currently are today as reflected in Table 3-10.

**Table 3-9. DSN 001 and DSN 002 Discharge Requirements**

**DSN 001**

| Effluent Characteristics | Effluent Limitations | | Monitoring Requirements | |
|---|---|---|---|---|
| | Monthly Average mg/L | Daily Maximum mg/L | Measurement Frequency | Sample Type |
| Flow (MGD) | Report | Report | 1/week | Instantaneous |
| pH | | minimum 6.0 | 1/week | Grab |
| Oil and Grease | 14.4 | 19.4 | 1/month | Grab |
| Total Suspended Solids | 29.9 | | 1/month | Grab |

**DSN 002**

| Effluent Characteristics | Effluent Limitations | | Monitoring Requirements | |
|---|---|---|---|---|
| | Monthly average | Daily Maximum mg/L | Measurement Frequency | Sample Type |
| Flow (MGD) | | | 1/day | Instantaneous |
| pH | 6.0 | 9.0 | 1/week | Grab |
| Intake/Effluent Temperature | | 36.1°C | Continuous | |
| Total Residual Oxidant | | | Daily | Grab |
| If flow< 654 MGD | 0.011 | 0.019 | If adding | |
| If flow ≥ 654 MGD | 0.038 | 0.660 | oxidants | |
| $IC_{25}$ Toxicity – survival, reproduction, and growth in 100% effluent) | | | Annual | Grab |

(Source: NPDES Permit No. TN005452)
$IC_{25}$ = 25 percent inhibition concentration
MGD = million gallons per day
mg/L = milligrams per liter
°C = degree Celsius
< = less than
≥ = greater than or equal to

| Table 3-10. Inflow Sources to the KIF DSN 001 & DSN 002 | |
|---|---|
| **Ash Pond (DSN 001)** | **Inflow to Pond (MGD)** |
| Ash Sluice Water | 31.992 |
| Station Sumps | 7.496 |
| Water Treatment Sump | 0.267 |
| Redwater Wetlands | 0.180 |
| Coal Pile Pumping Basin | 0.145 |
| Chemical Treatment Pond | 0.005 |
| Nonchemical Treatment Pond | 0.002 |
| Precipitation | 0.574 |
| Evaporation | -0.238 |
| **Total** | **40.42** |
| **Condenser Cooling Water Discharge Channel (DSN 002)** | **(MGD)** |
| Condenser Cooling Water | 1296.627 |
| Equipment Cooling Water and Precipitator Area Runoff | 18.186 |
| Intake Screen Backwash | 0.243 |
| Boiler Blowdown | 0.014 |
| Underflow Ponds | 0.010 |
| **Total** | **1315.08** |

(Source of Flow Rates: Kingston Fossil Plant Storm Water and Wastewater Flow Schematic, NPDES Permit No. TN0005452)

Condenser Cooling Water (CCW)
The primary use of raw water from the plant intake is for condenser cooling. The condenser cooling system discharges approximately 1,315 MGD. TVA is required to meet effluent characteristics as shown in Table 3-3 for DSN 002.

### 3.6.2. Environmental Consequences

**Construction Impacts**
Wastewaters generated during construction of the proposed KIF FGD scrubber system may include construction storm water runoff, domestic sewage, dewatering of work areas, nondetergent equipment washings, and hydrostatic test discharges.

*Surface Runoff*
Most construction activities related to the scrubber installation would be performed within the existing plant site. The proposed turn land on US 70 would be constructed in accordance with appropriate BMPs and should not result in any significant impacts to surface water. Construction of the proposed gypsum dewatering facility and the proposed gypsum pond facility would be on an area of the plant site that is currently managed as a wildlife area. Appropriate BMPs would be adopted, and all construction activities would be conducted in a manner to ensure that waste materials are contained and that the introduction of polluting materials into the receiving waters would be minimized. A Construction Storm Water Permit would be in effect that would require development of a project-specific Storm Water Pollution Prevention Plan. This plan would identify specific BMPs to address construction related activities, which would be implemented to ensure that storm water impacts are minimized and that no sediment or other polluting materials are introduced into receiving waters. Therefore, no impacts to

surface water would be expected from construction and installation of the FGD reactor and associated limestone and FGD wastes storage, unloading and handling area, or systems.

*Construction Workforce Domestic Sewage Disposal* - Portable toilets would be provided for the additional construction workers as needed. These toilets would be regularly pumped out and the sewage transported by tanker truck to a publicly owned treatment works accepting pump out.

*Equipment Washing* – These discharges would be handled in accordance with BMPs developed in accordance with the Construction Storm Water Permit (that covers water-only cleaning) and/or NPDES Permit TN0005452.

*Hydrostatic Testing* – These discharges would be handled in accordance with NPDES Permit TN0005452 or the TDEC General NPDES Permit for Discharges of Hydrostatic Test Water (TN670000).

Thus, with the implementation of BMPs, no significant impacts to the Clinch River are expected from construction activities.

**Operational Impacts**
The wastewater streams, which could change substantively under the proposed alternative, are:

- The addition of lime to reduce plume opacity, resulting in lime and gypsum being added to the ash pond (DSN 001).
- The addition of the FGD scrubber system wastewater to the CCW (DSN 002).
- Surface runoff from the proposed limestone handling area.
- Surface runoff from the proposed gypsum dewatering and storage facilities.

The estimated average flow from the proposed FGD system is approximately 800 gpm, (1.15 MGD), which would increase the total discharge from the CCW (DSN 002) less than 0.1 percent.

*Ash Pond DSN 001*
KIF is proposing to utilize lime ($Ca(OH)_2$) for flue gas conditioning ($SO_3$ mitigation) to help reduce plume opacity. The $Ca(OH)_2$ would react with $SO_3$ in the flue gas to produce calcium sulfate (gypsum). The gypsum and any unreacted lime would be removed from the flue gas by the electrostatic precipitators and would be wet-sluiced to the KIF ash pond (Outfall 001). The estimated quantities of lime and gypsum that would be sluiced to the KIF ash pond are 140,724 lb/day of lime, $Ca(OH)_2$, and 55,291 lb/day of gypsum, $CaSO_4$-$2H_2O$, respectively. Based on the NPDES permit flow schematic for KIF, the average daily flow for the ash pond (Outfall 001) is 40.423 MGD. Using this flow and the quantities of lime and gypsum above, the expected concentrations entering the ash pond are approximately 417 mg/L of lime and 164 mg/L of gypsum. It is expected that most of the lime and gypsum entering the ash pond would be in the particulate or solid form and would probably be removed by settling in the ash pond. Because the TSS concentrations in the ash pond discharge already trend at half the monthly average

concentration and could increase significantly from this activity, TVA would evaluate the estimated discharge quality by performing column tests or other appropriate technique for determining adequate design basis. If determined to be necessary, then appropriate mitigative measures would be evaluated and implemented as needed to ensure that the TSS limitation monthly on DSN 001 was not exceeded. The appropriate level of NEPA would be conducted if additional treatment were determined to be needed.

The coals burned at Cumberland Fossil Plant (CUF) and BRF are expected to be similar to those that may be burned at KIF after installation of the KIF scrubber. Samples of the ashes from CUF and BRF contained 1.8 and 2.7 milligrams per kilogram (mg/kg) of selenium, respectively. Samples of the CUF gypsum slurry only contained 0.3 mg/kg of selenium. Therefore, addition of the 55,291 lb/day (25,100 kilograms) of gypsum from the flue gas conditioning would only add 0.017 lb/day of selenium and would increase the selenium concentration of the ash pond discharge (DSN 001) by less than 0.0001 mg/L, which would be an insignificant amount.

Toxicity testing was conducted using KIF ash pond water, lime, and scrubber slurry from CUF, which should be similar to that expected at KIF. These tests showed some toxicity possibly due to the high pH (11.0 to 11.5 standard units [s.u.]). Additional tests were done with the pH adjusted following the USEPA protocol to 8.0 to 9.0 s.u. Following pH adjustment, there was no toxicity to fathead minnows even at 100 percent wastewater. Chronic toxicity to daphnids was seen at an $IC_{25}$ of 38.6 percent. However, the KIF ash pond discharges through a diffuser to the KIF intake that has an average flow of 1,347 MGD. Because the KIF ash pond has an average flow of 40.4 MGD, it would only represent approximately 3 percent of the total flow. This would be an order of magnitude less than the daphnid $IC_{25}$. There is a requirement to monitor chronic toxicity once per year in the KIF NPDES permit. The proposed addition of lime and gypsum to the KIF ash pond should have no significant impact on the Clinch River.

Currently, the KIF ash pond tends to have a neutral to slightly acidic pH. A lime slaker has been used intermittently to ensure that the ash pond pH is above 6.0 s.u. Addition of the lime mentioned above would probably increase the average alkalinity and pH of the ash pond effluent. If the ash pond pH increases above 8.0, installation of potential mitigative measures such as a carbon dioxide diffuser would be evaluated.

*CCW DSN 002*

The scrubber blowdown flow is estimated to be 800 gallons per minute (gpm) or 1.152 million gallons per day (MGD). Based on the NPDES permit flow schematic for KIF, the average daily flow for the CCW (Outfall 002) is 1,296.87 MGD. Therefore, the KIF scrubber blowdown should only comprise 0.09 percent of the CCW discharge. Toxicity testing was conducted using scrubber wastewater from Cumberland Fossil Plant (CUF), which should be similar to that expected at KIF. These tests showed no toxicity from mixing scrubber blowdown with KIF CCW at the 0.09 percent mixture. The only toxicities found were at concentrations approximately three orders of magnitude stronger than the expected mixture. This proposed new discharge would be submitted as a proposed modification of the existing NPDES permit for KIF. The proposed scrubber blowdown discharge should have no significant impact on the Clinch River.

*Water Withdrawals for Process and Cooling Water for Scrubber System* – Based on preliminary design information, water needs for the KIF scrubber have been estimated. For this EA, it is conservatively assumed that water demands could be as high as 3,500

gpm; of that amount, 540 gpm would be for equipment cooling and 2,960 gpm would be for process needs. At this rate for a capacity factor of 75 percent, the scrubber would use approximately 1,400 million gallons of raw water annually. This would be an increase of less than 0.3 percent over the current plant intake withdrawals from the river. Therefore, this proposed increase would not increase the velocities at the intake screens by a significant amount. A little less than half of this would be returned to the river; the remainder would be discharged to the atmosphere as water vapor. Of this amount, approximately 730 gpm would exit as scrubber effluent and ultimately be discharged through the CCW outfall. In addition, the gypsum dewatering facility would require up to 200 gpm for production of steam and rinse water.

*Limestone Handling for Scrubber System* – The limestone for the proposed FGD system would be delivered by truck, as described in Section 3.3 and Figures 2-1 and 2-2. A conservative estimate for the limestone needed for the proposed FGD system is 572,000 tons per year. The runoff from the limestone storage areas would be collected and handled in the existing CCB wastewater treatment facilities (first in the coal pile area drainage pond and then in the ash pond).

*Management of Scrubber Wastewater* – The proposed addition of a wet LSFO FGD system to KIF would consist of the following:

- Two absorbers
- A system that receives bulk limestone and prepares a limestone slurry
- A gas handling system that would transport gas from the existing precipitators until emitted from the chimney
- A new gypsum processing facility and a new gypsum disposal area

The process wastewater or blowdown from the proposed scrubber system would be treated in settling ponds prior to discharge to the CCW. The scrubber pond system would be designed and operated to ensure that there would be no discharge of any visible scum, floating materials, or objectionable color contrast, nor a significant discharge of solids (TSS). TVA would evaluate the estimated discharge quality by performing column tests or other appropriate technique for determining adequate design basis. If determined to be necessary, then appropriate mitigative measures would be evaluated and implemented as needed to ensure that the TSS limitation monthly on DSN 001 was not exceeded. The appropriate level of NEPA would be conducted if additional treatment were determined to be needed. The storm water runoff due to the proposed gypsum slurry dewatering transfer and storage systems associated with the KIF scrubber would have no significant impact on the aquatic environment of the Clinch River with the implementation of BMPs.

## 3.7. Noise

### 3.7.1. Affected Environment

The plant site is bordered by Watts Bar Lake to the south, Emory River to the east and north, and a partially wooded ridge to the west. There are homes located along Swan Pond Road to the west of the plant, on Swan Pond Circle and Emory River Road to the north of the plant, and on Lakewood Landing, Windswept Lane, and Lakewood Drive to

the south of the plant. The residences most affected by plant noise are west of the plant on Swan Pond Road. I-40 is directly south of the plant and influences noise levels at residences on the south side of the Watts Bar Lake.

Ambient noise was measured with a Bruel&Kjaer 2237 Integrating Sound Level Meter on October 17, 2005. Measurements were taken in six locations surrounding the plant; these locations are shown in Figure 3-6. Additional measurements were taken on US 70 in front of the United Methodist Church on December 20, 2005.

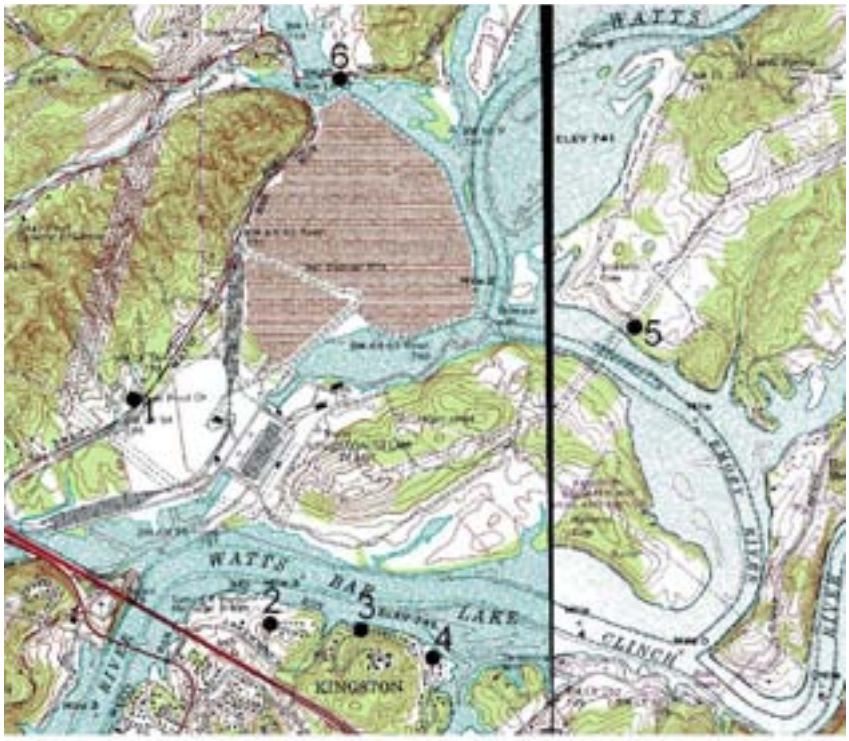


**Figure 3-6. Map of Noise Measurement Locations**

Leq is the continuous equivalent sound level or the “average” noise level during the measurement period. While Leq is very valuable for describing continuous noises, it is less useful for intermittent noises such as traffic. Leq smooths out the discrete high-level events, such as trucks passing, to the point of eliminating the annoyance factor of the events. MaxP is the maximum peak sound level during the measurement, which is an important descriptor for intermittent noises. The average Leq and the maximum MaxP of the measurements are shown in Table 3-11.

**Table 3-11. Noise Measurements Surrounding Kingston Fossil Plant**

| Measurement Location | Average Leq (dBA) | Maximum peak sound level (dBA) |
|---|---|---|
| 1. Swan Pond Baptist Church | 65 | 98 |
| 2. Lakewood Landing | 54 | 96 |
| 3. Windswept Lane | 51 | 88 |
| 4. Lakewood Drive | 49 | 86 |
| 5. Emory River Road | 41 | 82 |
| 6. Swan Pond Circle | 57 | 95 |
| 7. US 70 in front of Methodist Church 35 feet from the highway | 65 | 100 |

dBA = decibels, A-weighted

Noise levels on Emory River Road are typical of a rural area, while noise levels on Windswept Lane and Lakewood Drive are typical of a suburban residential area. However, noise levels at the other locations are more typical of a setting adjacent to a large industrial site or major highway. The location on US 70 is dominated by traffic noise from both the highway and the nearby interstate.

### 3.7.2. Environmental Consequences

**No Action Alternative**
If the No Action Alternative were adopted none of the transportation mode would be affected.

**Action Alternative**
*Construction*
Construction would normally take place during weekday/daytime hours; however, construction could occur during nights or weekends, if necessary to maintain schedule. Noise occurring between 10 p.m. and 7 a.m. is normally considered more annoying than noise occurring during the day, so the plan to limit construction activities to daytime hours would help to reduce possible noise impacts. The first phase of construction would be site preparation, which would use compactors, front loaders, scrapers, excavators, and graders. This type of equipment is expected to generate noise levels from 79 to 88 dBA at 50 feet (USEPA, 1971). The next phase of construction includes the building of the limestone preparation area, ball mill, FGD system, new stack, and gypsum handling system. This phase would use concrete mixers, cranes, pumps, generators, and compressors, which would generate noise levels from 76 to 85 dBA at 50 feet (USEPA, 1971). The final phase of construction would be clean up and testing, which would not use equipment that generates significant noise. In general, noise from construction activities would be similar to noise from current plant operations.

Maximum construction noise of 88 dBA at 50 feet would be about 59 dBA at the nearest residence approximately 1,500 feet away. This is expected to be audible at the nearest residence on Swan Pond Road during periods of low traffic, but it would not cause a significant increase in average noise levels**.**

Because of the temporary nature of construction, the similarity of construction noise to plant operating noise, and the high noise levels of existing traffic in the area, noise impacts from construction are expected to be insignificant.

*FGD Operation*

Operation of the proposed scrubber would generate additional noise. The FGD system would include slurry pumps, pump motors, modulating control valves, valve motors, oxidation air system blowers and blower motors, agitation system motors, and induced draft fan motors. The vendor specifications of each of these components require noise levels not to exceed 85 dBA at 3 feet. However, because of the additive effect of noise sources located close to one another, the total FGD operating noise level is likely to be somewhat higher than 85 dBA. If we assume the FGD system generates 95 dBA at 3 feet, the noise level at the nearest residence 1,500 feet away would be approximately 44 dBA. This is not expected to be audible over background noise during the day. While it may be audible at night when there is less background noise, it is not expected to cause a significant increase in average noise levels.

If limestone is crushed on site, this would be an additional source of noise. One ball mill is expected to generate 85 dBA at 3 feet, and two ball mills operating simultaneously would generate 88 dBA at 3 feet. This noise level is not expected to be audible over background noise levels at the nearest residence 1,500 feet away.

*Increased Truck Traffic*

Another potential noise impact of this project would be noise from trucks delivering limestone and, possibly, removing gypsum. Limestone would be delivered five or six days a week during the day shift. There would be no limestone deliveries on Sundays. There would be approximately 24 limestone trucks per hour, assuming 95 limestone trucks per day, an eight-hour shift and each truck returning empty. In addition, gypsum may be removed by truck or barge. If trucks were used to haul gypsum, there would be a maximum of 23 gypsum trucks per hour, assuming 90 gypsum trucks per day, an eight-hour shift, and limestone trucks are not used to haul gypsum.

Limestone trucks would generally travel along I-40 to US 70 to Swan Pond Road to the plant access road immediately east of I-40. This route would minimize noise impacts at residences along Swan Pond Road. However, trains would block this access road for three hours during each 24-hour period, requiring limestone trucks to travel along Swan Pond Road to an alternate access road adjacent to Swan Pond Baptist Church. Trucks taking this alternate route would pass numerous homes and a church on Swan Pond Road. Gypsum trucks would use the plant access road immediately east of I-40; they would not need to use the alternate plant access road adjacent.

While traveling on US 70, trucks would pass numerous small businesses, two churches, one motel, and one mobile home. There are also two uninhabited duplexes along this section of road. The churches and many of the businesses are located approximately 100 feet from the highway. However, the motel and the mobile home are situated quite close to the highway. Noise levels adjacent to US 70 are high with an average Leq of 60 dBA at 100 feet from the road or 65 dBA at 35 feet from the road. In addition to the traffic on US 70, trucks on I-40 contribute to the high noise levels in this area.

Predicted noise levels were calculated using Federal Highway Administration's (FHWA) Traffic Noise Model (FHWA, 1998) and are shown in Table 3-12.

| Table 3-12. Predicted Traffic Noise for Proposed Action | |
|---|---|
| **Location and Predictions** | **Predicted Noise (dBA)** |
| **US 70<br>100 feet from road** | |
| Predicted existing traffic noise | 65.9 |
| Predicted future traffic noise | 66.9 |
| Predicted increase in traffic noise | 1.0 |
| Predicted impact | No Impact |
| **US 70<br>35 feet from road** | |
| Predicted existing traffic noise | 72.4 |
| Predicted future traffic noise | 73.3 |
| Predicted increase in traffic noise | 0.9 |
| Predicted impact | No Impact |
| **Swan Pond Road to Main Plant Access Road<br>200 feet from road** | |
| Predicted existing traffic noise | 55.5 |
| Predicted future traffic noise | 57.1 |
| Predicted increase in traffic noise | 1.6 |
| Predicted impact | No Impact |
| **Swan Pond Road to Alternate Plant Access Road<br>150 feet from road** | |
| Predicted existing traffic noise | 57.2 |
| Predicted future traffic noise | 58.8 |
| Predicted increase in traffic noise | 1.6 |
| Predicted impact | No Impact |

To determine traffic noise impacts, predicted future noise levels were compared with existing levels. FHWA regulations consider an impact exists if predicted future levels "substantially exceed" existing levels; however, FHWA does not define "substantially exceed" (FHWA, 1995). Tennessee Department of Transportation (TDOT) defines three levels of impacts: an increase of 5 dBA or less is defined as "no impact,",an increase of 6 to 15 dBA is defined as a "moderate impact," and an increase greater than 15 dBA is defined as a "substantial impact." There would be no more than a 1.0 dBA increase in noise on US 70 and no more than a 1.6 dBA increase on Swan Pond Road. According to TDOT's criteria, this increase would cause "no impact."

*Limestone Unloading*

The limestone unloading area is located approximately 800 feet from the nearest residence on Swan Pond Road. If crushed limestone is purchased, it would be pneumatically conveyed from the truck to the silo to the absorber. If limestone is crushed on site, limestone trucks would be unloaded using conveyors. Either method would generate intermittent noise that may be audible at the nearest residence if it occurred during a pause in traffic on Swan Pond Road. However, noise from limestone unloading is not expected to cause a significant increase over existing noise levels.

*Barge Loading*
If gypsum were sold, it could be transported by barge or truck. If barges were used, they would be loaded using a conveyor, which would not generate significant noise levels. Noise from barge unloading is not expected to be audible over background noise at the nearest residence.

*Conclusion*
Based upon this evaluation, this project would not have a significant effect on the noise environment of the surrounding area.

## 3.8. Wetlands

### 3.8.1. Affected Environment

Wetlands are areas inundated by surface water or groundwater such that vegetation adapted to saturated soil conditions are prevalent. Wetlands generally include swamps, marshes, bogs, wet meadows, shoreline fringes, and similar areas.

On October 13 and 17, 2005, a ground survey was conducted within the proposed project areas on the TVA KIF property to identify jurisdictional wetlands. Four wetlands were found (W1/W1A, W2, W3, and W4) and classified according to the Cowardin system (Cowardin et al., 1979). These wetlands are depicted in Figure 3-7. Wetland determinations were performed according to USACE standards, which require documentation of hydrophytic vegetation, hydric soil, and wetland hydrology (Environmental Laboratory, 1987; Reed, 1997). Broader definitions of wetlands, such as that used by the U.S. Fish and Wildlife Service (Cowardin et al., 1979), the Tennessee definition (Tennessee Code 11-14-401), and the TVA Environmental Review Procedures definition (TVA, 1983), were also considered in this review. In addition, the TVA Rapid Assessment Method (TVARAM) was used to assess wetland condition and identify wetlands with special ecological significance (Mack, 2001). All of the wetlands identified within the project area were evaluated under TVARAM since all would be subject to new disturbance.

Wetland W1/W1A is a fringe wetland encompassing two drainageways (AS1 and AS2) on site and extending along an embayment of Watts Bar Reservoir. This wetland is classified as palustrine forested and is approximately 1.3 acres in size. Dominant vegetation include silver maple (*Acer saccharinum*), Chinese privet (*Ligustrum sinense*), sweet gum (*Liquidambar styraciflua*), and smooth alder (*Alnus serrulata*).

Wetland W2 is formed in a small depression at the head of an on-site drainageway (AS1). It is classified as palustrine forested and is approximately 0.05 acre in size. It is hydrologically connected to W1/W1A. Dominant vegetation includes silver maple, Chinese privet, red alder, and black willow (*Salix nigra*).

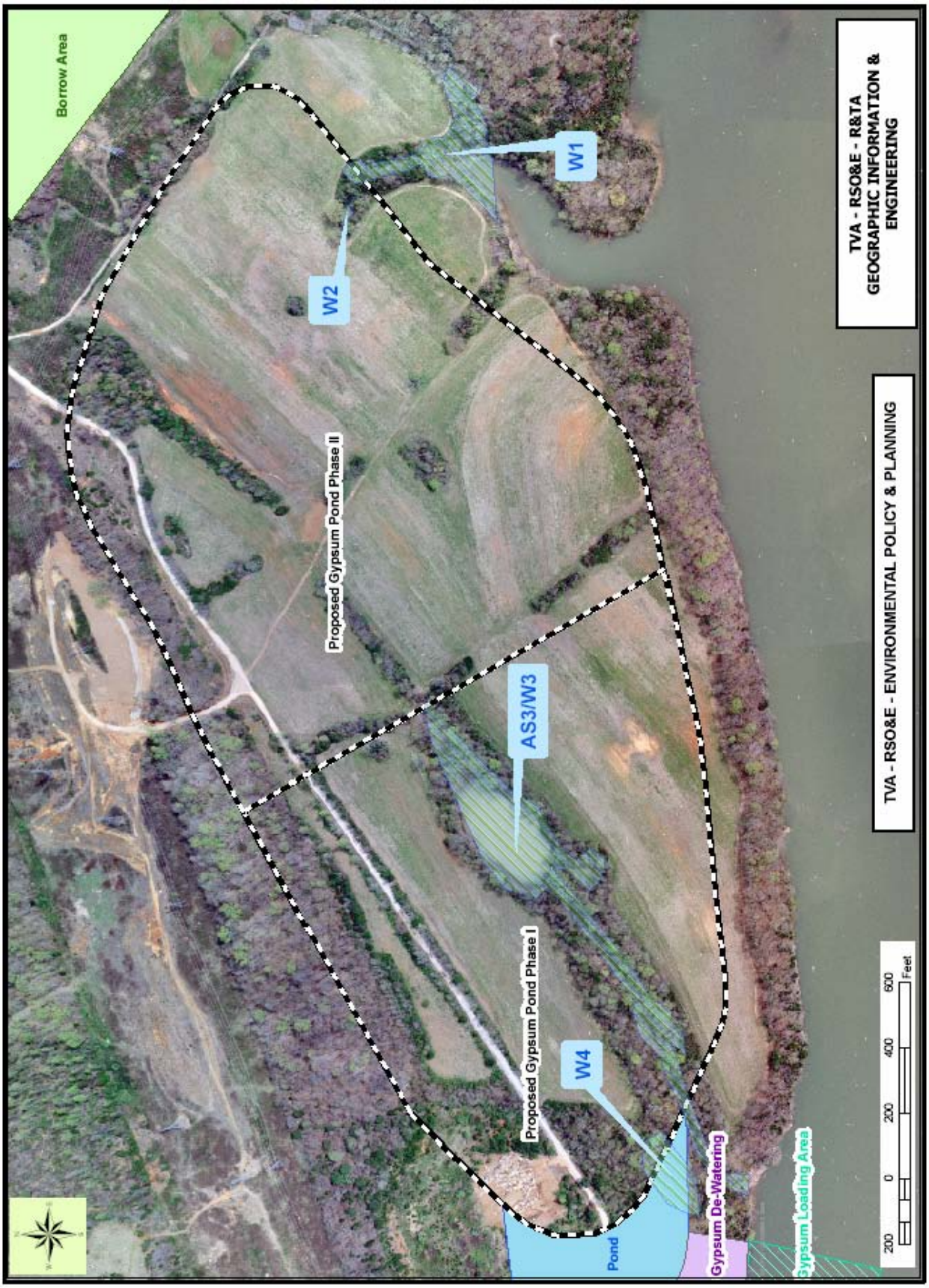


**Figure 3-7. Wetlands W1-W4**

Both W1/W1A and W2 are located within the proposed Gypsum Pond Phase 2 portion of the project area. Both wetland complexes meet USACE wetland determination standards and function in storm water retention, erosion control, and provision of wildlife habitat.

Wetland W3 consists of the fringe habitat along the channel/pond (AS3) extending from the southwest through the center of the proposed Gypsum Pond Phase 1 project area. This complex is classified as palustrine forested and includes an open water pond and drainage channel connected to Watts Bar Reservoir. The majority of the drainage channel has been diked; however, wetland fringe habitat is present along the dike and extends through breaks in the dike. This wetland complex is approximately 3.9 acres in size and is dominated by sycamore (*Platinus occidentalis*), tulip poplar (*Liriodendron tulipifera*), smooth alder, Chinese privet, and silver maple.

Wetland W4 is a palustrine-forested complex connected hydrologically to W3 (AS3) and located in the southwest corner of the Gypsum Pond Phase 1 project area. This area comprises 0.6 acre and receives hydrology from intermittent but temporary flooding associated with Watts Bar Reservoir water levels. Dominant vegetation includes Sweet gum, red maple (*Acer rubrum*), Chinese privet, and Nepalese browntop (*Microstegium vimineum*).

Both W3 and W4 meet the U.S. Fish and Wildlife Service wetland definition and may be considered jurisdictional by the USACE under the Clean Water Act. Although the hydric soil parameter is absent in these wetland complexes, both wetlands appear to be the consequence of disturbance to the area's hydrologic regime. Ditching, diking, and channeling have altered drainage patterns such that hydrophytic vegetation dominates the temporarily or permanently saturated/inundated soils of these wetlands, although hydric soil indicators have not yet developed. Both wetland complexes function in storm water retention, erosion control, and provision of wildlife habitat.

**Table 3-13. Affected Wetlands**

| Wetland ID | Type[a] | Estimated Acreage | TVA RAM Score | TVA RAM Category |
|---|---|---|---|---|
| W1/W1A | PFO1B | ~1.3 | 67.5 | 3 |
| W2 | PFO1C | ~0.05 | 47.5 | 2 |
| W3 | PFO1E/PUB | ~3.9 | 61 | 3 |
| W4 | PFO1A | ~0.6 | 42 | 2 |
| **TOTAL** | | **~5.85 acres** | | |

[a] Based on Cowardin et al. (1979)

### 3.8.2. Environmental Consequences

Activities in wetlands are regulated under Section 404 and Section 401 of the Clean Water Act and Executive Order 11990. Section 404 implementation requires activities in wetlands be authorized through a Nationwide General Permit or Individual Permit issued by the USACE. An individual permit would likely be required to fill the four wetlands in the project area. Section 401 requires water quality certification by the state for projects permitted by the federal government (Strand, 1997). Executive Order 11990 requires agencies to minimize wetland destruction, loss, or degradation and to preserve and enhance natural and beneficial wetland values while carrying out agency responsibilities.

TVARAM can aid in guiding wetland mitigation decisions consistent with TVA's independent responsibilities under the NEPA and Executive Order 11990. Using TVARAM, wetlands may be classified into three categories. Category 1 wetlands are considered "limited quality waters" and represent degraded aquatic resources that have limited potential for restoration and such low functionality that lower standards for avoidance, minimization, and mitigation can be applied. Category 2 includes wetlands of moderate quality and wetlands that are degraded but could be restored. Avoidance and minimization are the first lines of mitigation for Category 2 wetlands. Category 3 generally includes wetlands of very high quality or of regional/statewide concern, such as wetlands that provide habitat for threatened or endangered species. All practicable attempts are made to avoid any disturbance of Category 3 wetlands and their buffer zones.

**No Action Alternative**
Adoption of the No Action Alternative would not have an adverse impact on wetlands in the project area.

**Action Alternative**
The proposed use of the site would require filling all four wetlands within the project area, resulting in total wetland impacts of approximately 5.85 acres (Table 3-6). The wetland impacts associated with this project may be subject to Section 404 federal permit requirements as well as Section 401 state water quality certification. TVA would request a final jurisdictional determination from the USACE for these wetlands and obtain all necessary permits. Because there is no practical solution within the scope of the proposed project for minimizing or avoiding impacts to the on-site wetlands, TVA would mitigate for all wetland loss in compliance with the Clean Water Act.

## 3.9. Floodplains and Flood Risk

### 3.9.1. Affected Environment

*Gypsum Barge Loading Facility*

The potential area of impact from the proposed barge terminal would extend from about CRM 2.9 to 3.1 on Watts Bar Reservoir in Roane County, Tennessee. The 100-year floodplain for this reach of the Clinch River would be the area below elevation 747.1. The FRP elevation would be 748.4 at the upstream end of the proposed barge terminal site. The FRP is used to control flood-damageable development for TVA projects and residential and commercial development on TVA lands. At this location, the FRP elevation is equal to the 500-year flood or "critical action" elevation. Roane County participates in the National Flood Insurance Program (NFIP), which regulates floodplain development and requires demonstration that a project within the floodway would not increase flood elevations. There is a published floodway on this portion of the Clinch River.

*Gypsum Disposal Area*

The proposed gypsum disposal area would be constructed on the right bank of the Clinch River on Watts Bar Reservoir between CRMs 3.3 and 3.9. At this location, the 100-year flood elevation varies from 747.1 to 747.4, and the FRP (500-year flood) elevation varies from 748.6 to 749.1. The gypsum disposal area would reside completely outside of the published 100-year floodway on this portion of the Clinch River.

### 3.9.2. Environmental Consequences

**No Action Alternative**
If the No Action Alternative were chosen no floodplain impacts would occur.

**Action Alternative**
*Gypsum Barge Loading Facility*
The proposed project involves the construction of a gypsum loading barge terminal on the Clinch River in the vicinity of the KIF. Dredging to provide adequate water depth for barge mooring is also proposed. Consistent with Executive Order 11988, a barge terminal facility falls into a special category of the order, called a functionally dependent use. This is something that cannot perform its intended purpose unless it is located in close proximity to water.

Dredging is considered a repetitive action in the floodplain that should result in minor impacts if the excavated material is spoiled outside of the floodplain. The material dredged from the channel in the desired barge terminal locations may be contaminated with cesium and mercury due to past activities of the DOE facilities upstream in Oak Ridge. Therefore, Executive Order 11988 would require all material to be disposed above the FRP elevation of 748.4 feet, which is also the 500-year floodplain boundary. Disposal above this elevation would also prevent the loss of flood control storage. Routine post-construction dredging would be necessary for maintenance of adequate depth along the right bank of the Clinch River at the proposed barge terminal location.

A bathymetric survey of the Clinch and Emory Rivers in the vicinity of KIF was conducted in July 2005 to aid in determining potential barge terminal locations and estimating the amount of dredging that would be required for these facilities. The survey produced a bathymetric contour map with a 1-foot contour interval.

The normal summer pool elevation of Watts Bar Reservoir is approximately 741 feet, and the typical winter pool elevation is approximately 735.5 feet. The minimum winter pool elevation of Watts Bar Reservoir has actually varied from 735.5 to 735.1 feet in the last 30 years. Elevation 735.1 was reached most recently in 2002 and occurred four times in the last 30 years. Therefore, the barge terminal evaluation was carried out assuming a minimum reservoir elevation of 735. If a typical barge draws 9 feet of water, and a minimum required water depth below the barge is assumed to be 3 feet, the channel would need to be dredged to elevation 723 to provide adequate clearance for barges year-round. The downstream end of the originally proposed gypsum loading terminal site is situated along a portion of the river that is very shallow near the right bank and would require a significant amount of dredging to accommodate barges.

The barge terminal was also evaluated for impacts on flood elevations using the USACE HEC-RAS model (USACE, 2003). The HEC-RAS results for the originally defined gypsum barge loader location showed that the large amount of dredging required at the downstream end of this location would cause an increase in 100-year flood elevations. This increase would be unacceptable because the project would not comply with NFIP requirements.

Because of the unfavorable results of the flood analysis at the originally defined barge terminal location, an alternate location for the barge terminal, between CRMs 3.03-3.50 was also considered. This location is farther upstream than the original location, but still adjacent to the proposed gypsum disposal line, and would require considerably less

dredging in order to construct and maintain a barge terminal than the original site would require. The HEC-RAS model showed that addition of the proposed barge terminal anywhere in this upstream location would cause no increase in 100-year flood or 100-year floodway elevations compared to existing conditions, which would be consistent with NFIP requirements.

*Gypsum Disposal Area*

Small portions of Phases 1 and 2 of the gypsum disposal areas would be located in the 100- and 500-year floodplains of Watts Bar Reservoir on embayments of the Clinch River between CRMs 3.3 and 3.9.

Eight alternative locations, some on site and some off site, were considered for the gypsum disposal area. All locations except the proposed site were ruled out due to one or more issues including:

- Inadequate size
- Topography issues
- Floodplain or wetlands issues
- Relocation of transmission lines
- Karst issues
- The combined additional prohibitive cost of constructing and operating a drying facility and transporting the gypsum for off-site disposal

Therefore, there is no practicable alternative to siting the gypsum ponds at the proposed location. The floodplain area to be filled would be minimized by the proposed design.

Because some of the proposed gypsum fill area would be located within the 100-year floodplain, it would also be located within the TVA flood control storage zone. The flood control storage zone is the area around the reservoir where TVA purchased lands and/or flowage easement rights over private property so water could be stored during a flood control operation. The proposed gypsum pond would displace approximately 35 acre-feet of flood control storage in the Phase 1 pond and about 13 acre-feet in the Phase 2 pond. TVA believes the volume of displaced flood control storage has been minimized as required by the TVA Flood Control Storage Loss Guideline. Therefore, the proposed project would be consistent with the requirements of Executive Order 11988.

## 3.10. Aquatic Life

### 3.10.1. Affected Environment

The proposed action is located within TVA's KIF complex and adjacent to the Kingston State WMA in Roane County, Tennessee, along the Clinch River on Watts Bar Reservoir. Land use in the plant complex area is exclusively associated with the day-to-day operations of the fossil power generating facility, while the TWRA manages the adjacent wildlife management area for hunting. The KIF area has been heavily disturbed by previous plant development activities, but relatively minor disturbances have occurred in the adjacent wildlife management area. A field visit during the week of October 10, 2005, identified three watercourses within the wildlife management area that could be impacted by the proposed Action Alternative (Table 3-14).

**Table 3-14. Summary of Streams in the Kingston State Wildlife Management Area Potentially Affected by Proposed Construction of Gypsum Pond Associated With Kingston Fossil Plant Flue Gas Desulfurization (Scrubber Equipment)**

| Stream Label | Number of Flags | Stream Classification | Streamside Management Zone Classification | Description |
|---|---|---|---|---|
| ASB1 | 6 | Wet-weather conveyance | A (50 feet) | Part of Wetland W1; extends up east side of area; heavily wooded riparian zones (30-feet wide on west side); runs along road from graveyard to Watts Bar Reservoir |
| ASB2 | 8 | Wet-weather conveyance | A (50 feet) | Part of Wetland W1; runs from field through tree line to Watts Bar Reservoir; wooded riparian zones; stays wet due to impoundment; channel 5 feet. wide and 2 feet. deep; very straight channel; diked on west side |
| ASB3 | | Perennial | A (50 feet) | Dredged channel; 10 feet. wide and 3 feet deep; stream 1 to 2 feet wide; connects pond (~1 acre) to Watts Bar Reservoir; dredged material used for dikes along banks; large trees present |

This reach of Watts Bar Reservoir transitions from the upstream riverine reach of the Clinch River below Melton Hill Dam to the more lacustrine conditions found in the impounded portions of the Clinch and Emory river backwaters of Watts Bar Reservoir. Overbank areas near KIF are very shallow. The Emory River embayment enters the reservoir on the right bank about 2 river miles upstream of the KIF CCW discharge.

TVA began a program to monitor the ecological conditions of its reservoirs systematically in 1990. Previously, reservoir studies had been confined to assessments to meet specific needs as they arose. Reservoir (and stream) monitoring programs were combined with TVA's fish tissue and bacteriological studies to form an integrated Vital Signs Monitoring program. Vital signs monitoring 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.

Benthic macroinvertebrates are included in aquatic monitoring programs because of their importance to the aquatic food chain, and because they have limited capability of movement, thereby preventing them from avoiding undesirable conditions. Sampling and data analysis were based on seven parameters that include species diversity, presence of selected taxa that are indicative of good water quality, occurrence of long-lived organisms, total abundance of all organisms except those indicative of poor water quality, proportion of total abundance comprised by pollution-tolerant oligochaetes, proportion of total abundance comprised by the two most abundant taxa, and proportion of samples with no organisms present. Areas sampled included the forebay (area of the reservoir nearest the dam), a midreservoir transition station in the vicinity of TRM 560.8, and two upper reservoir inflow stations: one in the Clinch River arm at CRM 22, and one

in the Tennessee River arm at TRM 601. The Watts Bar midreservoir station is about 9 miles downstream from KIF.

Bottom life consistently rated better at the midreservoir location than the other three Watts Bar locations. Ratings in 1994 and 1996 were good at the midreservoir, but poor elsewhere (Table 3-8). Scores for this indicator had decreased to fair in the midreservoir area in 1998, 2000, and 2002, presumably because of the poorer dissolved oxygen concentrations near bottom, resulting from the low reservoir flows during the drought. Bottom life improved at all four locations in 2004, and was rated excellent at the midreservoir site.

**Table 3-15. Benthic Invertebrate Community Scores,* 1994-2004**

| Station | River Mile | 1994 | 1996 | 1998 | 2000 | 2002 | 2004 |
|---|---|---|---|---|---|---|---|
| Forebay | TRM 531 | 13 | 11 | 13 | 15 | 13 | 17 |
| Midreservoir | TRM 560.8 | 29 | 25 | 23 | 21 | 21 | 31 |
| Inflow (Tenn. River) | TRM 600 | 17 | 13 | 15 | 13 | 19 | 23 |
| Inflow (Clinch River) | CRM 19 | 13 | 15 | 15 | 13 | 13 | 21 |

| *Benthic Community Score | 7-12 | 13-18 | 19-23 | 24-29 | 30-35 |
|---|---|---|---|---|---|
| Community Condition | Very Poor | Poor | Fair | Good | Excellent |

The Reservoir Vital Signs Monitoring Program also has included annual fish sampling at Watts Bar from 1990 through 1994 and biennially until 2004. Fish are included in aquatic monitoring programs because they are important to the aquatic food chain and because they have a long life cycle, which allows them to reflect conditions over time. Fish are also important to the public for aesthetic, recreational, and commercial reasons. Ratings are based primarily on fish community structure and function. Also considered in the rating is the percentage of the sample represented by omnivore and insectivores, overall number of fish collected, and the occurrence of fish with anomalies such as diseases, lesions, parasites, deformities, etc. (TVA, 1999). Compared to other run-of-the-river reservoirs, the fish assemblage at the Watts Bar midreservoir station rated in the good range as depicted in Table 3-16. Species diversity and abundance are generally higher in Watts Bar Reservoir than other run-of-the-river reservoirs. Species more abundant in the sample were bluegill (*Lepomis macrochirus*), gizzard shad (*Dorosoma cepedianum*), and spotfin shiners (*Cyprinella spiloptera*) (TVA, 1999).

**Table 3-16. Recent (1993-2004) Reservoir Fish Assemblage Index Scores* Collected as Part of the Vital Signs Monitoring Program Upstream and Downstream of Kingston Fossil Plant, Watts Bar Reservoir**

| Station | River Mile | Year | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 1993 | 1994 | 1996 | 1998 | 1999 | 2000 | 2001 | 2002 | 2004 |
| Upstream | CRM 22 | 38 | 46 | 46 | 36 | | 44 | | 42 | 38 |
| | TRM 601 | 38 | 50 | 44 | 48 | | 46 | | 46 | 44 |
| Downstream | TRM 560.8 | 50 | 49 | 44 | 44 | | 46 | | 39 | 46 |
| | TRM 531 | 43 | 48 | 44 | 41 | 38 | 44 | 39 | 39 | 43 |

| *Reservoir Fish Assemblage Index Score | 12-21 | 22-31 | 32-40 | 41-50 | 51-60 |
|---|---|---|---|---|---|
| Community Condition | Very Poor | Poor | Fair | Good | Excellent |

Beginning in 2001, additional fish community samples have been collected biennially at two locations in Watts Bar Reservoir (CRM 1.5 and CRM 4.4) near KIF for 316a thermal compliance. Results of that sampling indicate good fish communities upstream and downstream of the plant. A total of 40 fish species was collected at two sites near KIF in TVA's most recent year of sampling in 2003, stations combined (Table 3-17).

**Table 3-17. Fish Species Collected in Fall Electrofishing and Gill Netting Samples at Two Sites (CRM 1.5 and CRM 4.4) in the Vicinity of Kingston Fossil Plant, Watts Bar Reservoir, 2003**

| Common Name | Scientific Name |
|---|---|
| Paddlefish | *Polyodon spathula* |
| Spotted gar | *Lepisosteus occulatus* |
| Longnose gar | *Lepisosteus osseus* |
| Skipjack herring | *Alosa chrysochloris* |
| Gizzard shad | *Dorosoma cepedianum* |
| Threadfin shad | *Dorosoma petenense* |
| Mooneye | *Hiodon tergisus* |
| Spotfin shiner | *Cyprinella spiloptera* |
| Common carp | *Cyprinus carpio* |
| Golden shiner | *Notemigonus chrysoleucas* |
| Emerald shiner | *Notropis atherinoides* |
| Bluntnose minnow | *Pimephales notatus* |
| Quillback | *Carpiodes cyprinus* |
| Smallmouth buffalo | *Ictiobus bubalus* |
| Black buffalo | *Ictiobus niger* |
| Spotted sucker | *Minytrema melanops* |
| Black redhorse | *Moxostoma duquesnei* |
| Golden redhorse | *Moxostoma erythrurum* |
| Blue catfish | *Ictalurus furcatus* |
| Channel catfish | *Ictalurus punctatus* |
| Flathead catfish | *Pylodictus olivaris* |
| White bass | *Morone chrysops* |
| Yellow bass | *Morone mississippiensis* |
| Striped bass | *Morone saxatilis* |
| Warmouth | *Lepomis gulosus* |
| Redbreast sunfish | *Lepomis auritus* |
| Green sunfish | *Lepomis cyanellus* |

**Table 3-17. Fish Species Collected in Fall Electrofishing and Gill Netting Samples at Two Sites (CRM 1.5 and CRM 4.4) in the Vicinity of Kingston Fossil Plant, Watts Bar Reservoir, 2003**

| Common Name | Scientific Name |
|---|---|
| Bluegill | *Lepomis macrochirus* |
| Longear sunfish | *Lepomis megalotis* |
| Redear sunfish | *Lepomis microlophus* |
| Smallmouth bass | *Micropterus dolomieu* |
| Spotted bass | *Micropterus punctulatus* |
| Largemouth bass | *Micropterus salmoides* |
| White crappie | *Pomoxis annularis* |
| Black crappie | *Pomoxis nigromaculatus* |
| Yellow perch | *Perca flavescens* |
| Logperch | *Percina caprodes* |
| Sauger | *Sander canadense* |
| Freshwater drum | *Aplodinotus grunniens* |
| Brook silverside | *Labidesthes sicculus* |

Note: Sport Fishing Index values were slightly above average for largemouth bass, channel catfish, and white bass.

Watts Bar Reservoir provides many opportunities for sport anglers. A Sport Fishing Index (SFI) has been developed to measure sport fishing quality for various species in Tennessee and Cumberland Valley reservoirs (Hickman, 1999). The SFI is based on the results of fish population sampling by TVA and state resources agencies and, when available, results of angler success as measured by state resource agencies (i.e., bass tournament results and creel surveys). In 2003, Watts Bar rated slightly below average for black bass species (largemouth, smallmouth, and spotted bass, combined), crappie, and sauger, but above average for striped bass and bluegill (see Table 3-18).

**Table 3-18. Sport Fishing Index for Selected Sport Fish Species in Watts Bar Reservoir, 2003**

| Fish Species | 2003 Score | 2003 Valleywide Average |
|---|---|---|
| Black Bass | 31 | 36 |
| Bluegill | 36 | 30 |
| Channel Catfish | 30 | 29 |
| Crappie | 31 | 36 |
| Largemouth Bass | 34 | 32 |
| Sauger | 30 | 34 |
| Smallmouth Bass | 24 | 32 |
| Spotted Bass | 30 | 31 |
| Striped Bass | 43 | 37 |
| White Bass | 30 | 29 |

### 3.10.2. Environmental Consequences

**No Action Alternative**
For the No Action Alternative, the existing conditions and trends described for aquatic life in Watts Bar Reservoir are expected to continue. If the No Action Alternative were chosen, there would be no reduction in $SO_2$ emissions from KIF. However, TVA would be required to either make additional systemwide reductions or purchase emission credits to meet their requirements under Title IV and CAIR. Continued aerial release of $SO_2$ from KIF at the present rates would result in similar impacts to aquatic life in areas affected by the eventual $SO_2$ fallout.

**Action Alternative**
The proposed Action Alternative would receive limestone via trucks, with the hopper located west of the surge bins. Since most of this action would occur on the power plant property, which has already been highly disturbed and does not contain any aquatic resources, no impacts to aquatic life are expected. However, construction of the gypsum disposal area(s), laydown areas, and effluent lines to carry gypsum to the ponds could impact the three watercourses identified. Some site preparation would be needed, such as grading, if this option were chosen.

Construction, operation, and maintenance of a barge unloading facility at KIF would have direct impacts to habitats and water quality in the Clinch River adjacent to KIF. Dredging activities required to maintain the navigation channel would be constructed in accordance with permit requirements, and construction of docking and mooring facilities would have direct instream impacts and would impact aquatic life in the adjacent portion of the Clinch River (Watts Bar Reservoir).

Because this alternative would not result in significant impacts to surface waters, no impacts to protected aquatic species would occur. All activities would be conducted using BMPs to minimize potential impacts to surface waters in the Kingston State WMA or the main stem of the Clinch River (Watts Bar Reservoir).

## 3.11. Terrestrial Ecology

### 3.11.1. Affected Environment

**Animals**
The southeast spoil storage area, and the module, ball mill, and new chimney areas lack wildlife habitat. The northwest spoil storage and the limestone stockpile areas consist of scrub/shrub and herbaceous field habitat. These areas have limited wildlife potential due to their poor quality and their isolation to other tracts of natural habitat.

The proposed gypsum disposal area consists primarily of herbaceous fields dominated by Johnson grass. Eastern meadowlarks, grasshopper sparrows, and savannah sparrows have all been recorded from this habitat. Red-tailed and red-shouldered hawks use the open areas for hunting. Edge habitat occurs where fields meet with forests. This edge habitat creates a diverse bird community. Birds inhabiting edges include northern bobwhite, eastern phoebe, Carolina wren, brown thrasher, white-eyed vireo, northern cardinal, indigo bunting, eastern towhee, field and song sparrows, and others. Small mammals and larger mammals such as white-tailed deer and coyotes use these edges.

Forests on the peninsula range from dry oak-hickory and dry mesic oak-hickory forests to bottomland forests. Oak-hickory forests provide habitat for wild turkey, yellow-billed cuckoos, woodpeckers, eastern wood pewees, blue jays, American crows, Carolina chickadees, eastern tufted titmice, white-breasted nuthatches, and many Neotropical migrants. Mammals occurring in oak-hickory forests include deer mice, white-tailed deer, gray fox, gray squirrel, eastern chipmunk, and others. Reptiles include rat snakes, five-lined skinks, eastern box turtles, and others.

Narrow bands of bottomland forests are found on the peninsula along the river margin and within wet sloughs. Birds observed in these areas include green and great blue herons, wood ducks, spotted sandpipers, belted kingfishers, and eastern kingbirds. Mammals specific to bottomland forests in the area include the beaver and muskrat. Because these areas typically stay wet, amphibians may be abundant. Amphibians include the American toad, eastern newt, spring peeper, and others. Water snakes are also typically abundant. Fringe wetlands along the Clinch River provide habitat for red-eared sliders, painted turtles, and other turtle species.

**Plants**

The proposed scrubber project at KIF is located within the southern portion of the Eastern Broadleaf Forest Province (Bailey, 1995). This province is characterized by a winter deciduous forest dominated by tall broadleaf trees that provide a dense canopy in summer and shed their leaves in the winter. Native forests of this region are characterized by mixtures of oaks, hickories, tulip trees, and pines. The small tree and shrub understory is thin. In spring, the herbaceous ground cover is luxurious and develops quickly. Once the trees reach full foliage, the shaded herbaceous layer is reduced.

The areas in and around KIF have been impacted and altered as a result of the operation of the existing facilities. In October 2005, field inspections of the areas associated with the proposed action reveal that the vegetation is a mixture of common native species and exotic invasives. Existing plant communities observed within the proposed project area include mixed deciduous forest, palustrine forest and wetlands, and grass/forbs.

**Mixed deciduous forest** occurs on gentle slopes and hilltops throughout the project area. This community covers approximately 50 percent of the proposed project area and is characterized by a wide variety of canopy species, including black oak, mockernut hickory, red cedar, southern red oak, sugar maple, sweet gum, sycamore, Virginia pine, and white oak. Characteristic understory trees and shrubs include American holly, blueberry, bush honeysuckle, Chinese privet, flowering dogwood, tree of heaven and Russian olive. Common understory vines and herbaceous species include Carolina moonseed, Christmas fern, crossvine, greenbriar, Japanese honeysuckle, poison ivy, trumpet creeper, Virginia creeper, and muscadine.

**Palustrine forest and wetlands** cover approximately 20 percent of the proposed project area. Narrow bands of bottomland forests are found on the peninsula along the margins of the riverbank, streams, and sloughs. Common bottomland hardwood forest species include American beech, hackberry, persimmon, pignut hickory, red maple, sourwood, and sycamore. Characteristic understory trees and shrubs include arrowwood, bush honeysuckle, Chinese privet, common buttonbush, hophornbeam, paw paw, Russian olive, silky dogwood, smooth alder, spicebush, and Virginia sweetspire. The common understory vines and herbaceous layer include Carolina moonseed, greenbriar,

Christmas fern, horehound, jewelweed, oriental bittersweet, poison ivy, New York fern, dissected grape fern, sensitive fern, and winged sumac.

**Grass/forbs** cover approximately 30 percent of the proposed project area. This area was dominated by grasses including Johnson grass, Bermuda grass, broom-sedge, and fescue. Other representative species include goldenrod, thoroughwort, blackberry, java-bean, Carolina vetch, and horse nettle.

The plant communities observed within the proposed project area are common and representative of the region. No uncommon plant communities were observed in the proposed project area.

No designated critical habitat is located within the proposed project area.

**Invasive Terrestrial Plant Species**
Several invasive species were observed within the KIF site, including Johnson grass, Chinese privet, Japanese honeysuckle, bush honeysuckle, tree of heaven, oriental bittersweet, Japanese stilt grass, and lespedeza. All of these species have the potential to impact native plant communities adversely because of their potential to spread rapidly and displace native vegetation. All of the proposed project area is on land wherein the native vegetation has been altered as a result of previous land-use history.

### 3.11.2. Environmental Consequences

**No Action Alternative**
*Animals*
Under the No Action Alternative, the wildlife refuge on the peninsula would continue to be managed by TWRA in its current state. Wildlife habitat on the peninsula would not be adversely affected; therefore, there would be no adverse impacts on wildlife and their habitats.

*Plants*
Adoption of the No Action Alternative would not result in any project-related impacts to the terrestrial ecology of the region.

*Invasive Terrestrial Plant Species*
Adoption of the No Action Alternative would not result in any project-related impacts due to the introduction or spread of invasive plant species.

**Action Alternative**
*Animals*
The addition of scrubbers at KIF would provide increased cumulative benefits to air quality. This will have indirect, beneficial effects on wildlife and their habitat.

Wildlife would be impacted as a result of the Action Alternative due to habitat alterations and increased activities on the peninsula. The loss of forest within the borrow area would result in local impacts to wildlife in and around the area. BMPs, which require TVA to revegetate borrow and spoil areas after work is completed, would be used in the borrow area. TVA should consult with TWRA about wildlife plantings before the area is re-vegetated. The loss of field, wetland, and forest within the proposed gypsum pond areas and gypsum dewatering area would also result in impacts to wildlife and their habitat. The extent of this loss is dependent upon TVA's abilities at finding a market for

gypsum. The more gypsum TVA can sell, the less land would be needed to store gypsum. The impacts to wildlife residing on the peninsula would be adverse, but since wildlife observed in this area is considered common both locally and regionally, the Action Alternative would not result in significant direct, indirect, or cumulative adverse impacts on wildlife or wildlife habitat.

Osprey nests are common in Roane County. An osprey nest is known to exist on the KIF property. This nest occurs in an area of heavy plant activity and therefore the ospreys are adapted to disturbances. The Action Alternative is not expected to result in significant direct, indirect, or cumulative adverse impacts on osprey and their habitat.

An active heron colony exists on an island off the southern end of the peninsula. This island would not be impacted by the proposed actions.

Eleven caves occur in Roane County. All of these caves are at adequate distances from KIF. The Action Alternative is not expected to result in significant direct, indirect, or cumulative adverse impacts to cave habitat.

*Plants*

Disturbance and removal of existing plant communities would occur during the proposed project actions. Because no uncommon terrestrial communities or otherwise unusual vegetation occurs on the lands to be disturbed under the proposed project actions, impacts to the terrestrial ecology of the region are expected to be insignificant as a result of the proposed activities.

*Invasive Terrestrial Plant Species*

As stated above (Section 3.11.1), the proposed project area has been altered by previous land-use history. Therefore, all project-related impacts due to the introduction and spread of invasive plant species are expected to be insignificant as a result of the proposed Action Alternative.

## 3.12. Threatened and Endangered Species

### 3.12.1. Affected Environment

**Terrestrial Animals**

No state- or federally protected species were observed during field investigations in 2005. However, review of the TVA Natural Heritage database indicated that two terrestrial animal species with federal status and nine with state status are reported from Roane County, Tennessee (Table 3-12). One additional species is considered uncommon by the Tennessee Natural Heritage Program, but does not have official status in the state.

**Table 3-19. Federally Listed and State-Listed Terrestrial Animal Species Reported From Roane County, Tennessee**

| Common Name | Scientific Name | Federal Status | State Status |
|---|---|---|---|
| **Amphibian** | | | |
| Eastern hellbender | *Cryptobranchus alleghaniensis alleghaniensis* | -- | In Need of Management |
| Tennessee cave salamander | *Gyrinophilus palleucus* | -- | Threatened |
| Four-toed salamander | *Hemidactylium scutatum* | -- | In Need of Management |
| **Reptiles** | | | |
| Eastern slender glass lizard | *Ophisaurus attenuatus longicaudus* | -- | In Need of Management |
| **Bird** | | | |
| Sharp-shinned hawk | *Accipiter striatus* | -- | In Need of Management |
| Bachman's sparrow | *Aimophila aestivalis* | -- | Endangered |
| Bald eagle | *Haliaeetus leucocephalus* | Listed Threatened | Endangered |
| Osprey | *Pandion haliaetus* | -- | Tracked but not state listed |
| **Mammals** | | | |
| Gray bat | *Myotis grisescens* | Listed Endangered | Endangered |
| Southeastern shrew | *Sorex longirostris* | -- | In Need of Management |

**Eastern hellbenders** are found in large and mid-size, fast-flowing, rocky rivers at elevations below 762 meters (2,500 feet) (Petranka, 1998). This large salamander is found in the Clinch River and its tributaries.

**Tennessee cave salamanders** occur in caves including those formed in sinkholes. There is a single record for this species in Roane County.

**Four-toed salamanders** inhabit forests surrounding swamps, bogs, marshes, vernal ponds, and other fish-free habitats (Petranka, 1998). Low-quality habitat exists for this species on the peninsula.

**Eastern slender glass lizards** are found in a variety of habitats within their range including dry grasslands, wooded areas, oak savannas, sand prairies, old fields, and pine barrens. A single historical record from 1887 is known from Roane County.

**Sharp-shinned hawks** inhabit pine and pine/hardwood forests. This hawk has a strong preference to nesting in pine trees (Wiggers and Kritz, 1991). Potential habitat for this species occurs within KIF boundaries.

**Bachman's sparrows** inhabit old fields with a high volume of grasses and forbs, and some scattered trees and shrubs with an open understory on dry, upland sites (Dunning and Watts, 1990). In the Southeast, this species occurs in mature pine forests, old

fields, and edge habitats with scattered large pines. KIF property lacks appropriate habitat for this species.

**Bald eagles** typically nest near large bodies of water including lakes, rivers, and riparian wetlands. There are no nesting records for this species on the KIF property.

**Ospreys** nest on both human-made and natural structures in or near large bodies of water. This species is known to nest on KIF property.

**Gray bats** roost in caves during all seasons and typically forage over open water habitats. Since there are no caves on the KIF property, gray bats do not roost here, but they are known to forage over Watts Bar Reservoir.

**Southeastern shrews** are found in a variety of habitats. They prefer moist situations in woods or fields (Linzey, 1998) including disturbed habitat such as abandoned fields with dense ground cover of honeysuckle, grasses, sedges, and herbs (Linzey and Brecht, 2002). Habitat for this species exists on the KIF property.

**Plants**

A review of the TVA Natural Heritage database indicated that no federally listed and 17 Tennessee state-listed plant species are known from within 5 miles of the site (see Table 3-20). One population of fetterbush is recorded on the shoreline of the proposed gypsum disposal area. However, field inspection of the entire proposed project area conducted in October 2005 revealed that neither this nor other federally listed or state-listed plant species are present on lands to be affected by the proposed activities.

**Table 3-20. Listed Plant Species Known From Within 5 Miles of the Proposed Site**

| Common name | Scientific name | Federal status | State status |
|---|---|---|---|
| American ginseng | *Panax quinquefolius* | -- | S-CE |
| Appalachian bugbane | *Cimicifuga rubifolia* | -- | THR |
| Canada lily | *Lilium canadense* | -- | THR |
| Earleaf foxglove | *Agalinis auriculata* | -- | END |
| Fetter-bush | *Leucothoe racemosa* | -- | THR |
| Goldenseal | *Hydrastis canadensis* | -- | S-CE |
| Large-flowered barbara's-buttons | *Marshallia grandiflora* | -- | END |
| McDowell sunflower | *Helianthus occidentalis* | -- | SPCO |
| Mountain bush-honeysuckle | *Diervilla rivularis* | -- | THR |
| Mountain honeysuckle | *Lonicera dioica* | -- | SPCO |
| Northern bush-honeysuckle | *Diervilla lonicera* | -- | THR |
| Northern white cedar | *Thuja occidentalis* | -- | SPCO |
| Prairie goldenrod | *Solidago ptarmicoides* | -- | END |
| Pursh's wild-petunia | *Ruellia purshiana* | -- | SPCO |
| Slender blazing-star | *Liatris cylindracea* | -- | THR |
| Spreading false-foxglove | *Aureolaria patula* | -- | THR |
| Tall larkspur | *Delphinium exaltatum* | -- | END |

END-Endangered, THR-Threatened, SPCO-Special Concern, S-CE–Special Concern-Commercially Exploited

**Aquatic Animals**
According to the TVA Natural Heritage database, no sensitive aquatic animal species are known to occur in the Clinch River, the Emory River, or the Tennessee River drainages within 10 miles of KIF in Roane County, Tennessee. A mussel survey completed on October 4, 2005, also failed to locate any sensitive species (Yokley, 2005).

### 3.12.2. Environmental Consequences

**No Action Alternative**
*Terrestrial Animals*

No threatened or endangered terrestrial animals were encountered during field surveys in 2005. The No Action Alternative would cause no impacts to threatened and endangered species.

*Plants*

No project-related impacts to rare species would result from the adoption of the No Action Alternative.

*Aquatic Animals*

No threatened or endangered aquatic animals were encountered during field surveys in 2005. The No Action Alternative would cause no impacts to threatened and endangered species.

**Action Alternative**
*Terrestrial Animals*

No threatened or endangered terrestrial animals were encountered during field surveys in 2005. Suitable habitat for eastern hellbenders, Tennessee cave salamanders, and Bachman's sparrows is not present in the project sites. The Action Alternative would not have an adverse impact on these species.

Suitable habitat for four-toed salamanders exists within forested wetlands on the project site. Impacts to these areas should be avoided, but if they are impacted, then appropriate wetland mitigation would be adopted.

Eastern slender glass lizard and southeastern shrew habitat exists on the project site. Because habitat for both species is abundant in Roane County, any impacts to these species would be localized and insignificant.

Gray bat maternity caves do not exist on KIF property though gray bats are known to forage over Watts Bar Reservoir. This foraging habitat would not be impacted by the proposed actions. The Action Alternative would not result in direct, indirect, or cumulative adverse impacts to this species.

Bald eagles are not known to nest on KIF property. The Action Alternative would not result in significant direct, indirect, or cumulative adverse impacts to this species.

*Plants*

No impacts to federally listed or state-listed plant species are anticipated as a result of the proposed action.

*Aquatic Animals*

The project area drains to the Watts-Bar Reservoir in the Tennessee River Basin. No impacts on sensitive aquatic animal species would likely occur as a result of either the No Action Alternative or proposed action.

## 3.13. Cultural Resources

### 3.13.1. Affected Environment

For at least 12,000 years, the lands along the Clinch and Emory Rivers have been an area for human occupation, which became more intense through succeeding cultural periods. In the East Tennessee area, archaeological investigations have demonstrated that Tennessee and the eastern Ridge and Valley region were the setting for each one of these cultural/temporal traditions, from the Paleo-Indian (10,000-8000 B.C.), the Archaic (8000-1200 B.C.), the Woodland (1200 B.C.-1000 A.D.), the Mississippian (1000-1500 A.D.), to the Protohistoric-Contact Period (1500-1750 A.D.). Prehistoric archaeological stages are based on changing settlement and land-use patterns and artifact styles. Each of these broad periods is generally broken into subperiods (Early, Middle, and Late), which are also based on artifact styles and settlement patterns. Smaller time periods, known as "Phases" are represented by distinctive sets of artifactual remains. In addition, historic era cultural traditions have included the Cherokee (1700 A.D.-present), European- and African-American (1750 A.D.-present) occupations.

The Paleo-Indian Period represents the documented first human occupation of the area. The settlement and land-use pattern of this period was dominated by highly mobile bands of hunters and gatherers. The subsequent Archaic Period represents a continuation of the hunter-gatherer lifestyle. Through time, there is increasing social complexity and the appearance of horticulture late in the period. The settlement pattern during this period is characterized by spring and summer campsites. Increased social complexity, reliance on horticulture and agriculture, and the introduction of ceramic technology characterize the Woodland Period. The increased importance of horticulture is associated with a less mobile lifestyle as suggested by semipermanent structures. The Mississippian Period, the last prehistoric period in East Tennessee, is associated with the pinnacle of social complexity in the southeastern United States. This period is characterized by permanent settlements, maize agriculture, and chiefdom-level societies. The Protohistoric-Contact Period consisted of the effects of European contact in the region. During this period, European contact arose through trade and construction of European settlements along the borders of Native-American territory. European-American settlement increased in the early 19th century as the Cherokee were forced to give up their land. Both Anderson and Roane Counties were established in 1801 (Mielnik, 1998; Hall and Parker, 1998). The counties were characterized by a rural agrarian economy and later industry.

TVA is mandated under the National Historic Preservation Act of 1966 and the Archaeological Resources Protection Act of 1979 to protect significant archaeological resources and historic properties located on TVA lands or affected by TVA undertakings. A historic property is defined, under 36 CFR § 800.16 (l), as “any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places.”

For the undertaking addressed in this EA, the Area of Potential Effect (APE) is the 125-acre tract and 2.6 miles of shoreline for the proposed scrubber site and barge loading facility for KIF in Roane County. The APE, as defined in 36 CFR § 800.16(d), is "the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if such properties exist." An Undertaking is defined, under 36 CFR § 800.16(y), "as a project, activity or program funded in whole or in part under the direct or indirect jurisdiction of a Federal agency, including those carried out by or on behalf of a Federal agency; those carried out with Federal financial assistance; those requiring a Federal permit, license or approval; and those subject to state or local regulation administered pursuant to delegation or approval by a Federal agency."

In 2003, a previous archaeological survey was conducted for part of this area (Wild, 2003). Four previously recorded historic properties were identified during the background research; however, only three of those were relocated. Only one of these sites was considered potentially eligible for listing in the National Register of Historic Places (NRHP) because intact archaeological deposits were identified in the project area.

The archaeological survey for the adjacent 125-acre tract and 2.6 miles of shoreline along Watts Bar Reservoir near the confluence of the Clinch and Emory Rivers was conducted from December 5-8 and 12-14, 2005. Three new archaeological resources (AR 1-3) were identified during the December 2005 survey; none qualified for a Tennessee state site number. No cultural deposits were identified, and no cultural material was identified on the shoreline.

### 3.13.2. Environmental Consequences

**No Action Alternative**
Under the No Action Alternative there would be no ground disturbing activities and no potential for historic properties to be affected.

**Action Alternative**
Thomas, 2005, identified only one potentially eligible site within the project area. This site would be avoided by construction activities or the location would be subject to a Phase 2 site evaluation prior to any ground disturbance. The State Historic Preservation Officer has concurred with TVA's determination that no historic properties eligible or potentially eligible for listing in the NRHP would be affected and that the one potentially eligible site should be avoided (see Appendix A). If the site cannot be avoided then further archaeological test excavations should be carried out to determine the NRHP eligibility of the site.

## 3.14. Socioeconomics

### 3.14.1. Affected Environment

Roane County (the location of KIF) has a total population estimated to be about 53,000 (Table 3-14). The primary labor market area for the plant includes several additional surrounding counties, including most of the Knoxville metropolitan area as well as several other counties. This area has an estimated population of almost 886,000, with a per capita personal income of $27,283 as of 2003, almost 87 percent of the national average. Total employment in the area was almost 516,000 in 2003 (Table 3-21). The

industrial structure of the area is similar to that of the state and the nation, although construction employment in 2003 was a slightly larger share of the total than in the state or the nation, with almost 35,000 workers employed in construction.

**Table 3-21. Population and Income**

| Location | Population Estimate, 2004 | Percent Increase, Population, 1990-2004 | Per Capita Personal Income, 2003 | Per Capita Personal Income (Percent of U.S.) |
|---|---|---|---|---|
| Anderson County | 72,244 | 5.9 | 27,668 | 87.9 |
| Blount County | 113,744 | 32.3 | 26,253 | 83.4 |
| Cumberland County | 50,084 | 44.2 | 23,191 | 73.7 |
| Knox County | 400,061 | 19.2 | 30,901 | 98.2 |
| Loudon County | 42,237 | 35.1 | 27,515 | 87.4 |
| McMinn County | 50,981 | 20.3 | 21,800 | 69.3 |
| Meigs County | 11,524 | 43.5 | 19,967 | 63.4 |
| Monroe County | 42,070 | 37.7 | 19,668 | 62.5 |
| Morgan County | 20,132 | 16.4 | 17,455 | 55.5 |
| Rhea County | 29,792 | 22.4 | 21,097 | 67.0 |
| Roane County | 52,920 | 12.1 | 25,332 | 80.5 |
| **Total, Primary Labor Market Area** | **885,789** | **22.0** | **27,283** | **86.7** |
| Tennessee | 5,900,962 | 21.0 | 28,641 | 91.0 |
| United States | 293,655,404 | 18.1 | 31,472 | 100.0 |

Source: U.S. Census Bureau; U.S. Bureau of Economic Analysis, Regional Economic Information System

**Table 3-22. Employment, 2003**

| | Total Employment | Farm (%) | Manufacturing (%) | Construction (%) | Government (%) |
|---|---|---|---|---|---|
| Anderson County | 52,839 | 1.1 | 19.3 | 5.8 | 10.0 |
| Blount County | 55,594 | 2.5 | 15.2 | 9.7 | 12.7 |
| Cumberland County | 24,845 | 3.9 | 10.3 | 13.6 | 8.9 |
| Knox County | 277,693 | 0.6 | 6.8 | 5.9 | 13.9 |
| Loudon County | 16,746 | 8.8 | 17.8 | 6.2 | 12.7 |
| McMinn County | 24,594 | 5.8 | 21.6 | 6.2 | 10.7 |
| Meigs County | 5,476 | 7.9 | 14.2 | 12.9 | 9.0 |
| Monroe County | 16,511 | 6.8 | 26.8 | 5.3 | 11.1 |
| Morgan County | 6,212 | 7.1 | 6.5 | 12.3 | 24.7 |
| Rhea County | 14,480 | 3.8 | 33.8 | 5.6 | 16.9 |
| Roane County | 20,981 | 3.3 | 8.8 | 5.0 | 20.8 |
| **Total, Primary Labor Market Area** | **515,971** | **2.1** | **11.8** | **6.7** | **13.3** |
| Tennessee | 3,475,998 | 3.0 | 12.2 | 5.9 | 12.5 |
| United States | 167,174,400 | 1.8 | 9.0 | 5.8 | 14.2 |

% = Percent
Source: U.S. Bureau of Economic Analysis, Regional Economic Information System

### 3.14.2. Environmental Consequences

**No Action Alternative**
Under the No Action Alternative, there would be no impacts since no construction would occur and there would be no changes in operations.

**Action Alternative**
Under the Action Alternative, construction activities would occur over a period of about four years. An additional 200 to 300 people would be employed during construction, with a peak of about 300 over a period of about five months (see Section 2.1.8). Most of the workers likely would already live in commuting range of the plant, and therefore few workers would be expected to move into the area. Some workers might be hired from the Chattanooga area, but they most likely would commute as well, given the temporary nature of the work. The construction employment would be an increase of about 1.4 percent in current employment in Roane County and less than 0.1 percent increase in the primary labor market area.

The jobs and income from construction would be a relatively small, positive impact on the economy of the area and would probably have a small, positive impact on local government revenues. However, since few workers would be likely to move into the area, no noticeable impacts to community services would be expected.

After the completion of construction, permanent plant staffing would be expected to increase by 50 people. This would be a small, positive impact to the local economy and to local government revenues, with no noticeable impacts to community services. Shipment of limestone would require about 60 to 100 truck deliveries per day over either five or six days per week. This would require employment of truck drivers and might have some effect on employment at limestone quarries in the general vicinity of the plant. The result would be a small, positive impact to the economy of the area.

## 3.15. Environmental Justice

### 3.15.1. Affected Environment

According to the 2000 Census of Population, the minority population is a smaller share of the total in Roane County than in the primary labor market area and much lower than the state and national averages (Table 3-16). The plant is located in Tract 307, Block Group 2. Two other Census tracts, 302.02 and 306, are near the plant site. Tract 302.02, Block Group 4, is south and southeast of the site, across the Clinch River. Tract 306, Block Group 1, is also across the Clinch River, southwest of the plant. Minority populations are very small in all of these areas, well below the state and national levels. Poverty rates in these block groups range from 8.6 percent, lower than the county, state, and national levels, to 28.2 percent, well above the county, state, and national levels.

Local truck routes would be in or near Census Tract 306, Block Group 4, which is to the west of Swan Pond Road, as well as Census Tract 306, Block Group 1, and Census Tract 307, Block Group 2. Minority populations in these block groups are generally small compared to the state and the nation, while poverty levels range from below the county level to much higher.

**Table 3-23. Minority and Low Income Population, 2000**

| | Total Population | Nonwhite Population | | Hispanic Population | | Below Poverty Level (%) |
|---|---|---|---|---|---|---|
| | | Number | Percent | Number | Percent | |
| CT 307, BG 2 | 737 | 18 | 2.4 | 0 | 0.0 | 8.6 |
| CT 302.02, BG 4 | 580 | 11 | 1.9 | 0 | 0.0 | 15.3 |
| CT 306, BG 1 | 739 | 32 | 4.3 | 2 | 0.3 | 28.2 |
| CT 306, BG 4 | 819 | 65 | 7.9 | 7 | 0.9 | 14.6 |
| Roane County | 51,910 | 2,470 | 4.8 | 359 | 0.7 | 13.9 |
| Primary Labor Market Area | 844,202 | 68,519 | 8.1 | 10,766 | 1.3 | 12.8 |
| Tennessee | 5,689,283 | 1,125,973 | 19.8 | 123,838 | 2.2 | 13.5 |
| United States (000) | 281,421.9 | 69,961.3 | 24.9 | 35,305.8 | 12.5 | 12.4 |

% = Percent
CT = Census Tract
BG = Block Group
Source: U.S. Census Bureau, U.S. Census of Population, 2000

### 3.15.2. Environmental Consequences

**No Action Alternative**
Under the No Action Alternative, there would be no impacts, since no construction would occur and there would be no changes in operations.

**Action Alternative**
As discussed above, the minority population in the area around the plant site is a very small share of the total. The poverty level is lower than the county, state, and national averages in the block group in which the plant is located (Census Tract 307, Block Group 2). However, it is higher in the area southwest of the plant, across the Clinch River (Census Tract 306, Block Group 1). In the other potentially impacted areas (Census Tract 302.02, Block Group 4, and Census Tract 306, Block Group 4), the rate is slightly higher than the county rate.

Construction would occur on the current plant site, within an area that has been heavily disturbed by previous plant developmental activities. There would be some traffic increase in the area due to the construction workers and to occasional movement of construction equipment and materials. Workers likely would approach the plant from several directions and would constitute a small addition to current traffic flows. Equipment and material movements would be occasional and likely would be confined to I-40 except for the distance from the Midtown exit east on US 70 and north on Swan Pond Road to the plant entrance. This route from I-40 to the plant has only a small number of residences and has a relatively low traffic flow. Therefore, neither construction nor the associated truck movements would be expected to have disproportionate impacts to disadvantaged populations.

During operation, about 95 round trips per day, nonholiday weekdays, would be required to supply limestone to the plant. These trucks likely would exit I-40 at Midtown, proceed south to US 70, then east to Swan Pond, and then north to the plant. When feasible, trucks would use the existing entrance at the south end of the plant, immediately north of I-40. However, a new entrance is planned slightly farther north on Swan Pond, to be

used when unloading of coal trains blocks the existing roadway (see Section 3.3). Impacts of these trucks would be felt by the few scattered residents along this route and by workers and customers of the few businesses located there. Residents in the larger area to the south and southwest of this route likely would be affected occasionally because they would normally use some part of this route for access to work, shopping, and other purposes. However, given the sparse population along the truck route and the dispersed nature of the impacts, no disproportionate impacts to disadvantaged populations would be expected.

## 3.16. Prime Farmland

### 3.16.1. Affected Environment

Prime farmland soils, as defined by the U.S. Department of Agriculture, are those soils that have the best combination of physical and chemical properties for production of agricultural crops. The concern that continued conversion of prime farmland to nonagricultural use would deplete the nation's resource of productive farmland prompted creation of the 1981 Federal Farmland Protection Policy Act. The act set guidelines that require that all federal agencies evaluate land prior to permanently converting to nonagricultural land use. Before an action is taken, completion of *Form AD 1006*, "Farmland Conversion Impact Rating," is required with assistance from the Natural Resource Conservation Service (NRCS).

Most of the soils that would be impacted by the proposed action are not considered prime farmland. The soil types are on land that is hilly or sloped and subject to erosion. The type soil that covers the largest portion being impacted is Waynesboro very fine sandy loam, slope phase (Table 3-24). A total area of about 86 acres of this soil would be impacted. The Waynesboro phase is alluvial soil derived from sandstone and shale. The slope phase differs from the typical soil in that it is more sloped and, consequently, has lost much or all of the surface soil to erosion. Dewey silty clay loam, hilly phase makes up the next largest soil type being impacted. The Dewey series is residuum from the weathering of limestone. The hilly phase like the slope phase of the Waynesboro phase is more hilly and eroded than the typical Dewey silty clay loam. In the borrow area, 6.9 acres of Fullerton cherty silt loam, eroded hilly phase would be impacted. This soil is heavily eroded residuum derived from moderately cherty dolomitic limestone.

Soils characterized as being prime farmland occur on about 11.6 acres of the area that would be impacted by the proposed action. The soil type most impacted is the Waynesboro very fine sandy loam. This is an alluvial soil derived from sandstone and shale and exists on terraces. The other two soil types, Huntington silt loam (Arrington) and Lindside silt loam, are also alluvial soils but they are derived primarily from limestone and are considered bottomland soils. The areas considered prime farmland have been cultivated and managed by TWRA. Since the proposed action would permanently convert this land to nonagricultural use, a *Form AD 1006*, "Farmland Conversion Impact Rating," was completed with assistance from the NRCS. The Farmland Conversion Impact Rating uses several criteria to assess the relative detrimental impact from the loss of prime farmland. A total score of 160 or more out of a possible maximum of 260 indicates that the prime farmland is valuable enough to merit protection under the Federal Farmland Protection Policy Act, i.e., requiring justification for the farmland conversion or consideration of alternative locations.

Clarence Conner, resource soil scientist, completed the NRCS's section of the Farmland Conversion Impact Rating. He assigned a rating of 100, the maximum relative value, for the prime farmland soils in the project area. Because the affected land is in close proximity to the power plant, the site assessment score is 29 for a total impact rating of 129. Even though the relative value of the farmland is 100 percent, the total score falls significantly below the level, which suggests consideration of other locations.

**Table 3-24. Soils in the Areas Proposed for Gypsum Disposal Operations at Kingston Fossil Plant**

| Soil Descriptions | Soil Symbol | Gypsum Pond Phase 1&2 | Borrow Area | Dewatering Area | Pond |
|---|---|---|---|---|---|
| **Prime Farmland Soils** | | **Acres** | | | |
| Huntington silt loam (Arrington) | Hl | | | 0.3 | |
| Lindside silt loam | Li | 2.1 | | | |
| Waynesboro very fine sandy loam | Wv | 0.5 | | 6.7 | 2.0 |
| **Prime Farmland Acreage** | | **2.6** | | **7.0** | **2.0** |
| **Other Soils** | | | | | |
| Dewey silty clay loam, hilly phase | Dsl | 7.5 | 13.5 | | |
| Fullerton cherty silt loam, eroded hilly phase | Fct | | 6.9 | | |
| Waynesboro very fine sandy loam, slope phase | Wvx | 85.9 | 12.9 | 1.4 | 4.0 |
| Disturbed area | | | | 2.0 | 1.2 |
| **Total Acres in Proposed Area** | | **96.0** | **33.3** | **10.4** | **7.2** |

Source: USDA, 1942

### 3.16.2. Environmental Consequences

**No Action Alternative**
The prime farmland would continue to be available to TWRA to grow crops for wildlife. There would be no impacts to prime farmland.

**Action Alternative**
Since the land being impacted by the proposed action is already part of a large industrial site and no longer associated with a farming enterprise engaged in production agriculture, the Farmland Conversion Impact Rating was well below the critical score of 160. Consequently, the total rating of the prime farmland being converted by the proposed action is not high enough to warrant the consideration of alternative locations.

# CHAPTER 4

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# CHAPTER 5

## 5. LIST OF PREPARERS

### 5.1. NEPA Project Management

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Position: NEPA Specialist & Project Manager
Involvement: NEPA Compliance, Document Preparation

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Position: NEPA Team Leader
Involvement: NEPA Compliance and Document Review

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Involvement: Noise

# CHAPTER 6

## 6. LIST OF AGENCIES AND PERSONS CONSULTED

**Federal Agencies**

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3701 Bell Road
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**State and County Agencies**

Mr. David Owenby
Tennessee Department of Environment
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401 Church Street
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Tennessee Wildlife Resources Agency
P.O. Box 40747
Nashville, TN 37204

The Honorable Ken Yager
Mayor of Roane County
County Courthouse
P.O. Box 643
Kingston, TN 37763

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# APPENDIX A – CORRESPONDENCE

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# United States Department of the Interior

FISH AND WILDLIFE SERVICE
446 Neal Street
Cookeville, TN 38501

March 31, 2006

Mr. Dave Robinson
Tennessee Valley Authority
1101 Market Street, MR 2T
Chattanooga, Tennessee 37402

Re: FWS #2006-EC-0148

Dear Mr. Robinson:

Thank you for your letter and enclosure of March 3, 2006, regarding the Draft Environmental Assessment (EA) for the installation and operation of a flue gas desulfurization system at the Kingston Fossil Plant in Roane County, Tennessee. U.S. Fish and Wildlife Service (Service) personnel have reviewed the information submitted and offer the following comments for consideration.

The draft EA is adequate and would support the conclusion of "not likely to adversely affect" for the federally endangered gray bat (*Myotis grisescens*), with which we concur. In view of this, we believe that the requirements of section 7 of the Endangered Species Act of 1973, as amended, are fulfilled. Obligations under section 7 of the Act must be reconsidered if (1) new information reveals impacts of the proposed action that may affect listed species or critical habitat in a manner not previously considered, (2) the proposed action is subsequently modified to include activities which were not considered during this consultation, or (3) new species are listed or critical habitat designated that might be affected by the proposed action.

Thank you for the opportunity to comment on this action. If you have any questions, please contact Steve Alexander of my staff at 931/528-6481 (ext. 210) or via e-mail at *steven_alexander@fws.gov*.

Sincerely,

Lee A. Barclay, Ph.D.
Field Supervisor

**TENNESSEE HISTORICAL COMMISSION**
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
2941 LEBANON ROAD
NASHVILLE, TN 37243-0442
(615) 532-1550

January 25, 2006

Mr. J. Bennett Graham
Tennessee Valley Authority
400 W. Summit Hill Drive
WT 11D - Cultural Resources
Knoxville, Tennessee 37902

RE: TVA, ARCHAEOLOGICAL ASSESSMENT, BULL RUN & KINGSTON STEAM PLANTS, KINGSTON, ROANE COUNTY, TN

Dear Mr. Graham:

At your request, our office has reviewed the above-referenced archaeological survey report in accordance with regulations codified at 36 CFR 800 (Federal Register, December 12, 2000, 77698-77739). Based on the information provided, we concur that the project area contains no archaeological resources eligible for listing in the National Register of Historic Places.

If project plans are changed or archaeological remains are discovered during construction, please contact this office to determine what further action, if any, will be necessary to comply with Section 106 of the National Historic Preservation Act.

Your cooperation is appreciated.

Sincerely,

Herbert L. Harper
Executive Director and
Deputy State Historic
Preservation Officer

HLH/jmb

U.S. Department of Agriculture

# FARMLAND CONVERSION IMPACT RATING

| | |
|---|---|
| **PART I** *(To be completed by Federal Agency)* | Date Of Land Evaluation Request 2/17/06 |
| Name Of Project Kingston Scrubber Project | Federal Agency Involved Tennessee Valley Authority |
| Proposed Land Use Scrubber Operations | County And State Roane County, Tennessee |
| **PART II** *(To be completed by NRCS)* | Date Request Received By NRCS 2-21-06 |

Does the site contain prime, unique, statewide or local important farmland? *(If no, the FPPA does not apply – do not complete additional parts of this form).* Yes ☒ No ☐ | Acres Irrigated 0 | Average Farm Size 99

| Major Crop(s) | Farmable Land In Govt. Jurisdiction | Amount Of Farmland As Defined in FPPA |
|---|---|---|
| Corn | Acres: 109376 % | Acres: 34752 % 32 |
| Name Of Land Evaluation System Used: Roane County Land Evaluation | Name Of Local Site Assessment System: None | Date Land Evaluation Returned By NRCS: 2-27-06 |

| **PART III** *(To be completed by Federal Agency)* | Alternative Site Rating | | | |
|---|---|---|---|---|
| | Site A | Site B | Site C | Site D |
| A. Total Acres To Be Converted Directly | 96.0 | 10.4 | 7.2 | |
| B. Total Acres To Be Converted Indirectly | | | | |
| C. Total Acres In Site | 96.0 | 10.4 | 7.2 | |
| **PART IV** *(To be completed by NRCS)* Land Evaluation Information | | | | |
| A. Total Acres Prime And Unique Farmland | 2.6 | 7.0 | 2.0 | |
| B. Total Acres Statewide And Local Important Farmland | 0 | 0 | 0 | |
| C. Percentage Of Farmland In County Or Local Govt. Unit To Be Converted | .007 | .020 | .005 | |
| D. Percentage Of Farmland In Govt. Jurisdiction With Same Or Higher Relative Value | 9.8 | 9.8 | 9.8 | |
| **PART V** *(To be completed by NRCS)* Land Evaluation Criterion Relative Value Of Farmland To Be Converted *(Scale of 0 to 100 Points)* | 0 100 | 0 100 | 0 100 | 0 |

| **PART VI** *(To be completed by Federal Agency)* Site Assessment Criteria *(These criteria are explained in 7 CFR 658.5(b)* | Maximum Points | | | | |
|---|---|---|---|---|---|
| 1. Area In Nonurban Use | 15 | 8 | 8 | 8 | |
| 2. Perimeter In Nonurban Use | 10 | 8 | 8 | 8 | |
| 3. Percent Of Site Being Farmed | 20 | 0 | 0 | 0 | |
| 4. Protection Provided By State And Local Government | 20 | 0 | 0 | 0 | |
| 5. Distance From Urban Builtup Area | 15 | 5 | 5 | 5 | |
| 6. Distance To Urban Support Services | 15 | 0 | 0 | 0 | |
| 7. Size Of Present Farm Unit Compared To Average | 10 | 5 | 5 | 5 | |
| 8. Creation Of Nonfarmable Farmland | 10 | 0 | 0 | 0 | |
| 9. Availability Of Farm Support Services | 5 | 3 | 3 | 3 | |
| 10. On-Farm Investments | 20 | 0 | 0 | 0 | |
| 11. Effects Of Conversion On Farm Support Services | 10 | 0 | 0 | 0 | |
| 12. Compatibility With Existing Agricultural Use | 10 | 0 | 0 | 0 | |
| TOTAL SITE ASSESSMENT POINTS | 160 | 0 29 | 0 29 | 0 29 | 0 |
| **PART VII** *(To be completed by Federal Agency)* | | | | | |
| Relative Value Of Farmland *(From Part V)* | 100 | 0 100 | 0 100 | 0 100 | 0 |
| Total Site Assessment *(From Part VI above or a local site assessment)* | 160 | 0 29 | 0 29 | 0 29 | 0 |
| TOTAL POINTS *(Total of above 2 lines)* | 260 | 129 | 129 | 129 | |

Site Selected: | Date Of Selection | Was A Local Site Assessment Used? Yes ☐ No ☐

Reason For Selection:

*(See Instructions on reverse side)*

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Form AD-1006 (10-83)